ESTTA Tracking number: **ESTTA245154**

Filing date: **10/27/2008**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE TRADEMARK TRIAL AND APPEAL BOARD

Proceeding	91173105
Party	Plaintiff Honda Motor Co., Ltd.
Correspondence Address	Mark G. Matuschak Wilmer Cutler Pickering Hale and Dorr LLP 60 State Street Boston, MA 02109 UNITED STATES mark.matuschak@wilmerhale.com, cora.han@wilmerhale.com
Submission	Testimony For Plaintiff
Filer's Name	Dyan Finguerra-DuCharme
Filer's e-mail	dyan.finguerra@wilmerhale.com
Signature	/Dyan Finguerra-DuCharme/
Date	10/27/2008
Attachments	Filing of testimony.pdf (3 pages)(79527 bytes) Mangham transcript.pdf (71 pages)(6703399 bytes) Mangham exhibits 1-20.pdf (60 pages)(6473601 bytes) Mangham ex 21 000001-000099.pdf (99 pages)(12113553 bytes) Mangham ex 21 000100-000160.pdf (61 pages)(6670574 bytes) Mangham ex 21 00161-000273.pdf (113 pages)(13556135 bytes) Mangham ex 21 000246-0000346.pdf (73 pages)(9126718 bytes) Mangham ex 22 00585-00649.pdf (65 pages)(7195319 bytes) Mangham ex 22 00650-00709.pdf (60 pages)(6652202 bytes) Mangham ex 22 00802-00907.pdf (106 pages)(11653196 bytes) Mangham ex 23 000347-000440.pdf (94 pages)(9821675 bytes) Mangham ex 23 00441-000542.pdf (102 pages)(11012897 bytes)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE TRADEMARK TRIAL AND APPEAL BOARD

In the Matter of Application Serial No. 78/339,571
Published: May 30, 2006 at TM 674
Mark: DEALERDASHBOARD

HONDA MOTOR CO., LTD.,	)	Opposition No. 91/173,105
	)	
Opposer,	)	
	)	
v.	)	
	)	
MICHAEL DALTON,	)	
	)	
Applicant	)	
	)	

NOTICE OF FILING OF TESTIMONY

Opposer Honda Motor Co., Ltd. hereby files the transcript of Cyndee Mangham taken on September 16, 2008, along with Exhibits 1 through 24, pursuant to 37 C.F.R. § 2.125. Further to 37 C.F.R. § 2.123, this transcript has been certified by the officer taking the deposition and the exhibits have been properly prepared.

Dated: New York, New York
October 27, 2008

Respectfully submitted,

WILMER CUTLER PICKERING
HALE and DORR LLP

By: _____
Dyan Finguerra-DuCharme
399 Park Avenue
New York, NY 10022
(212) 937-7203

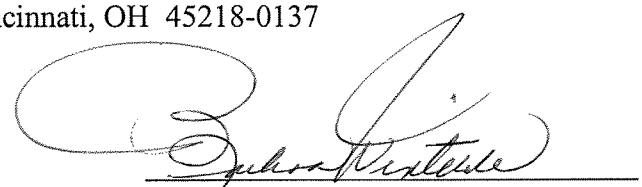
Mark G. Matuschak
60 State Street
Boston, Massachusetts 02109
(617) 526-6000

Attorneys for Opposer
Honda Motor Co., Ltd.

Certificate of Service

I hereby certify that a true and complete copy of the foregoing Opposer's Notice of Filing of Testimony has been served by FedEx to:

Michael Dalton
Box 18137
670 Northland Blvd.
Cincinnati, OH 45218-0137



Barbara Winterble

CERTIFIED TRANSCRIPT

UNITED STATES PATENT AND TRADEMARK OFFICE

HONDA MOTOR CO., LTD.,	)	
	)	
Opposer,	)	
	)	
vs.	)	OPPOSITION NO.
	)	91173105
MICHAEL DALTON,	)	
	)	
Applicant.	)	
	)	

Trial Testimony of CYNTHIA MANGHAM, at 3635 Fashion Way, Torrance, California, commencing at 10:00 a.m., Tuesday, September 16 ,2008, before Deborah L. Heskett, CSR No. 11797.

PAGES 1 - 60

APPEARANCES OF COUNSEL:

FOR HONDA MOTOR CO., LTD.:

WILMER CUTLER PICKERING HALE AND DORR LLP
BY: DYAN FINGUERRA-DUCHARME, ATTORNEY AT LAW
399 Park Avenue
New York, New York 10022
(212) 937-7203
dyan.finguerra-ducharme@wilmerhale.com

ALSO PRESENT:

LINDA YAMADA

Tuesday, September 16 ,2008, Torrance, California

10:00 a.m.

-- o0o --

CYNTHIA MANGHAM,

the witness, having been administered an oath in accordance with CCP Section 2094, testified as follows:

EXAMINATION

BY MS. FINGUERRA-DUCHARME:

Q. Good morning. Will you please state your name.

A. Cynthia Mangham.

Q. And are you employed?

A. Yes. At American Honda.

Q. And what is your position?

A. Manager of the interactive network marketing and rollout.

Q. Before we get into what your current job responsibilities are, why don't we start with your background.

A. All right.

Q. Where did you go to college?

A. University of Florida.

Q. And what degree did you earn?

A. Business Administration, marketing. Bachelor

of Science in business administration in marketing specialty.

Q. What did you do after you graduated from the University of Florida?

A. I went to the company called Computer Forms & Systems.

Q. And how long were you at Computer Forms & Systems?

A. Nine months.

Q. And what was your job at Computer Forms & Systems?

A. I was a sales trainee for computer supplies and accessories.

Q. And what did you do after you left Computer Forms & Systems?

A. Went to a company called ECZELL.

Q. And what did you do at ECZELL?

A. I started as a sales trainee, and then I was in purchasing and product development.

Q. Okay. And how long did you work at ECZELL?

A. Approximately two years.

Q. And what did you do when you left ECZELL?

A. Went to a company called Contel.

Q. And what was your position at Contel?

A. I started in market research, and then I was a

marketing administrator.

Q. And how long were you there for?

A. About four years.

Q. And what did you do when you left Contel?

A. Went to power equipment at American Honda.

Q. And what position did you hold initially at Honda?

A. Assistant manager of market research.

Q. And what were your responsibilities as the assistant manager?

A. Conducting primary and secondary market research on power equipment consumers and with our dealers, power equipment dealers.

Q. And when you say conducting primary research on power equipment, what does that involve?

A. Primary research is research that is developed by us or by a company that was hired by us as opposed to a company going out and researching multiple people or customers for a number of companies.

Q. And would that latter definition be secondary market research?

A. Yes.

Q. And how long did you hold the position of assistant manager of marketing?

A. About two years, year and a half. About year

and a half, actually.

Q. And what happened after that?

A. I went to the service division, automotive service division, as a marketing administrator.

Q. And what did that entail?

A. I was responsible for our customer satisfaction surveys.

Q. And how long were you in that position for?

A. About two years.

Q. And what position did you move to after that?

A. I went to the parts division and was originally marketing administrator for research and then assistant manager of marketing research.

Q. Okay. And when did you move into the position you are currently in?

A. In 2000, I started working in E-Business division in the role of -- working with the interactive network.

Q. What is the E-Business division?

A. E-Business division is a short-lived division that started in 2000, and it existed for about four years at American Honda. And it consisted of technical and nontechnical staff working on E-Commerce projects. And it was split into two areas within the group, and that was business to dealer and business to consumer.

And I was on the business-to-dealer side.

Q. Okay. And what about today?

A. I am still working on the interactive network.

Q. Okay. And are you on both sides, or are you just business to dealer?

A. E-Business no longer exists, and we are actually in separate divisions. So as of right now, we are in the automotive sales division, even though we support all the different dealerships. And the B-to-C side is in the automotive operations division.

Q. Okay.

A. So they are completely separated.

Q. And what exactly are your responsibilities now?

A. My interactive network is our dealer communication system. And our group is responsible for working with the dealers and working with other business units to help our IT group develop applications that enhance the interactive network so it's a better product for them.

Q. Okay. And how familiar are you with the automotive industry?

A. I'm very familiar.

Q. Okay. In total, how long have you been working in the automotive industry?

A. It's about 17 years.

Q. Okay. And how much of your time is dedicated to working with car dealers?

A. Probably 85 percent of the time.

Q. Okay. I'm going to move now into talking a bit about the way terms are used in the automotive industry --

A. Okay.

Q. -- or in the business world in general. So the first term I want to talk about is dealer.

A. Okay.

Q. Are you familiar with the term dealer?

A. Yes.

Q. And how are you familiar with the term dealer?

A. As it relates to the automotive business, I'm familiar with it from working with dealers and having to do research about dealers and with dealers.

Q. And what does the term dealer mean?

A. Dealer is basically, the middleman between us and the consumers. They are the ones who purchase our product and sell it to consumers.

Q. Okay.

A. And the dealer is the owner of the business.

Q. And what term is used to describe the dealer's business?

A. Dealership.

Q. Do you know -- strike that.

What do you base your definition of dealer upon?

A. Well, if you look it up on the Internet or if you look in the dictionary or just knowledge, kind of has a file of all of our dealers, and the data element for the person who owns a dealer is called dealer.

Q. How does -- strike that.

Do you know whether the definition of the term dealer is acceptable in the industry?

A. Yes. It's widely known.

Q. And how does Honda use the term dealer?

A. As the person who owns the dealership.

Q. And throughout your tenure at Honda, have you ever become aware of other companies in the United States using the term dealer to describe their services?

A. Yes.

Q. Can you provide me with some examples?

A. Well, in most companies, there's electronics dealers or -- people who sell office supplies are considered dealers or any -- any business where you're purchasing a product and selling it without modifying it is usually considered a dealer. The person who owns it is the dealer.

Q. Now, I want to talk about another term, dashboard.

A. Okay.

Q. Other than as a console in a car, what other types of dashboards are you familiar with?

A. Dashboard is -- it's a definition for a user interface, for a product that provides a snapshot of key indicators, usually for executive level people at -- within a business.

Q. And when did interactive dashboards become popular?

A. Interactive dashboards probably -- well, around the -- when the Internet became more prevalent, it became more viable. It became viable to have dashboards as we know them now.

Q. Does the term dashboard describe the functions and features of these interactive products?

A. Could you repeat that?

Q. Does the term dashboard describe the functions and features of these interactive products?

A. Yes.

Q. How so?

A. Basically, a dashboard, just like a dashboard on a car, is just a quick snapshot of what you need to know, in the case of a business dashboard, to run your

business, like in a car, you need to see the dashboard in order to operate the car properly.

Q. What types of information is generally found on a dashboard?

A. It's usually key operating indicators and real-time information data that can be updated frequently. If it's something that's only updated monthly, it probably wouldn't -- or yearly, it wouldn't be on the dashboard.

Q. When you say "key operating indicators," what do you mean by that?

A. Indicators that somebody in the -- usually in the management, definitely -- or usually in the executive, definitely in a management position, needs to run their business or to help them better run their business.

Q. Can you give me some examples of what a key operating indicator would be?

A. In our case, number of vehicles they are selling, their inventory, their turn on the inventory, their customer satisfaction ratings, the percent complete of training.

Q. And when you said before "real-time information," what do you mean by real-time information data?

A. It's information that is updated almost immediately from the time it's available. For example, for retail delivery registrations, dealership personnel would input the information into their interactive network, and within 10, 15 minutes, they would see that information show up on the report, that they had sold that car, vehicle.

Q. Now, are there other terms that describe this kind of a product?

A. A dashboard?

Q. Right.

A. Reports, summary reports. I usually hear it referred to as dashboard or digital dashboard.

Q. Is there a general understanding of the term dashboard for use in business?

A. Yes.

Q. And is the term dashboard unique to the automotive industry?

A. No, it's not.

Q. All right. Before, you had mentioned that you were in charge -- or you are responsible for parts of Honda's interactive network system.

A. Uh-huh.

Q. Can you talk a little bit more about what that means and how it works?

A. What the interactive network is?

Q. Uh-huh.

A. Interactive network is our dealer communication system. So all automotive dealers -- automotive companies, excuse me, have a dealer communication system, or it's referred to as DCS in the industry. And it's a way for dealers and manufacturers to communicate with each other, including us providing information to the dealerships, such as we do in the dashboard or dealers providing us information as to the number of cars they've sold, what kind of parts they want to order, or -- just a wealth of information that goes back and forth.

Q. And communicating with your dealers is the primary mechanism now that you use a dashboard?

A. Yes. Yes.

Q. And you mentioned too that the dealers, they can communicate with each other?

A. Correct.

Q. They do that through the dashboard?

A. Yeah. There are some applications on the interactive network, such as bulletin boards, where they can post, and dealers can respond to those posts. Or there's something called a parts locater or a vehicle locater, and that's where dealership personnel is

looking for a specific part or a car that they -- if they have a customer, let's say, who needs a car or a part for their vehicle, they can find out where those vehicles or parts are located. And they can either e-mail that person; they can call the person.

If it's something called a critical part or a part that's an obsolescent part that -- for example, a part that hasn't been around for 30 years for a car that's -- or 30 years old or 20 years old and it's a part that Honda doesn't sell, they can post a message. And the next day, all the dealerships will receive a message saying such and such dealer needs X part and to let them know to contact that dealership if they have it.

Q. And that message gets posted on the dashboard?

A. No. It gets posted on the interactive network.

Q. So how is the interactive network different from the dashboard?

A. The dashboard is one of the applications that resides on the interactive network. So you can go -- when you log in to the interactive network, depending on your job role, if you're a dealer, the first thing you see is the dashboard. And from there, you can go to any other application on IN.

Q. I see.

So the dashboard is a portal through which you can get to other areas on IN?

A. No. IN is the portal; the dashboard is one of the tools or applications on IN.

Q. Okay. But the first thing that the dealer sees when they log in to the system is their own personal dashboard?

A. Right. Most of the IN users would see the home page, which is messages -- the messages that they receive and few links to different applications. If you are a dealer, the first page that you would see is the dashboard.

Q. Did there come a time when Honda used the term dealer dashboard in connection with its interactive network system for dealers?

A. No.

Q. Did there come a time when Honda used the term dealer dashboard in connection with its dealers at all?

A. Well, the dealer dashboard is a tool for the dealers, and it resides on the interactive network.

MS. FINGUERRA-DUCHARME: All right. Let's go off the record for a second.

(Recess taken.)

BY MS. FINGUERRA-DUCHARME:

Q. Did there come a time when Honda used the term

dealer dashboard to describe an application?

A. Yes.

Q. What did it use it in -- what service or product did it use the term dealer dashboard in connection with?

A. Our dealer dashboard that we offer to dealer principals.

Q. Okay. And what did it consist of?

A. Key operating indicators and information about that dealership to help them perform better.

Q. How did it come about that Honda developed a dashboard for dealers?

A. Our dealers requested information on E-Business products, like our Owner Link, which is a consumer product for new -- actually for existing car owners of Honda products. And there are a variety of reports in different areas, and they were mentioning that they didn't have access to those reports, and it would be nice to have a place where they had a summary of all the information.

So we started investigating the dashboard and just -- a dashboard-type product, and we decided to add other key operating indicators on there other than E-Business so they would actually be interested in looking at all the information.

Q. What are the key indicators that you add?

A. The retail delivery, sales inventory information, customer satisfaction information.

Q. And when did Honda first begin using the term dealer dashboard?

A. In 2004.

Q. And you may have already answered this, but what was the purpose of Honda's dealer dashboard?

A. To provide a summary of information to the dealer principal.

Q. What made Honda choose the term dealer dashboard to describe its product?

A. Prior to our group existing, the technical group was responsible for naming the applications on IN. And they had a tendency to come up with clever marketing types of names, and it was difficult for dealerships to find applications. And based -- that was based on research. We went out and asked dealers about their opinion on the interactive network.

And based on that, my group was directed by me -- and in this case, this was my product -- to name applications as -- for what they are as opposed to coming up with marketing terms, since this is really a utility site. It's not something we are trying to sell the dealers.

Q. And when you say that it was -- in this case, you wanted to come up with a name for an application as for what they are as opposed to a marketing term, what do you mean by that?

A. So in this case, it's a dashboard. And it's a dashboard for dealers, so it's called dealer dashboard. And we knew in the future that we might have a dashboard for, for example, sales managers. So it would be called sales manager dashboard or service manager dashboard. And basically, the dealer is the audience and dashboard is what it is.

Q. Who did you work with to develop the dealer dashboard?

A. Our interactive network development team and also the dealers' advisory board and other managers at American Honda.

Q. What does Honda's dealer dashboard look like?

A. Now it has four tabs. At the time when it was first developed, there were three tabs by department in the dealership. So there's a sales, service, and parts.

And on there, it's a series of numbers or snapshots of reports. And on each of the reports, the title -- some of the titles are underlined. If it's underlined, then that means it's a link, which is standard for the Internet industry: If it's underlined,

it's usually a link. And by "link," I mean they can click on it, and it takes them somewhere. It either takes them to an application that elaborates on the report, or it takes them to a report with a lot more detail.

So on the dashboard, it's a summary of all those various reports and applications.

Q. And who has access to Honda's dealer dashboard?

A. Any user at a dealership that is given access. Dealer principals are automatically given access to the application. Other than that, the dealer has to assign it to the person.

Q. And who is the primary audience for Honda's dealer dashboard?

A. Dealer principals.

MS. FINGUERRA-DUCHARME: Let's take a short recess again.

(Recess taken.)

BY MS. FINGUERRA-DUCHARME:

Q. When a dealer opens up the application for the dashboard, what do they see on their screen?

A. They see a title that says dashboard, and there are three tabs. And it also automatically opens up to the sales tab. So they will see the various snapshot figures or reports on the page for the sales area.

Q. All right. Now, we are going to talk a bit about other people who use the term dealer dashboard or dashboard.

A. Okay.

(Deposition Exhibit 1 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. I have just handed you a document that has been marked Exhibit 1.

A. Yes.

Q. And it consists of Bates numbers H-001142 through 001143.

A. Okay.

Q. And are you familiar with this document?

A. Yes.

Q. Actually, let's just back up for a second.

Can you tell me what research you've done concerning the third-party use of the term dealer dashboard?

A. I ran several searches on Google on dealer dashboard -- on Google, Yahoo!, and AOL -- and I also have read a number of books.

Q. Okay. Can you walk me through the steps that you took when you conducted your Internet research?

A. Yes. I pulled up the search engine, like in

this case, Google or AOL or Yahoo!, and I typed in the word "dealer dashboard." And from there, I got over 9 million hits.

And then I went through the different selections and clicked on most of them, other than the ones that were related directly to a vehicle dashboard, and read the article and went to different links -- or read the site, not the article -- to review the site and went to different links attached to that -- tied to that site and reviewed them.

Q. So now, if you can take a look at Exhibit 1 that I handed you.

A. Okay.

Q. What is Exhibit 1?

A. It is for a product called CORDA CenterView. It's a dashboard software.

Q. And have you seen Exhibit 1 before?

A. Yes.

Q. When did you first come across Exhibit 1?

A. August 3rd, 2008.

Q. Okay. And does Exhibit 1 accurately reflect the Web site that you reviewed when you were doing your Internet research?

A. Yes, it does.

Q. I assume August 3rd is the date you did your

Internet research?

A. Well, it says that. It varies by document.

Q. Okay.

A. I did searches multiple times, but I printed it out the day I did the search.

Q. Okay. If you could look on the first page of Exhibit 1, H-001142.

A. Uh-huh.

Q. You'll see towards the bottom, it says, About a dashboard. Can you read to me how it describes a dashboard?

A. A dashboard is like a dashboard of a car, always supplying the user with all the vital information to manage your performance. The dashboard helps you see where you've been and where your business is going.

Q. Okay. Is this definition of dashboard consistent with your own understanding and use of the term dashboard?

A. Yep. Perfect.

Q. Okay. And is this definition of dashboard in line with the way Honda uses the term in its dashboard product?

A. Yes, it is.

(Deposition Exhibit 2 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. We've just marked Exhibit 2, which consists of H-001149 through H-001151.

What is Exhibit 2?

A. It is a screen shot of a company -- of a site called First Break Consulting.

Q. Have you seen Exhibit 2 before?

A. Yes.

Q. When did you first come across Exhibit 2?

A. During my search on August 3rd, 2008.

Q. Does Exhibit 2 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. Okay. What kind of service does First Break Consulting provide on this Web site printout?

A. It looks like they are a consulting firm that works with dealers on business solutions, including digital dashboards.

Q. And are they offering dashboards to dealers?

A. Yes.

(Deposition Exhibit 3 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Okay. We've just marked as Exhibit 3, a document that's Bates-labeled H-001162 through 001172.

What is Exhibit 3?

A. It is a screen shot of a site that is a -- Dashboard Spy blog is the name of it.

Q. Have you seen Exhibit 3 before?

A. Yes.

Q. When did you first come across Exhibit 3?

A. August -- well, I came across it earlier.

Q. Okay.

A. So I don't know the exact date.

This article or this screen shot I printed August 3rd, but I saw it earlier. Probably in April or May of 2008.

Q. Okay. Because you've done Internet research several times over the spring and the summer?

A. Yes.

Q. Does Exhibit 3 accurately reflect the Web site you reviewed when you did your Internet research?

A. Yes.

Q. If you look on page 7, which is labeled 001168 --

A. Uh-huh.

Q. -- what type of dashboard does the Web site describe?

A. It is an auto dealer sales management dashboard.

Q. Does the term dashboard describe the services that are offered in connection with this software?

A. Yes, it does.

Q. And what audience or group is this company targeting with this product?

A. Automobile dealerships, management at automobile dealerships.

Q. Does the term dealer dashboard describe the product or service that's provided by this company?

A. Yes, it does.

(Deposition Exhibit 4 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Okay. We've handed you Exhibit 4, which is Bates-labeled H-001173 through H-001174.

A. Okay.

Q. What is Exhibit 4?

A. It is a screen shot of a site for Goal Lines Solutions.

Q. And have you seen Exhibit 4 before?

A. Yes, on August 3rd, 2008.

Q. Does Exhibit 4 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What product is advertised on Exhibit 4?

A. It is a product to build dealer dashboards.

Q. Okay. What kind of service does Goal Line Solutions, Inc., provide with its dealer dashboard product?

A. The dashboard product provides key operating information.

Q. It's okay if you read straight from --

A. Okay.

Q. -- the exhibit as well.

A. Okay. So it provides key operating or -- they're called KPI information for advisers and technicians at a dealership in a graphical format.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. What audience or group is this company targeting with its service?

A. Auto dealers.

Q. Does the term dealer dashboard describe the product or service provided by this company?

A. Yes.

(Deposition Exhibit 5 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. We've just handed you Exhibit 5, which consists of Bates numbers H-001208 through H-001210.

What is Exhibit 5?

A. It is a screen shot of an article on a SharePoint site.

Q. And have you seen Exhibit 5 before?

A. Yes, on August 20th, 2008.

Q. Does Exhibit 5 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. Okay. What product is advertised on Exhibit 5?

A. Karastan, which is a manufacturer of rugs.

Q. And what are they describing in this article?

A. A dashboard that is available for Karastan dealers.

Q. What do they call this dashboard? If you look on page H-001209, how do they describe their dashboard?

A. It's a dealer dashboard. It's for -- each dealer can go to the site to gain information. And it says it's just like a car dealer -- a car dashboard delivers critical information to the driver. Each dealer dashboard delivers all the current and important information at a glance.

Q. Does the term dashboard describe its services?

A. Yes.

Q. And what audience or group is Karastan trying to reach with their service?

A. Their dealer.

Q. Does the term dealer dashboard describe the service that Karastan provides to its customers --

A. Yes, it does.

Q. -- or strike that -- that it provides to its dealers?

A. Yes, it does. Those are their customers; their dealers are their customers.

(Deposition Exhibit 6 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. We've just given you Exhibit 6 --

A. Yes.

Q. -- which is Bates-stamped H-001211 through H-001213.

What is Exhibit 6?

A. It is a screen capture of a site about Autogate Pro.

Q. Have you seen Exhibit 6 before?

A. Yes, on August 20th, 2008.

Q. Does Exhibit 6 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What kind of product is advertised on Exhibit 6?

A. A dealer dashboard.

Q. Okay. What kind of services does Autogate provide with its dealer dashboard product?

A. Autogate company -- Autogate provides Internet leads, and this is a dashboard that reports the leads for the dealership.

Q. Does the term dashboard describe its services?

A. Yes.

Q. Okay. And what audience or group is this company targeting with its service?

A. Dealers.

Q. Does the term dealer dashboard describe the product or service provided by this company?

A. Yes, it does.

(Deposition Exhibit 7 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You have just been handed Exhibit 7, which is marked H-001214 through H-001217.

What is Exhibit 7?

A. It is a screen capture of RV Trader online and an article -- a press release that resides on RV Trader online.

Q. Have you seen Exhibit 7 before?

A. Yes, I have, on August 20th, 2008.

Q. Okay. Does Exhibit 7 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. If you turn to page -- it's marked H-001217.

A. Uh-huh.

Q. And you will see in the second paragraph, it's talking about a newsletter.

A. Yes.

Q. What is the name of the newsletter?

A. Dealer Dashboard e-newsletter.

Q. And who is the audience for the newsletter?

A. RV dealers.

Q. And what does the Dealer Dashboard e-newsletter consist of?

A. It offers tips on how to drive more business to the dealership and how to more effectively leverage the RVTraderOnline.com selling tools.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. And what audience or group is the company targeting?

A. Dealers, RV dealers.

Q. Does the term dealer dashboard describe the services provided by this company?

A. Yes, it does.

(Deposition Exhibit 8 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've been handed Exhibit 8, which is marked H-001140 through H-001141.

A. Yes.

Q. What is Exhibit 8?

A. It is a screen shot for Autogate Pro.

Q. This is the same as we looked at before?

A. Yes. Yeah.

Q. Okay.

A. It is.

I probably did it, and I was trying -- it doesn't have a date on it either.

MS. YAMADA: It's the same one without the first page.

THE WITNESS: Yeah. And it's a little --

MS. YAMADA: It's --

THE WITNESS: It's the same information.

MS. FINGUERRA-DUCHARME: Okay.

MS. YAMADA: -- Exhibit 6.

MS. FINGUERRA-DUCHARME: Okay.

THE WITNESS: It is the same as Exhibit 6.

MS. FINGUERRA-DUCHARME: It's just printed in a

nicer format.

THE WITNESS: Or a different part of that site, I think.

BY MS. FINGUERRA-DUCHARME:

Q. So does Exhibit 8 accurately reflect the Web site that you reviewed when you had done your Internet research?

A. Yes, it does.

Q. And what service does this promote, or product?

A. It's a dealer dashboard that provides a real-time snapshot of performance of a business by measuring leads and time and business hours, average response time.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. And what audience or group is the company targeting with its service?

A. Dealers.

Q. And does the term dealer dashboard describe the product or service provided by this company?

A. Yes, it does.

(Deposition Exhibit 9 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Okay. You've just been handed Exhibit 9, which

consists of H-001137 through H-001139.

What is Exhibit 9?

A. It is a screen capture of a AutoTrader.com site, printed on August 3rd, 2008.

Q. Have you seen Exhibit 9 before?

A. Yes.

Q. Does Exhibit 9 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What kind of service is provided or is advertised in Exhibit 9?

A. A dashboard --

Q. And --

A. -- for dealers.

Q. -- does the term dealer dashboard describe the services that are provided?

A. Yes, it does.

Q. And what audience or group is the company targeting with its service?

A. Automotive dealers.

Q. Does the term dealer dashboard describe the services that are provided by this company?

A. Yes, it does.

(Deposition Exhibit 10 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. I'm handing you Exhibit 10, which is stamped H-001134 through H-001136.

A. Yes.

Q. What is Exhibit 10?

A. It is a screen shot of a ZDNet site, and it's about Mazda's dealer analysis dashboard application.

Q. Have you seen Exhibit 10 before?

A. Yes, I have, on August 3rd, 2008.

Q. Does Exhibit 10 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What kind of service is advertised on Exhibit 10?

A. A dealer dashboard application for Mazda dealers.

Q. What kind of service does Mazda provide with its dealer dashboard product?

A. It provides performance data for the field managers at Mazda.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. What audience or group is the company targeting with its service?

A. It's for field managers to use with dealers.

Q. Does the term dealer dashboard describe the service provided by this company?

A. Yes, it does.

(Deposition Exhibit 11 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've just been handed Exhibit 11, which is H-001236 through H-001238.

A. Yep.

Q. What is Exhibit 11?

A. It is a screen capture of a blog from FurnishWEB about a dealer dashboard.

Q. Have you seen Exhibit 11 before?

A. Yes, I have.

Q. Okay. Does Exhibit 11 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What product is described on Exhibit 11?

A. A dealer dashboard.

Q. Okay. And what kind of service is provided with the dealer dashboard described in Exhibit 11?

A. What kind of services?

Q. Or what kind of product?

A. FurnishWEB is a -- looks like it's a software

product that creates dealer dashboards.

Q. And what does the dealer dashboard consist of? Or what is some of the information that could be found on the dealer dashboard that is discussed in Exhibit 11?

A. Sales analysis information, year-to-date sales, top sales, top sellers.

Q. Does the term dashboard describe the services that are provided?

A. Yes, it does.

Q. And what audience or group is this company targeting with this software?

A. Dealers.

Q. And does the term dealer dashboard describe the service that is provided by this company?

A. Yes, it does.

(Deposition Exhibit 12 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've just been handed Exhibit 12, which is Bates-stamped H-001233 through H-001235.

What is Exhibit 12?

A. It is an article about Subaru Australia's dealer dashboard.

Q. Okay. Have you seen Exhibit 12 before?

A. Yes, I have, on August 20th, 2008.

Q. Does Exhibit 12 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. So what product is discussed on Exhibit 12?

A. Subaru's dealer dashboard.

Q. And what is Subaru's dealer dashboard?

A. It's a summary of sales figures, orders, inventory for Subaru dealers.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. And what audience or group is Subaru targeting?

A. Dealers.

Q. Does the term dealer dashboard describe the product or service provided by Subaru?

A. Yes, it does.

(Deposition Exhibit 13 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've just been handed Exhibit 13, which is Bates-stamped H-001231 through H-001232.

What is Exhibit 13?

A. It is a log-on page for McIntosh dealers' dealer dashboard.

Q. Have you seen Exhibit 13 before?

A. Yes, I have.

Q. Does Exhibit 13 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What product is advertised on Exhibit 13?

A. A dealer dashboard.

Q. What service is McIntosh providing with its dealer dashboard?

A. Price list, dealer agreements, images.

Q. Does the term dashboard describe McIntosh's services?

A. Yes.

Q. And what audience or group is McIntosh targeting with its service?

A. Dealers.

Q. Does the term dealer dashboard describe the product or service that's provided by McIntosh?

A. Yes.

(Deposition Exhibit 14 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've been handed Exhibit 14, which consists of H-001228 through H-001230.

A. Yes.

Q. What is Exhibit 14?

A. You realize it's two different things.

Q. Oh.
A. It's Section 3.
Q. It's actually three different things.
A. Yeah.
Q. Okay. Let's just have Exhibit 14 be simply 001228.
A. Okay.
Q. So what is Exhibit 14?
A. It's a log-in page for Denon dealers' dashboard.
Q. Have you seen Exhibit 14 before?
A. Yes, I have.
Q. Does Exhibit 14 accurately reflect the Web site that you reviewed when you did your Internet research?
A. Yes, it does.
Q. What service is reflected on Exhibit 14?
A. A dealer dashboard for Denon dealers.
Q. And what is the Denon dealer dashboard?
A. It is a product that provides you with all kind of product-related items such as download images, sell sheets, and more.
Q. And does the term dashboard describe Denon's services?
A. Yes, it does.
Q. And what audience or group is Denon targeting

with its service?

A. Their dealers.

Q. Does the term dealer dashboard describe the service that's provided by Denon?

A. Yes, it does.

MS. FINGUERRA-DUCHARME: So let's mark H-001229 as Exhibit 15.

(Deposition Exhibit 15 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Okay. What is Exhibit 15?

A. It is a screen capture of Dashboard Online.

Q. Have you seen Exhibit 15 before?

A. Yes, I have.

Q. Does Exhibit 15 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. Okay. What product is advertised on Exhibit 15?

A. Their dashboard product for dealers.

Q. Okay. And what does the dashboard provide dealers with?

A. Web management solutions for auto dealers.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. What audience or group is this company targeting with its service?

A. Dealers.

Q. And does the term dealer dashboard describe the product or service provided by this company?

A. Yes, it does.

(Deposition Exhibit 16 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've been given Exhibit 16, which is H-001230.

What is Exhibit 16?

A. A screen capture of the Marantz dealer dashboard.

Q. Have you seen Exhibit 16 before?

A. Yes, I have.

Q. When did you first come across Exhibit 16?

A. August 20, 2008.

Q. Does Exhibit 16 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What service is reflected on Exhibit 16?

A. A dealer dashboard.

Q. Whose dealer dashboard is reflected on Exhibit 16?

A. Marantz.

Q. And what kind of service is Marantz providing with its dealer dashboard?

A. What kind of service? It's providing a dealer dashboard that has sell sheets, images, identity images.

Q. Does the term dashboard describe this service?

A. Yes.

Q. And what audience or group is the company targeting with its service?

A. Marantz dealers.

Q. Does the term dealer dashboard describe the service that's provided by Marantz?

A. Yes, it does.

(Deposition Exhibit 17 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've just been handed Exhibit 17, which is Bates-stamped H-001226 through 001227.

A. Yes.

Q. What is Exhibit 17?

A. A screen capture of Siebel Dealer dashboard.

Q. Have you seen Exhibit 17 before?

A. Yes.

Q. Does Exhibit 17 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. What product is advertised on Exhibit 17?

A. A dealer dashboard.

Q. What kind of service does Siebel provide with its dealer dashboard product?

A. It's a -- they provide a variety of dashboard for dealer employees, including sales consultant, sales manager, service employees -- service managers.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. And what audience or group is the company targeting with its dashboard?

A. Dealers.

Q. Does the term dealer dashboard describe the product or service provided by this company?

A. Yes, it does.

(Deposition Exhibit 18 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Okay. You've been handed Exhibit 18, which is marked H-001224 through H-001225.

What is Exhibit 18?

A. It is a screen shot capture from Diversified Financial Solution services site.

Q. Have you seen Exhibit 18 before?

A. Yes, I have.

Q. Does Exhibit 18 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. Okay. What service is described on Exhibit 18?

A. Their dealer dashboard.

Q. What is their dealer dashboard?

A. It's a dashboard for their dealers.

Q. Does the term dashboard describe its services?

A. Yes, it does.

Q. And what group is the company targeting with its service?

A. The dealers.

Q. Does the dealer dashboard describe the service provided by Diversified Financial?

A. Yes, it does.

(Deposition Exhibit 19 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You've just been handed Exhibit 19, which consists of H-001218 through H-001223.

What is Exhibit 19?

A. It is a screen capture of Dashboard Spy.

Q. Have you seen Exhibit 19 before?

A. Yes, I have.

Q. Does Exhibit 19 accurately reflect the Web site that you reviewed when you did your Internet research?

A. Yes, it does.

Q. Okay. What product or service is advertised in Exhibit 19?

A. It's an article about an auto dealer's management -- sales management dashboard.

Q. And what does this dashboard provide?

A. Provides real-time financial information about dealers, sales, F&I, fixed ops, accounting, and inventory profit centers.

Q. Does the term dashboard describe the services?

A. Yes, it does.

Q. And what audience or group is the company targeting?

A. Dealers.

Q. Does the term dealer dashboard describe this service provided by this company?

A. Yes, it does.

MS. FINGUERRA-DUCHARME: Do you need to take a break?

THE WITNESS: I'm okay.

MS. YAMADA: I'm going to run to the restroom before you start on these.

MS. FINGUERRA-DUCHARME: Okay. We're off the

record for now.

(Recess taken.)

(Deposition Exhibit 20 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Did there come a time when you have done any research for the use of dashboard on Amazon?

A. Yes, I have.

Q. And what is Amazon?

A. Amazon is a site that sells a variety of products, especially books.

Q. Okay. And is Amazon a site that's open to the general consuming public?

A. Yes, it is.

Q. So the general consuming public can order books from Amazon?

A. Yes.

Q. And what search did you run on Amazon?

A. Books for dashboards.

Q. And you've been handed Exhibit 20, which is Bates-stamped H-001175 through H-001177.

A. Correct.

Q. What is Exhibit 20?

A. It is a screen capture of the books that showed up when there was a search on dashboards.

Q. And so all of the books that are reflected here relate to dashboards?

A. All except for one.

Q. Which one does not?

A. The bottom, Dashboard Confessional. That's a group.

Q. Okay. And other than the Dashboard Confessional, which I think is Item No. 6, the other dashboard -- the other books that are reflected here, the dashboards, are they the same dashboards that we've been discussing today?

A. Yes. Same type of dashboards.

MS. FINGUERRA-DUCHARME: Okay. So let's mark this as an exhibit.

(Deposition Exhibit 21 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. You have just been handed Exhibit 21, which consists of H-00001 through H-000346.

A. Correct.

Q. What is Exhibit 21?

A. It's a copy of the book Excel 2007 Dashboards & Reports for Dummies.

Q. If you could turn to page 11 of Exhibit 21. So it's -- actually, the real book, 11.

A. Oh. Sorry.

Q. Can you review the definition of dashboard?

A. Read it?

Q. Sure.

A. Dashboard is a visual interface that provides at-a-glance views into key measures relevant to a particular objective or business process. They have three main attributes: Typically graphical in nature, often display only data relevant to the goal of the dashboard, and they inherently contain predefined conclusions that relieve the end user from performing his own analysis.

Q. Is this definition of dashboard consistent with your own understanding and use of the term?

A. Yes, it is.

Q. Does this definition of dashboard align with the way Honda uses the term in its dashboard products?

A. Yes, it does.

Q. Is it also consistent with the ways in which we just saw all of those third parties using the term dashboards in the previous exhibits?

A. Yes, it is. Yes, it does.

(Deposition Exhibit 22 marked for identification.)

///

BY MS. FINGUERRA-DUCHARME:

Q. You've just been handed Exhibit 22, which is Bates-stamped H-000585 through H-000907.

A. Correct.

Q. What is Exhibit 22?

A. It is a copy of a book entitled Performance Dashboards.

Q. Do you recall if this book had come up in your Amazon search?

A. Yes, it did.

Q. If you could turn to page 293 of the book. It's almost the end.

A. Okay.

Q. And if you'll see towards the bottom of the page, there's a glossary and the term dashboard is defined.

A. Uh-huh.

Q. Can you read that definition?

A. Dashboard is a visual display mechanism used in an operationally oriented performance management system that measures performance against targets and thresholds using right-time data.

Q. Is this definition of dashboard consistent with your own understanding and use of the term?

A. Yes, it is.

Q. Does this definition of dashboard align with the way Honda uses the term dashboard in its dashboard products?

A. Yes, it does.

Q. And is it consistent with the ways in which the third parties that we had seen in the previous exhibits use the term dashboard?

A. Yes.

(Deposition Exhibit 23 marked for identification.)

BY MS. FINGUERRA-DUCHARME:

Q. Okay. You've just been given Exhibit 23, which consists of H-000347 through H-000584.

What is Exhibit 23?

A. It is a copy of the book Marketing by the Dashboard Light.

Q. And do you recall if Exhibit 23 was reflected in the Amazon search that you had done for dashboard?

A. Yes, it was.

Q. If you could turn to page H-000365.

A. Okay.

Q. And you'll see that in the second paragraph, it describes a marketing dashboard. Will you take a moment to read that definition?

A. Out loud?

Q. Or you can read it to yourself.
A. Okay. All right.
Q. Is this definition of dashboard consistent with your own understanding and use of the term?
A. Yes, it is.
Q. Does this definition of dashboard align with the way Honda uses the term in its dashboard?
A. Yes, it does.
Q. And is this consistent with the way the third parties that we saw in the previous exhibits use the term dashboard?
A. Yes.
(Deposition Exhibit 24 marked for identification.)
BY MS. FINGUERRA-DUCHARME:
Q. You have now been given Exhibit 24, which consists of Bates Nos. H-000908 through H-001133.
A. Okay.
Q. What is Exhibit 24?
A. It is a copy of a book entitled Information Dashboard Design.
Q. Do you recall if this book was reflected on your Amazon search?
A. No.
Q. Do you want to look back on --

A. On this search?

Q. -- that search?

A. Okay. Yes, it was.

Q. Okay. Great.

If you can turn to page H-000952. And if you can read -- you can read it to yourself -- the paragraph underneath What is a Dashboard.

A. All right. All right.

Q. Okay. Is this definition of dashboard consistent with your understanding and use of the term?

A. Yes, it is.

Q. Does this definition of dashboard align with the way Honda uses the term in its dashboard products?

A. Yes.

Q. And is it consistent with the way the third parties have used the term in the exhibits that we had looked at before?

A. Yes, it does.

Q. Okay. And if you'd turn back to -- maybe starting on page H-00929, and flip forward through the pages, can you let me know if these pages accurately reflect your understanding of what a dashboard looks like?

A. 929 through 952?

Q. Yeah.

A. Okay. Okay.

Q. So are those accurate reflections for your understanding of what dashboards may look like?

A. Yes.

MS. FINGUERRA-DUCHARME: Okay. Thank you very much for your time.

(TIME NOTED: 11:42 a.m.)

CERTIFICATE OF DEPONENT

I have read the foregoing transcript of my deposition and except for any corrections or changes noted on the errata sheet, I hereby subscribe to the transcript as an accurate record of the statements made by me.

Cynthia Mangham

CYNTHIA MANGHAM

SUBSCRIBED AND SWORN before and to me this 21 day of October, 2008, by Cynthia Mangham proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

Linda Yamada

NOTARY PUBLIC

My Commission expires:

LINDA YAMADA
Commission # 1616334
Notary Public - California
Los Angeles County
My Comm. Expires Nov 13, 2009

STATE OF CALIFORNIA) ss:
COUNTY OF LOS ANGELES)

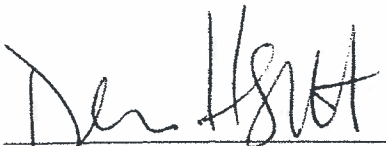
I, DEBORAH L. HESKETT, CSR No. 11797, do hereby certify:

That the foregoing deposition testimony of Cynthia Mangham was taken before me at the time and place therein set forth, at which time the witness was placed under oath and was sworn by me to tell the truth, the whole truth, and nothing but the truth;

That the testimony of the witness and all objections made by counsel at the time of the examination were recorded stenographically by me, and were thereafter transcribed under my direction and supervision, and that the foregoing pages contain a full, true, and accurate record of all proceedings and testimony to the best of my skill and ability.

I further certify that I am neither counsel for any party to said action, nor am I related to any party to said action, nor am I in any way interested in the outcome thereof.

IN WITNESS WHEREOF, I have subscribed my name this 23rd day of September, 2008.



DEBORAH L. HESKETT, CSR No. 11797

I N D E X

TUESDAY, SEPTEMBER 16 ,2008

DEPOSITION EXHIBITS

CYNTHIA MANGHAM

NUMBER	DESCRIPTION	IDENTIFIED
EXHIBIT 1	CenterView Corda Screen Shot	20
EXHIBIT 2	First Break Screen Shot	23
EXHIBIT 3	Dashboards By Example Screen Shot	23
EXHIBIT 4	Goal Lines Solutions Screen Shot	25
EXHIBIT 5	Karastan Mohawk Screen Shot	26
EXHIBIT 6	Autogate Pro Screen Shot	28
EXHIBIT 7	RV Trader Screen Shot	29
EXHIBIT 8	Autogate Pro Screen Shot	31
EXHIBIT 9	Auto Trader Screen Shot	33
EXHIBIT 10	ZDNet Screen Shot	34

DEPOSITION EXHIBITS (CONTINUED)

CYNTHIA MANGHAM

NUMBER	DESCRIPTION	IDENTIFIED
EXHIBIT 11	FurnishWEB Screen Shot	35
EXHIBIT 12	Subaru Australia Drives Dealer Productivity Screen Shot	36
EXHIBIT 13	McIntosh Screen Shot	37
EXHIBIT 14	Denon Screen Shot	39
EXHIBIT 15	Dashboard Development Enterprises eTools Screen Shot	40
EXHIBIT 16	The Marantz Screen Shot	41
EXHIBIT 17	Siebel Dealer Screen Shot	42
EXHIBIT 18	Diversified Financial Services Screen Shot	43
EXHIBIT 19	The Dashboard Spy Screen Shot	44

DEPOSITION EXHIBITS (CONTINUED)

CYNTHIA MANGHAM

NUMBER	DESCRIPTION	IDENTIFIED
EXHIBIT 20	Amazon Screen Shot	46
EXHIBIT 21	Excel 2007 Dashboards & Reports for Dummies	47
EXHIBIT 22	Performance Dashboards	49
EXHIBIT 23	Marketing by the Dashboard Light	50
EXHIBIT 24	Information Dashboard Design	51

WORD INDEX

CenterView

- Overview
- Features & Benefits
- Product Tour
- Technical Overview
- Examples
- Why Choose CenterView?
- Product Brochure (pdf)
- Case Studies/White Papers
- CenterView Updates
- Request Live Demo
- Free Trial

Corda Customers:

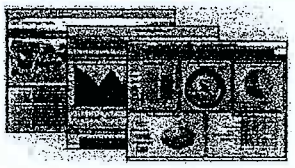
Chevron

Check out some of Corda's Clients

Testimonial

"You can go to the Intranet, pull up your dashboard and see your sales performance in relation to weekly and monthly goals. This instant access to sales data has proven to be a major motivational tool for our sales staff."
-- Barry Moore, Director of E-Commerce
Australia's Tourism Queensland

CENTERVIEW™



Powerful dashboards that deliver greater control of your organization's performance management.

Dashboard

CORDA CenterView an enterprise dashboard solution that allows for rap prototyping, cloning and deployment from any and all databases, busines intelligence, spreadsheet or operational applications throughout an organization.

Learn more about Dashboard Software
Dashboard Examples

A dashboard is an important tool for any C-level executive and other business manager. Whil keeping you on top of vital statistics and KPIs, a dashboard solution like CORDA CenterView helps you visualize and track trends on every level of your business and to align activities wit key goals. With a dashboard solution, your business intelligence is ready and waiting for you. Try a free evaluation download of our dashboard today.

About CORDA and CenterView™

CORDA Technologies Inc. is a leading provider of software products that transform raw data into easy-to-read and easy-to-use graphical formats. CORDA's dashboard solution, CenterView™, creates charts, maps and graphs from business information that help you to organize and understand raw data.

Working on any platform or operating system, CORDA CenterView™ can take data stored in virtually any file format and enterprise system to create highly interactive and understandable graphs and charts. Because it creates a fully customizable dashboard, you can choose which graphs and charts -- as well as business-specific visualizations, such as factory processes, logistics routes, etc. -- are the most important to keep on your office computer always, as wel on your tablet PC, wireless PDA and cell phone.

The infinite drill-down capabilities of our dashboard means you never have to sacrifice information. Click on a bar or point to reveal associated graphs and details of the dashboard. of your business information is at your fingertips with CenterView™ dasboards.

About a Dashboard

A dashboard is like the dashboard of a car, always supplying the user with all the vital information to manage your performance. A dashboard helps you see where you've been an where your business is going.

CORDA CenterView™ is an easy-to-use yet very informative business dashboard solution. Compare CenterView™ to other dashboard products or business intelligence software and th

TURNING DATA INTO DECISIONS

Read More Testimonials

choice is clear. Only CenterView™ offers you all the capabilities you want in the dashboard solution you need.

Visit CORDA today for a free evaluation download of our dashboard and experience the business dashboard solution for your company.

H-001143

IT Solutions

FIRST·BREAK CONSULTING·LTD.

DIGITAL DASHBOARD

President's Message

Our Clients

Contact Us

Solutions Home

Home

Microsoft CERTIFIED Partner

Digital Dashboards

Digital Dashboards use Microsoft Exchange and other Office 2000 products to knit together a real-time system that integrates information from many different sources. The idea is like the dashboard of your car -- at a glance, you can see if things are working or not (engine, transmission, speed, tach, electronics, radiator temperature; etc.) and make quick, yet informed decisions based on what the information tells you.

Digital Dashboard Example

A sales department has a digital dashboard that tells them what products are selling well, how regions are selling relative to one another, key customers and accounts receivable. Using real-time information from the Web, direct connections to operational systems databases inside the company, and other systems, the dashboard presents a concise picture of your business to the people who can make decisions quickly.

A FBC Customer uses their Digital Dashboard to let them know a few pieces of key information clearly, concisely and in real-time:

- how are dealers converting sales from leads passed to them
- what is the relative effectiveness of different advertising campaigns on leads to the call center
- what is the revenue by dealer by day, week, month, quarter and annually

Isn't this an Executive Information System?

Yes and no. In the past Executive Information Systems (EIS) were developed to provide very similar function to Digital Dashboards. The key difference is the information in the Dashboard is real-time, generated by connecting to databases or the web. It is not coded in static pages or assembled by a support person.

As a result, the information in the Dashboard has far wider applicability in business. While a CEO may be able to justify a headcount to gather and sort this type of information, a Sales Manager cannot. That does not mean however, the Sales Manager doesn't need this type of information. It just means it is often hard to get the real data. (Anybody who has tried to get real budget/actual data from a finance department knows what I mean)

Isn't a Digital Dashboard a Data Warehouse?

To a certain degree, but Data Warehouses are the answer to poorly integrated and unfriendly systems. The warehouse integrates these disparate systems together. The best example I can think of is the Telephone Company. They think of you as telephone numbers (home, fax, internet, cell, pager) and each of these numbers is an account. Unfortunately, they cannot think of you as a person. The warehouse lets them do it until their systems become more market-focused.

To a great extent, connecting to

- how many customers are in the queue waiting a callback
- what are their competitors doing – discussion database

Using the Digital Dashboard enables management to deal with the issues in real-time. A dealer's telephone representative is ill -- and no calls are being made back to leads. Previously, they would find this out a week later, when the percentage converted to sales was low and they investigated it. Now they can call the dealer and say: "You have 5 calls in you queue you have not called back ... why?" In this case they can assist the dealer or re-direct the calls to a dealer that can handle the workload.

Similarly, the effectiveness of marketing campaigns can be seen immediately. If a campaign is successful, the marketing group can recognize it immediately and refocus resources to the most successful campaign.

In the past we have performed post-mortems ... today we can provide real-time treatment of business problems.

How does it work?

Office 2000 has features that make the integration of information to Knowledge Workers (MS calls it Knowledge Management or KM) relatively easy. We can connect to SQL Server, Oracle or DB2 databases and extract information as it is requested. The information is placed in a web-page format and displayed in Outlook -- where users look at their mail, their calendar and other relevant business information. The Digital Dashboard can display any web pages, from the WWW or internal webs, as well as the public and private folders of the user. The user easily customizes the the data in real-time will eliminate data warehouses. If this isn't possible, an intermediary, such as a SQL Server database can accumulate the information, and pass it to the Dashboard.

How do I get started?

You can read about Digital Dashboards from Microsoft on their web-site. They have a few demonstration Dashboards you can look at to get a look and feel. Naturally, I would recommend you engage a consultant with the business experience to help you determine what information is worthwhile putting on your Dashboard, and how to access the data at its source.

How can First-Break Consulting help?

We have senior consultants that will help you determine what you need to view on the dashboard and how to connect to your data. We can quickly and inexpensively mockup a few screens to review and refine. Our technical experts can build the web-pages and Exchange folders required. We can also assist in managing the connectivity requirements to databases inside your organization.

For more information and a discussion on how we can help you implement Digital Dashboards in your organization please contact Matt Alexander at matt.alexander@firstbreak.com

dashboard and the flexible reporting features can be used instead of the many printed reports generated by most business systems.

Voice: 604.926.6031 Fax: 604.922.1860

Dashboards By Example Volume I

What's on your Dashboard?

Welcome to the definitive collection of BI Dashboards - where you and your work are the stars. No sales pitches, useless theory or big egos - just real-life dashboard project teams and their dashboards. Dedicated to keeping BI real!

Part of the Da Spy Network

Dashboard: Examples & Best Practices. From Excel Dashboards to Enterprise Business Intelligence, these dashboard implementations contain KPIs, metrics, charts, trends and more.

For more Business Intelligence Dashboard Examples, use this link to the Dashboard Spy sitemap: **Dashboard**

Note: Dashboards By Example readers can get these interesting business intelligence dashboard white papers and I.T. trade magazines at no cost.

Dashboard

From a simple excel dashboard to a fully integrated enterprise reporting suite, the **Business Dashboard** is being quickly adopted as the new face of Business Intelligence. It has a rapidly growing role in BI reporting and analysis.

An enterprise dashboard allows at-a-glance visualization of company health and monitoring of key performance indicators. Simple to understand and high in ROI, these executive dashboards are becoming "must-haves" for all enterprises. Easy-to-use by business users and fun-to-implement by the IT department, BI dashboard projects are quickly funded and politically popular.

Dashboards by Example Sponsors

Business Intelligence Dashboard Vendors to check out:

"Dashboards by Example" is a business intelligence blog dedicated to showing you actual examples of do's and don'ts of dashboard design. Study examples of enterprise dashboards, scorecards and other business intelligence interfaces implemented by the world's top organizations.

Looking for a particular dashboard? Try these listings of BI dashboards (call them what you want):

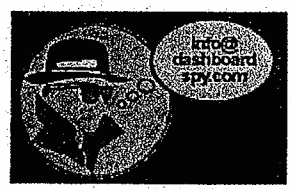
- Dashboards Page 1
- Dashboards Page 2
- Dashboard Page 3
- Dashboard Page 4
- Dashboard Page 5
- Dashboard Page 6
- Dashboard Page 7

Search Dashboards

O Web ◉ This Site

Google Search

This dashboard screenshot blog is part of the Dashboard Spy network - a unique collection of business intelligence resources. Send us your Dashboards!



RSS Feed

- Subscribe to Feed
-
- Google

Navigate

- Home
- About The Dashboard Spy Blog
- Sitemap

Enterprise Dashboard Advertisements

H-001166

Archives

- July 2008
- June 2008
- May 2008
- April 2008
- March 2008
- February 2008
- January 2008
- December 2007
- November 2007
- October 2007
- September 2007
- August 2007
- July 2007
- June 2007
- May 2007
- April 2007
- March 2007
- February 2007
- January 2007
- December 2006
- November 2006
- October 2006
- September 2006
- August 2006
- July 2006
- June 2006
- May 2006
- April 2006
- March 2006

Meta

- Log in

Categories

- Dashboard Screenshots
- Uncategorized

Links

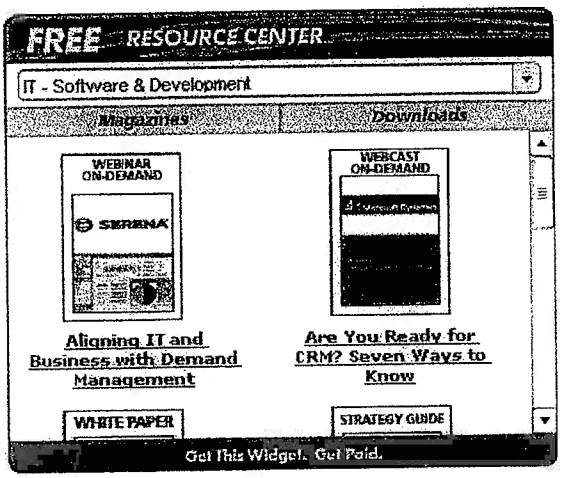
- Dashboard Reporting Resources
  The Original Version of the Business Intelligence Reporting and Dashboard Design Resource
  0
- Business Week Dashboard Article
  Widely read article on enterprise dashboards
  0
- Executive Dashboard Examples
  Site Map for Executive Dashboards
  0
- Digital Dashboard Resource
  Home of the independent voice of the Digital Dashboarding community - The Dashboard Spy
  0
- A Collection of Business Dashboard Videos
  Watch videos of interest to the business intelligence dashboard community
  0

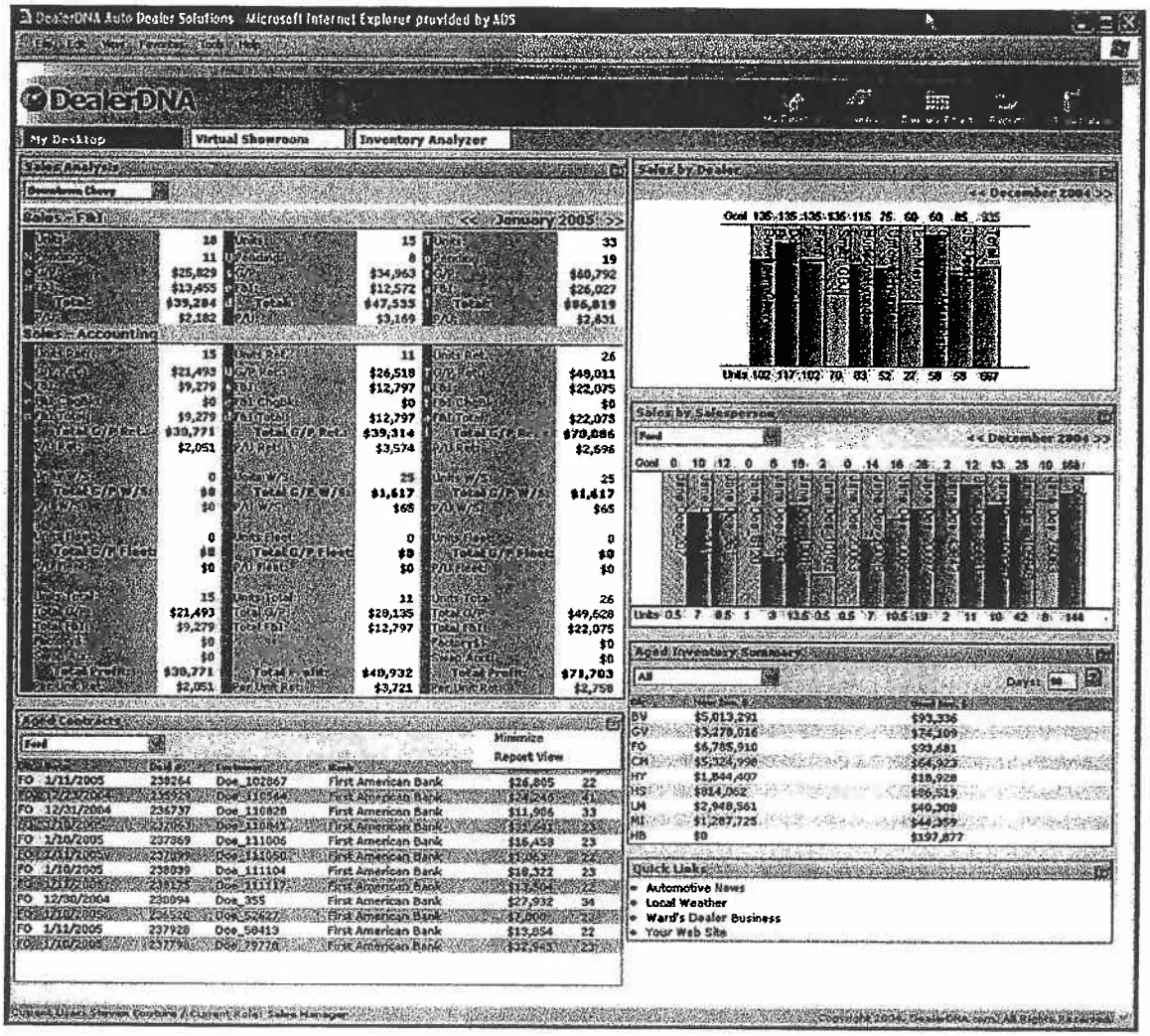
« A property management dashboard
Network monitoring dashboard »

An auto dealer sales management dashboard

Automobile dealerships have embraced the **business intelligence dashboard** as it effectively allows summarization of monthly sales metrics. The monthly trends in sales have become a "hot" KPI to track on executive dashboards.

This sales dashboard provides users with real-time financial information about their Sales, F&I, Fixed Operations, Accounting and Inventory profit centers. PDFs available at http://www.dealerdna.com/pages/sales.html





So what or who is The Dashboard Spy? As his about page states, The Dashboard Spy is just a guy interested in the design of business dashboards. He could not find any executive dashboard design source books and so set about creating his own. Finally convinced to post his extensive collection of dashboard screenshots online, he was amazed to find how popular it has become. If you have a nice screenshot to share, please leave a comment or send an email to info _at_ dashboardspy.com. Also check out The Dashboard Spy's favorite books.

Tags: Dealership dashboards, Automobile Dealership Management Dashboard

ShareThis

Was this enterprise dashboard interesting enough to share? Help spread the news about **Dashboards By Example**. Click on the "Share" icon above to submit this post to your social bookmark service or email the link to a fellow dashboarder or even yourself.

What do you think about this dashboard post? Please leave a comment. Your opinions are valuable to the entire business dashboarding community.

Leave a Reply

Name :

Mail (will not be published) :

Website:

Submit Comment

Last Modified: Tuesday, March 18th, 2008 @ 05:23

This business intelligence dashboard blog entry was posted on Saturday, March 4th, 2006 at 6:54 pm and is filed under Dashboard Screenshots. You can follow any responses to this entry through the RSS 2.0 feed. You can leave a response, or trackback from your own site.

Dashboard Spy Readers: See these related Business Intelligence Dashboard posts:

- Equipment Dealer Dashboard - An Enterprise Dashboard for Dealership Sales Management...
- Physical Dashboard for Tracking Web Marketing Metrics...
- Telesales Dashboard - Tracking Outbound Call Activity for a Call Center with SAS/GRAPH...
- Automotive Maintenance Dashboard - a real-world, physical dashboard used by auto mechanics to inspect your car...
- Branding Dashboard - Gorgeous enterprise dashboards for marketing management and tracking advertising awareness...
- Oracle JD Edwards Plant Management Dashboard...
- Sales Compensation Dashboard...
- Sales and Marketing Enterprise Dashboard - tracking pipeline KPIs...

Latest posts of interest to the business intelligence dashboarding community - Have you read these recent enterprise dashboard posts?

Recently Posted

- Diversity Dashboard
- Second Best Excel Dashboard of 2008
- Provost Dashboard
- Flex Dashboard Tracks Olympics Medal Results
- 4 BI Worst Practices
- 2008 Best Excel Dashboard
- Performance Benchmarking Dashboards
- Heat Maps for Data Visualization
- Xcelsius 2008 Dashboard - Gas Price Data
- Small Business Dashboards

More Dashboards

Dashboards by Example Volume 1 Goals and Objectives

"Dashboards By Example - BI Dashboard Samples" is the theme and mission statement of this blog. We salute the Dashboard Spy in the field - those business users, project managers, IT executives, application designers, business intelligence experts, analysts, coders and subject matter experts who are on site creating this exciting and new "face of BI". Your business intelligence dashboard can go by many names - performance dashboard, executive dashboard, business dashboard, balanced scorecard, KPI metric summary, enterprise dashboard, bi dashboard, corporate dashboard. Whatever we call it, we believe that the at-a-glance visual approach is the key to user-centric design. Let's learn from each other's dashboard examples and continue to increase the level of usability and usefulness.

We strongly believe that the more dashboards you study, the more adept you will become at choosing correct design solutions for your company. "Learn by Example" is not just a motto - we take it literally, hence the name "Dashboards by Example". So take every chance you get to view examples of BI interfaces. As a matter of fact, take a second now, and study this dashboard example.

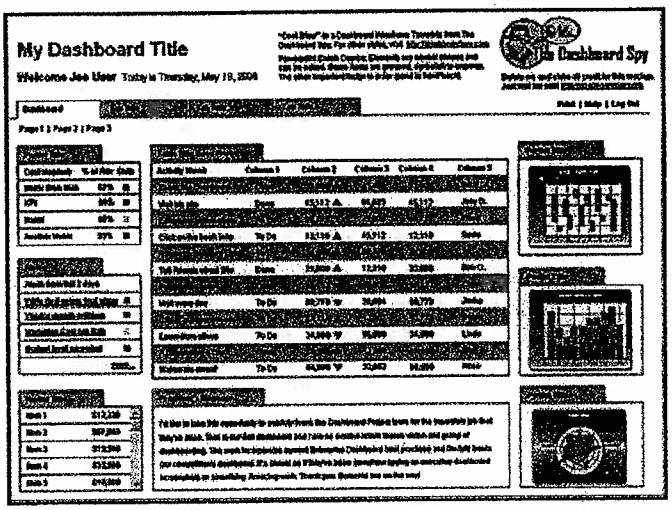
What's on your Dashboard?

The Dashboard Spy wants your dashboards!! I've collected over 1000 screenshots of business intelligence dashboards and scorecards for Volume 1 and now need you to send me the next 1000 dashboards for Volume 2. Email me at info at dashboardspy.com and tell me about your dashboard. Send me images, notes, technical details, business rules, metrics, KPIs, anything that you think your fellow Dashboard Spies will have an interest in. Keep this library of dashboarding resources going!

Also, I'd love more links to both the main Dashboard Spy site at http://dashboardspy.com and the Volume 1 blog of 1000 dashboards at http://www.enterprise-dashboard.com. I'd love your help in making these resources better known.

Looking forward to seeing your dashboards, The Dashboard Spy

P.S. Did you check out this free dashboard template for wireframing? Click on the image below for the download link and instructions. Consider it a gift for your unfailing support. Thank you very much. Sincerely, your friend in dashboarding, Dash.



CLOSINGTHELOOP
on customer service

Improve Cl

About Products Solutions My Account Careers

Dealer Dashboard

IF YOU CAN'T MEASURE IT, **CAN'T MANAGE IT**

Dealer Dashboard Key Performance Indicators (KPI's) provide the dealer and service manager with visibility to the crucial numbers that drive the performance of the sirvice Department. You have the ability to set target goals for the average labor dollars per repair order, one line work order percentages and average hours per repair order and see the results by year, month, week or day. By comparing it to the prior year's results, you have visibility to improvements in your department and more importantly areas of concern.

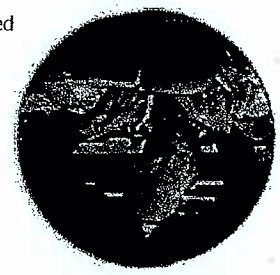
By using our secure data extraction portal we provide daily updating on Labor sales, Repair order counts and total hours sold for all sales categrories

The dealer Report allows you to graph the KPI's by pay type and reporting period to identify trends and areas of opportunity

- Total r
- Total n
- Jobs pe
- Labor h

Advisor and Technician Scorecards

- provide KPI information specific to the Advisor and Technician by pay type and specified time periods
- Graphic display of achieved labor hours per repair order to goal and to previous years performance.
- Allows for goal setting based on the number of repair orders for cross sell categories
- Displays sell through rate of cross sell opportunities and compares performance to set goals
- Provides year to date summary totals for all categories
- Printable copy for each staff member



- Repair
- Jobs pe
- Labor h (billed ho
- Total la
- Tech h (paid hou
- Dollars
- Total la

dataBridge
Connecting People & Information

800.260.9357
Request Information

Search

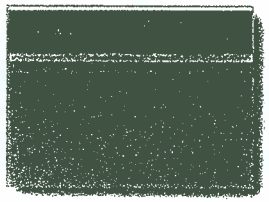
Home | About Us | Features | Our Customers | Sample Intranet | SharePoint Training | Contact Us

Our Customers

AchieveGlobal
Twist
Karastan
Biltmore
The Scully Group
Ydesigns
Multi-View
Caris Healthcare

Karastan

Karastan
Karastan has been creating some of the world's most beautiful rugs for almost three-quarters of a century and enjoys a dual role as leader in both manufacturing and interior design innovations.



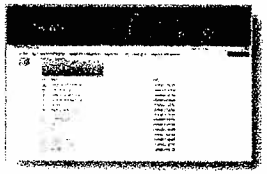
Portal Entry Page

Karastan needed a secure way to effectively and efficiently communicate with their four distinct US dealer networks. Here is some of the information they need to communicate:

- **Price Lists** and **Price Tags**
- **Merchandising** and **Display Information**
- **Marketing** and **Promotions Calendars**
- **General** and **Special Announcements**
- **Current Microsoft Word** and **Excel Files**

H-001208

Dashboard



Document Library

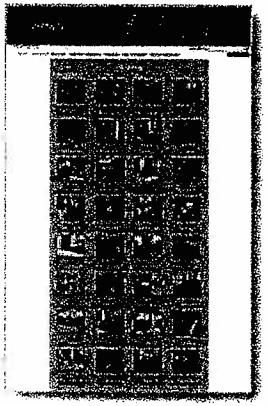


Image Library

Each dealer "Rep Group" needed it's own site so first we designed a **portal "entry" page**. All of the dealers go to www.repnews.com to log in and select their respective dashboard. Just like a car dashboard delivers critical information to the driver (i.e. speed, gear, lights, gas temperature etc.) Each dealer **Dashboard** delivers all the current and important information at a glance. (i.e. newest documents, announcements, calendars, links etc.)

As new documents, events and announcements are added to the sites the information is automatically posted to the dashboards making it easy for the dealers to stay informed and access files.

SharePoint has provided Karastan a secure online environment that is easy to navigate, can be accessed from any computer 24/7 and is almost effortless to maintain and manage.

dataBridge specializes in building Intranets, Extranets and Business Portals using Microsoft SharePoint. Our primary focus is intranet development, SharePoint Online Training, Customizing SharePoint, SharePoint development, Microsoft SharePoint consulting and SharePoint support. Collaborate more efficiently as a team with meeting workspaces. Manage tasks, manage documents, share calendars and contact lists with this powerful collaboration suite. Let us help you customize SharePoint, SharePoint Development, SharePoint Support, SharePoint Consulting SharePoint Online Training, dataBridge SharePoint Training DVD.

Home | About dataBridge | Overview | Features | Our Customers | Sample Intranet | Training | Contact Us

DATAMOTIVE

Maximising Sales Opportunities

Feature Highlights

Escalation Process
Ensures no prospects go unactioned by providing back-ups to staff of your choice.

Inactivity Reports
A review of all prospects that have had no action for 14 days but remain active.

Configurable Reports
Create reports to suit your dealershipâ€™s requirements. Schedule reports for email delivery to multiple recipients. Configurable reports may be reviewed and edited.

Editable Leads
The editable lead function allows you to update any of the customer information fields.

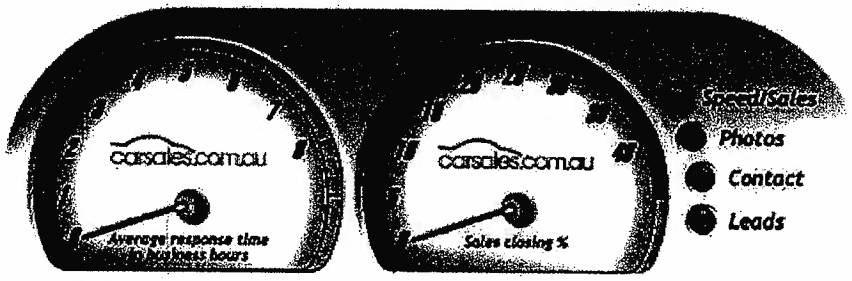
Summary Report
The summary report will provide you with an even greater snapshot of your business than the dashboard. It provides reporting with benchmarks to state and national results.

Diary
Autogate Pro has diary functionality and a to do list, providing your sales team with valuable time management tools.

Brochures
Print single or multi-vehicle brochures with your own dealership branding.

Bulk Emails
Email marketing is powerful and cost effective. Use the â€œbulk emailâ€□ function to keep in touch with your customers and prospects better than ever before.

AUTOGATE PRO.



The Dealer Dashboard appears in your home page when you login to Autogate Pro. It provides a real time snapshot of the performance of your business. The dashboard gauges are clearly marked, with green indicating the ideal performance range. Using Autogate, you can ensure your dealership operates â€œin the green,â€□ maximising your return on investment.

With Autogate Pro you can capture and manage all your leads - from carsales.com.au, your own dealer website, and all other Internet providers - in one location.

More Than Just Internet Leads

Autogate Pro is not just for Internet leads. All customers, including phone-ins, walk-ins and referrals, can be managed in this user-friendly application. You can even upload your existing customer data.

Reports

Autogate Proâ€™s configurable report writer will allow you to construct a report based on any criteria in your lead management system and then generate emails for specific marketing opportunities.

TRADER ONLINE SITES

- Aero Trader
- ATV Trader
- Bargain Trader
- Boat Trader
- Commercial Truck Trader
- Cycle Trader
- Equipment Trader
- PWC Trader
- Sailboat Trader
- Snowmobile Trader
- Trader Online
- Trailer Trader
- Walneck's Classic Cycle
- Yacht Trader

- » Search RVs
- » Browse RVs
  - Browse By Type
  - Browse By Make
  - Browse Dealers
- » Find Dealers

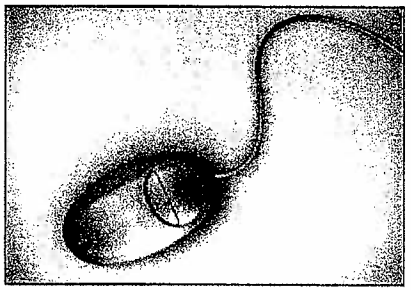
- » Resources
- » About Us

RVTraderOnline.com > About Us > Press Room > Press Release - New RVTraderOnline.com Breaks Weekly Visitor Record

PEOPLE ARE TALKING

RV buyers and sellers are talking about RV Trader.Learn More...

GOT FEEDBACK?



Tell us what you think of our new website.Learn More...

H-001215

PRESS RELEASE

New RVTraderOnline.com Breaks Weekly Visitor Record

Contact:
Jerald Motil
RV Trader Marketing
(757) 351-8640
jerald.motil@dominionenterprises.com

Norfolk, VA - February 19, 2008

RV Trader, a division of Dominion Enterprises, announced today record-breaking traffic on RVTraderOnline.com during the week of Feb. 11.

RVTraderOnline.com hosted 206,722 visitors between Feb. 11 and Feb. 17, 2008—up more than 48% over the same week in 2007 - according to Omniture SiteCatalyst HBX.

"As our Web site traffic continues to set new records, the new site design continues to prove its value. We look forward to offering more and more consumers access to the Internet's largest database of recreational vehicles," said Tim Custer, general manager of Dominion Enterprises' RV brand. "Particularly in light of slowing RV shipments, according to the Recreation Vehicle Industry Association, RVTraderOnline.com's growth is a welcome sign that RV buyers are still looking to buy," continued Custer.

Upcoming improvements to RVTraderOnline.com include more exposure for RV dealers in the site's Behind the Wheel consumer e-newsletter and on the RV Insider Blog.

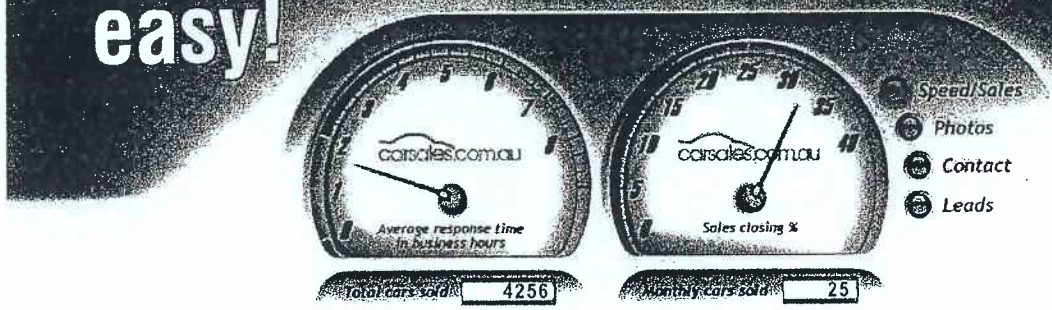
Re-launched in November 2007, the Web site offers RV dealers a completely redesigned Inventory Management Tool (IMT) and Instant Mobile Lead Alert. Also new for RV dealers is the Dealer Dashboard e-newsletter. Delivered directly to advertisers' inboxes every month, it offers tips on how to drive more business to the dealership and how to more effectively leverage the RVTraderOnline.com selling tools.

Three main buttons, "Find," "Sell" and "Research," take visitors directly to the information they seek. The "Find" button provides instant access to more than 81,000 RVs for sale - the Internet's largest database of recreational vehicles. The "Research" button offers additional information on everything from finance and insurance to RV parts and accessories.

About RVTraderOnline.com
RVTraderOnline.com, a division of Dominion Enterprises, is the largest database of recreational vehicles for sale online. Headquartered in Norfolk, Va., it is part of the Trader family of online vehicle classified advertising sites that includes BoatTrader.com, CycleTrader.com, AeroTrader.com, EquipmentTraderOnline.com and CommericalTruckTrader.com. For more information about RVTraderOnline.com, call toll-free 1-888-813-7304 or visit http://www.RVTraderOnline.com

About Dominion Enterprises
Dominion Enterprises, Norfolk, Va., is a leading media and information services company serving recreation, employment, automotive, real estate, marine and industrial markets. The company has more than 500 magazine titles, over 40 market-leading Web sites, and operates a variety of Web and technology businesses. The company had 2006 annual revenue of more than $850 million and has more than 7,200 employees nationwide. For more information, visit www.DominionEnterprises.com

The Dashboard makes it easy!



AUTOGATE PRO.

Autogate Professional's outstanding new features

Dealer Dashboard

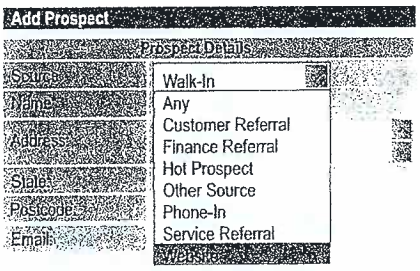
The Dealer Dashboard provides a real time snapshot of the performance of your business by measuring:

- Incoming leads
- Average response time in business hours
- % of cars displayed with photos
- % of customers contacted

Measure your exact **"Speed Of Response"**
The #1 Critical Success Factor for Internet selling is how quickly your sales team are able to contact the customer. The dealer dashboard will measure this for you and will be your benchmark for ongoing improvement.

If your dealership is operating in "the green" in all categories, your return on investment will be significant.

Add a Prospect



Autogate Pro is more than just a tool to manage Internet leads. The Add a Prospect function allows you to enter **ALL** customers: phone-ins, walk-ins, referrals from customers or referrals from within your own business as well as all forms of e-leads. (Talk to us about uploading your existing customer data).

Integrated Lead Management

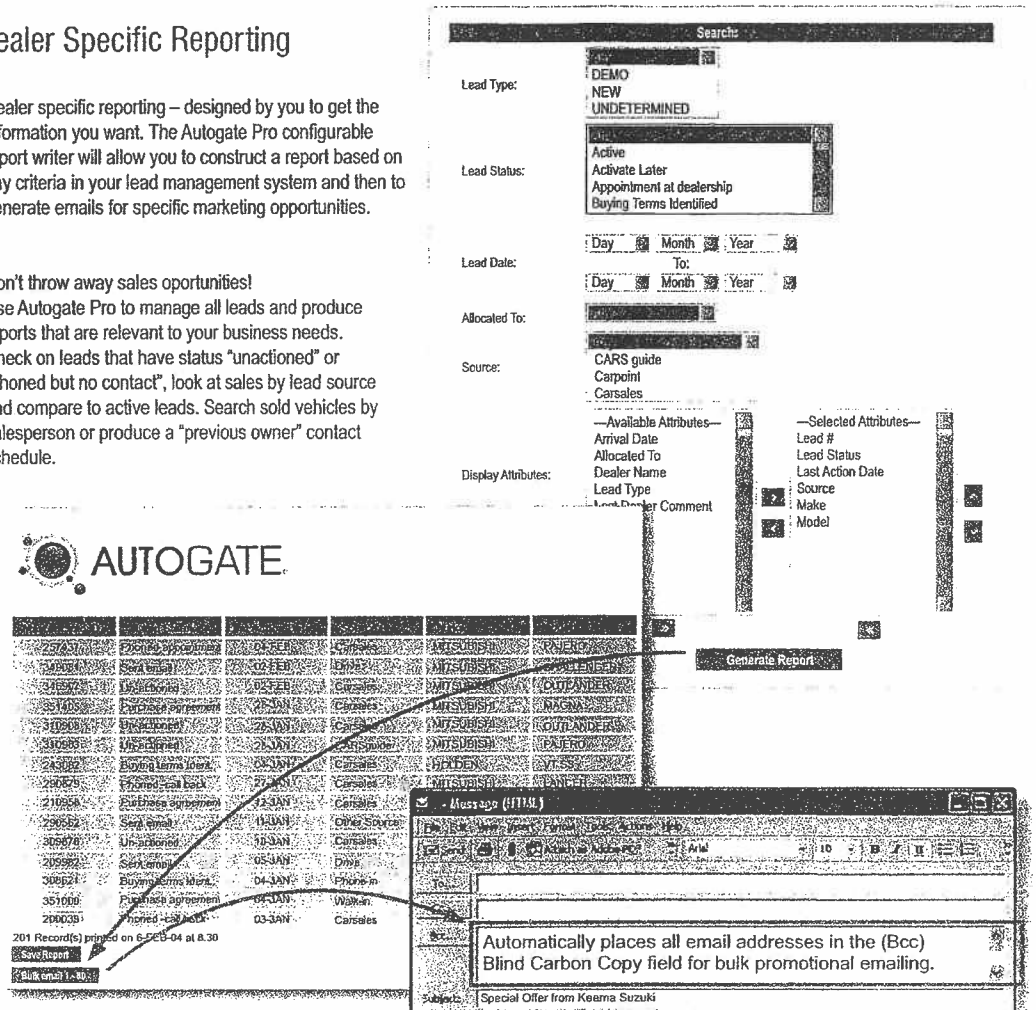
Lead ID	Status	Name	Source	Last Action	Time Left	Score
358274	Un-actioned	MELISSA	Carsales	THU, 05/02 - 12:16	1 hr	5670
358120	Home visit arranged	MRS JONES	Carsales	THU, 05/02 - 10:14	3 hr	8946
359058	Active	DAVID	Drive	WED, 04/02 - 20:05	1 day	9023
358563	Sent email	THOMAS	Dealer website	TUE, 03/02 - 9:50	2 days	4578
358890	Appointment	ADAM	Walk-in	TUE, 03/02 - 1:35	2 days	5940
356204	Sold	JASON	Carpoint	MON, 02/02 - 3:20	3 days	7098
356200	Phoned - call back	ISMAIL	Carsales	SUN, 01/02 - 5:03	4 days	5890

Capture all your prospects in one location. All leads accepted – carsales.com.au, other Internet providers, dealer website, etc.

Dealer Specific Reporting

Dealer specific reporting – designed by you to get the information you want. The Autogate Pro configurable report writer will allow you to construct a report based on any criteria in your lead management system and then to generate emails for specific marketing opportunities.

Don't throw away sales oportunities!
Use Autogate Pro to manage all leads and produce reports that are relevant to your business needs. Check on leads that have status "unactioned" or "phoned but no contact", look at sales by lead source and compare to active leads. Search sold vehicles by salesperson or produce a "previous owner" contact schedule.

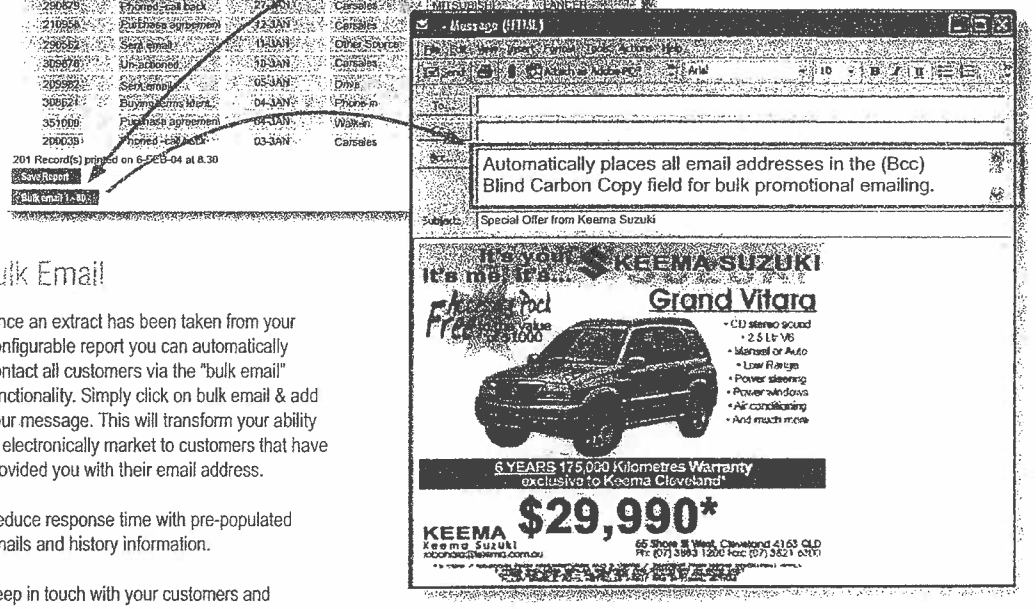


Bulk Email

Once an extract has been taken from your configurable report you can automatically contact all customers via the "bulk email" functionality. Simply click on bulk email & add your message. This will transform your ability to electronically market to customers that have provided you with their email address.

Reduce response time with pre-populated emails and history information.

Keep in touch with your customers and prospects better than ever before.



Advertising is an investment…Autogate Pro will help you maximise your returns.

AUTOGATE PRO

For more infomation: Ph: (03) 9805 3600
or email sales@carsales.com.au

carsales.com.au
Australia's Leading Automotive Website

H-001141

AutoTrader.com FOR DEALERS | PARTNER WITH US | ADVERTISING SOLUTIONS | DEALER

BACK TO HOME

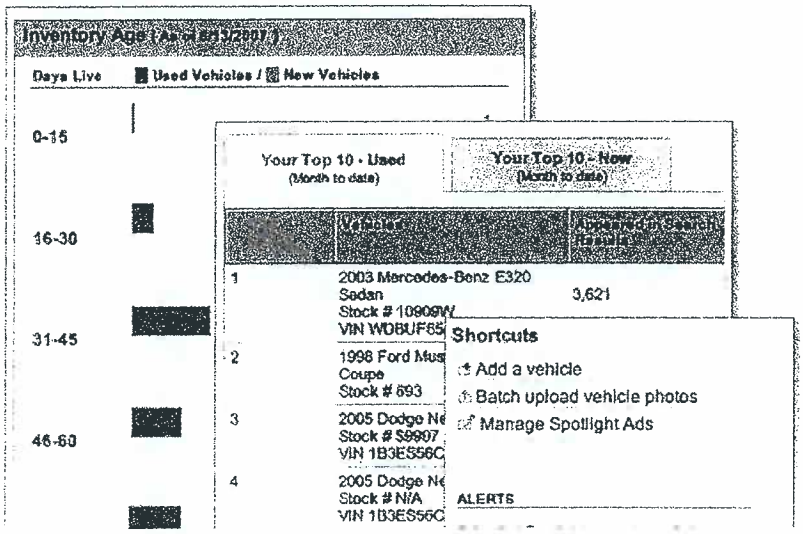
DEALER RESOURCES

AUTOTRADER.COM FOR DEALERS

Its the next generation of online automotive advertising. AutoTrader.com for Dealers gives our dealers more choices, more flexibility and more resources for success. With intuitive features and advanced options, we make it easier than ever to have 360-degree control of your virtual marketplace.

DASHBOARD FEATURE

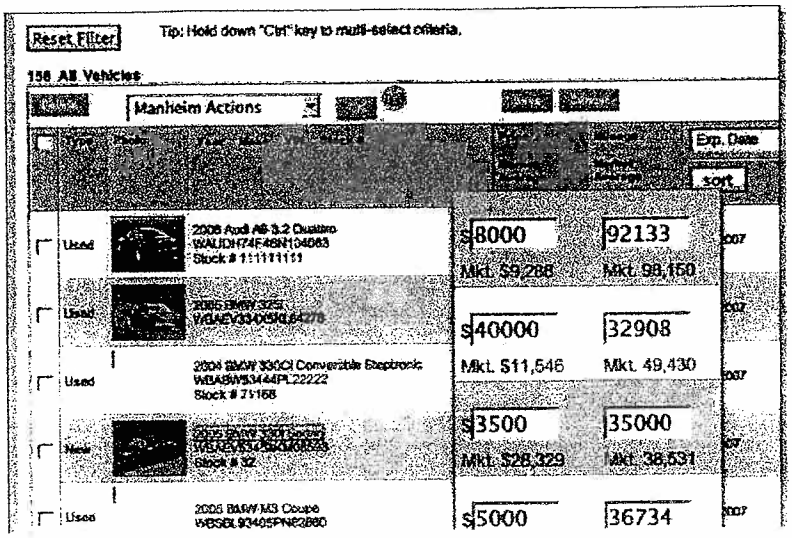
Your dealer site gives you critical inventory information and alerts, right on your dashboard. You can also see a snapshot of which vehicles are getting the most activity on the site.



MARKET COMPARISONS

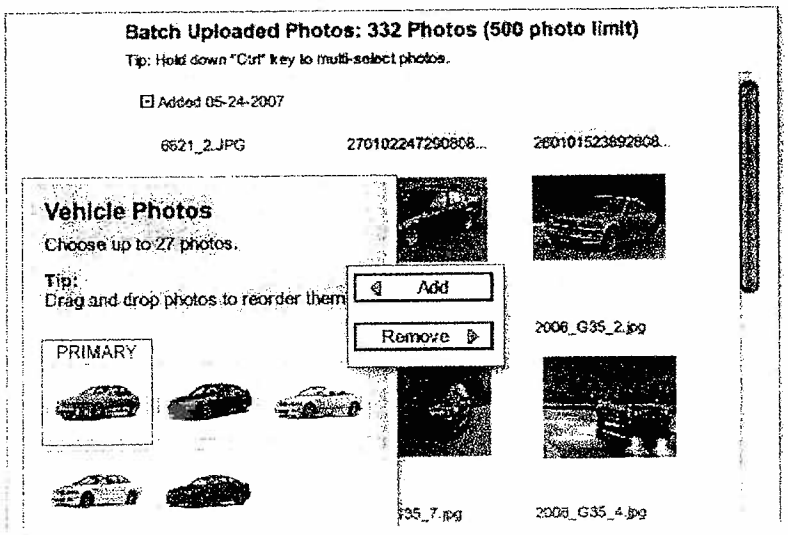
Now you can compare head-to-head pricing with your competition whether theyre across the street, or across the state.

H-001137



EASY PHOTO UPLOADING

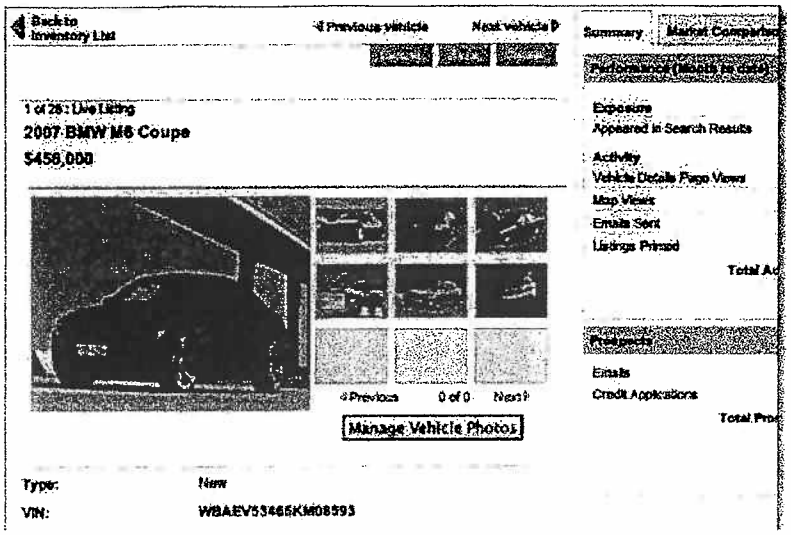
Weve also made managing your vehicle photos a snap, with two convenient ways to add pictures to your listings by selecting photos youve already added to your media library, or by uploading new ones directly from your computer.



ENHANCED USABILITY AND FLEXIBILITY

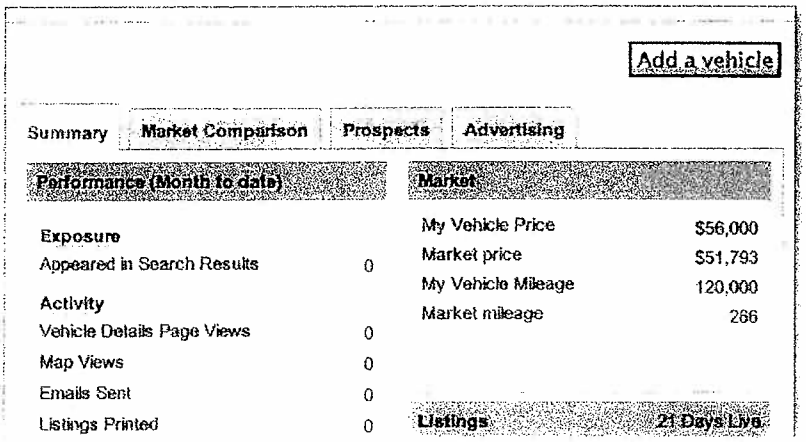
Our enhanced editing features make updating your listings faster and easier than ever. The single page layout provides a complete view of your vehicle, as a shopper would see it.

H-001138



ADVANCED REPORTING CAPABILITIES

Weve even added dedicated sections where you can easily see your prospects, gauge your activity, manage your advertising products, and review your reports.



H-001139

Mazda's Dealer Analysis Dashboard Application Creates More Productivity

Download Now
(you must be registered)

Date:	01-03-2006
Vendor:	BEA Systems
Registration:	Required
Type:	Case Studies
File size:	Not specified
Format:	PDF, Acrobat Reader
Pages:	Not specified

Publisher's description

North American Mazda sales and customer service field managers are responsible for visiting each dealership in their territory at least four times a year to review performance and improve sales. Field managers spent at least three days collecting performance data from several mainframe reports, spreadsheets, and third party analyses to prepare for one dealership visit. Mazda field managers needed a more efficient way to prepare for meetings. Mazda deployed the BEA AquaLogic User Interaction to provide managers with easy access to the data they need for dealership reviews. Through this dealer analysis application, managers view performance on the national, regional, and local level.

Upload your whitepaper now

Just In **Most Read**

Green Data Center Storage Part II: Cost Effectiveness in Transitioning

Distributed and Parallel Database S

Oracle 10g R2 RAC Implementatior 10 Linux, IBM BladeCenter and IBM TotalStorage

Migrating From Domino to Exchang 4)

What's New for XML in SQL Server

Latest Videos

Are CIOs adopting At the AlwaysOn St Stanford University, the iPhone and whe to use them acros..

Buzz Report: The best iPhone app ye

Video: Whitbread CIO

Fusing a Fibre Cable

ZDNet's CIO Vision Series

Customs | Murray Harrison, C

Australian Customs Cl
Harrison dislikes SLAs
if a vendor talks to him
innovation. In this inter
explains why getting e
gadgets can be dangerous and talks abc
Customs' outsourcing strategy has evol

stands to lose the most from the NBN applies whether it loses the NBN contr

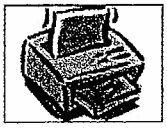
iPhone suckers test our patience
So how many of you have bought a 3C iPhone? Do you feel like a sucker? If you don't, maybe you will once your first bill arrives.

Tags

3g apple bank britain bro call centre chief information office commander communications conroy dns fibre google governmen hutchison ibm internet iphone mac merger microsoft mobile phone nas nbn ne new zealand open source optu outsourcing patch queensland revi security software storage telstra uk vodafone y youtube

Featured

iPhone Launch Centre
The ZDNet.com.au iPhone resource guide contains everything you need to know about Apple's highly anticipated mobile device.
Click here for more.



Superguide: Printers -- all you need to know
Looking to buy a printer? Our superguide rates the latest printers and shines a light into the industry.
Click here for more.

Power Centre: Transforming IT Management
Driving business growth through enterprise IT management. **Dig deeper by clicking here.**

Thursday, April 3, 2008

Release 3.0.6 - Dealer Sales History and Analysis

Dealer Sales History and Analysis

We are very pleased to announce a new version of FurnishWEB launching just a few weeks after our last release and just in time for the High Point Furniture Market. FurnishWEB now has screens for Dealer Sales Analysis! This type of reporting has been one of the top requests from our clients and their users. We're are very glad to meet these requests and provide yet more value to our customers.

FurnishWEB accumulates and summarizes invoice sales information by customer and product for sales analysis and reporting. We've taken this summarized data and provided several online tools creating a more meaningful understanding of each dealer's sales history.

Dealer Dashboard Updates
On the Dealer Dashboard there are two new pieces of information; Collections Year-To-Date (YTD) and Top Sellers YTD. The Collections pie chart displays the collections a dealer has purchased most in the current year. The Top Sellers lists the top 10 products the dealer purchased this year.

Categories

In the News (11)

New Releases (8)

Tips and Tricks (4)

Thoughts and Ramblings (3)

Furniture Market (2)

Blog Archive

▼ 2008 (7)

▼ May (1)

Ligna Launches New Site Powered by FURNISHWEB

► April (2)

► March (2)

► February (2)

► 2007 (23)

► 2006 (2)

Furnishweb Users

A-America

H-001236

Dealer Sales Tools

There is also a new link on the Dealer Dashboard to Sales Tools. Sales Tools is deceptively simple but this link conceals some real power! Sales Tools is an interactive, sortable summary of sales information. Sales history can be summarized by product, collection, type, family, class and finish ... each column is sortable providing the ability to find the Best Sellers in each category.

Sales reps should find this area especially useful when preparing a visit with the dealer. We anticipate this tool to quickly become some of the most used web pages in FurnishWEB!

This page shows you:

- LY $: All Last Year Sales
- LY QTY : All Last Year Quantities
- LYTD $: Last Year to Date Sales
- LYTD QTY: Last Year to Date Quantities
- YTD $: Current Year to Date Sales
- YTD QTY : Current Year to Date Quantities
- Order $: Current Backlog Order Dollar Amount
- Order QTY : Current Backlog Order Quantites
- Order Price : Minimum Price Paid for Product on Open Order

Other Patches and Fixes

With this release we've also included some minor improvements based on user feedback. There are now links to the Collection, Finish, Family, Class and Types while viewing a Product Detail. This will allow a quick return to the product list for those categories.

We've collapsed the Shipto Locations on the Dealer dashboard so they don't fill up so much screen space and opens up space for the new Sales Analysis charts. The

Bassett Mirror

Bradington-Young

Creations

Intercon

Ligna

Ligo Products Inc.

Pulaski Furniture

Rivers Edge Furniture

Samuel Lawrence Furniture

Sitcom

Somerton Home Furnishings

Westwood Design

Furniture Industry

Furniture Today

High Point Market

Inside Furniture Blog

Las Vegas Market

Feed

Subscribe in a reader

user can reveal the list of Shipto locations by clicking on the Shipto Bar.

Thanks to all of the sales managers, customer service reps, sales reps, and buyers that use FurnishWEB. We hope these new features will help you provide better service and do your jobs more efficiently.

Posted by Jeff at 10:53 AM

Labels: New Releases

0 comments:

Post a Comment

Links to this post

Create a Link

Newer Post Home Older Post

Subscribe to: Post Comments (Atom)

H-001238

Subaru Australia Drives Dealer Productivity Via Plumtree-Powered Dashboard

SAN FRANCISCO -- Plumtree Portal Helps Workload Management for Dealers, Streamlines Communications and Provides Tools to Improve Customer Satisfaction

Plumtree Software (Nasdaq:PLUM) today announced that Subaru Australia has deployed a dashboard application built using the Plumtree Enterprise Web Suite to its network of 92 dealers across Australia. The dealer dashboard has streamlined communication between Subaru and its dealer network so that each dealer has direct access to the latest metrics such as inventory, order status and promotional details. As a result, dealers are able to target improved customer service, while effectively representing the Subaru brand.

"The dealer dashboard in the portal has been a huge win for Subaru Australia because it gives dealers a central point of reference for key metrics and trends that they couldn't see before," said Gary Watson, national sales manager at Subaru.

Dealers clamored to test the dashboard, which went live in May 2004 after six months of development, and have been highly satisfied with the results. "Dealers used to ring our business managers every day asking for access to simple metrics like how many cars have been in inventory over 60 days. They need this information because they're measured, and paid on it, but there was no easy way for them to access it themselves," Watson said. "Now that the dashboard is in place, those types of calls have been replaced by requests for even more dashboard functionality."

What's in Subaru's Dealer Dashboard?

Subaru manufactures and imports its cars from Japan, covering the Forester, Impreza, Liberty and Outback models, which total approximately 30,000 units of sales annually. Australia is the company's third-largest market in the world, after Japan and the U.S. The Australian operation performs marketing and distribution functions, maintains supplies of spare parts and also sustains relationships with dealers across Australia.

To support the activities of the local Subaru operation, Subaru deployed a dealer dashboard that offers dealers access to the following information, much of which is drawn from a less accessible AS/400 system:

--Sales: reports on vehicle sales figures;

--Orders: lists of current orders for parts and vehicles or other items, status of cars in the dealership and delivery dates, and full detail of each dealers supply chain, from order to delivery;

--Inventory: data on spare parts and new vehicles;

--Marketing: promotional details including model specifications, feature comparisons and pricing guides;

--Services: details on services such as warranties;

--Branding: guidelines for promoting Subaru's brand;

--Calendar: calendar of sales appointments shared with Subaru employees; and

--Communications: Dealer bulletins and program information.

Previously, the company communicated with dealers in three separate lines of business: spare parts, services and sales. Each of these relationships was managed by different employees. By consolidating the three lines of business information targeted at dealers through one central dealer dashboard, information is presented in a way that allows dealers to "pull" access at any time convenient to them. This helps the dealers spend more time on planning and management, and reinforces the professionalism of the Subaru brand.

In addition to dealer satisfaction, customer satisfaction has also been targeted for improvement using the dealer dashboard. "Customers are anxious to know when their new car will arrive -- especially if they custom ordered it to meet their exact tastes," said Watson. "Using the dashboard in the portal gives the dealers better visibility into our production and delivery timelines, which makes for happy customers."

"Over 60% of Plumtree customers deploy dashboards in their portals to arm employees with critical business data for acting quickly and effectively," said Dean Stockwell, general manager, Asia Pacific at Plumtree Software. "Subaru's dealer dashboard is a great example of this and shows how quickly a dashboard can deliver value, with timelines measured in months, not years."

About Plumtree Software

Plumtree Software is a global pioneer in creating advanced software environments where information resources work together with human ingenuity. Well established as the portal thought leader, Plumtree enables a full, rich suite of applications that coordinate human-managed activities across systems, processes and business boundaries. With its flexible and open portal system, Plumtree delivers smart solutions throughout the enterprise and beyond. Progressive enterprises large and small, like Airbus, Mazda, Pratt & Whitney and the U.S. Navy depend on Plumtree to help them rapidly harness untapped potential in their organizations. For more information, visit www.plumtree.com.

Home / Dealer Dashboard

McIntosh®

DEALER DASHBOARD

session is

WELCOME TO THE MCINTOSH DEALER DASHBOARD

This section is devoted to you, the Dealer and International Distributor. After logging in, you will have access to price lists, dealer agreements, high resolution images and more.

Dealer Login

Username/email:

Password:

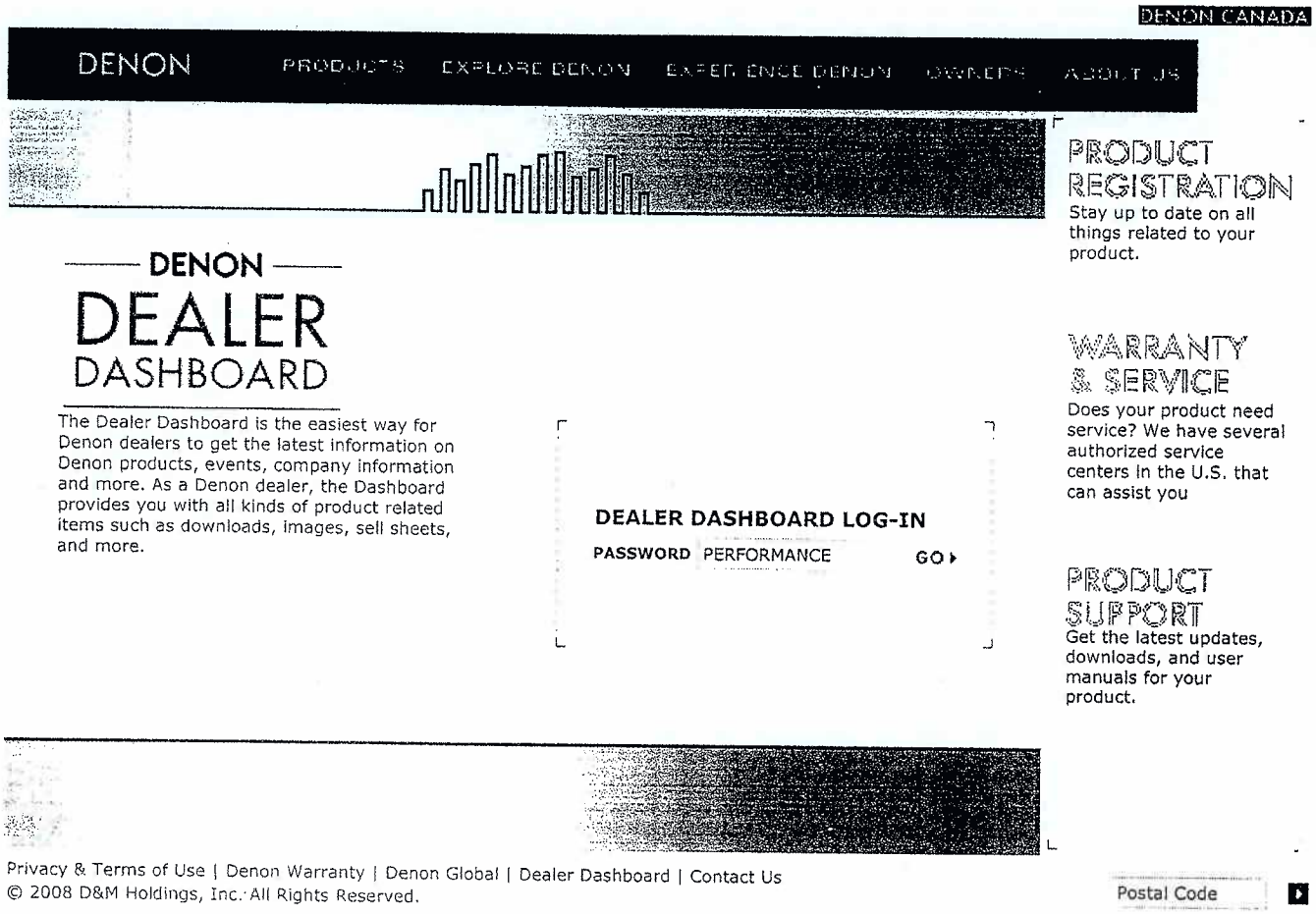
LOG-IN

Forgot Your Password?

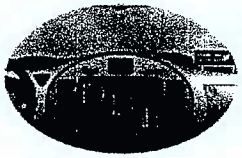
Home
Site Map
McIntosh Showcase
Product Collection
Owners

Inside McIntosh
Contact Us
Dealer Locator
International

About D&M Holdings, Inc.
McIntosh Japan
Privacy Policy
Terms of Use
Dealer Dashboard



Dashboard Dealership Enterprises



"A Leader in Reporting Solutions for Auto Dealers"

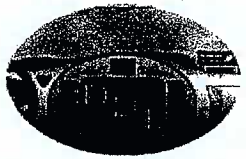
› Contact Us:
(925) 558-2790

› Email Us:
admin@dashboardonline.com

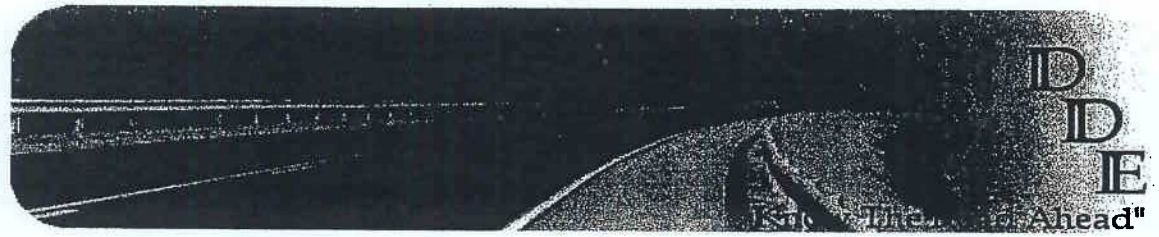
Home

Partners / Clients

Dashboard Development Enterprises



"Provides custom programming, software products and consulting"



Etools + Products

Select a Product

Dashboard provides clients with a vast array of online reporting systems. Choose from our list of products to learn more.

eTools + DASHBOARD DIXON HUGHES PLLC

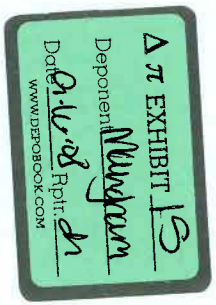
Services

Dashboard leads the Automotive Industry in custom enterprise level reporting solutions. Many of the nation's most profitable Dealer Groups are our clients.

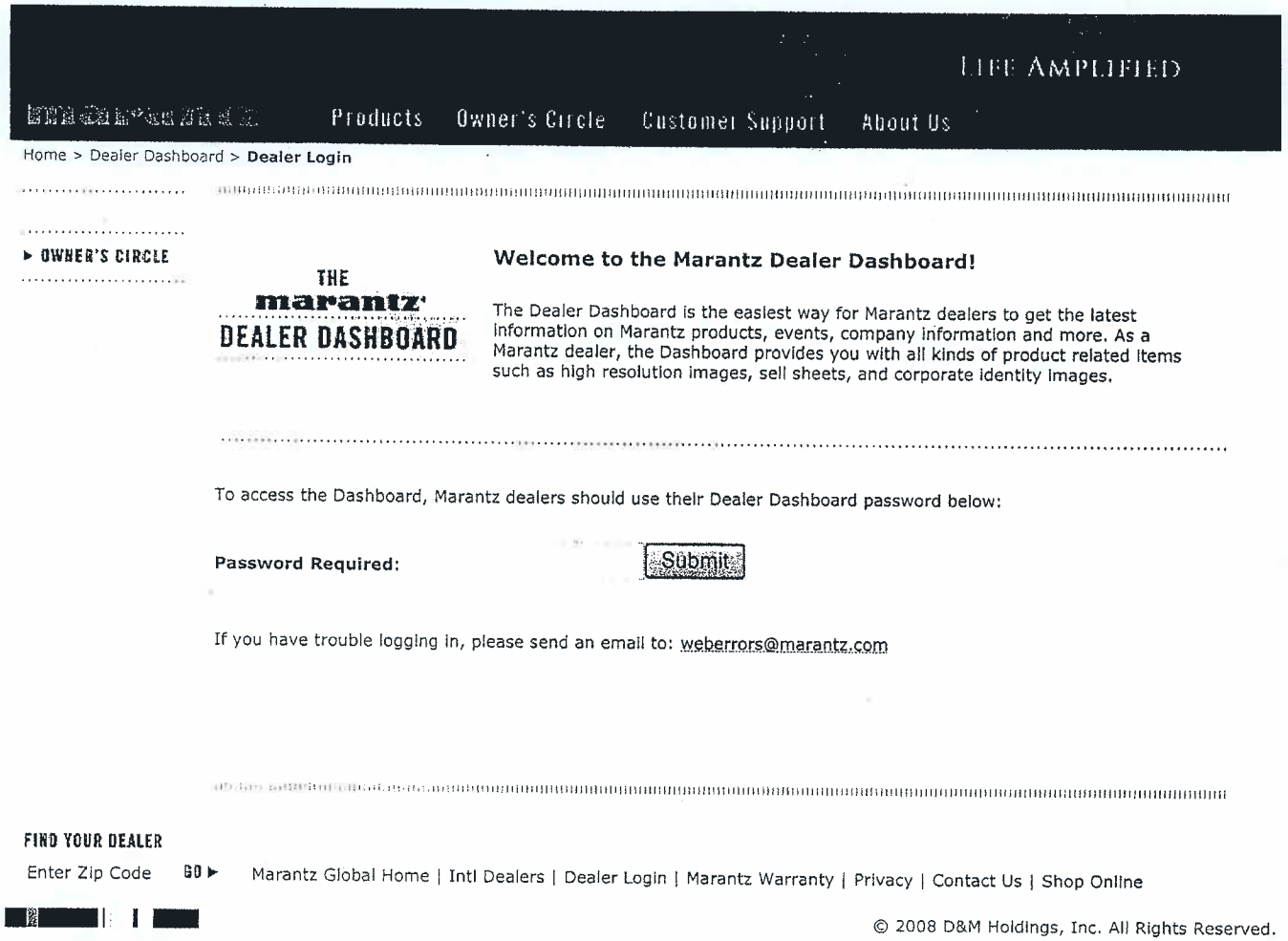
Our solutions are affordable, professional, and come with the best support team in the business.

Company Info

Dashboard is the market leader in Web management solutions for auto dealers. Dashboard rapidly develops high quality system products and related services to satisfy the current and emerging needs of our customers. Our mission is to exceed customer expectations for service, quality, speed of implementation, ease of use and support.



H-001229


LIFE AMPLIFIED
Products
Owner's Circle
Customer Support
About Us
Home > Dealer Dashboard > Dealer Login
▸ OWNER'S CIRCLE
THE marantz DEALER DASHBOARD
Welcome to the Marantz Dealer Dashboard!
The Dealer Dashboard is the easiest way for Marantz dealers to get the latest information on Marantz products, events, company information and more. As a Marantz dealer, the Dashboard provides you with all kinds of product related items such as high resolution images, sell sheets, and corporate identity images.
To access the Dashboard, Marantz dealers should use their Dealer Dashboard password below:
Password Required:
Submit
If you have trouble logging in, please send an email to: weberrors@marantz.com
FIND YOUR DEALER
Enter Zip Code
GO ▸
Marantz Global Home | Intl Dealers | Dealer Login | Marantz Warranty | Privacy | Contact Us | Shop Online
© 2008 D&M Holdings, Inc. All Rights Reserved.

H-001230


Δ π EXHIBIT 12
Deponent Wingham
Date 8/18/08 Rpt
WWW.DEPOBOOK.COM

Using Siebel Dealer Dashboards (Dealer)

Siebel Dealer provides dealer employees with dashboards that allow them to view the most important information that they need for their work on one screen. The following dashboards are available:

- **Sales Consultant Dashboard.** Includes actual and goal unit sales, today's activities, my calendar, current opportunities, and my promotions.
- **Sales Manager Dashboard.** Includes actual and goal unit sales for team, today's activities, my calendar, current opportunities, team's promotions, and team's calendar.
- **Service Employee Dashboard.** Includes today's activities, my calendar, my promotions, and current service requests.
- **Service Manager Dashboard.** Includes today's activities, my calendar, store promotions, and current service requests for team.
- **Store Dashboard.** Includes actual and goal unit sales for store, today's activities, my calendar, current opportunities, team's promotions, and team's calendar. To be used by the store general manager.

Some of the applets on the dashboards display daily data, and some display monthly data. In addition, the calendar can display data for the day, week, or month.

- **Daily data.** The following applets display data for the current day:
  - Today's Activities. Displays all of the employee's activities for the current day. The first column lists activities that have a due date of today and are not done. The second column lists activities that have a due date of before today and are not done; it continues to display past-due activities for the number of days defined in Dealer Preference view, as described in Entering Dealer Preferences (Dealer).

    NOTE: The Today's Activities only displays certain types of activities, as described in Changing Types of Activities Displayed in the Dealer Dashboard.
  - Current Opportunities. Displays all current opportunities for this consultant where there is no activity or there has been activity in the last 15 days. This is based on the value in the Last Activity Date in the Opportunity view of the Contacts screen. Whenever you make any change to an opportunity, this field is updated.
  - My Promotions, Team's Promotions, or Store Promotions. Displays all promotions that are active on the current day. Promotions are displayed if their campaign is not completed, and the creation date is within 30 days of today's date, and today is between the start date and end date of the campaign.
  - Team's Calendar (Today). Available to sales managers and store manager only. Gives the managers a view of the calendars of all their reports for the current day. The manager can also click the left arrow or right arrow to view their reports' calendars for previous or later days.
- **Monthly data.** The following applet displays data for the current month:

- Unit Sales. Displays the actual sales and sales goals for the current month for fleet, new retail and used retail sales. On the sales consultant dashboard, it displays the actual sales and sales goals for that individual sales consultant. On the sales manager dashboard, it displays the actual sales and sales goals for the manager's team. All these sales goals are based on the monthly forecast, described in Process of Creating the Monthly Forecast (Dealer). Actual data is based on the Service History view.

- **Calendar**. Provides a complete calendar for creating and tracking appointments and other activities. Employees can display and use a daily, weekly, or monthly calendar.

To use Dealer dashboards

1. Navigate to the Dashboard screen.
2. From the Show drop-down list, select:
   - Sales Consultant Dashboard
   - Sales Manager Dashboard
   - Service Employee Dashboard
   - Service Manager Dashboard
   - Store Dashboard

   NOTE: Employees can only select the view that is appropriate to them. For example, a sales consultant does not have the sales manager view available.

   The dashboards display the most important information needed by these employees, in summary form.
3. Sales managers can refresh the data in the dashboard by clicking Refresh. Sales consultants' data is refreshed periodically, based on the refresh interval set in Dealer Preference view, as described in Entering Dealer Preferences (Dealer).

   The Update field in the Unit Sales and Activities applets shows the last time that the data was refreshed.
4. To view more complete information, click the heading above any of the applets in the dashboard.

   The appropriate screen appears, with more complete information.

Siebel Dealer Administration Guide

H-001227

DiversifiedFinancialServices, LLC

Farm | Irrigation | Industrial | Grain Bins | Sale Items

- ome to Diversified
- t Diversified Financial
- ion Statement
- cy Policy
- act Diversified
- loyee Access
- Postings

Diversified Financial Services - Privacy Policy

This is the web site of Diversified Financial Services.

Our postal address is
14010 FNB Pkwy Ste 400
Omaha, NE 68154

We can be reached via e-mail at Our Email Address

or you can reach us by telephone at 402.964.8040

For each visitor to our Web page, our Web server automatically recognizes no information regarding the domain or e-mail address.

We collect information volunteered by the consumer or dealer, such as customer account information or dealer information and/or site registrations.

The information we collect is used for internal review and is then discarded.

With respect to cookies: On Dealer Logins, we set a cookie that helps us determine on the Dealer Dashboard pages your unique dealer identification number.

With respect to Ad Servers: We do not partner with or have special relationships with any ad server companies.

With respect to security: We have appropriate security measures in place in our physical facilities to protect against the loss, misuse or alteration of information that we have collected from you at our site and SSL.

If you feel that this site is not following its stated information policy, you may contact us at the above addresses or phone number.

Return to Main Page

H-001224

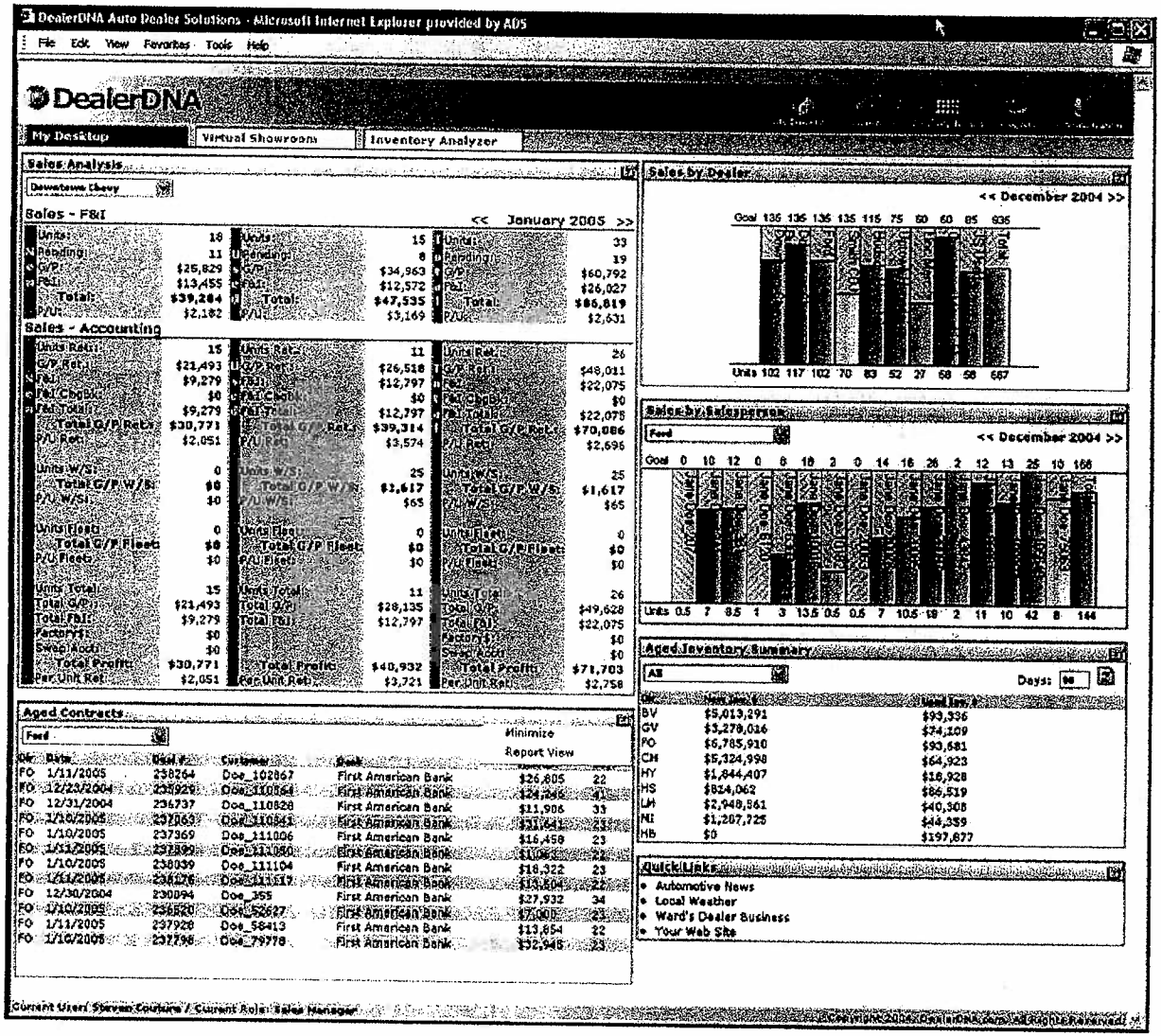
The Dashboard Spy

March 5, 2006

An auto dealer sales management dashboard

Filed under: Dashboard Screenshots — dashboardspy @ 2:54 am

This sales dashboard rovides users with real-time financial information about their Sales, F&I, Fixed Operations, Accounting and Inventory profit centers. PDFs available at http://www.dealerdna.com/pages/sales.html



So what or who is The Dashboard Spy? As his about page states, The Dashboard Spy is just a guy interested in the design of business

dashboards. He could not find any executive dashboard design source books and so set about creating his own. Finally convinced to post his extensive collection of dashboard screenshots online, he was amazed to find how popular it has become. If you have a nice screenshot to share, please leave a comment or send an email to info _at_ dashboardspy.com. Also check out The Dashboard Spy's favorite books.

Possibly related posts: (automatically generated)

- **Xcelsius Linear Gauge**
- The Tim O'Reilly Book Publishing Metrics Executive Dashboard

No Comments »

No comments yet.

RSS feed for comments on this post. TrackBack URI

Leave a comment

Name (required)

Mail (will not be published) (required)

Website

Submit Comment

- ## Executive Dashboards

  Update: Dashboard Report Excel Templates

  Looking for examples of **Executive Dashboards**? The Dashboard Spy collection of executive dashboard screenshots has moved to this link: **Dashboard**. At http://www.enterprise-dashboard.com, you can study the best practices of over 837 dashboard screenshots!

  Welcome to The Dashboard Spy - a collection of executive dashboard screenshots. This reference work is proudly offered as a source book to everyone involved in executive dashboard design and implementation. May it spur plenty of ideas and lead to a successful executive dashboard, scorecard or business intelligence project.

- Search

- ## What is a Dashboard?

  Known by many names (enterprise dashboard, executive dashboard, digital dashboard, business dashboard, business intelligence dashboard, performance dashboard, balanced scorecard, kpi summary, data visualization, and so on...), it is basically a way for business users to get an at-a-glance understanding of metrics of importance to them. In addition to acting as a summarization device, the dashboard also serves to highlight specific data and allows the user to drill down and inspect specific items. It allows a browsing style of user interaction in addition to the usual menu based navigation. As such, the dashboard also represents a user interface design pattern that designers should study and understand. From the perspective of information technology staff, the dashboard often represents a consolidation of data from disparate data sources. The effort is usually considerable when it comes to the necessary extraction, transformation and presentation of the data.

- ## Blogroll

  - Enterprise dashboard Screenshots have MOVED!! Visit The Dashboard Spy Enterprise Dashboard Screenshot Blog Volume 1
  - Executive Dashboard Wikipedia Entry
  - Executive Dashboards Explained by BusinessWeek
  - z List of dashboard resources

- ## Top Posts

- Excel Dashboarding Spreadsheet Download - nice presentation of dashboard KPIs
- Excel-based Enterprise Dashboard - excel worksheet xls file download
- Red Light - Green Light - 123 - Enterprise Dashboard Indicator Icons, a graphic resource for enterprise dashboards from The Dashboard Spy
- Project Management Dashboard - Letting team members access MS Project through a dashboard
- A Gallup Q12 Employee Engagement Dashboard - Monitoring Employee Satisfaction via a Flash-based Scorecard
- Beijing Summer Olympics Dashboard
- Supply Chain Management Dashboard Screenshot - Key Performance Indicators & Metrics for Forecast, Inventory, Orders
- Excel 2007 Dashboard Screenshots - a new wave of dashboards on the way
- An Executive Console - KPI Dashboard Screenshots showing Financials, Sales, Production, IT System
- Microsoft Office PerformancePoint Server 2007 Dashboards - Scorecards, Analytics and Planning with an Excel Dashboard as the Front End

Pages

- An Introduction
- Books on Enterprise Dashboards

Archives

- August 2008
- July 2008
- June 2008
- May 2008
- April 2008
- March 2008
- November 2007
- October 2007
- September 2007
- August 2007
- July 2007
- April 2007
- February 2007
- January 2007
- November 2006
- October 2006
- September 2006
- August 2006

- July 2006
- June 2006
- May 2006
- April 2006
- March 2006

Meta

- Log in
- Entries RSS
- Comments RSS
- WordPress.org

Calendar

March 2006

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Apr »

Blog at WordPress.com.

Category
< Any Category
Books
Business & Investing (3,711)
Computers & Internet (2,602)
Professional & Technical (6,439)
Entertainment (1,869)
Science (3,747)
Nonfiction (6,562)
Arts & Photography (898)
Literature & Fiction (12,667)
Health, Mind & Body (2,529)
History (2,037)
Travel (1,422)
Medicine (1,280)
Home & Garden (640)
Biographies & Memoirs (2,560)
Romance (1,624)
Science Fiction & Fantasy (1,345)
Parenting & Families (852)
Children's Books (1,842)
Teens (1,167)
Comics & Graphic Novels (94)
Religion & Spirituality (2,353)
Mystery & Thrillers (5,883)
Reference (2,338)
Cooking, Food & Wine (134)
Sports (992)
Outdoors & Nature (829)
Law (491)
Gay & Lesbian (380)

Shipping Option
Any Shipping Option
Can be shipped within one business day from Amazon.com (24,233)

Format
Any Format
Printed Books (34,124)
HTML (27)
Audiobooks (9)
Calendars (6)
PDF (3)

Binding
Any Binding
Paperback (24,944)
Hardcover (8,929)
Large Print (120)
Board Book (3)

Avg. Customer Review
Any Avg. Customer Review
★★★★☆ & Up (20,301)
★★★☆☆ & Up (24,177)
★★☆☆☆ & Up (24,806)
★☆☆☆☆ & Up (25,028)

Promotion
Any Promotion
4-for-3 Books (3,168)
Bargain Books (782)

Condition
Any Condition
Used
New
Collectible

Books > "dashboard"

Related Searches: dashboard excel.

Showing 1 - 12 of 34,217 Results « Previous | **Page: 1** 2 3 ... | Next » Sort by Relevance

1. 

Information Dashboard Design: The Effective Visual Communication of Data by Stephen Few (**Paperback** - Jan 24, 2006)

Buy new: ~~$34.99~~ **$23.09** 45 Used & new from $17.99

In Stock
Eligible for **FREE** Super Saver Shipping.

★★★★½ (39)

Other Editions: Paperback

Excerpt - page 2: "... CLARIFYING THE VISION **Dashboards** offer a unique and powerful solu- tion to an organization's ..."
Surprise me! See a random page in this book.

2. 

Performance Dashboards: Measuring, Monitoring, and Managing Your Business by Wayne W. Eckerson (**Hardcover** - Oct 14, 2005)

Buy new: ~~$45.00~~ **$29.70** 55 Used & new from $23.98

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

★★★★½ (18)

Other Editions: Hardcover

Excerpt - page 3: "... CHAPTER 1 What Are Performance **Dashboards**? THE CONTEXT FOR PERFORMANCE **DASHBOARDS** The Power of Focus Executives ..."
Surprise me! See a random page in this book.

3. 

Excel 2007 Dashboards & Reports For Dummies (For Dummies (Computer/Tech)) by Michael Alexander (**Paperback** - Mar 4, 2008)

Buy new: ~~$24.99~~ **$16.49** 41 Used & new from $13.04

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

★★★★★ (2)

4. 

Performance Dashboards and Analysis for Value Creation (Wiley Finance) by Jack Alexander (**Hardcover** - Nov 3, 2006)

Buy new: ~~$70.00~~ **$44.10** 40 Used & new from $37.07

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

★★★★★ (6)

Excerpt - page 3: "... Quality • Customer Satisfaction • Innovation • **Dashboards** FIGURE 1.2 The Measurement Challenge: Creating Context and Effectively Integrating ..."
Surprise me! See a random page in this book.

5. 

Marketing by the Dashboard Light by Patrick LaPointe (**Paperback** - Oct 1, 2005)

Buy new: **$34.95** 3 Used & new from $34.95

Not in stock; order now and we'll deliver when available
Eligible for **FREE** Super Saver Shipping.

★★★★☆ (3)

Other Editions: Hardcover

6. 

DASHBOARD CONFESSIONAL THE PLACES YOU HAVE COME TO FEAR THE MOST GUITAR VOCAL (Play It Like It Is) by Dashboard Confessional (**Paperback** - Nov 4, 2007)

Buy new: ~~$17.95~~ **$14.36** 21 Used & new from $9.95

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

★★★★★ (1)

7. **Integrated Enterprise Excellence, Vol. II Business Deployment: A Leaders' Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard** by Forrest W. Breyfogle III (**Hardcover** - April 2008)

H-001175

Listmania!

Professional SQL Server BI and Development Must Haves: A list by Joseph Salvatore

Business Intelligence: A list by Jorge Cordeiro Duarte "jcduarte"

Create a Listmania! list

Search Listmania!

Buy new: ~~$54.95~~ **$41.21** 14 Used & new from $36.18

In Stock
Eligible for **FREE** Super Saver Shipping.

☆☆☆☆☆ (9)

Excerpt - page 5: "... prise business metrics, the method to display or present such **dashboards** and scorecards may not lead to the right behavior (See ..."
Surprise me! See a random page in this book.

8. 

Enterprise Dashboards: Design and Best Practices for IT by Shadan Malik (**Hardcover** - Aug 12, 2005)

Buy new: ~~$45.00~~ **$38.25** 31 Used & new from $23.95

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

☆☆☆☆☆ (6)

Other Editions: Kindle Edition

9. 

Xcelsius 2008 Dashboard Best Practices (Business Objects Press) by Loren Abdulezer (**Paperback** - Dec 8, 2008)

Buy new: ~~$30.99~~ **$26.39**

Available for Pre-order
Eligible for **FREE** Super Saver Shipping.

10. 

Beginning Mac OS X Tiger Dashboard Widget Development by Fred Terry (**Paperback** - Jul 19, 2006)

Buy new: ~~$34.99~~ **$23.53** 49 Used & new from $0.25

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

Other Editions: Kindle Edition

Excerpt - page 3: "... 1 Tiger, **Dashboard**, and Widgets If you have had a chance to play ..."
Surprise me! See a random page in this book.

11. No image available

Balanced Scorecards & Operational Dashboards with Microsoft Excel by Ron Person (**Paperback** - Dec 15, 2008)

Buy new: ~~$49.99~~ **$31.49**

Available for Pre-order
Eligible for **FREE** Super Saver Shipping.

12. 

Microsoft ® Office 2007 Business Intelligence by Doug Harts (**Paperback** - Nov 16, 2007)

Buy new: ~~$39.99~~ **$26.39** 25 Used & new from $17.71

Get it by **Wednesday, Aug 20** if you order in the next **7 hours** and choose one-day shipping.
Eligible for **FREE** Super Saver Shipping.

☆☆☆☆☆ (8)

Other Editions: Kindle Edition

Excerpt - page 2: "... Excel Services SharePoint Report Center I Key Performance Indicators 1 **Dashboards** Analytic Chart/ Grid (Scorecard Designer Biz # Planning Office On ..."
Surprise me! See a random page in this book.

Showing 1 - 12 of 34,217 Results « Previous | **Page:** **1** 2 3 ... | Next »

Sort by Relevance

Search Feedback

Did you find what you were looking for? Yes No

If you need help or have a question for Customer Service, please visit the Help Section.

H-001176

Search powered by A9

Where's My Stuff?
- Track your recent orders.
- View or change your orders in Your Account.

Shipping & Returns
- See our shipping rates & policies.
- Return an item (here's our Returns Policy).

Need Help?
- Forgot your password? Click here.
- Redeem or buy a gift certificate/card.
- Visit our Help department.

Search Amazon.com GO

Your Recent History(What's this?)

You have no recently viewed items.

After viewing product detail pages or search results, look here to find an easy way to navigate back to pages you are interested in.

Loading Recommendations...

Recent Searches

dashboard (All Products)

> **View & Edit Your Browsing History**

amazon.com® Amazon.com Home | Directory of All Stores

International Sites: Canada | United Kingdom | Germany | Japan | France | China

Business Programs: Sell on Amazon | Build an eCommerce Site | Advertise With Us | Developer Services | Self-Publish with Us

Help | View Cart | Your Account | 1-Click Settings

Investor Relations | Press Release | Careers at Amazon | Join Associates | Join Advantage | Join Honor System

Present data effectively and increase the value of your reports

Excel® 2007 Dashboards & Reports FOR DUMMIES®

Full-color insert shows dashboard reports you can create

A Reference for the Rest of Us!®

FREE eTips at dummies.com®

Michael Alexander
Author of Crystal Xclesius For Dummies

Excel® 2007 Dashboards & Reports For Dummies®

Cheat Sheet

Excel 2007 offers some new conditional formatting rules that allow you to add icons to your dashboards. With icons, you can represent and distinguish values from one another by using different shapes and colors. Here's a quick glance at the Icon Sets that come with Excel 2007.

Icon Set Name	Icons	Icon Set Name	Icons
3 Arrows (Colored)		4 Arrows (Colored)	
3 Arrows (Gray)		4 Arrows (Gray)	
3 Flags		Red to Black	
3 Traffic Lights (Rimmed)		4 Traffic Lights	
3 Traffic Lights (Unrimmed)		4 Ratings	
3 Symbols (Circled)		5 Arrows (Colored)	
3 Symbols (Uncircled)		5 Arrows (Gray)	
3 Signs		5 Ratings	
		5 Quarters	

If you're working in an environment where not everyone has Excel 2007, definitely avoid using Excel 2007's Icon Set conditional formatting. Why? Icon Sets aren't backwards compatible, so anyone who doesn't have Excel 2007 can't use them.

For Dummies: Bestselling Book Series for Beginners

Excel® 2007 Dashboards & Reports For Dummies®

Cheat Sheet

A creative alternative to using the Icon Sets offered with conditional formatting is to use the various symbol fonts that come with Office. The symbol fonts are Wingdings, Wingdings2, Wingdings3, and Webdings. Each character/font combination shown in the table below displays an icon that can be used to represent a value in your dashboard.

Character	Font	Icon	Character	Font	Icon
3	Webdings	◂	f	Wingdings 3	←
4	Webdings	▸	g	Wingdings 3	→
5	Webdings	▴	h	Wingdings 3	↑
6	Webdings	▾	i	Wingdings 3	↓
l	Wingdings	●	j	Wingdings 3	↖
n	Wingdings	■	k	Wingdings 3	↗
t	Wingdings	♦	l	Wingdings 3	↙
P	Wingdings	🏳	m	Wingdings 3	↘
C	Wingdings	🌩	p	Wingdings 3	▲
D	Wingdings	👌	q	Wingdings 3	▼
J	Wingdings	☺	t	Wingdings 3	◀
K	Wingdings	😐	u	Wingdings 3	▶
L	Wingdings	☹	r	Wingdings 3	△
O	Wingdings 2	×	s	Wingdings 3	▽
P	Wingdings 2	✓	v	Wingdings 3	◁
Q	Wingdings 2	☒	w	Wingdings 3	▷
R	Wingdings 2	☑			

It's always nice to see the approach others have taken to design their reporting mechanisms. Here's a list of sites (in no particular order) dedicated to business intelligence and the presentation of data through dashboards. I often visit these sites to get ideas and fresh new perspectives on dashboards and reports.

- `www.dashboardspy.com`: The Dashboard Spy posts examples of business intelligence dashboards, pointing out examples of good and bad dashboard design. This is a virtual warehouse of dashboarding ideas.
- `www.perceptualedge.com`: Visualization expert Stephen Few provides some fascinating insights on data visualization and dashboarding. A generous amount of articles and examples can be found at his site and his blog.
- `www.juiceanalytics.com/writing`: Zach and Chris Gemignani of Juice Analytics use their site as a platform to critique charts and offer interesting ideas around reporting data.
- `http://blog.instantcognition.com/category/visualization`: Instant Cognition is a blog where you'll find loads of articles on the latest visualization and Web analytics trends. You're sure to get plenty of ideas from the wide array of topics presented at this blog.
- `www.edwardtufte.com/bboard`: Professor Edward Tufte is an icon in the field of information design and data visualization. He shares his thoughts around visual communication in a series of articles at his site. Although many of these ideas are academic in nature, they'll get you thinking in new ways about how to best present data.

For Dummies: Bestselling Book Series for Beginners

Excel® 2007 Dashboards & Reports FOR DUMMIES®

by Michael Alexander

Wiley Publishing, Inc.

Excel® 2007 Dashboards & Reports For Dummies®
Published by
Wiley Publishing, Inc.
111 River Street
Hoboken, NJ 07030-5774

www.wiley.com

Published by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

Library of Congress Control Number: 2008921207

ISBN: 978-0-470-22814-2

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

About the Author

Michael Alexander is a Microsoft Certified Application Developer (MCAD) with over 14 years experience consulting and developing office solutions. He is the author/co-author of several books on business analysis using Microsoft Excel and Access. Michael is one of 96 Microsoft Excel MVPs worldwide who has been recognized for his contributions to the Excel community. He is also the principal player behind *DataPigTechnologies.com*, a site that offers video tutorials to beginning and intermediate Excel and Access users. He currently lives in Frisco, Texas where he works as a Senior Program Manager for a top technology firm. Michael can be contacted at `mike@datapig technologies.com`.

Dedication

For my family.

Author's Acknowledgments

My deepest thanks to Greg Croy, Christopher Morris, Loren Abdulezer and all the professionals at Wiley who have helped bring this book to fruition. And a special thank you to my beautiful wife Mary who will open this book long enough to read the dedication and acknowledgments.

Publisher's Acknowledgments

We're proud of this book; please send us your comments through our online registration form located at www.dummies.com/register/.

Some of the people who helped bring this book to market include the following:

Acquisitions, Editorial, and Media Development

Senior Project Editor: Christopher Morris

Executive Editor: Gregory S. Croy

Copy Editor: Jennifer Riggs

Technical Editor: Loren Abdulezer

Editorial Manager: Kevin Kirschner

Assistant Producer: Kit Malone

Media Development Coordinator: Jenny Swisher

Editorial Assistant: Amanda Foxworth

Sr. Editorial Assistant: Cherie Case

Cartoons: Rich Tennant (www.the5thwave.com)

Composition Services

Project Coordinator: Katie Key

Layout and Graphics: Stacie Brooks, Reuben W. Davis, Alissa D. Ellet, Joyce Haughey, Christine Williams

Proofreader: Joni Heredia

Indexer: Potomac Indexing, LLC

Publishing and Editorial for Technology Dummies

Richard Swadley, Vice President and Executive Group Publisher

Andy Cummings, Vice President and Publisher

Mary Bednarek, Executive Acquisitions Director

Mary C. Corder, Editorial Director

Publishing for Consumer Dummies

Diane Graves Steele, Vice President and Publisher

Joyce Pepple, Acquisitions Director

Composition Services

Gerry Fahey, Vice President of Production Services

Debbie Stailey, Director of Composition Services

Contents at a Glance

Table of Contents

Introduction

The term *business intelligence (BI),* coined by Howard Dresner of the Gartner Group, describes the set of concepts and methods to improve business decision-making by using fact-based support systems. Practically speaking, BI is what you get when you analyze raw data and turn that analysis into knowledge. BI can help an organization identify cost-cutting opportunities, uncover new business opportunities, recognize changing business environments, identify data anomalies, and create widely accessible reports, among other things.

Over the last few years, the BI concept has overtaken corporate executives who are eager to turn impossible amounts of data into knowledge. As a result of this trend, whole industries have been created. Software vendors that focus on BI and dashboarding are coming out of the woodwork. New consulting firms touting their BI knowledge are popping up virtually every week. And even the traditional enterprise solution providers, like Business Objects and SAP, are offering new BI capabilities.

This need for BI has manifested itself in many forms. Most recently, it's come in the form of dashboard fever. *Dashboards* are reporting mechanisms that deliver business intelligence in a graphical form.

Maybe *you've* been hit with dashboard fever. Or maybe your manager is hitting you with dashboard fever. Nevertheless, you're probably holding this book because you're being asked to create BI solutions (that is, dashboards) in Excel.

Although many IT (information technology) managers would scoff at the thought of using Excel as a BI tool, Excel is inherently part of the enterprise BI tool portfolio. Whether IT managers are keen to acknowledge it, most of the data analysis and reporting done in business today is done by using spreadsheets. Here are several significant reasons to use Excel as the platform for your dashboards and reports:

- **Tool familiarity:** If you work in corporate America, you're conversant in the language of Excel. You can send even the most seasoned of senior vice presidents an Excel-based reporting tool and trust he'll know what to do with it. With an Excel reporting process, your users spend less time figuring how to use the tool and more time looking at the data.

- **Built-in flexibility:** With most enterprise dashboarding solutions, the capability to perform analyses outside the predefined views is either disabled or unavailable. How many times have you dumped enterprise-level data into Excel so you can analyze it yourself? I know I have. You can bet that if you give users an inflexible reporting mechanism, they'll do what it takes to create their own usable reports. In Excel, features, such as pivot tables, autofilters, and Form controls allow you to create mechanisms that don't lock your audience into one view. And because you can have multiple worksheets in one workbook, you can give them space to do their own side analysis as needed.
- **Rapid development:** Building your own reporting capabilities in Excel can liberate you from the IT department's resources and time limitations. With Excel, not only can you develop reporting mechanisms faster, but you have the flexibility to adapt more quickly to changing requirements.
- **Powerful data connectivity and automation capabilities:** Excel isn't the toy application some IT managers make it out to be. With its own native programming language and its robust object model, Excel can be used to automate processes and even connect to various data sources. With a few advanced techniques, you can make Excel a hands-off reporting mechanism that practically runs on its own.
- **Little to no incremental costs:** Not all of us can work for multi-billion dollar companies that can afford enterprise-level reporting solutions. In most companies, funding for new computers and servers is limited, let alone funding for expensive BI reporting packages. For those companies, leveraging Microsoft Office is frankly the most cost-effective way to deliver key business reporting tools without compromising too deeply on usability and functionality.

All that being said, so many reporting functions and tools are in Excel that it's difficult to know where to start. Enter your humble author, spirited into your hands via this book. Here, I show you how you can turn Excel into your own personal BI tool. With a few fundamentals and some of the new BI functionality Microsoft has included in this latest version of Excel, you can go from reporting data with simple tables to creating a meaningful reporting component that's sure to wow management.

About This Book

The goal of this book is to show you how to leverage Excel functionality to build and manage better reporting mechanisms. Each chapter in this book provides a comprehensive review of the technical and analytical concepts that help you create better reporting components — components that can be used for both dashboards and reports.

It's important to note that this book isn't a guide to visualizations or dashboarding best practices. Those are subjects worthy of their own book. This book focuses on understanding the technical aspects of using Excel's various tools and functionality and applying them to reporting.

The chapters in this book are designed to be standalone chapters that you can selectively refer to as needed. As you move through this book, you can create increasingly sophisticated dashboard and report components. After reading this book, you can

- Analyze large amounts of data and report that data in a meaningful way.
- Get a better understanding of data by viewing it from different perspectives.
- Quickly slice data into various views on the fly.
- Automate redundant reporting and analyses.
- Create interactive reporting processes.

Foolish Assumptions

I make three assumptions about you as the reader, which are:

- You've already bought and installed Excel 2007.
- You have some familiarity with the basic concepts of data analysis, such as working with tables, aggregating data, and performing calculations.
- You have a strong grasp of basic Excel concepts, such as managing table structures, creating formulas, referencing cells, filtering, and sorting.

How This Book Is Organized

The chapters in this book are organized into six parts. Each of these parts includes chapters that build on the previous chapters' instructions. The idea is that as you go through each part, you can build dashboards of increasing complexity until you're an Excel reporting guru.

Part I: Making the Move to Dashboards

Part I is all about helping you think about your data in terms of creating effective dashboards and reports. Chapter 1 introduces you to the topic of dashboards and reports, giving you some of the fundamentals and basic ground rules for creating effective dashboards and reports. Chapter 2 shows you a few concepts around data structure and layout. In this chapter, I demonstrate the impact of a poorly-planned data set and show you the best practices for setting up the source data for your dashboards and reports.

Part II: Building Basic Dashboard Components

In Part II, you take an in-depth look at some of the basic dashboard components you can create using Excel 2007. This part begins with Chapter 3 where I introduce you to pivot tables and discuses how a pivot table can play an integral role in Excel-based dashboards. Chapter 4 provides a primer on building charts in Excel 2007, giving beginners a solid understanding of how Excel charts work. Chapter 5 introduces you to the new and improved conditional formatting functionality found in Excel 2007. In this chapter, I present several ideas for using the new conditional formatting tools in dashboards and reports. In Chapter 6, you explore the various techniques that can be used to create dynamic labels, allowing for the creation of a whole new layer of visualization.

Part III: Building Advanced Dashboard Components

In Part III, you go beyond the basics to take a look at some of the advanced components you can create with Excel 2007. This part consists of three chapters, starting with Chapter 7, in which I demonstrate how to represent time trending, seasonal trending, moving averages, and other types of trending in dashboards. You're also introduced to Sparklines in this chapter. In Chapter 8, you explore the many methods used to *bucket* data, or put data into groups for reporting. Chapter 9 demonstrates some of charting techniques that help you display and measure values versus goals.

Part IV: Advanced Reporting Techniques

Part IV focuses on techniques that help you automate your reporting processes and give your users an interactive user interface. Chapter 10 provides a clear understanding of how macros can be leveraged to supercharge and automate your reporting systems. Chapter 11 illustrates how you can provide your clients with a simple interface, allowing them to easily navigate through and interact with their reporting systems.

Part V: Working with the Outside World

The theme in Part V is importing and exporting information to and from Excel. Chapter 12 explores some of the ways to incorporate data that doesn't originate in Excel. In this chapter, I show you how to import data from external sources as well as how to create systems that allow for dynamic refreshing of external data sources. Chapter 13 wraps up this look on Excel dashboards and reports by showing you the various ways to distribute and present your work.

Part VI: The Part of Tens

Part VI is the classic Part of Tens section found in almost all *For Dummies* series titles. The chapters found here each present ten or more pearls of wisdom, delivered in bite-sized pieces. In Chapter 14, I share with you ten or so chart-building best practices, helping you design more effective charts. In Chapter 15, I provide a checklist of questions you should ask yourself before sharing your Excel dashboards and reports.

Sample Files for This Book

This book comes with samples files that can be downloaded from the Wiley Web site at the following URL:

www.dummies.com/go/dashboards

Icons Used In This Book

Throughout this book, you may notice little icons in the left margin that act as road signs to help you quickly pull out the information that's most important to you. Here's what they look like and what they represent.

Information tagged with a Remember icon identifies general information and core concepts that you may already know but should certainly understand and review.

Tip icons include short suggestions and tidbits of useful information.

Look for Warning icons to identify potential pitfalls, including easily-confused or difficult-to-understand terms and concepts.

Technical Stuff icons highlight technical details that you can skip unless you want to bring out the tech geek in you.

Where to Go from Here

If you want to get an understanding of best practices and techniques to get started with a dashboarding project, start with Chapters 1 and 2.

If you're looking for a quick tutorial on reporting data with pivot tables, Chapter 3 is what you need.

If you're relatively new to Excel and you're looking to get a sense of the basic reporting tools available in Excel, Chapters 4, 5 and 6 will get you started.

If you're a bit more experienced and you'd like to discover some advanced techniques for reporting data and automating you dashboards, you can explore Chapters 7 through 11.

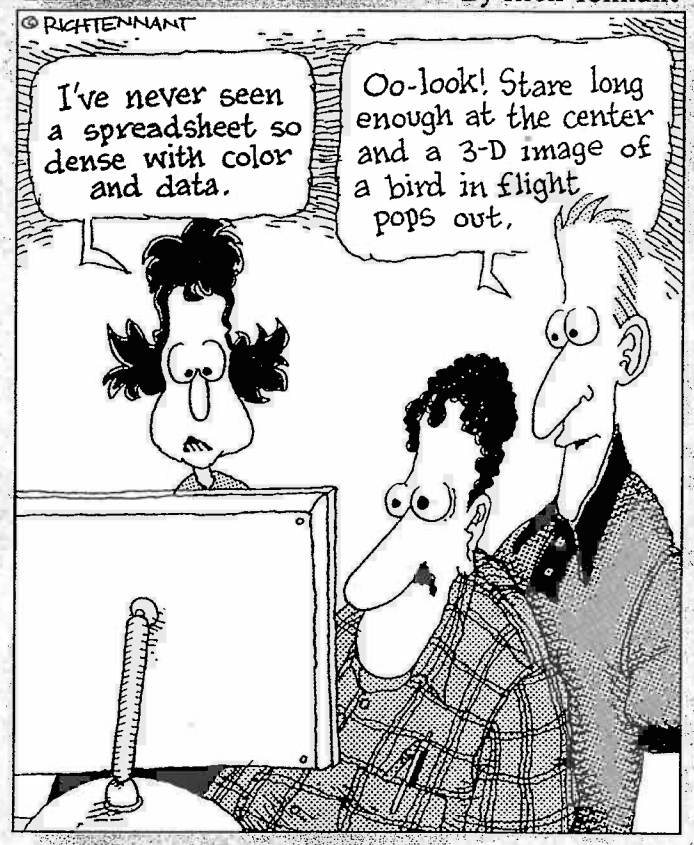
Working in an environment where you have to share your reporting with the outside world? Chapters 12 and 13 will show you how to use external data and some of the ways you can distribute your dashboards.

You can also just open the book to any chapter you want and dive right into the art and science of building reporting mechanisms with Excel.

Part I

Making the Move to Dashboards

The 5th Wave By Rich Tennant



In this part . . .

In this section, you discover how to think about your data in terms of creating effective dashboards and reports. Chapter 1 introduces you to the topic of dashboards and reports, giving you some of the fundamentals and basic ground rules for creating effective dashboards and reports. Chapter 2 shows you a few concepts around data structure and layout. In this part, you discover the impact of a poorly-planned data set and the best practices for setting up the source data for your dashboards and reports.

Chapter 1

Getting in the Dashboard State of Mind

In This Chapter

- Comparing dashboards to reports
- Getting started on the right foot
- Dashboarding best practices

In his song, "New York State of Mind," Billy Joel laments the differences between California and New York. In this homage to the Big Apple, he implies a mood and a feeling that comes with thinking about New York. I admit it's a stretch, but I'll to extend this analogy to Excel — don't laugh.

In Excel, the differences between building a dashboard and creating standard table-driven analyses are as great as the differences between California and New York. To approach a dashboarding project, you truly have to get into the dashboard state of mind. As you'll come to realize in the next few chapters, dashboarding requires far more preparation than standard Excel analyses. It calls for closer communication with business leaders, stricter data modeling techniques, and the following of certain best practices. It's beneficial to have a base familiarity with fundamental dashboarding concepts before venturing off into the mechanics of building a dashboard.

In this chapter, you get a solid understanding of these basic dashboard concepts and design principles as well as what it takes to prepare for a dashboarding project.

Defining Dashboards and Reports

It isn't difficult to use *report* and *dashboard* interchangeably. In fact, the line between reports and dashboards frequently gets muddied. I've seen countless reports that have been referred to as dashboards just because they included a few charts. Likewise, I've seen many examples of what could be considered dashboards but have been called reports.

Now this may all seem like semantics to you, but it's helpful to clear the air a bit and understand the core attributes of what are considered to be reports and dashboards.

Defining reports

Reports are probably the most common application of business intelligence. A *report* can be described as a document that contains data used for reading or viewing. It can be as simple as a data table or as complex as a subtotaled view with interactive drilling, similar to Excel's Subtotal functionality.

The key attribute of a report is that it doesn't lead a reader to a predefined conclusion. Although a report can include analysis, aggregations, and even charts, reports often allow for the end user to apply his own judgment and analysis to the data.

To clarify this concept, Figure 1-1 shows an example of a report. This report shows the National Park overnight visitor statistics by period. Although this data can be useful, it's clear this report isn't steering the reader in any predefined judgment or analysis; it's simply presenting the aggregated data.

National Park Overnight Visitor Stats

	Tent Campers	RV Campers	Backcountry	Lodging	Concessioner Campgrounds	Total
Jan-05	2,397,098	4,446,370	3,934,114	3,235,039	838,932	14,851,553
Feb-05	2,395,236	4,378,491	4,221,920	3,386,345	814,734	15,196,726
Mar-05	2,329,845	4,663,020	4,153,999	3,312,100	650,088	15,109,052
Apr-05	2,424,227	4,596,036	3,601,198	3,317,010	644,543	14,583,014
May-05	2,579,716	4,232,793	3,747,293	3,486,041	725,979	14,771,822
Jun-05	1,978,867	3,943,183	3,586,062	3,527,045	733,121	13,768,278
Jul-05	1,680,414	3,759,294	3,460,005	3,538,176	743,256	13,181,145
Sep-05	1,644,691	3,768,528	3,955,795	3,726,504	786,102	13,901,620
Oct-05	1,574,706	4,043,206	3,921,104	3,787,463	852,820	14,179,299
Nov-05	1,617,706	3,937,271	3,929,665	3,880,622	865,694	14,230,958

Figure 1-1: Reports present data for viewing but don't lead readers to conclusions.

Defining dashboards

A *dashboard* is a visual interface that provides at-a-glance views into key measures relevant to a particular objective or business process. Dashboards have three main attributes:

- Dashboards are typically graphical in nature, providing visualizations that help focus attention on key trends, comparisons, and exceptions.
- Dashboards often display only data that are relevant to the goal of the dashboard.
- Because dashboards are designed with a specific purpose or goal, they inherently contain predefined conclusions that relieve the end user from performing his own analysis.

Figure 1-2 illustrates a dashboard that uses the same data shown in Figure 1-1. This dashboard displays key information about the National Park overnight visitor stats. As you can see, this presentation has all the main attributes that define a dashboard. First, it's a visual display that allows you to quickly recognize the overall trending of the overnight visitor stats. Second, you can see that not all the detailed data is shown here; only the key pieces of information that's relevant to support the goal of this dashboard. Finally, by virtue of its objective, this dashboard effectively presents you with analysis and conclusions about the trending of overnight visitors.

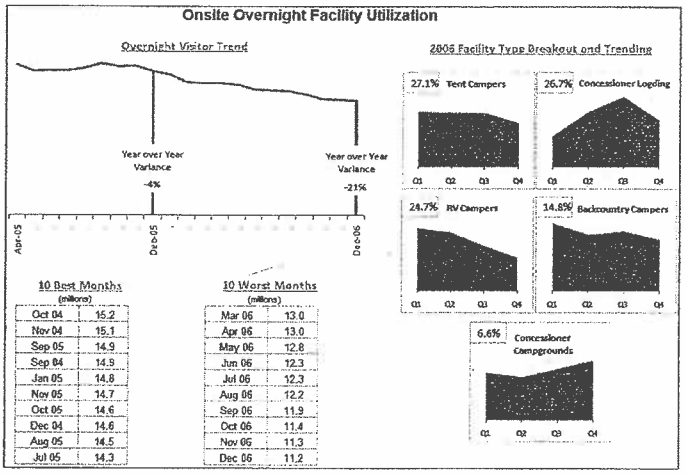


Figure 1-2: Dashboards provide at-a-glance views into key measures relevant to a particular objective or business process.

Preparing for Greatness

Imagine your manager asks you to create a dashboard that tells him everything he should know about monthly service subscriptions. Do you jump to action and slap together whatever comes to mind? Do you take a guess at what he wants to see and hope it's useful? These questions sound ridiculous but such situations happen more that you think. I'm constantly called to action to create the next great reporting tool but am rarely provided the time to gather the true requirements for it. Between limited information and unrealistic deadlines, the end product often ends up being unused or having little value.

This brings me to one of the key steps in preparing for dashboarding — collecting user requirements.

In the non-IT world of the Excel analyst, user requirements are practically useless because of sudden changes in project scope, constantly changing priorities, and shifting deadlines. The gathering of user requirements is viewed to be a lot of work and a waste of valuable time in the ever-changing business environment. But as I mention at the start of this chapter, it's time to get into the dashboard state of mind.

Consider how many times a manager has asked you for an analysis and then said "No, I meant this." Or, "Now that I see it, I realize I need this." As frustrating as that can be for a single analysis, imagine running into this during the creation of a complex dashboard with several data integration processes. The question is, would you rather spend your time on the front end gathering user requirements or spend time painstakingly redesigning the dashboard you'll surely come to hate?

The process of gathering user requirements doesn't have to be an overly complicated or formal one. Here are some simple things you can do to ensure you have a solid idea of the purpose of the dashboard.

Establish the audience and purpose for the dashboard

Chances are your manager has been asked to create the reporting mechanism, and he has passed the task to you. Don't be afraid to clarify the source of the initial request and talk to them about what they're really asking for. Discuss the purpose of the dashboard and the triggers that caused them to ask for a dashboard in the first place. You may find, after discussing the matter, that a simple Excel report meets their needs, foregoing the need for a full-on dashboard.

If a dashboard is indeed warranted, talk about who the end users are. Take some time to meet with some of the end users and talk about how they'd use the dashboard. Will the dashboard be used as a performance tool for regional

managers? Will the dashboard be used to share data with external customers? Talking through these fundamentals with the right people helps align your thoughts and avoids the creation of a dashboard that doesn't fulfill the necessary requirements.

Delineate the measures for the dashboard

Most dashboards are designed around a set of measures, or *key performance indicators (KPIs).* A KPI is an indicator of the performance of a task deemed to be essential to daily operations or processes. The idea is that a KPI reveals performance that is outside the normal range for a particular measure, so it therefore often signals the need for attention and intervention. Although the measures you place into your dashboards may not officially be called KPIs, they undoubtedly serve the same purpose — to draw attention to problem areas.

The topic of creating effective KPIs for your organization is a subject worthy of its own book and is out of the scope of this endeavor. For a detailed guide on KPI development strategies, pick up David Parmenter's *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs* (Wiley). This book provides an excellent step-by-step approach to developing and implementing KPIs.

The measures used on a dashboard should absolutely support the initial purpose of that dashboard. For example, if you're creating a dashboard focused on supply chain processes, it may not make sense to have human resources headcount data incorporated. It's generally a good practice to avoid inclusion of nice-to-know data into your dashboards simply to fill white space or because the data is available. If the data doesn't support the core purpose of the dashboard, leave it out.

Here's another tip: When gathering the measures required for the dashboard, I find that it often helps to write a sentence to describe the measure needed. For example, instead of simply adding the word *Revenue* into my user requirements, I write what I call a *component question,* such as, "What is the overall revenue trend for the last two years?" I call it a *component question* because I intend to create a single component, such as a chart or a table, to answer the question. For instance, if the component question is, "What is the overall revenue trend for the last two years?," you can imagine a chart component answering that question by showing the two-year revenue trend.

I sometimes take this a step further and actually incorporate the component questions into a mock layout of the dashboard to get a high-level sense of the data the dashboard will require. Figure 1-3 illustrates an example.

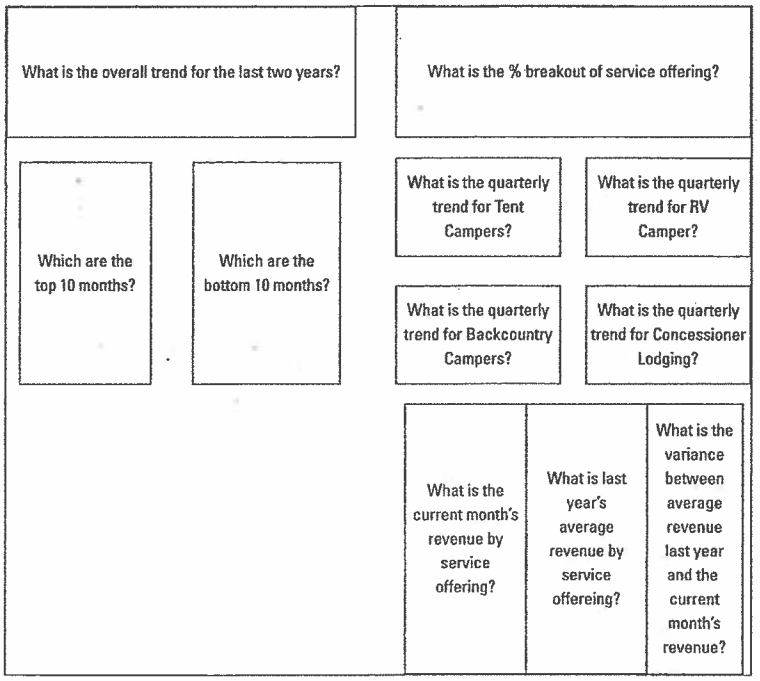


Figure 1-3: Each box in this dashboard layout mockup represents a component and the type of data required to create the measures.

Each box in this dashboard layout mockup represents a component on the dashboard and its approximate position. The questions within each box provide a sense of the types of data required to create the measures for the dashboard.

Catalog the required data sources

When you have the list of measures that need to be included on the dashboard, it's important to take a tally of the available systems to determine if the data required to produce those measures are available. Ask yourself the following questions:

- Do you have access to the data sources necessary?
- How often are those data sources refreshed?
- Who owns and maintains those data sources?
- What are the processes to get the data from those resources?
- Does the data even exist?

These are all questions you need answered when negotiating development time, refresh intervals, and phasing.

Conventional wisdom says that the measures on your dashboard shouldn't be governed by the availability of data. Instead, you should let dashboard KPIs and measures govern the data sources in your organization. Although I agree with the spirit of that statement, I've been involved in too many dashboard projects that have fallen apart because of lack of data. Real-world experience has taught me the difference between the ideal and the ordeal.

If your organizational strategy requires that you collect and measure data that is nonexistent or not available, press pause on the dashboard project and turn your attention to creating a data collection mechanism that will get the data you need.

Define the dimensions and filters for the dashboard

In the context of reporting, a *dimension* is a data category used to organize business data. Examples of dimensions are Region, Market, Branch, Manager, or Employee. When you define a dimension in the user requirements stage of development, you're determining how the measures should be grouped or distributed. For example, if it's determined that your dashboard should report data by employee, you need to ensure that your data collection and aggregation processes include employee detail. As you can imagine, adding a new dimension after the dashboard is built can get complicated, especially when your processes require many aggregations across multiple data sources. The bottom line is that locking down the dimensions for a dashboard early in the process definitely saves you headaches.

Along those same lines, you want to get a clear sense of the types of filters that are required. In the context of dashboards, *filters* are mechanisms that allow you to narrow the scope of the data to a single dimension. For example, you can filter on Year, Employee, or Region. Again, if you don't account for a particular filter while building your dashboarding process, you'll likely be forced into an unpleasant redesign of both your data collection processes and your dashboard.

If you're confused by the difference between dimensions and fields, think about a simple Excel table. A dimension is like a column of data (such as a column containing employee names) in an Excel table. A filter, then, is the mechanism that allows you to narrow your table to show only the data for a particular employee. For example, if you apply Excel's AutoFilter to the employee column, you are building a filter mechanism into your table.

Determine the need for drill-down features

Many dashboards provide *drill-down features* that allow users to "drill" into the details of a specific measure. You want to get a clear understanding of the types of drill-downs your users have in mind.

To most users, *drill-down feature* means the ability to get a raw data table supporting the measures shown on the dashboard. Although getting raw data isn't always practical or possible, discussing these requests will at a minimum allow you to talk to your users about additional reporting, links to other data sources, and other solutions that may help them get the data they need.

Establish the refresh schedule

A *refresh schedule* refers to the schedule by which a dashboard is updated to show the latest information available. Because you're the one responsible for building and maintaining the dashboard, you should have a say in the refresh schedules. Your manager may not know what it takes to refresh the dashboard in question.

While you're determining the refresh schedule, keep in mind the refresh rates of the different data sources whose measures you need to get. You can't refresh your dashboard any faster than your data sources. Also, negotiate enough development time to build macros that aid in automation of redundant and time-consuming refresh tasks.

A Quick Look at Dashboard Design Principles

When collecting user requirements for your dashboarding project, there's a heavy focus on the data aspects of the dashboard: The types of data needed, the dimensions of data required, the data sources to be used, and so on. This is a good thing — without solid data processes, your dashboards won't be effective or maintainable. That being said, here's another aspect to your dashboarding project that calls for the same fervor in preparation: the *design aspect.*

Excel users live in a world of numbers and tables, not visualization and design. Your typical Excel analyst has no background in visual design and is often left to rely on his own visual instincts to design his dashboards. As a result, most Excel-based dashboards have little thought given to effective visual design, often resulting in overly cluttered and ineffective user interfaces.

The good news is that dashboarding has been around for such a long time, there's a vast knowledge base of prescribed visualization and dashboard design principles. Many of these principles seem like common sense; even so, these are concepts that Excel users don't often find themselves thinking about. Because this chapter is about getting into the dashboard state of mind, I break that trend and review a few dashboard design principles that improve the design aspect of your Excel dashboards.

Many of the concepts in this section come from the work of *Stephen Few*, visualization expert and author of several books and articles on dashboard design principles. As this book is primarily focused on the technical aspects of building reporting components in Excel, this section offers a high-level look at dashboard design. If you find that you're captivated by the subject, feel free to visit Stephen Few's Web site at `www.perceptualedge.com`.

Rule number 1: Keep it simple

Dashboard design expert, Stephen Few, has the mantra, "Simplify, Simplify, Simplify." The basic idea is that dashboards cluttered with too many measures or too much eye candy can dilute the significant information you're trying to present. How many times has someone told you that your reports look "busy"? In essence, this complaint means that too much is going on in the page or screen, making it hard to see the actual data.

Here are a few actions you can take to ensure simpler and more effective dashboard designs.

Don't turn your dashboard into a data repository

Admit it. You include as much information onto a report as possible, primarily to avoid being asked for additional information. We all do it. But in the dashboard state of mind, you have to fight the urge to force every piece of data available onto your dashboards.

Overwhelming users with too much data can cause them to lose sight of the primary goal of the dashboard and focus on inconsequential data. The measures used on a dashboard should support the initial purpose of that dashboard. Avoid the urge to fill white space for the sake of symmetry and appearances. Don't include nice-to-know data just because the data is available. If the data doesn't support the core purpose of the dashboard, leave it out.

Avoid the fancy formatting

The key to communicating effectively with your dashboards is to present your data as simply as possible. There's no need to wrap it in eye candy to make it more interesting. It's okay to have a dashboard with little to no color

or formatting. You'll find that the lack of fancy formatting only serves to call attention to the actual data. Focus on the data and not the shiny happy graphics. Here are a few guidelines:

- **Avoid using colors or background fills to partition your dashboards.** Colors in general should be used sparingly, reserved for providing information about key data points. For example, assigning the colors red, yellow, and green to measures traditionally indicates performance level. Adding these colors to other sections of your dashboard only serves to distract your audience.
- **De-emphasize borders, backgrounds, and other elements that define dashboard areas.** Try to use the natural white space between your components to partition your dashboard. If borders are necessary, format them to hues lighter than the ones you've used for your data. Light grays are typically ideal for borders. The idea is to indicate sections without distracting from the information displayed.
- **Avoid applying fancy effects, such as gradients, pattern fills, shadows, glows, soft edges, and other formatting.** Excel 2007 makes it easy to apply effects that make everything look shiny, glittery, and generally happy. Although these formatting features make for great marketing tools, they don't do your reporting mechanisms any favors.
- **Don't try to enhance your dashboards with clip art or pictures.** Not only do they do nothing to further data presentation, they often just look tacky.

Limit each dashboard to one printable page

Dashboards in general should provide at-a-glance views into key measures relevant to particular objectives or business processes. This implies that all the data is immediately viewable on the one page. Although including all your data on one page isn't always the easiest thing to do, there's much benefit to being able to see everything on one page or screen. You can compare sections more easily, you can process cause and effect relationships more effectively, and you rely less on short term memory. When a user has to scroll left, right, or down, these benefits are diminished. Furthermore, users tend to believe that when information is placed out of normal view (areas that require scrolling), it's somehow less important.

But what if you can't fit all the data on one sheet? First, review the measures on your dashboard and determine if they really need to be there. Next, format your dashboard to use less space (format fonts, reduce white space, and adjust column and row widths). Finally, try adding interactivity to your dashboard, allowing users to dynamically change views to show only those measures that are relevant to them.

Use layout and placement to draw focus

As I discuss earlier in this chapter, only measures that support the dashboard's utility and purpose should be included in the dashboard. However, it should be said that just because all measures on your dashboard are significant, they may not always have the same level of importance. In other words, you'll frequently want one component of your dashboard to stand out from the others.

Instead of using bright colors or exaggerated sizing differences, you can leverage location and placement to draw focus to the most important components on your dashboard.

Various studies have shown that readers have a natural tendency to focus on particular regions of a document. For example, researchers at the Poynter Institute's Eyetracker III project have found that readers view various regions on a screen in a certain order, paying particular attention to specific regions on the screen. They use the diagram in Figure 1-4 to illustrate what they call *priority zones.* Regions with the number 1 in the diagram seem to have high prominence, attracting the most attention for longer periods of time. Meanwhile, priority 3 regions seem to have low prominence.

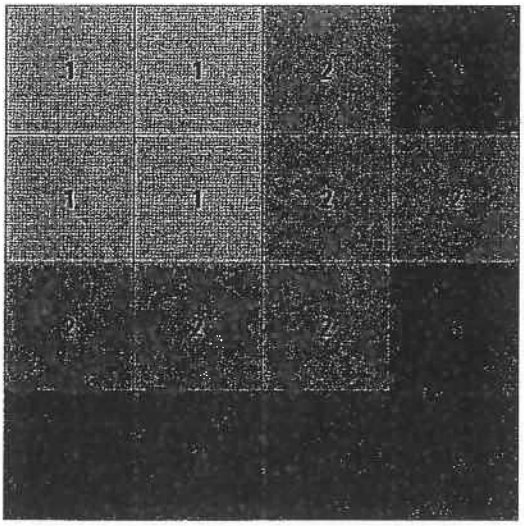


Figure 1-4: Studies show that users pay particular attention to the upper-left and middle-left of a document.

You can leverage these priority zones to promote or demote certain components based on significance. If one of the charts on your dashboard warrants special focus, you can simply place that chart in a region of prominence.

Note that surrounding colors, borders, fonts, and other formatting can affect the viewing patterns of your readers, de-emphasizing a previously high prominence region.

Format numbers effectively

There will undoubtedly be lots of numbers in your dashboards. Some of them will be in charts, and others will be in tables. Remember that every piece of information on your dashboard should have a reason for being there. It's important that you format your numbers effectively to allow your users to understand the information they represent without confusion or hindrance. Here are some guidelines to keep in mind when formatting the numbers in your dashboards and reports:

- **Always use commas to make numbers easier to read.** For example, instead of 2345, show 2,345.
- **Only use decimal places if that level of precision is required.** For instance, there's rarely benefit for showing the decimal places in a dollar amount, such as $123.45. Likewise in percentages, use only the minimum number of decimals required to represent the data effectively. For example instead of 43.21%, you may be able to get away with 43%.
- **Only use the dollar symbol when you need to clarify that you're referring to monetary values.** If you have a chart or table that contains all revenue values, and there's a label clearly stating this, you can save rooms and pixels by leaving out the dollar symbol.
- **Format very large numbers to the thousands or millions place.** For instance, instead of displaying 16,906,714, you can format the number to read 17M.

You can easily format large numbers in Excel by using the Format Cells dialog box, shown in Figure 1-5. Here, you can specify a custom number format by selecting Custom in the Category list and entering the desired number format code in the Type input box. In Figure 1-5, the format code `0,,"M"` ensures the numbers are formatted to millions with an M appendage.

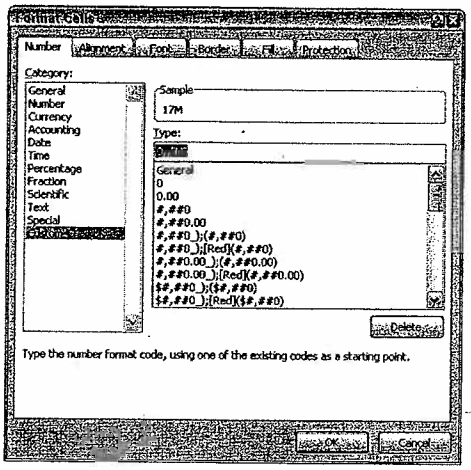


Figure 1-5: Select Custom in the Category list and enter a number format code in the Type input box.

Table 1-1 lists some common format codes and how they affect numbers.

Table 1-1 Number Format Codes

Number Format Code	*How 16,906,714 Would be Displayed*
0,	16907
0,0,	16,907
0.00,	16,906.71
0,"K"	16907K
0,0,"K"	16,907K
0.00,"K"	16,906.71K
$0,0,"K"	$16,907K
0,,	17
0,,"M"	17M
0.0,,"M"	16.9M
0.00,,"M"	16.91M
$0.0,,"M"	$16.9M

Use titles and labels effectively

It's common sense, but many people often fail to label items on dashboards effectively. If your manager looks at your dashboard and asks you, "What is this telling me?," you likely have labeling issues. Here are a few guidelines for effective labeling in your dashboards and reports:

- **Always include a timestamp on your reporting mechanisms.** This minimizes confusion when distributing the same dashboard or report in monthly or weekly installments.
- **Always include some text indicating when the data for the measures was retrieved.** In many cases, timing of the data is a critical piece of information when analyzing a measure.
- **Use descriptive titles for each component in your dashboard.** This allows users to clearly identify what they're looking at. Be sure to avoid cryptic titles with lots of acronyms and symbols.
- **Although it may seem counterintuitive, it's generally good practice to de-emphasize labels by formatting them to hues lighter than the ones used for your data.** Lightly colored labels give your users the information they need without distracting them from the information displayed. Ideal colors to use for labels are colors that are commonly found in nature: soft grays, browns, blues, and greens.

Chapter 2

Building a Super Model

In This Chapter

- Understanding the best data modeling practices
- Leveraging Excel functions to deliver data
- Creating smart tables that expand with data

One of Excel's most attractive features is its flexibility. You can create an intricate system of interlocking calculations, linked cells, and formatted summaries that work together to create a final analysis. However, years of experience has brought me face-to-face with an ugly truth. Although Excel is like the cool gym teacher that lets you do anything you want, a lack of structure in your data models can lead to some serious headaches in the long run.

What's a data model? A *data model* provides the foundation upon which your reporting mechanism is built. When you build a spreadsheet that imports, aggregates, and shapes data, you're essentially building a data model that feeds your dashboards and reports.

Creating a poorly-designed data model can mean hours of manual labor maintaining and refreshing your reporting mechanisms. On the other hand, creating an effective model allows you to easily repeat monthly reporting processes without damaging your reports or your sanity.

The goal of this chapter is to show you the concepts and techniques that help you build effective data models. In this chapter, you discover that creating a successful reporting mechanism requires more than slapping data onto a spreadsheet. Although you'll see how to build cool dashboard components in later chapters, those components won't do you any good if you can't effectively manage your data models. On that note, let's get started.

Data Modeling Best Practices

Building an effective model isn't as complicated as you may think. It's primarily a matter of thinking about your reporting processes differently. Most people spend very little time thinking about the supporting data model

behind a reporting process. If they think about it at all, they usually start by imagining a mockup of the finished dashboard and work backward from there.

Instead of seeing just the finished dashboard in your head, try to think of the end-to-end process. Where will you get the data? How should the data be structured? What analysis will need to be performed? How will the data be fed to the dashboard? How will the dashboard be refreshed?

Obviously the answers to these questions are highly situation-specific. However, some data modeling best practices will guide you to a new way of thinking about your reporting process. These are discussed in the next few sections.

Separating data, analysis, and presentation

One of the most important concepts in a data model is the separation of data, analysis, and presentation. The fundamental idea is that you don't want your data to become too tied into any one particular way of presenting that data.

To get your mind around this concept, think about an invoice. When you receive an invoice, you don't assume the financial data on that invoice is the true source of your data. It's merely a presentation of data that's actually stored in some database. That data can be analyzed and presented to you in many other manners: in charts, in tables, or even on Web sites. This sounds obvious, but Excel users often fuse data, analysis, and presentation together.

For instance, I've seen Excel workbooks that contain 12 tabs, each representing a month. On each tab, data for that month is listed along with formulas, pivot tables, and summaries. Now what happens when you're asked to provide summary by quarter? Do you add more formulas and tabs to consolidate the data on each of the month tabs? The fundamental problem in this scenario is that the tabs actually represent data values that are fused into the presentation of your analysis.

For an example more in-line with reporting, take a look at Figure 2-1. Hard-coded tables, such as this, are common. This table is an amalgamation of data, analysis, and presentation. Not only does this table tie you to a specific analysis, but there's little to no transparency into what the analysis exactly consists of. Also, what happens when you need to report by quarters or when another dimension of analysis is needed? Do you import a table that consists of more columns and rows? How does that affect your model?

	A	B	C	D	E	F	G	H	I
2		Jan	Feb	Mar	Apr	May	Jun	Jul	
3	Sales	3.69 M	6.99 M	5.77 M	4.96 M	8.48 M	4.71 M	7.48 M	
4	% Distribution	5%	9%	7%	6%	10%	6%	9%	
5									

Figure 2-1: Avoid using hard-coded tables that fuse data, analysis, and presentation.

The alternative is to create three layers in your data model: a data layer, an analysis layer, and a presentation layer. You can think of these layers as three different spreadsheets in an Excel workbook. One sheet to hold the raw data that feeds your report, one sheet to serve as a staging area where the data is analyzed and shaped, and one to serve as the presentation layer. Figure 2-2 illustrates the three layers of an effective data model.

As you can see in Figure 2-2, the raw dataset is located on its own sheet. Although the dataset has some level of aggregation applied to keep it manageably small, no further analysis is done on the data sheet.

The analysis layer consists primarily of formulas that analyze and pull data from the data layer into formatted tables (commonly referred to as *staging tables*). These staging tables ultimately feed the reporting components in your presentation layer. In short, the sheet that contains the analysis layer becomes the staging area where data is summarized and shaped to feed the reporting components. Notice in the analysis tab in Figure 2-2, the formula bar illustrates that the table consists of formulas that reference the data tab.

There are a couple of benefits to this setup. First, the entire reporting model can easily be refreshed by simply replacing the raw data with an updated dataset. The formulas in the analysis tab continue to work with the latest data. Second, any additional analysis can easily be created by using different combinations of formulas on the analysis tab. If you need data that doesn't exist in the data sheet, you can easily append a column to the end of the raw dataset without disturbing the analysis or presentation sheets.

Note that you don't necessarily have to place your data, analysis, and presentation layers on different spreadsheets. In small data models, you may find it easier to place your data in one area of a spreadsheet while building your staging tables in another area of the same spreadsheet.

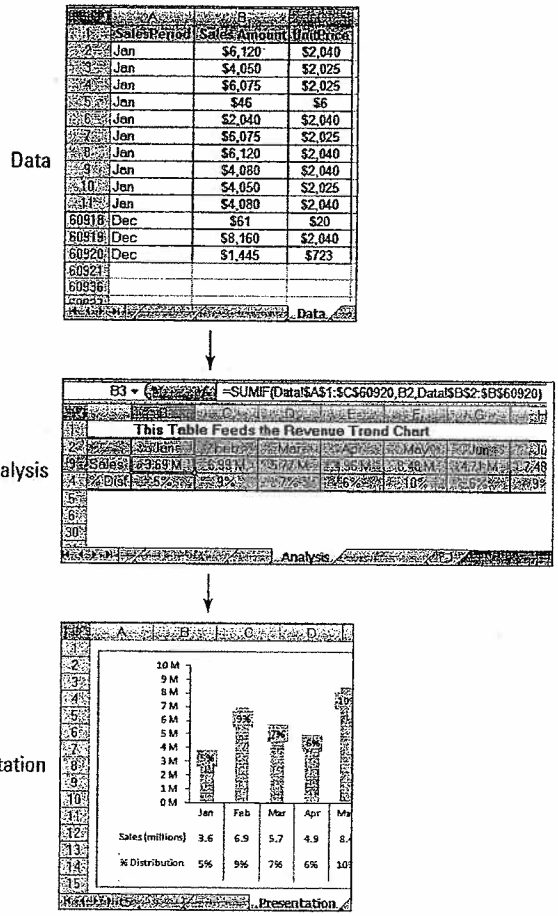


Figure 2-2: An effective data model separates data, analysis, and presentation.

Along those same lines, remember that you're not limited to just three spreadsheets either. That is to say you can have several sheets that provide the raw data, several sheets that analyze, and several that serve as the presentation layer.

Wherever you choose to place the different layers, keep in mind that the idea remains the same. The analysis layer should primarily consist of formulas that pull data from the data sheets into staging tables used to feed your presentation. Later in this chapter, you explore some of the formulas that can be used in your analysis sheets.

Starting with appropriately structured data

Not all datasets are created equal. Although some datasets work in a standard Excel environment, they may not work for data modeling purposes. Before building your data model, ensure your source data is appropriately structured for dashboarding purposes.

At the risk of oversimplification, I assert that datasets typically used in Excel come in three fundamental forms:

- **The spreadsheet report**
- **The flat data file**
- **The tabular dataset**

The punch line is that only flat data files and tabular datasets make for effective data models. I review and discuss each of these different forms in the next few sections.

Spreadsheet reports make for ineffective data models

Spreadsheet reports display highly-formatted, summarized data and are often designed as presentation tools for management or executive users. A typical spreadsheet report makes judicious use of empty space for formatting, repeats data for aesthetic purposes, and presents only high level analysis. Figure 2-3 illustrates what I mean by *spreadsheet report.*

	Europe			North America		
France				Canada		
Segment	Sales Amount	Unit Price		Segment	Sales Amount	Unit Price
Accessories	$48,942	$7,045		Accessories	$119,303	$22,381
Bikes	$3,597,879	$991,098		Bikes	$11,714,700	$3,908,691
Clothing	$129,508	$23,912		Clothing	$383,022	$72,524
Components	$871,125	$293,854		Components	$2,246,255	$865,410
Germany				Northeast		
Segment	Sales Amount	Unit Price		Segment	Sales Amount	Unit Price
Accessories	$35,681	$5,798		Accessories	$51,246	$9,666
Bikes	$1,602,487	$545,175		Bikes	$5,690,285	$1,992,517
Clothing	$75,593	$12,474		Clothing	$163,442	$30,969
Components	$337,787	$138,513		Components	$1,051,702	$442,598
United Kingdom				Northwest		
Segment	Sales Amount	Unit Price		Segment	Sales Amount	Unit Price
Accessories	$43,180	$7,419		Accessories	$53,308	$11,417
Bikes	$3,435,134	$1,094,354		Bikes	$10,484,495	$3,182,041
Clothing	$120,225	$21,981		Clothing	$201,052	$40,055
Components	$712,588	$253,458		Components	$1,784,207	$695,876

Figure 2-3: A spreadsheet report.

Although a spreadsheet report may look nice, it doesn't make for an effective data model. Why? The primary reason is that these reports offer you no separation of data, analysis, and presentation. You're essentially locked into one analysis.

Although you could make charts from the report shown in Figure 2-3, it'd be impractical to apply any analysis outside what's already there. For instance, how would you calculate and present the average of all bike sales? How would you calculate a list of the top ten best performing markets?

With this setup, you're forced into very manual processes that are difficult to maintain month after month. Any analysis outside the high-level ones already in the report is basic at best — even with fancy formulas. Furthermore, what happens when you're required to show bike sales by month? When your data model requires analysis with data that isn't in the spreadsheet report, you're forced to search for another dataset.

Flat data files lend themselves nicely to data models

The next type of file format is flat file. *Flat files* are data repositories organized by row and column. Each row corresponds to a set of data elements, or a *record.* Each column is a *field.* A field corresponds to a unique data element in record. Figure 2-4 contains the same data as the report in Figure 2-3 but is in flat data file format.

	A	B	C	D	E	F	G	H
1	Region	Market	Business Segment	Internet Sales Amount	Reseller Sales Amount	Total Sales Amount	Internet Gross Profit	Reseller Gross Profit
2	Europe	France	Accessories	2,628	8,015	3,895	1,803	6,1
3	Europe	France	Bikes	26,598	524,445	136,773	37,959	519,6
4	Europe	France	Clothing	5,075	17,172	6,043	5,152	11,7
5	Europe	France	Components	20,485	179,279	54,262	8,992	103,3
6	Europe	Germany	Accessories	2,768	5,638	2,615	2,862	4,4
7	Europe	Germany	Bikes	136,151	196,125	94,840	161,268	140,9
8	Europe	Germany	Clothing	7,150	12,374	7,159	5,765	8,5
9	Europe	Germany	Components	46,885	58,611	29,216	25,407	35,4
10	Europe	United Kingdom	Accessories	4,205	2,579	5,745	3,732	2,2
11	Europe	United Kingdom	Bikes	111,830	175,522	364,844	86,695	170,3
12	Europe	United Kingdom	Clothing	7,888	6,763	12,884	6,546	4,3
13	Europe	United Kingdom	Components	31,331	39,005	124,036	19,291	22,3
14	North America	Canada	Accessories	3,500	12,350	9,766	3,162	10,8
15	North America	Canada	Bikes	327,426	425,669	501,422	305,118	348,9

Figure 2-4: A flat data file.

Notice that every data field has a column, and every column corresponds to one data element. Furthermore, there's no extra spacing, and each row (or record) corresponds to a unique set of information. But the key attribute that makes this a flat file is that no single field uniquely identifies a record. In fact, you'd have to specify four separate fields (Region, Market, Business Segment, and a month's sales amount) before you could uniquely identify the record.

Flat files lend themselves nicely to data modeling in Excel because they can be detailed enough to hold the data you need and still be conducive to a wide array of analysis with simple formulas — SUM, AVERAGE, VLOOKUP, and SUMIF, just to name a few. Later in this chapter, you explore formulas that come in handy in a reporting data model.

Tabular datasets are perfect for pivot table driven data models

Many effective data models are driven primarily by pivot tables. Pivot tables (which I cover in Chapter 3) are Excel's premier analysis tools. For those of you who have used pivot tables before, you know they offer an excellent way to summarize and shape data for use by reporting components, such as charts and tables.

Tabular datasets are ideal for pivot table driven data models. Figure 2-5 illustrates a tabular dataset. Note that the primary difference between a tabular dataset, as shown in Figure 2-5, and a flat data file is that the column labels don't double as actual data. For instance, in Figure 2-4, the month identifiers are integrated into the column labels. In Figure 2-5, the Sales Period column contains the month identifier. This subtle difference in structure is what makes tabular datasets optimal data sources for pivot tables. This structure ensures that key pivot table functions, such as sorting and grouping, work the way they should.

	A	B	C	D	E	F
1	Region	Market	Product	Sales Period	Actual	Forecast
2	Europe	France	Accessories	Jan	1,706	385
3	Europe	France	Accessories	Feb	3,767	700
4	Europe	France	Accessories	Mar	1,219	251
5	Europe	France	Accessories	Apr	3,091	557
6	Europe	France	Accessories	May	7,057	942
7	Europe	France	Accessories	Jul	5,930	770
8	Europe	France	Accessories	Aug	9,628	1,281
9	Europe	France	Accessories	Sep	4,279	500
10	Europe	France	Accessories	Oct	2,504	528
11	Europe	France	Accessories	Nov	7,493	846
12	Europe	France	Accessories	Dec	2,268	283
13	Europe	France	Bikes	Jan	64,895	24,101
14	Europe	France	Bikes	Feb	510,102	166,174
15	Europe	France	Bikes	Mar	128,806	45,711
16	Europe	France	Bikes	Apr	81,301	26,314

Figure 2-5: A tabular dataset.

The attributes of a tabular dataset are as follows:

- The first row of the dataset contains field labels that describe the information in each column.
- The column labels don't pull double-duty as data items that can be used as filters or query criterion (such as months, dates, years, regions, markets, and so on).
- There are no blank rows or columns — every column has a heading, and a value is in every row.
- Each column represents a unique category of data.
- Each row represents individual items in each column.

Avoiding turning your data model into a database

In Chapter 1, you might have read that measures used on a dashboard should absolutely support the initial purpose of that dashboard. The same concept applies to the backend data model. You should only import data that's necessary to fulfill the purpose of your dashboard or report.

In an effort to have as much data as possible at their fingertips, many Excel users bring into their spreadsheets every piece of data they can get their hands on. You can spot these people by the 40 megabyte files they send through e-mail. You've seen these spreadsheets — two tabs that contain presentation and then six hidden tabs that contain thousands of lines of data (most of which isn't used). They essentially build a database in their spreadsheet.

What's wrong with utilizing as much data as possible? Well, here are a few issues:

- **Aggregating data within Excel increases the number of formulas.** If you're bringing in all raw data, you have to aggregate that data in Excel. This inevitably causes you to exponentially increase the number of formulas you have to employ and maintain. Remember that your data model is a vehicle for presenting analyses, not processing raw data. The data that works best in reporting mechanisms is what's already been aggregated and summarized into useful views that can be navigated and fed to dashboard components. Importing data that's already been aggregated as much as possible is far better. For example, if you need to report on Revenue by Region and Month, there's no need to import sales transactions into your data model. Instead, use an aggregated table consisting of Region, Month, and Sum of Revenue.
- **Your data model will be distributed with your dashboard.** In other words, because your dashboard is fed by your data model, you need to maintain the model behind the scenes (likely in hidden tabs) when distributing the dashboard. Besides the fact that it causes the file size to be unwieldy, including too much data in your data model can actually degrade the performance of your dashboard. Why? When you open an Excel file, the entire file is loaded into memory (or *RAM*) to ensure quick data processing and access. The drawback to this behavior is that Excel requires a great deal of RAM to process even the smallest change in your spreadsheet. You may have noticed that when you try to perform an action on a large formula-intensive dataset, Excel is slow to respond, giving you a Calculating indicator in the status bar. The larger your dataset is, the less efficient the data crunching in Excel is.

- **Large datasets can cause difficulty in scalability.** Imagine that you're working in a small company and you're using monthly transactions in your data model. Each month holds 80,000 lines of data. As time goes on, you build a robust process complete with all the formulas, pivot tables, and macros you need to analyze the data that's stored in your neatly maintained tab. Now what happens after one year? Do you start a new tab? How do you analyze two datasets on two different tabs as one entity? Are your formulas still good? Do you have to write new macros?

These are all issues that can be avoided by importing only aggregated and summarized data that's useful to the core purpose of your reporting needs.

Using tabs to document and organize your data model

Wanting to keep your data model limited to one worksheet tab is natural. In my mind, keeping track of one tab is much simpler than using different tabs. However, limiting your data model to one tab has its drawbacks, including the following:

- **Using one tab typically places limits on your analysis.** Because only so many datasets can fit on a tab, using one tab limits the number of analyses that can be represented in your data model. This in turn limits the analysis your dashboard can offer. Consider adding tabs to your data model to provide additional data and analysis that may not fit on just one tab.
- **Too much on one tab makes for a confusing data model.** When working with large datasets, you need plenty of staging tables to aggregate and shape the raw data so that it can be fed to your reporting components. If you use only one tab, you're forced to position these staging tables below or to the right of your datasets. Although this may provide all the elements needed to feed your presentation layer, a good deal of scrolling is necessary to view all the elements positioned in a wide range of areas. This makes the data model difficult to understand and maintain. Use separate tabs to hold your analysis and staging tables, particularly in data models that contain large datasets occupying a lot of real estate.
- **Using one tab limits the amount of documentation you can include.** You'll find that your data models easily become a complex system of intertwining links among components, input ranges, output ranges, and formulas. Sure, it all makes sense while you're building your data model, but try coming back to it after a few months. You'll find you've forgotten what each data range does and how each range interacts with the final presentation layer. To avoid this problem, consider adding a model map

tab to your data model. The model map tab essentially summarizes the key ranges in the data model and allows you to document how each range interacts with the reporting components in the final presentation layer. As you can see in Figure 2-6, the model map is nothing fancy; just a table that lists some key information about each range in the model.

Figure 2-6: A model map allows you to document how each range interacts with your data model.

Tab	Range	Purpose	Linked Component/s
Analysis 1	A2:A11	Provides the data source for the trend graph component	United States trend 1
Analysis 2	A3:A11	Data source for the List Box Component	List Box 1
Analysis 2	C1	Output range for the selected item in the List Box component.	Conditional Trend Icon
Analysis 2	D1:R1	Vlookup formulas that reference cell C1. This range also serves as the source data for the Combination Chart component.	Combination Chart 1
Data	C4:R48	Main Dataset for this data model	

You can include any information you think appropriate in your model map. The idea is to give yourself a handy reference that guides you through the elements in your data model.

Testing your data model before building reporting components on top of it

This best practice is simple. Make sure your data model does what it's supposed to do before building dashboard components on top of it. In that vein, here are a few things to watch for:

- **Test your formulas to ensure they're working properly:** Make sure your formulas don't produce errors and that each formula outputs expected results.
- **Double-check your main dataset to ensure it's complete:** Check that your data table has not truncated when transferring to Excel. Also, be sure that each column of data is present with appropriate data labels.
- **Make sure all numeric formatting is appropriate:** Be sure that the formatting of your data is appropriate for the field. For example, check to see that dates are formatted as dates, currency values are formatted properly, and that the correct number of decimal places are displayed where needed.

The obvious goal here is to eliminate easily avoidable errors that may cause complications later.

Speaking of documenting your data model . . . .

Another way to document the logic in your data model is to use comments and labels liberally. It's amazing how a few explanatory comments and labels can help clarify your spreadsheets. The general idea here is that the logic in your model should be clear to you even after you've been away from your data model for a long period of time.

Also, consider using colors to identify the ranges in your data model. Using colors in your data model enables you to quickly look at a range of cells and get a basic indication of what that range does. The general concept behind this best practice is that each color represents a range type. For example, you could use yellow to represent staging tables used to feed the charts and the tables in your presentation layer. You could use gray to represent formulas that aren't to be altered or touched, or purple to represent reference tables used for lookups and drop-down lists.

You can use any color you want; it's up to you to give these colors meaning. The important thing is that you have a visual distinction between the various ranges being used in your data model.

Excel Functions That Really Deliver

As you discover in this chapter, the optimal data model for any reporting mechanism is one where data, analysis, and presentation is separated into three layers. Although all three layers are important, the analysis layer is where the real art comes into play. The fundamental task of the analysis layer is to pull information from the data layer and then create staging tables that feed your charts, tables, and other reporting components. To do this effectively, you need to employ formulas that serve as data delivery mechanisms — formulas that deliver data to a destination range.

You see, the information you need lives in your data layer (typically a table containing aggregated data). *Data delivery formulas* are designed to get that data and deliver it to the analysis layer so it can be analyzed and shaped. The cool thing is that after you've set up you data delivery formulas, your analysis layer automatically updates each time your data layer is refreshed.

Confused? Don't worry — in this section, I show you a few Excel functions that work particularly well in data delivery formulas. As you go through the examples here, you'll start to see how these concepts come together.

The VLOOKUP function

The VLOOKUP function is the king of all lookup functions in Excel. I'd be willing to bet you've at least heard of VLOOKUP, if not used it a few times yourself.

The purpose of VLOOKUP is to find a specific value from a column of data where the leftmost row value matches a given criterion.

VLOOKUP basics

Take a look a Figure 2-7 to get the general idea. The table on the left shows sales by month and product number. The table on the right translates those product numbers to actual product names. The VLOOKUP function can help in associating the appropriate name to each respective product number.

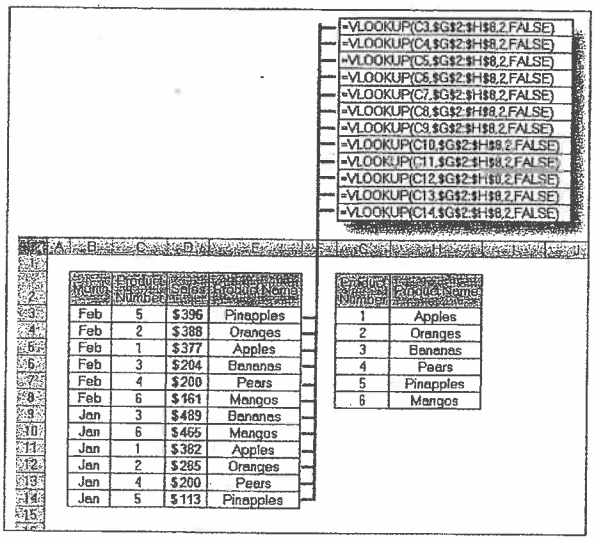


Figure 2-7: In this example, the VLOOKUP function helps to look up the appropriate product names for each product number.

To understand how VLOOKUP formulas work, take a moment to review the basic syntax. A VLOOKUP formula requires four arguments:

```
VLOOKUP(Lookup_value, Table_array, Col_index_num, Range_lookup)
```

***Lookup_value*:** The *Lookup_value* argument identifies the value being looked up. This is the value that needs to be matched to the lookup table. In the example in Figure 2-7, the *Lookup_value* is the product number. Therefore the first argument for all the formulas shown in Figure 2-7 reference column C (the column that contains the product number).

***Table_array*:** The *Table_array* argument specifies the range that contains the lookup values. In Figure 2-7, that range is G2:H8. Here are a couple points to keep in mind with this argument. First, for a VLOOKUP to work, the leftmost column of the table must be the matching value. For instance,

if you're trying to match product numbers, the leftmost column of the lookup table must contain product numbers. Second, notice that the reference used for this argument is an absolute reference. This means the column and row references are prefixed with dollar ($) signs — as in `$G$2:$H$8`. This ensures that the references don't shift while you copy the formulas down or across.

Col_index_num The *Col_index_num* argument identifies the column number in the lookup table that contains the value to be returned. In the example in Figure 2-7, the second column contains the product name (the value being looked up), so the formula uses the number 2. If the product name column was the fourth column in the lookup table, the number 4 would be used.

Range_lookup The *Range_lookup* argument specifies whether you're looking for an exact match or an approximate match. If an exact match is needed, you'd enter `FALSE` for this argument. If the closest match will do, you'd enter `TRUE` or leave the argument blank.

Applying VLOOKUP formulas in a data model

As you can imagine, there are countless ways to apply a `VLOOKUP` formula in your data model. No reason to start bland though. Let me show you one of the more intriguing ways is to implement `VLOOKUP`s.

With a few `VLOOKUP` formulas and a simple drop-down list, you can create a data model that not only delivers data to the appropriate staging table but allows you to dynamically change data views based on a selection you make. Figure 2-8 illustrates the setup.

To see this effect in action, get the `Chapter 2 Sample File.xlsx` workbook from this book's companion Web site. Open that workbook to see a `VLOOKUP1` tab.

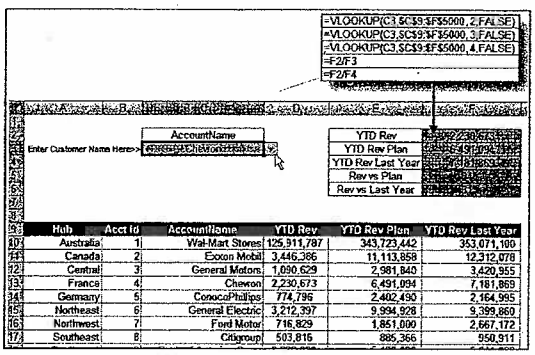


Figure 2-8: Using the `VLOOKUP` function to extract and shape data.

The data layer in the model shown in Figure 2-8 resides in the range A9:F209. The analysis layer is held in range E2:F6. The data layer consists of all formulas that extract and shape the data as needed. As you can see, the VLOOKUP formulas use the Customer Name value in cell C3 to look up the appropriate data from the data layer. So, if you entered **General Motors** in cell C3, the VLOOKUP formulas would extract the data for General Motors.

You may have noticed that the VLOOKUP formulas in Figure 2-8 specify a Table_array argument of $C$9:$F$5000. This means that the lookup table they're pointing to stretches from C9 to F5000. That seems strange because the table ends at F209. Why would you force your VLOOKUP formulas to look at a range far past the end of the data table?

Well, remember the idea behind separating the data layer and the analysis layer is so that your analysis layer can be automatically updated when your data is refreshed. When you get new data next month, you should be able to simply replace the data layer in model without having to rework your analysis layer. Allowing for more rows than necessary in your VLOOKUP formulas ensures that if your data layer grows, records won't fall outside the lookup range of the formulas.

Later in this chapter, I show you how to automatically keep up with growing data tables by using smart tables.

Using data validation drop-down lists in your data model

In the example illustrated in Figure 2-8, the data model allows you to select customer names from a drop-down list when you click cell C3. The customer name serves as the lookup value for the VLOOKUP formulas. Changing the customer name extracts a new set of data from the data layer. This allows you to quickly switch from one customer to another without having to remember and type the customer name.

Now, as cool as this seems, the reasons for this setup aren't all cosmetic. There are practical reasons for adding drop-down lists to your data models.

Many of your models consist of multiple analytical layers where each shows a different set of analyses. Although each analysis layer is different, they often need to revolve around a shared dimension, such as the same customer name, the same market, or the same region. For instance, when you have a data model that reports on Financials, Labor Statistics, and Operational Volumes, you want to make certain that when the model is reporting financials for the South region, the Labor statistics are for the South region as well.

An effective way to ensure this happens is to force your formulas to use the same dimension references. If cell C3 is where you switch customers, every analysis that is customer-dependent should reference cell C3. Drop-down

lists allow you to have a predefined list of valid variables located in a single cell. With a drop-down list, you can easily switch dimensions while building and testing multiple analysis layers.

Adding a drop-down list is a relatively easy thing to do with Excel's Data Validation functionality. To add a drop-down list:

1. **Select the Data tab on the Ribbon.**
2. **Click the Data Validation button.**
3. **Select the Settings tab in the newly-activated Data Validation dialog box (see Figure 2-9).**
4. **In the Allow drop-down list, choose List.**
5. **In the Source input box, reference the range of cell that contain your predefined selection list.**
6. **Click OK.**

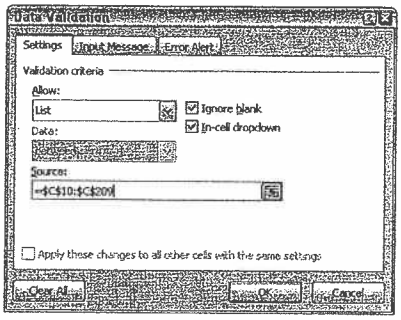


Figure 2-9: You can use data validation to create a predefined list of valid variables for your data model.

The HLOOKUP function

The HLOOKUP function is the less popular cousin of the VLOOKUP function. The *H* in HLOOKUP stands for *horizontal.* Because Excel data is typically vertically-oriented, most situations require a vertical lookup (or VLOOKUP). However, some data structures are horizontally-oriented, requiring a horizontal lookup; thus the HLOOKUP function comes in handy. The HLOOKUP searches a lookup table to find a single value from a row of data where the column label matches a given criterion.

HLOOKUP basics

Figure 2-10 demonstrates a typical scenario where HLOOKUP formulas are used. The table in C3 requires quarter-end numbers (March and June) for 2004. The HLOOKUP formulas use the column labels to find the correct month columns and then locates the 2004 data by moving down the appropriate number of rows. In this case, 2004 data is in row 4, so the number 4 is used in the formulas.

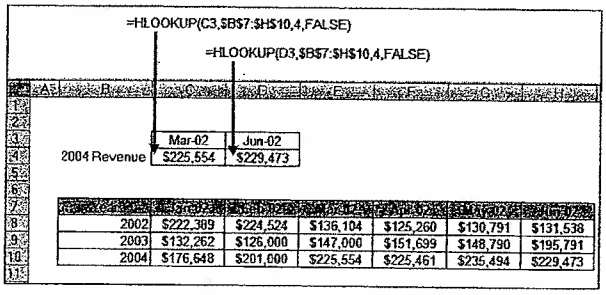


Figure 2-10: HLOOKUP formulas help to find March and June numbers from the lookup table.

To get your mind around how this works, take a look at the basic syntax of the HLOOKUP function.

```
HLOOKUP(Lookup_value, Table_array, Row_index_num,
        Range_lookup)
```

***Lookup_value*:** The *Lookup_value* argument identifies the value being looked up. In most cases, these values are column names. In the example in Figure 2-10, the column labels are being referenced for the *Lookup_value*. This points the HLOOKUP function to the appropriate column in the lookup table.

***Table_array*:** The *Table_array* argument identifies the range that contains the lookup table. In Figure 2-10, that range is B7:H10. Like the VLOOKUP examples earlier in this chapter, notice that the references used for this argument are absolute. This means the column and row references are prefixed with dollar ($) signs — as in $B$7:$H$10. This ensures that the reference doesn't shift while you copy the formula down or across.

***Row_index_num*:** The *Row_index_num* argument identifies the row number that contains the value you're looking for. In the example in Figure 2-10, the 2004 data is located in row 4 of the lookup table. Therefore, the formulas use the number 4.

***Range_lookup*:** The *Range_lookup* argument specifies whether you're looking for an exact match or an approximate match. If an exact match is

needed, you'd enter FALSE for this argument. If the closest match will do, you'd enter TRUE or leave the argument blank.

Applying HLOOKUP formulas in a data model

HLOOKUPs are especially handy for shaping data into structures appropriate for charting or other types of reporting. A simple example is demonstrated in Figure 2-11. With HLOOKUPs, the data shown in the raw data table at the bottom of the figure is reoriented in a staging table at the top. When the raw data is changed or refreshed, the staging table captures the changes.

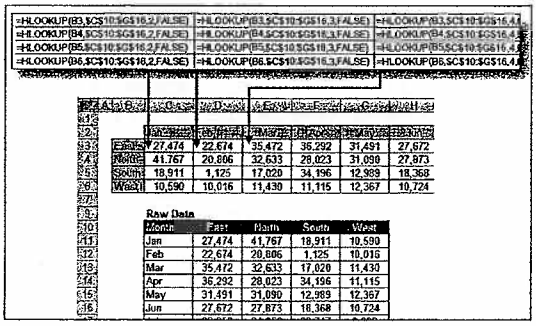


Figure 2-11: In this example, HLOOKUP formulas pull and reshape data without disturbing the raw data table.

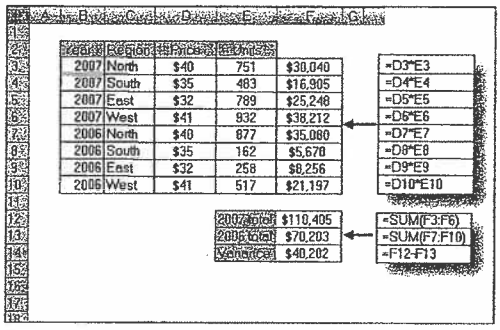
The SUMPRODUCT function

The SUMPRODUCT function is actually listed under the math and trigonometry category of Excel functions. Because the primary purpose of SUMPRODUCT is to calculate the sum product, most people don't know you can actually use it to look up values. In fact, you can use this versatile function quite effectively in most data models.

SUMPRODUCT basics

The SUMPRODUCT function is designed to multiply values from two or more ranges of data and then add the results together to return the sum of the products. Take a look at Figure 2-12 to see a typical scenario where the SUMPRODUCT is useful.

In Figure 2-12, you see a common analysis where you need the total sales for the years 2006 and 2007. As you can see, to get the total sales for each year, you first have to multiply Price by the number of Units to get the total for each Region. Then you have to sum those results to get the total sales for each year.



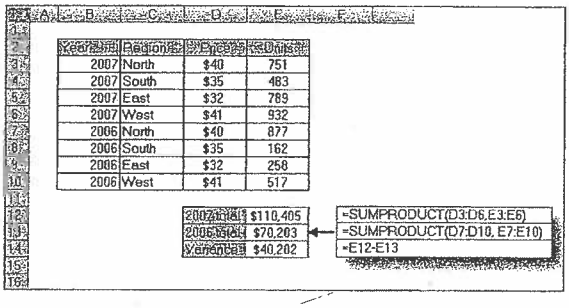
Year	Region	Price	Units	
2007	North	$40	751	$30,040
2007	South	$35	483	$16,905
2007	East	$32	789	$25,248
2007	West	$41	932	$38,212
2006	North	$40	877	$35,080
2006	South	$35	162	$5,670
2006	East	$32	258	$8,256
2006	West	$41	517	$21,197

2007 Total	$110,405
2006 Total	$70,203
Variance	$40,202

=D3*E3
=D4*E4
=D5*E5
=D6*E6
=D7*E7
=D8*E8
=D9*E9
=D10*E10
=SUM(F3:F6)
=SUM(F7:F10)
=F12-F13

Figure 2-12: Without the SUMPRODUCT, getting the total sales for each year involves a two-step process: first multiply price and units and then sum the results.

With the SUMPRODUCT function, you can perform the two-step analysis with just one formula. Figure 2-13 shows the same analysis with SUMPRODUCT formulas. Instead of using 11 formulas, you can accomplish the same analysis with just 3!



Year	Region	Price	Units
2007	North	$40	751
2007	South	$35	483
2007	East	$32	789
2007	West	$41	932
2006	North	$40	877
2006	South	$35	162
2006	East	$32	258
2006	West	$41	517

2007 Total	$110,405
2006 Total	$70,203
Variance	$40,202

=SUMPRODUCT(D3:D6,E3:E6)
=SUMPRODUCT(D7:D10, E7:E10)
=E12-E13

Figure 2-13: The SUMPRODUCT function allows you to perform the same analysis with just 3 formulas instead of 11.

The syntax of the SUMPRODUCT function is fairly simple:

```
SUMPRODUCT(Array1, Array2, ...)
```

Array: *Array* represents a range of data. You can use anywhere from 2 to 255 arrays in a SUMPRODUCT formula. The arrays get multiplied together and then added. The only hard and fast rule you have to remember is that all the arrays must have the same number of values. That is to say, you can't use the SUMPRODUCT if range X has 10 values and Range Y has 11 values. Otherwise, you get the #VALUE! error.

A twist on the SUMPRODUCT function

The interesting thing about the SUMPRODUCT function is that it can be used to filter out values. Take a look at Figure 2-14 to see what I mean.

The formula in cell E12 is pulling the sum of total units for just the North region. Meanwhile, cell E13 is pulling the units logged for the North region in the year 2006.

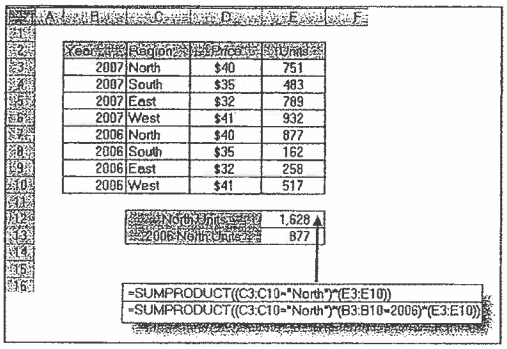


Figure 2-14: The SUMPRODUCT function can be used to filter data based on criteria.

To understand how this works, take a look at the formula in cell E12 shown in Figure 2-14. That formula reads `SUMPRODUCT((C3:C10="North")*(E3:E10))`.

In Excel, `TRUE` evaluates to 1 and `FALSE` evaluates to 0. Every value in Column C that equals `"North"` evaluates to `TRUE` or 1. Where the value is not `"North"`, it evaluates to `FALSE` or 0.The part of the formula that reads `(C3:C10="North")` enumerates through each value in the range `C3:C10`, assigning a 1 or 0 to each value. Then internally, the SUMPRODUCT formula translates to

```
(1*E3)+(0*E4)+(0*E5)+(0*E6)+(1*E7)+(0*E8)+(0*E9)+(0*E10)
```

This gives you the answer of 1628 because

```
(1*751)+(0*483)+(0*789)+(0*932)+(1*877)+(0*162)+(0*258)+(0
*517)
```

equals 1628.

Applying SUMPRODUCT formulas in a data model

As always in Excel, you don't have to hard-code the criteria in your formulas. Instead of explicitly using `"North"` in the SUMPRODUCT formula, you could reference a cell that contains the filter value. You can imagine that cell A3

contains the word `"North"`, in which case you can use `(C3:C10=A3)` instead of `(C3:C10="North")`. This way, you can dynamically change your filter criteria, and your formula keeps up.

Figure 2-15 demonstrates how you can use this concept to pull data into a staging table based on multiple criteria. Note that each of the SUMPRODUCT formulas shown here reference cells B3 and C3 to filter on Account and Product Line. Again, you can add data validation drop-down lists to cells B3 and C3, allowing you to easily change criteria.

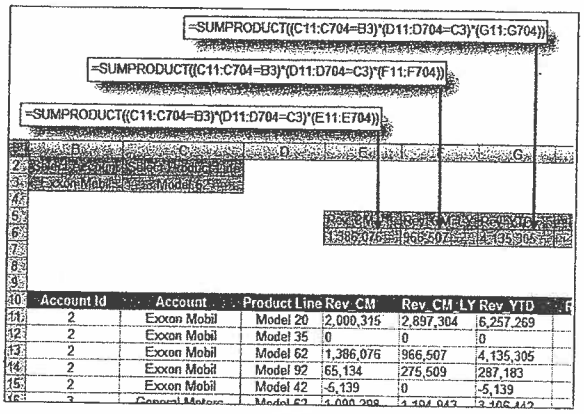


Figure 2-15: The SUMPRODUCT function can be used to pull summarized numbers from the data layer into staging tables.

The CHOOSE function

The CHOOSE function returns a value from a specified list of values based on a specified position number. For instance, if you enter the formulas `CHOOSE (3,"Red", "Yellow", "Green", "Blue")` into a cell, Excel returns `Green` because Green is the third item in the list of values. The formula `CHOOSE(1,"Red", "Yellow", "Green", "Blue")` would return `Red`. Although this may not look useful on the surface, the CHOOSE function can dramatically enhance your data models.

CHOOSE basics

Figure 2-16 illustrates how CHOOSE formulas can help pinpoint and extract numbers from a range cells. Note that instead of using hard-coded values, like `Red`, `Green`, and so on, you can use cell references to list the choices.

Take a moment to review the basic syntax of the CHOOSE function:

```
CHOOSE(index_num, value1, value2, ...)
```

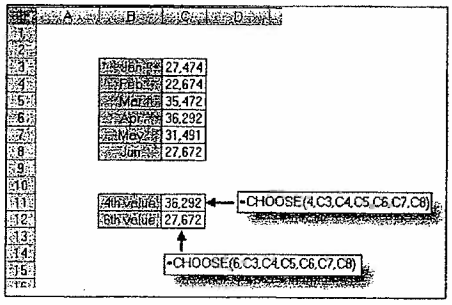


Figure 2-16: The CHOOSE function allows you to find values from a defined set of choices.

Index_num: The *Index_num* argument specifies the position number of the chosen value in the list of values. If the third value in the list is needed, the *Index_num* is 3. The *Index_num* argument must be an integer between one and the maximum number of values in the defined list of values. That is to say, if there are ten choices defined in the CHOOSE formula, the *Index_num* argument can't be more than ten.

Value: Each *Value* argument represents a choice in the defined list of choices for that CHOOSE formula. The *Value* arguments can be hard-coded values, cell references, defined names, formulas, or functions. In Excel 2007, you can have up to 255 choices listed in your CHOOSE formulas. In Excel 2003, you're limited to 29 *Value* arguments.

Applying CHOOSE formulas in a data model

The CHOOSE function is especially valuable in data models where there are multiple layers of data that need to be brought together. Figure 2-17 illustrates an example where CHOOSE formulas help pull data together.

In this example, you have two data tables: one for Revenues and one for Net Income. Each contains numbers for separate regions. The idea is to create a staging table that pulls data from both tables so that the data corresponds to a selected region.

To understand what's going on, focus on the formula in cell F3, shown in Figure 2-17. The formula is `CHOOSE($C$2,F7,F8,F9,F10)`. The `Index_num` argument is actually a cell reference that looks at the value in cell C2, which happens to be the number 2. As you can see, cell C2 is actually a VLOOKUP formula that pulls the appropriate index number for the selected region. The list of defined choices in the CHOOSE formula is essentially the cell references that make up the revenue values for each region: F7, F8, F9, and F10. So the formula in cell F3 translates to `CHOOSE(2, 27474, 41767, 18911, 10590)`. The answer is 41,767.

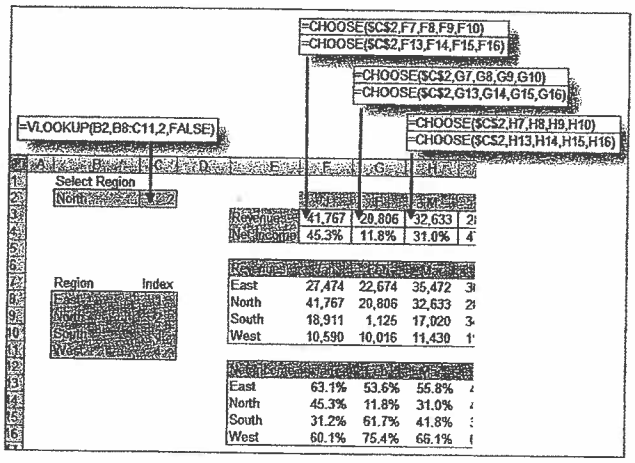


Figure 2-17: The CHOOSE formulas ensure the appropriate data is synchronously pulled from multiple data feeds.

Using Smart Tables That Expand with Data

One of the challenges you can encounter when building data models is a data table that expands over time. That is to say, the table grows in the number of records it holds due to new data being added. To get a basic understanding of this challenge, take a look at Figure 2-18. In this figure, you see a simple table that serves as the source for the chart. Notice that the table lists data for January through June.

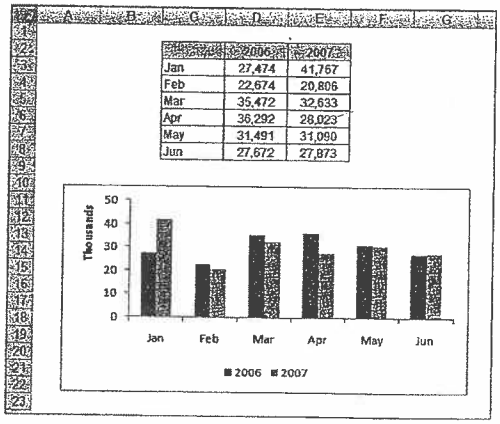


Figure 2-18: As you select a region in cell C2, the CHOOSE formulas ensure the appropriate data is synchronously pulled from multiple data feeds.

Imagine that next month, this table expands to include July data. You'll have to manually update your chart to include July data. Now imagine you had this same issue across your data model, with multiple data tables that link to multiple staging tables and dashboard components. You can imagine it'd be an extremely painful task to keep up with changes each month.

To solve this issue, you can use Excel's Table feature (you can tell they spent all night coming up with that name). The *Table feature* allows you to convert a range of data into a defined table that's treated independently of other rows and columns on the worksheet. After a range is converted to a table, Excel views the individual cells in the table as a single object that has functionality that a normal data range doesn't have.

For instance, Excel tables offer the following features:

- They're automatically enabled with auto filter drop-down headers so that you can filter and sort easily.
- They come with the ability to quickly add a Total row with various aggregate functions.
- You can apply special formatting to Excel tables independent of the rest of the spreadsheet.
- (Most importantly for data modeling purposes), they automatically expand to allow for new data.

The Table feature did exist in Excel 2003 under a different name: the List feature (found in Excel's Data menu). The benefit of this fact is that Excel tables are fully compatible with Excel 2003!

Converting a range to an Excel table

To convert a range of data to an Excel table, follow these steps:

1. **Highlight the range of cells that contain the data you want included in your Excel table.**
2. **On the Insert tab of the Ribbon, click the Table button.**

   This opens the Create Table dialog box, as shown in Figure 2-19.
3. **In the Create Table dialog box, verify the range for the table and specify whether the first row of the selected range is a header row.**
4. **Click OK to apply the changes.**

After the conversion takes place, notice a few small changes. Excel put auto filter drop-downs on your header rows, the rows in your table now have alternate shading, and any header that didn't have a value has been named by Excel.

You can use Excel tables as the source for charts, pivot tables, list boxes, or anything else for which you'd normally use a data range. In Figure 2-20, a chart has been linked to the Excel table.

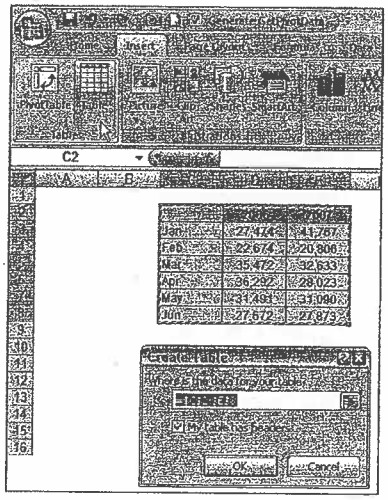


Figure 2-19: Converting a range of data to an Excel table.

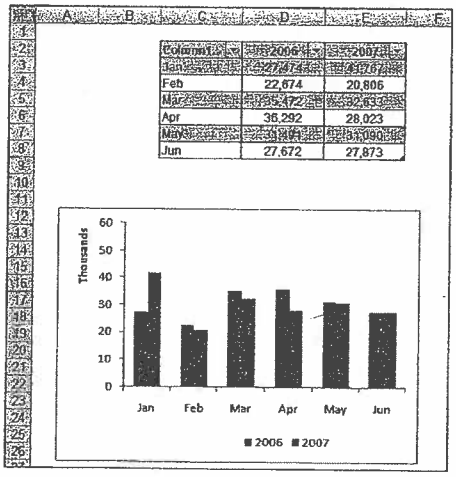


Figure 2-20: Excel tables can be used as the source for charts, pivot tables, named ranges, and so on.

Here's the impressive bit. When data is added to the table, Excel automatically expands the range of the table and incorporates the new range into any linked object. That's just a fancy way of saying that any chart or pivot table tied to an Excel table automatically captures new data without manual intervention.

For example, if I add July and August data to the end of the Excel table, the chart automatically updates to capture the new data. In Figure 2-21, I added July with no data and August with data to show you that the chart captures any new records and automatically plots the data given.

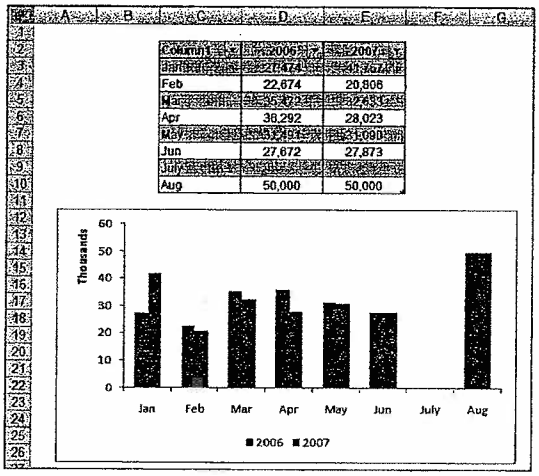


Figure 2-21: Excel tables automatically expand when new data is added.

Take a moment to think about what Excel tables mean to a data model. They mean pivot tables that never have to be reconfigured, charts that automatically capture new data, and ranges that automatically keep up with changes.

Converting an Excel table back to a range

If you want to convert an Excel table back to a normal range, you can follow these steps:

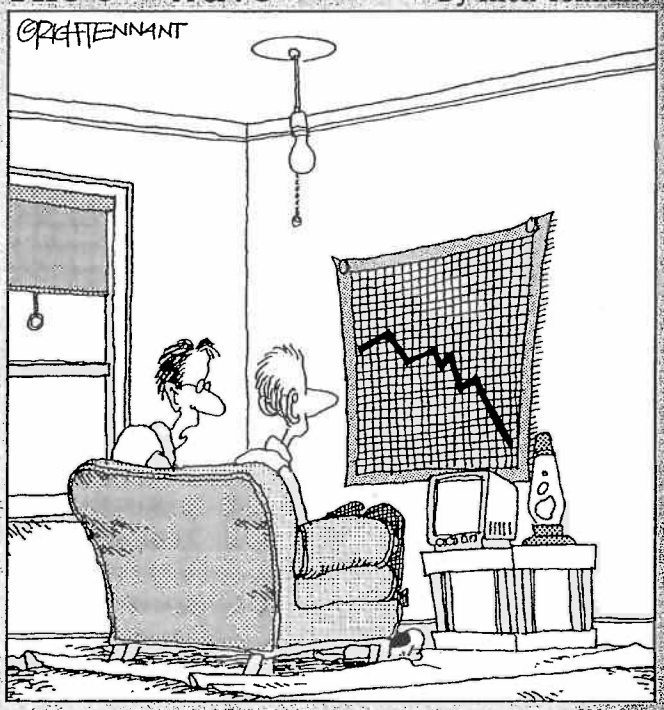
1. **Place your cursor in any cell inside the Excel table and select the Table Tools Design sub tab in the Ribbon.**

2. **Click the Convert to Range button, as shown in Figure 2-22.**
3. **When asked if you're sure (via a message box), click the Yes button.**

Figure 2-22: To remove Excel table functionality, convert the table back to a range.

Part II
Building Basic Dashboard Components

The 5th Wave By Rich Tennant



"My girlfriend ran a spreadsheet of my life, and generated this chart. My best hope is that she'll change her major from 'Computer Sciences' to 'Rehabilitative Services.'"

In this part . . .

In this section, you take an in-depth look at some of the basic dashboard components you can create using Excel 2007. You start with Chapter 3, where I introduce you to pivot tables and discuss how a pivot table can play an integral role in Excel-based dashboards. Chapter 4 provides a primer on building charts in Excel 2007, giving beginners a solid understanding of how Excel charts work. Chapter 5 introduces you to the new and improved conditional formatting functionality found in Excel 2007. In that chapter, I present several ideas for using the new conditional formatting tools in dashboards and reports. In Chapter 6, I explore the various techniques that can be used to create dynamic labels, allowing for the creation of a whole new layer of visualization.

Chapter 3

The Pivotal Pivot Table

In This Chapter

- Introducing pivot tables
- Building your first pivot table
- Creating top and bottom reports
- Using pivot-driven views

I know what you're thinking. Am I supposed to be jumping right in with pivot tables? My answer is an emphatic yes!

In Chapter 2, you were introduced to the concept of reporting models that separate the data, analysis, and presentation layers. As you will discover in this chapter, pivot tables lend themselves nicely to this concept. With pivot tables, you can build reporting models that not only can be easy to set up, but can be refreshed with a simple press of a button. This allows you to spend less time maintaining your dashboards and reports and more time doing other useful things. No utility in the whole of Excel allows you to achieve this efficient data model better than a pivot table.

For those who are new to pivot tables, relax a bit. After going through this introduction, you'll be pleasantly surprised at how easy it is to create and use pivot tables. Later, you'll find some time-saving techniques to help create some useful pivot-driven views for your dashboards and reports.

An Introduction to the Pivot Table

A *pivot table* is a robust tool that allows you to create an interactive view of your dataset, commonly referred to as a *pivot table report.* With a pivot table report, you can quickly and easily categorize your data into groups, summarize large amounts of data into meaningful analyses, and interactively perform a wide variety of calculations.

Pivot tables get their name from their ability to drag and drop fields within the pivot table report to dynamically change (or *pivot*) perspective and give you an entirely new analysis using the same data source.

Think of a pivot table as an object you can point at your dataset. When you look at your dataset through a pivot table, you can see your data from different perspectives. The dataset itself doesn't change, and it's not connected to the pivot table. The pivot table is simply a tool you are using to dynamically change analyses, apply varying calculations, and interactively drill down to the detail records.

The reason a pivot table is so well suited for dashboarding and reporting is that you can refresh the analyses shown through your pivot table by simply updating the dataset it is pointed to. This allows you to set up your analysis and presentation layers only one time; then, to refresh your reporting mechanism, all you have to do is press a button.

Let's start this exploration of pivot tables with a lesson on the anatomy of a pivot table.

The Four Areas of a Pivot Table

A pivot table is composed of four areas. The data you place in these areas defines both the utility and appearance of the pivot table. Take a moment to understand the function of each of these four areas.

Values area

The *values area,* as shown in Figure 3-1, is the large rectangular area below and to the right of the column and row headings. In this example, the values area contains a sum of the values in the Sales Amount field.

Region	(All)			
Sales Amount	Segment			
Market	Accessories	Bikes	Clothing	Components
Australia	23,974	1,351,873	43,232	203,791
Canada	119,303	11,714,700	383,022	2,246,255
Central	46,551	6,782,978	155,874	947,448
France	48,942	3,597,879	129,508	871,125
Germany	35,681	1,602,487	75,593	337,787
Northeast	51,246	5,690,285	163,442	1,051,702
Northwest	53,308	10,484,495	201,052	1,784,207
Southeast	45,736	6,737,556	165,689	959,337
Southwest	110,080	15,430,281	364,099	2,693,568
United Kingdom	43,180	3,435,134	120,225	712,588

Values area

Figure 3-1: The values area of a pivot table calculates and counts data.

The values area is the area that calculates and counts data. The data fields that you drag and drop here are typically those that you want to measure — fields, such as Sum of Revenue, Count of Units, or Average of Price.

Row area

The *row area* is shown in Figure 3-2. Placing a data field into the row area displays the unique values from that field down the rows of the left side of the pivot table. The row area typically has at least one field, although it's possible to have no fields.

Region	(All)			
Sales Amount	Segment			
Market	Accessories	Bikes	Clothing	Components
Australia	23,974	1,351,873	43,232	203,791
Canada	119,303	11,714,700	383,022	2,246,255
Central	46,551	6,782,978	155,874	947,448
France	48,942	3,597,879	129,508	871,125
Germany	35,681	1,602,487	75,593	337,787
Northeast	51,246	5,690,285	163,442	1,051,702
Northwest	53,308	10,484,495	201,052	1,784,207
Southeast	45,736	6,737,556	165,689	959,337
Southwest	110,080	15,430,281	364,099	2,693,568
United Kingdom	43,180	3,435,134	120,225	712,588

Row area

Figure 3-2: The row area of a pivot table gives you a row-oriented perspective.

The types of data fields that you would drop here include those that you want to group and categorize, such as, Products, Names, and Locations.

Column area

The *column area* is composed of headings that stretch across the top of columns in the pivot table.

As you can see in Figure 3-3, the column area stretches across the top of the columns. In this example, it contains the unique list of business segments.

Placing a data field into the column area displays the unique values from that field in a column-oriented perspective. The column area is ideal for creating a data matrix or showing trends over time.

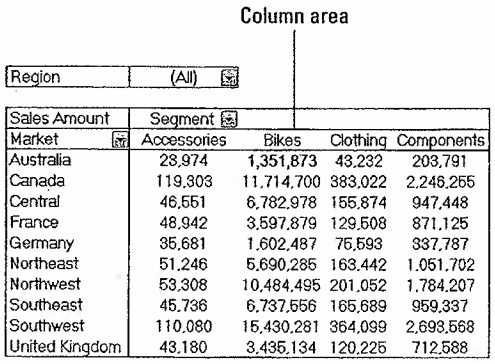


Figure 3-3: The column area of a pivot table gives you a column-oriented perspective.

Filter area

The *filter area* is an optional set of one or more drop-downs at the top of the pivot table. In Figure 3-4, the filter area contains the Region field, and the pivot table is set to show all regions.

Placing data fields into the filter area allows you to filter the entire pivot table based on your selections. The types of data fields that you'd drop here include those that you want to isolate and focus on; for example, Region, Line of Business, and Employees.

Filter area

Region	(All)

Sales Amount	Segment			
Market	Accessories	Bikes	Clothing	Components
Australia	23,974	1,351,873	43,232	203,791
Canada	119,303	11,714,700	383,022	2,246,255
Central	46,551	6,782,978	155,874	947,448
France	48,942	3,597,879	129,508	871,125
Germany	35,681	1,602,487	75,593	337,787
Northeast	51,246	5,690,285	163,442	1,051,702
Northwest	53,308	10,484,495	201,052	1,784,207
Southeast	45,736	6,737,556	165,689	959,337
Southwest	110,080	15,430,281	364,099	2,693,568
United Kingdom	43,180	3,436,134	120,225	712,588

Figure 3-4: The Filter Area allows you to easily apply filters to your pivot table report.

Creating Your First Pivot Table

If you've followed along so far, you now have a good understanding of the basic structure of a pivot table, so let's quit all the talking and use the following steps to walk through the creation of your first pivot table:

You can find the sample file for this chapter on this book's companion Web site.

1. **Click any single cell inside your *data source* (the table you'll use to feed the pivot table).**
2. **Select the Insert tab in the Ribbon. Here, find the PivotTable icon, as shown in Figure 3-5. Choose PivotTable from the drop-down list beneath the icon.**

   This activates the Create PivotTable dialog box, as shown in Figure 3-6. As you can see, this dialog box asks you to specify the location of your source data and the place you want to put the pivot table.

   Notice that in the Create PivotTable dialog box, Excel makes an attempt to fill in the range of your data for you. In most cases, Excel gets this right. However, always make sure the correct range is selected.

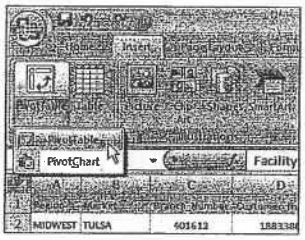


Figure 3-5: Start a pivot table via the Insert tab.

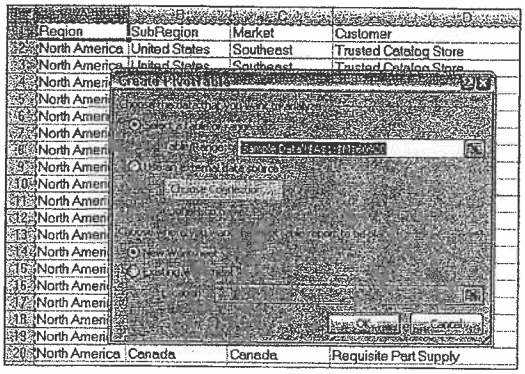


Figure 3-6: The Create PivotTable dialog box.

You will also note in Figure 3-6 that the default location for a new pivot table is New Worksheet. This means your pivot table will be placed in a new worksheet within the current workbook. You can change this by selecting the Existing Worksheet option and specifying the worksheet you want the pivot table to be placed.

3. **Click OK.**

   At this point, you have an empty pivot table report on a new worksheet. Next to the empty pivot table, you see the PivotTable Field List dialog box, shown in Figure 3-7.

   The idea here is to add the fields you need into the pivot table by using the four *drop zones* found in the PivotTable Field List — Report Filter, Column Labels, Row Labels, and Values. Pleasantly enough, these drop zones correspond to the four areas of the pivot table you review at the beginning of this chapter.

   If clicking the pivot table doesn't activate the PivotTable Field List dialog box, you can manually activate it by right-clicking anywhere inside the pivot table and selecting Show Field List.

   Now before you go wild and start dropping fields into the various drop zones, it's important that you ask yourself two questions; "What am I measuring?" and "How do I want to see it?." The answer to these questions gives you some guidance when determining which fields go where.

   For your first pivot table report, you want to measure the dollar sales by market. This automatically tells you that you will need to work with the Sales Amount field and the Market field.

How do you want to see that? You want markets to go down the left side of the report and sales amount to be calculated next to each market. Remembering the four areas of the pivot table, you'll need to add the Market field to the Row Labels drop zone, and the Sales Amount field to the Values drop zone.

4. **Find the Market field in field selector and place a check next to it, as demonstrated in Figure 3-8.**

   Now that you have regions in your pivot table, it's time to add the dollar sales.

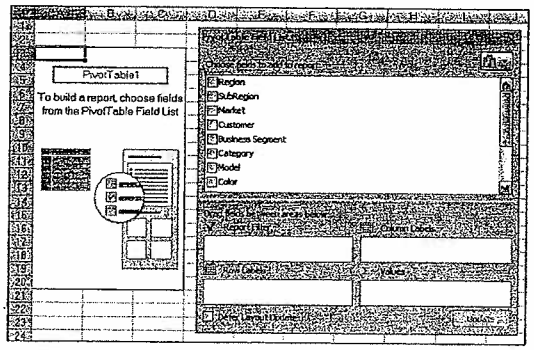


Figure 3-7: The PivotTable Field List dialog box.

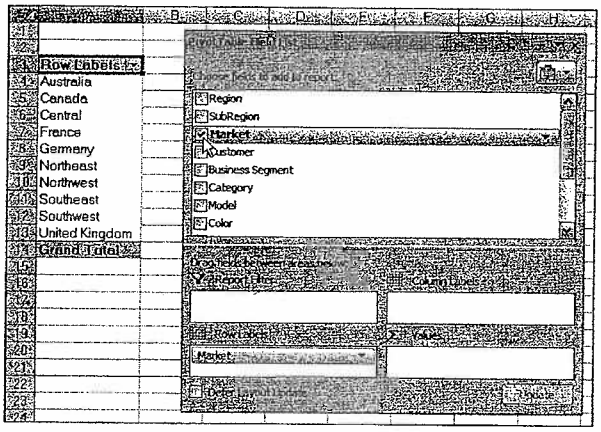


Figure 3-8: Place a check next to the Market field to add it.

5. **Find the Sales Amount field in field selector and place a check next to it, as demonstrated in Figure 3-9.**

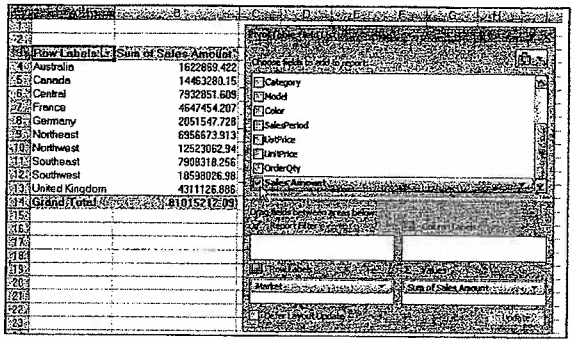


Figure 3-9: Add the Sales Amount field.

Placing a check next to any field that is *non-numeric* (text or date) automatically places that field into the row area of the pivot table. Placing a check next to any field that is *numeric* automatically places that field in the values area of the pivot table.

What happens if you need fields in the other areas of the pivot table? Well, instead of checking the field, you can drag any field directly to the different drop zones.

One more thing; when you add fields to the drop zones, you may find it difficult to see all the fields in each drop zone. You can expand the PivotTable Field List dialog box by clicking and dragging the borders of the dialog box.

As you can see, you have just analyzed the sales for each market in just five steps! That's an amazing feat considering you start with over 60,000 rows of data. With a little formatting, this modest pivot table can become the starting point for a management dashboard or report.

Changing and rearranging your pivot table

Now here's the wonderful thing about pivot tables. You can add as many layers of analysis as made possible by the fields in your source data table. Say that you want to show the dollar sales each market earned by business segment. Because your pivot table already contains the Market and Sales Amount fields, all you have to add the Business Segment field.

So simply click anywhere on your pivot table to reactivate the PivotTable Field List dialog box and then place a check next to the Business Segment field. Figure 3-10 illustrates what your pivot table should look like now.

If clicking the pivot table doesn't activate the PivotTable Field List dialog box, you can manually activate it by right-clicking anywhere inside the pivot table and selecting Show Field List.

Imagine that your manager says that this layout doesn't work for him. He wants to see business segments going across the top of the pivot table report. No problem. Simply drag the Business Segment field from the Row Labels drop zone to the Column Labels drop zone. As you can see in Figure 3-11, this instantly restructures the pivot table to his specifications.

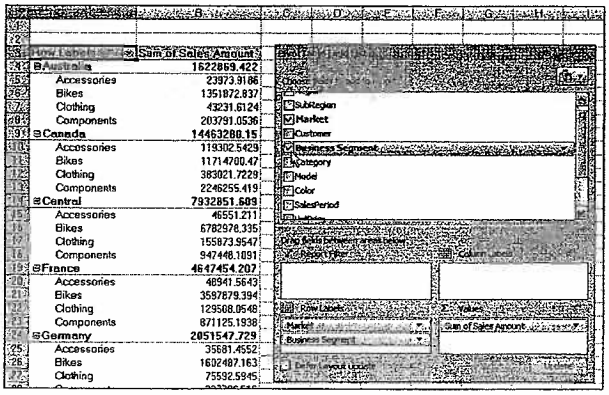


Figure 3-10: Adding a layer of analysis is as easy as bringing in another field.

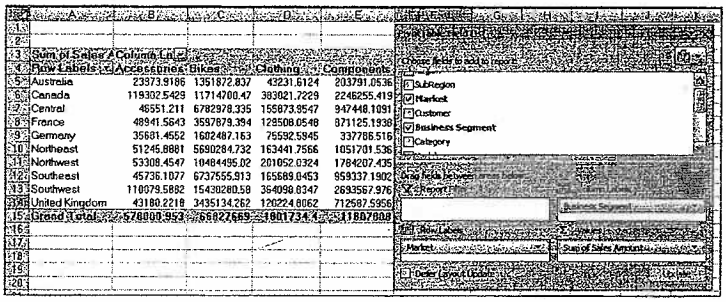


Figure 3-11: Your business segments are now column oriented.

Adding a report filter

Often times, you're asked to produce reports for one particular region, market, product, and so on. Instead of working hours and hours building separate reports for every possible analysis scenario, you can leverage pivot tables to help create multiple views of the same data. For example, you can do so by creating a region filter in your pivot table.

Click anywhere on your pivot table to reactivate the PivotTable Field List dialog box and then drag the Region field to the Report Filter drop zone. This adds a drop-down selector to your pivot table, shown in Figure 3-12. You can then use this selector to analyze one particular region at a time.

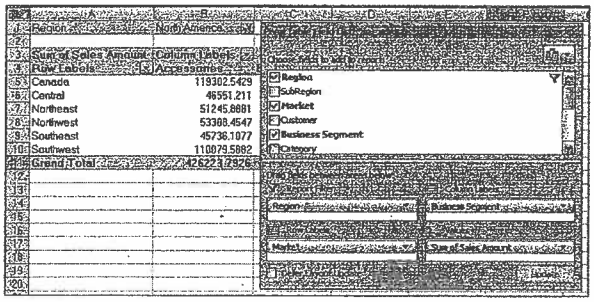


Figure 3-12: Using pivot tables to analyze regions.

Keeping your pivot table fresh

In Hollywood, it's important to stay fresh and relevant. As boring as your pivot tables may seem, they'll eventually become the stars of your reports and dashboards. So it's just as important to keep your pivot tables fresh and relevant.

As time goes by, your data may change and grow with newly-added rows and columns. The action of updating your pivot table with these changes is *refreshing* your data.

Your pivot table report can be refreshed by simply right-clicking inside your pivot table report and selecting Refresh, as demonstrated in Figure 3-13.

Sometimes, *you're* the data source that feeds your pivot table changes in structure. For example, you may have added or deleted rows or columns from your data table. These types of changes affect the range of your data source, not just a few data items in the table.

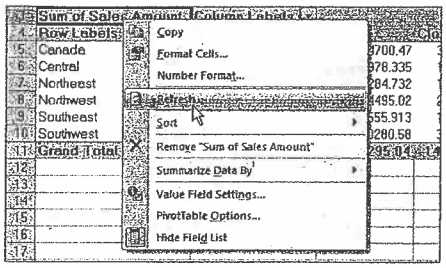


Figure 3-13: Refreshing your pivot table captures changes made to your data.

Pivot tables and spreadsheet bloat

It's important to understand that pivot tables do come with space and memory implications for your reporting processes. When you create a pivot table, Excel takes a snapshot of your dataset and stores it in a pivot cache. A *pivot cache* is essentially a memory container that holds this snapshot of your dataset. Each pivot table report you create from a separate data source creates its own pivot cache, which increases your workbook's memory usage and file size. The increase in memory usage and file size depends on the size of the original data source that is being duplicated to create the pivot cache.

Simple enough, right? Well, here's the rub: You often need to create separate pivot tables from the same data source in order to analyze the same data in different ways. If you create two pivot tables from the data source, a new pivot cache is automatically created even though one may already exist for the dataset being used. This means that you're bloating your spreadsheet with redundant data each time you create a new pivot table using the same dataset.

To work around this potential problem, you can employ Copy and then Paste. That's right, simply copying a pivot table and pasting it somewhere else will create another pivot table *without* duplicating the pivot cache. This allows you to create multiple pivot tables that use the same source data, with negligible increase in memory and file size.

In these cases, performing a simple Refresh of your pivot table won't do. You have to update the range being captured by the pivot table. Here's how:

1. **Click anywhere inside your pivot table to activate the PivotTable Tools context tab in the Ribbon.**
2. **Select the Options tab in the Ribbon.**
3. **Click the Change Data Source button, as demonstrated in Figure 3-14.**

   The Change PivotTable Data Source dialog box appears.
4. **Change the range selection to include any new rows or columns. (See Figure 3-15.)**
5. **Click OK to apply the change.**

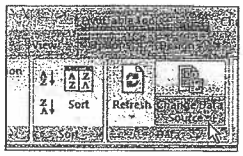


Figure 3-14: Changing the range that feeds your pivot table.

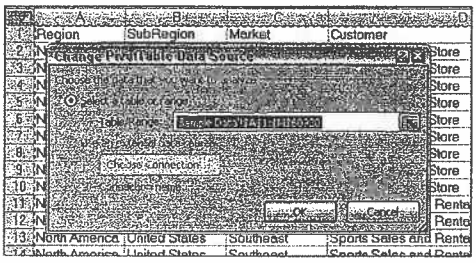


Figure 3-15: Select the new range that feeds your pivot table.

Customizing Your Pivot Table Reports

The pivot tables you create often need to be tweaked in order to get the look and feel you're looking for. In this section, I cover some of the options you can adjust to customize your pivot tables to suit your reporting needs.

Changing the pivot table layout

Unlike the previous versions of Excel, Excel 2007 gives you a choice in the layout of your data in a pivot table. The three layouts, shown side by side in Figure 3-16, are the Compact Form, Outline Form, and Tabular Form. Although no layout stands out as being better than the others, I prefer using the Tabular Form layout because it seems easiest to read, and it's the layout that most people who have seen pivot tables in the past are used to.

Compact Form Layout

Row Labels	Sales
⊟Australia	1622869.422
Accessories	23973.9186
Bikes	1351872.837
Clothing	43231.6124
Components	203791.0536
⊟Canada	14463280.15
Accessories	119302.5429
Bikes	11714700.47
Clothing	383021.7229
Components	2246255.419
⊟Central	7932851.609
Accessories	46551.211
Bikes	6782978.335
Clothing	155873.9547
Components	947448.1091
⊟France	4647454.207
Accessories	48941.5643
Bikes	3597879.394
Clothing	129508.0548
Components	871125.1938
⊟Germany	2051547.729
Accessories	35681.4552
Bikes	1602487.163
Clothing	75592.5945
Components	337786.516

Outline Form Layout

Market	Segment	Sales
⊟Australia		1622869.422
	Accessories	23973.9186
	Bikes	1351872.837
	Clothing	43231.6124
	Components	203791.0536
⊟Canada		14463280.15
	Accessories	119302.5429
	Bikes	11714700.47
	Clothing	383021.7229
	Components	2246255.419
⊟Central		7932851.609
	Accessories	46551.211
	Bikes	6782978.335
	Clothing	155873.9547
	Components	947448.1091
⊟France		4647454.207
	Accessories	48941.5643
	Bikes	3597879.394
	Clothing	129508.0548
	Components	871125.1938
⊟Germany		2051547.729
	Accessories	35681.4552
	Bikes	1602487.163
	Clothing	75592.5945
	Components	337786.516

Tabular Form Layout

Market	Segment	Sales
⊟Australia	Accessories	23973.9186
	Bikes	1351872.837
	Clothing	43231.6124
	Components	203791.0536
Australia Total		1622869.422
⊟Canada	Accessories	119302.5429
	Bikes	11714700.47
	Clothing	383021.7229
	Components	2246255.419
Canada Total		14463280.15
⊟Central	Accessories	46551.211
	Bikes	6782978.335
	Clothing	155873.9547
	Components	947448.1091
Central Total		7932851.609
⊟France	Accessories	48941.5643
	Bikes	3597879.394
	Clothing	129508.0548
	Components	871125.1938
France Total		4647454.207
⊟Germany	Accessories	35681.4552
	Bikes	1602487.163
	Clothing	75592.5945
	Components	337786.516
Germany Total		2051547.729

Figure 3-16: The three layouts for a pivot table report.

The layout you choose not only affects the look and feel of your reporting mechanisms, but it may also affect the way you build and interact with any dashboard models based on your pivot tables.

Changing the layout of a pivot table is easy. Follow these steps:

1. **Click anywhere inside your pivot table to activate the PivotTable Tools context tab in the Ribbon.**
2. **Select the Design tab in the Ribbon.**
3. **Click the Report Layout icon and choose the layout you like. (See Figure 3-17.)**

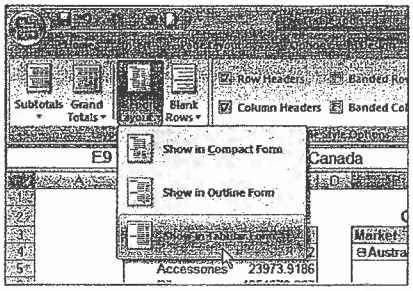


Figure 3-17: Changing the layout for your pivot table.

Customizing field names

Notice that every field in your pivot table has a name. The fields in the row, column, and filter areas inherit their names from the data labels in your source table. The fields in the Values area are given a name, such as Sum of Sales Amount.

There will often be times when you might prefer the name Total Sales instead of the unattractive default name, like Sum of Sales Amount. In these situations, the ability to change your field names is handy. To change a field name, do the following:

1. **Right-click any value within the target field.**

   For example, if you want to change the name of the field Sum of Sales Amount, you right-click any value under that field.

2. **Select Value Field Settings. (See Figure 3-18.)**

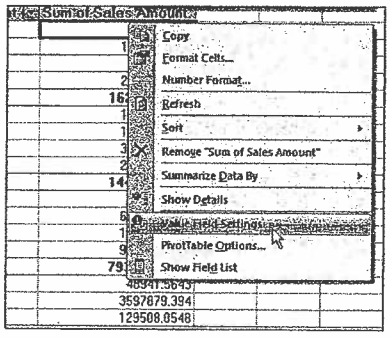


Figure 3-18: Right-click on any value in the target field to select the Value Field Settings option.

The Value Field Settings dialog box appears.

Note that if you were changing the name of a field in the row or column area, this selection is Field Settings.

3. **Enter the new name in the Custom Name input box. (See Figure 3-19.)**

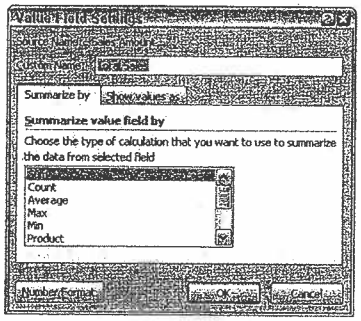


Figure 3-19: Use the Custom Name input to change the name of the field.

4. **Click OK to apply the change.**

If you use the name of the data label used in your source table, you receive an error. For example, if you rename Sum of Sales Amount as Sales Amount, you get an error message because there's already a Sales Amount field in the source data table. Well, this is kinda lame, especially if Sales Amount is exactly what you want to name the field in your pivot table.

To get around this, you can name the field and add a space to the end of the name. Excel considers Sales Amount (followed by a space) to be different from Sales Amount. This way you can use the name you want, and no one will notice it's any different.

Applying numeric formats to data fields

Numbers in pivot tables can be formatted to fit your needs (that is, formatted as currency, percentage, or number). You can easily control the numeric formatting of a field using the Value Field Settings dialog box. Here's how:

1. **Right-click any value within the target field.**

   For example, if you want to change the format of the values in the Sales Amount field, right-click any value under that field.

2. **Select Value Field Settings.**

   The Value Field Settings dialog box appears.

3. **Click the Number Format.**

   The Format Cells dialog box opens.

4. **Apply the number format you desire, just as you normally would on your spreadsheet.**

5. **Click OK to apply the changes.**

   After you set the formatting for a field the applied formatting will persist even if you refresh or rearrange your pivot table.

Changing summary calculations

When creating your pivot table report, Excel will, by default, summarize your data by either counting or summing the items. Instead of `Sum` or `Count`, you might want to choose functions, such as `Average`, `Min`, `Max`, and so on. In all, 11 options are available, including

- **`Sum`:** Adds all numeric data.
- **`Count`:** Counts all data items within a given field, including numeric-, text-, and date-formatted cells.
- **`Average`:** Calculates an average for the target data items.
- **`Max`:** Displays the largest value in the target data items.
- **`Min`:** Displays the smallest value in the target data items.
- **`Product`:** Multiplies all target data items together.
- **`Count Nums`:** Counts only the numeric cells in the target data items.
- **`StdDevP` and `StdDev`:** Calculates the standard deviation for the target data items. Use `StdDevP` if your dataset contains the complete population. Use `StdDev` if your dataset contains a sample of the population.

- **VarP and Var:** Calculates the statistical variance for the target data items. Use `VarP` if your data contains a complete population. If your data contains only a sampling of the complete population, use `Var` to estimate the variance.

You can easily change the summary calculation for any given field by taking the following actions:

1. **Right-click any value within the target field.**
2. **Select Value Field Settings.**

   The Value Field Settings dialog box appears.
3. **Choose the type of calculation you want to use from the list of calculations. (See Figure 3-20.)**
4. **Click OK to apply the changes.**

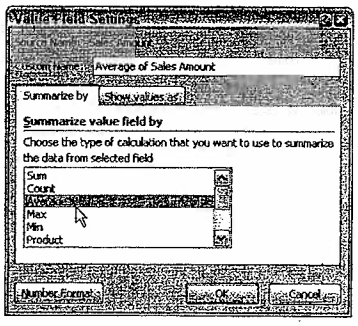


Figure 3-20: Changing the type of summary calculation used in a field.

Did you know that a single blank cell causes Excel to count instead of sum? That's right. If all the cells in a column contain numeric data, Excel chooses Sum. If just one cell is either blank or contains text, Excel chooses Count.

Be sure to pay attention to the fields that you place into the values area of the pivot table. If the field name starts with Count Of, Excel's counting the items in the field instead of summing the values.

Suppressing subtotals

Notice that each time you add a field to your pivot table, Excel adds a subtotal for that field. There may be, however, times when the inclusion of subtotals either doesn't make sense or just hinders a clear view of your pivot table report. For example, Figure 3-21 shows a pivot table where the subtotals inundate the report with totals that serve only to hide the real data you're trying to report.

Region	SubRegion	Market	Business Segment	Sum of Sales Amount
⊟North America	⊟United States	⊟Central	Accessories	$46,561
			Bikes	$6,782,978
			Clothing	$155,874
			Components	$847,449
		Central Total		$7,832,862
		⊟Northeast	Accessories	$51,246
			Bikes	$5,690,285
			Clothing	$163,442
			Components	$1,051,702
		Northeast Total		$6,956,674
		⊟Northwest	Accessories	$53,308
			Bikes	$10,484,495
			Clothing	$201,052
			Components	$1,784,207
		Northwest Total		$12,523,063
		⊟Southeast	Accessories	$45,736
			Bikes	$6,737,556
			Clothing	$165,689
			Components	$959,337
		Southeast Total		$7,908,318
		⊟Southwest	Accessories	$110,080
			Bikes	$15,430,281
			Clothing	$364,099
			Components	$2,693,568
		Southwest Total		$18,598,027
	United States Total			$53,818,934
North America Total				$53,818,934
Grand Total				$53,818,934

Figure 3-21: Subtotals sometimes muddle the data you're trying to show.

Removing all subtotals at one time

You can remove all subtotals at once by taking these actions:

1. **Click anywhere inside your pivot table to activate the PivotTable Tools context tab in the Ribbon.**
2. **Select the Design tab in the Ribbon.**
3. **Click the Subtotals icon and select Do Not Show Subtotals. (See Figure 3-22.)**

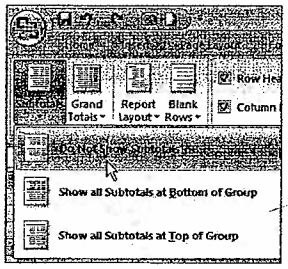


Figure 3-22: Use the Do Not Show Subtotals option to remove all subtotals at once.

As you can see in Figure 3-23, the same report without subtotals is much more pleasant to review.

Region	SubRegion	Market	Business Segment	Sum of Sales Amount
⊟North America	⊟United States	⊟Central	Accessories	$46,551
			Bikes	$6,762,976
			Clothing	$155,874
			Components	$947,448
		⊟Northeast	Accessories	$51,246
			Bikes	$5,696,285
			Clothing	$163,442
			Components	$1,051,702
		⊟Northwest	Accessories	$53,309
			Bikes	$10,484,495
			Clothing	$281,052
			Components	$1,784,207
		⊟Southeast	Accessories	$45,736
			Bikes	$8,737,556
			Clothing	$165,689
			Components	$958,337
		⊟Southwest	Accessories	$110,080
			Bikes	$15,430,281
			Clothing	$364,089
			Components	$2,693,568
Grand Total				$53,918,934

Figure 3-23: The same report without subtotals.

Removing the subtotals for only one field

Maybe you want to remove the subtotals for only one field? In such a case, you can take the following actions:

1. **Right-click any value within the target field.**
2. **Select Field Settings.**

   The Field Settings dialog box appears.
3. **Choose the None button under the Subtotals option, as demonstrated in Figure 3-24.**
4. **Click OK to apply the changes.**

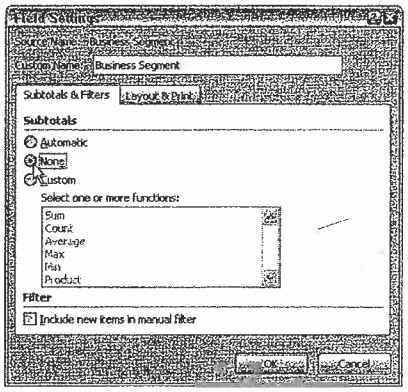


Figure 3-24: Choose the None option to remove subtotals for one field.

Removing Grand Totals

There may be instances when you want to remove the Grand Totals from your pivot table.

1. **Right-click anywhere on your pivot table.**
2. **Select PivotTable Options.**

   The Options dialog box appears.
3. **Click the Totals & Filters tab.**
4. **Remove the check from Show Grand Totals for Rows.**
5. **Remove the check from Show Grand Totals for Columns.**

Showing and hiding data items

A pivot table summarizes and displays all the records in your source data table. There may, however, be situations when you want to inhibit certain data items from being included in your pivot table summary. In these situations, you can choose to hide a data item.

In terms of pivot tables, hiding doesn't just mean preventing the data item from being shown on the report, hiding a data item also prevents it from being factored into the summary calculations.

In the pivot table illustrated in Figure 3-25, I show sales amounts for all Business Segments by Market. In this example, however, I want to show totals without taking sales from the Bikes segment into consideration. In other words, I want to hide the Bikes segment.

	A	B	C
1			
2	Market	Business Segment	Sum of Sales Amount
3	⊟Australia	Accessories	$23,974
4		Bikes	$1,351,873
5		Clothing	$43,232
6		Components	$203,791
7	Australia Total		$1,622,869
8	⊟Canada	Accessories	$119,303
9		Bikes	$11,714,706
10		Clothing	$383,022
11		Components	$2,246,255
12	Canada Total		$14,463,280
13	⊟Central	Accessories	$46,551
14		Bikes	$6,782,978
15		Clothing	$155,874
16		Components	$947,448
17	Central Total		$7,932,852

Figure 3-25: I want to remove Bikes from this analysis.

I can hide the Bikes Business Segment by clicking the Business Segment drop-down list arrow and removing the check next to Bikes (see Figure 3-26).

After choosing OK to close the selection box, the pivot table instantly recalculates, leaving out the Bikes segment. As you can see in Figure 3-27, the Market totals sales now reflect the sales without Bikes.

I can just as quickly reinstate all hidden data items for my field. I simply click the Business Segment drop-down list arrow and place a check next to the Select All selection (see Figure 3-28).

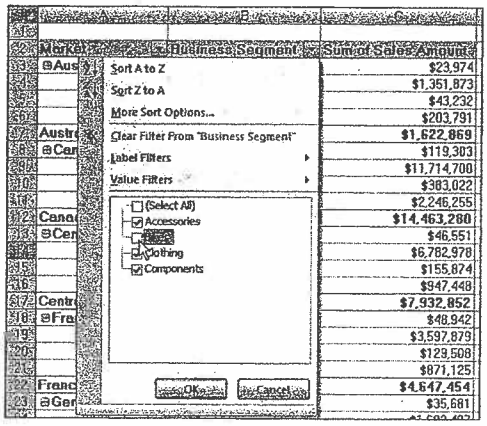


Figure 3-26: Removing the check from the Bikes item hides the Bikes segment.

Market	Business Segment	Sum of Sales Amount
⊟Australia	Accessories	$23,974
	Clothing	$43,232
	Components	$203,791
Australia Total		$270,997
⊟Canada	Accessories	$119,303
	Clothing	$383,022
	Components	$2,246,255
Canada Total		$2,748,580
⊟Central	Accessories	$46,551
	Clothing	$155,874
	Components	$947,448
Central Total		$1,149,873

Figure 3-27: Segment analysis without the Bikes segment.

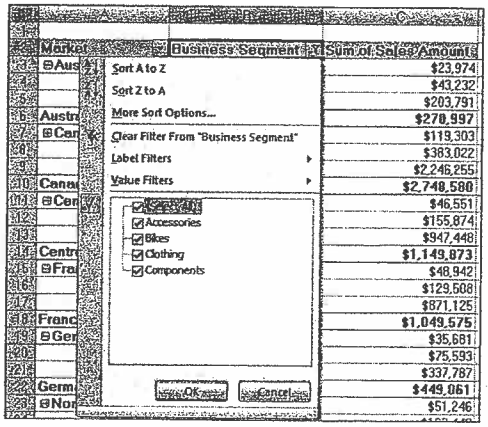


Figure 3-28: Placing a check next to Select All forces all data items in that field to become unhidden.

Hiding or showing items without data

By default, your pivot table shows only data items that have data. This inherent behavior may cause unintended problems for your data analysis.

Look at Figure 3-29, which shows a pivot table with the SalesPeriod field in the row area and the Region field in the filter area. Note that the Region field is set to (All), and every sales period appears in the report.

Region	(All)
SalesPeriod	Sum of Sales Amount
1/1/2004	$1,670,606
2/1/2004	$2,708,046
3/1/2004	$2,742,965
4/1/2004	$2,219,217
5/1/2004	$3,329,835
6/1/2004	$1,575,998
7/1/2004	$2,341,746
8/1/2004	$1,540,073
9/1/2004	$1,166,333
10/1/2004	$844,833
11/1/2004	$2,325,757
12/1/2004	$1,703,437
Grand Total	$24,168,846

Figure 3-29: All sales periods are showing.

If I choose to filter for only Europe in the filter area, you will notice that only a portion of all the sales periods are now showing. (See Figure 3-30.) The pivot table suddenly shows only those sales periods that apply to the Europe region.

	A	B
1		
2	Region	Europe
3		
4	SalesPeriod	Sum of Sales Amount
5	1/1/2004	$240,541
6	2/1/2004	$769,615
7	3/1/2004	$536,571
8	4/1/2004	$333,899
9	5/1/2004	$1,002,925
10	6/1/2004	$275,767
11	7/1/2004	$407,807
12	Grand Total	$3,567,125

Figure 3-30: Filtering for the Europe region causes some of the sales periods to disappear.

The behavior of displaying only those items with data could cause trouble if I plan on using this pivot table as the feeder for my charts or other dashboard components. From a dashboarding-and-reporting perspective, it isn't ideal if half the year disappeared each time customers selected Europe.

Here's how you can prevent Excel from hiding pivot items without data:

1. **Right-click any value within the target field.**

   In this example, the target field is the SalesPeriod field.

2. **Select Field Settings.**

   The Field Settings dialog box appears.

3. **Select the Layout & Print tab in the Field Settings dialog box.**

4. **Place a check next to the Show Items with No Data option. (See Figure 3-31.)**

5. **Click OK to apply the change.**

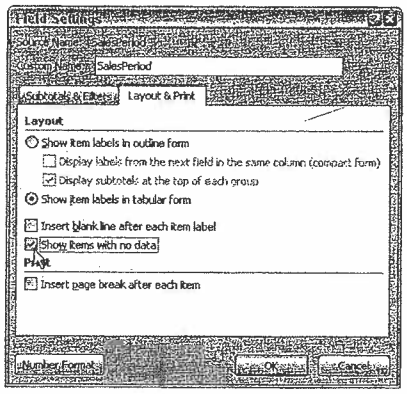


Figure 3-31: Click the Show Items with No Data option to force the display all data items.

As you can see in Figure 3-32, after choosing the Show Items with No Data option, all the sales periods appear whether the selected region had sales that period or not.

Now that I'm confident that the structure of the pivot table is locked, I can use it to feed charts and other components in my dashboard.

	A	B
1		
2	Region	Europe
3		
4	SalesPeriod	Sum of Sales Amount
5	1/1/2004	$240,541
6	2/1/2004	$769,615
7	2/29/2004	
8	3/1/2004	$536,571
9	3/31/2004	
10	4/1/2004	$333,899
11	4/30/2004	
12	5/1/2004	$1,002,925
13	5/31/2004	
14	6/1/2004	$275,767
15	7/1/2004	$407,807
16	8/1/2004	
17	9/1/2004	
18	10/1/2004	
19	11/1/2004	
20	12/1/2004	
21	Grand Total	$3,567,125

Figure 3-32: All sales periods are now displayed even if there is no data to be shown.

Sorting your pivot table

By default, items in each pivot field are sorted in ascending sequence based on the item name. Excel gives you the freedom to change the sort order of the items in your pivot table.

Like many actions you can perform in Excel, there are lots of different ways to sort data within a pivot table. The easiest way, and the way that I use the most, is to apply the sort directly in the pivot table. Here's how:

1. **Right-click any value within the *target field* (the field you need to sort).**

   In the example shown in Figure 3-33, I want to sort by Sales Amount.

2. **Select Sort and then select the sort direction.**

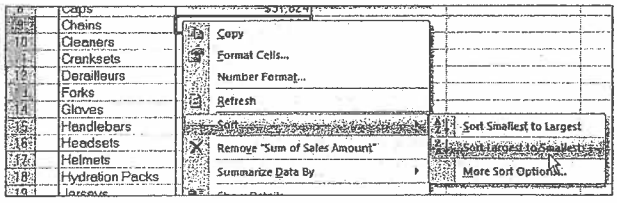


Figure 3-33: Applying a sort to a pivot table field.

The changes take effect immediately and persist while you work with your pivot table.

Creating Useful Pivot-Driven Views

At this point in your exploration of pivot tables, you have covered enough of the fundamentals to start creating your own pivot table reports. In this last section, I share with you a few of the techniques I use to create some of the more useful report views. Although you could create these views by hand, creating them with pivot tables helps save you hours of work and allows you to more easily update and maintain them.

Producing top and bottom views

You'll often find that managers are interested in the top and bottom of things: the top 50 customers, the bottom 5 sales reps, the top 10 products. Although you may think this is because managers have the attention span of a four-year-old, there's a more logical reason for focusing on the outliers.

Dashboarding and reporting is often about showing actionable data. If you, as a manager, know who the bottom ten revenue-generating accounts are, you could apply your effort and resources in building up those accounts. Because you most likely wouldn't have the resources to focus on all accounts, viewing a manageable subset of accounts would be more useful.

Luckily, pivot tables make it easy to filter your data for the top five, the bottom ten, or any conceivable combination of top or bottom records. Here's an example.

Imagine that in your company, the Accessories Business Segment is a high-margin business — you make the most profit for each dollar of sales in the Accessories segment. To increase sales, your manager wants to focus on the 50 customers who spend the least amount of money on Accessories. He obviously wants to spend his time and resources on getting those customers to buy more accessories. Here's what to do:

1. **Build a pivot table with Business Segment in the filter area, Customer in the row area, and Sales Amount in the values area (see Figure 3-34.) For cosmetic value, change the layout to Tabular Form.**

   You can find the sample file for this chapter on this book's companion Web site.

2. **Right-click any customer name in the Customer field, select Filter, and then Top 10 — as demonstrated in Figure 3-35.**

Don't let the label *Top 10* confuse you. You can use the Top 10 option to filter both top and bottom records.

3. **In the Top 10 Filter dialog box, as illustrated in Figure 3-36, you simply have to define the view you're looking for. In this example, you want the bottom 50 items (customers), as defined by the Sum of Sales Amount field.**

4. **Click OK to apply the filter.**

Business Segment	(All)
Customer	Sum of Sales Amount
A Bike Store	85177.0812
A Great Bicycle Company	9055.2903
A Typical Bike Shop	83457.1089
Acceptable Sales & Service	1258.3767
Accessories Network	2215.8975
Acclaimed Bicycle Company	7682.26
Ace Bicycle Supply	3749.1338
Action Bicycle Specialists	328503.1613
Active Cycling	1805.454
Active Life Toys	200013.366
Active Systems	643.3457
Active Transport Inc.	88245.8727
Activity Center	42804.2561
Advanced Bike Components	363131.3817
Aerobic Exercise Company	2676.654
Affordable Sports Equipment	311446.431

Figure 3-34: Build this pivot table to start.

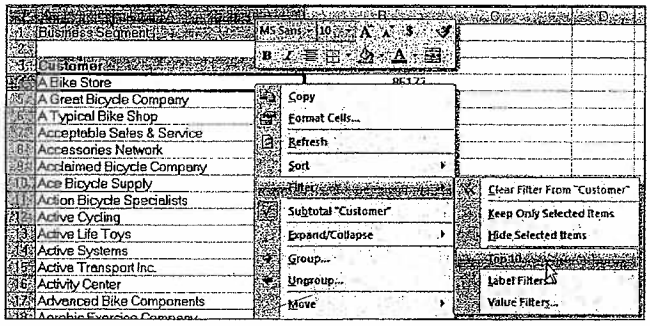


Figure 3-35: Select the Top 10 filter option.

Figure 3-36: Specify the filter you want to apply.

5. **In the filter area, click the drop-down button for the Business Segment field and select Change the Filter area. (See Figure 3-37.)**

   At this point, you have exactly what your manager has asked for — the 50 customers who spend the least amount of money on Accessories. You can go a step further and format the report a bit by sorting on the Sum of Sales Amount and applying a currency format to the numbers. (See Figure 3-38.)

Note that because you built this view using a pivot table, you can easily adapt your newly created report to create a whole new view. For example, you can add the Market field to the filter area to get the 50 United Kingdom customers who spend the least amount of money on Accessories. This, my friends, is the power of using pivot tables for the basis of your dashboards and reports. Continue to play around with the Top 10 Filter option to see what kind of reports you can come up with.

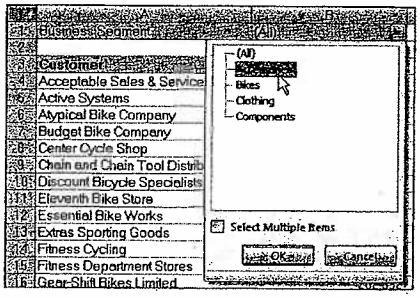
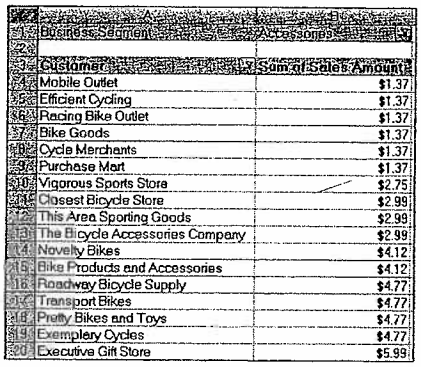


Figure 3-37: Filter your pivot table report to show Accessories.



Business Segment	Accessories
Customer	Sum of Sales Amount
Mobile Outlet	$1.37
Efficient Cycling	$1.37
Racing Bike Outlet	$1.37
Bike Goods	$1.37
Cycle Merchants	$1.37
Purchase Mart	$1.37
Vigorous Sports Store	$2.75
Closest Bicycle Store	$2.99
This Area Sporting Goods	$2.99
The Bicycle Accessories Company	$2.99
Novelty Bikes	$4.12
Bike Products and Accessories	$4.12
Roadway Bicycle Supply	$4.77
Transport Bikes	$4.77
Pretty Bikes and Toys	$4.77
Exemplary Cycles	$4.77
Executive Gift Store	$5.99

Figure 3-38: Your final report.

You may notice that in Figure 3-39, the bottom 50 report is showing only 23 records. This is because there are fewer than 50 customers in the United Kingdom market that have Accessories sales. Because I asked for the bottom 50, Excel shows up to 50 accounts, but fewer if there are fewer than 50. If there's a tie for any rank in the bottom 50, Excel shows you all the tied records.

You can remove the applied filters in your pivot tables by taking these actions:

1. **Click anywhere inside your pivot table to activate the PivotTable Tools context tab in the Ribbon.**
2. **Select the Options tab in the Ribbon.**
3. **Click the Clear icon and select Clear Filters, as demonstrated in Figure 3-40.**

Market	United Kingdom
Business Segment	Accessories
Customer	Sum of Sales Amount
Vigorous Sports Store	$2.75
Closest Bicycle Store	$2.99
Exclusive Bicycle Mart	$15.00
Extended Tours	$20.19
Instruments and Parts Company	$20.99
Tachometers and Accessories	$23.18
Metropolitan Bicycle Supply	$25.76
Number One Bike Co.	$29.73
Nearby Cycle Shop	$35.99
Metro Metals Co.	$46.11
Cycles Wholesaler & Mfg.	$375.53
Cycling Goods	$432.54
Exceptional Cycle Services	$757.72
Channel Outlet	$918.44
Express Bike Services	$1,718.19
Downhill Bicycle Specialists	$1,915.21
Uttermost Bike Shop	$3,806.93
Bulk Discount Store	$4,087.01
Commerce Bicycle Specialists	$4,435.70
Action Bicycle Specialists	$4,861.49
Exhibition Showroom	$5,723.12
Riding Cycles	$6,459.01
Prosperous Tours	$7,486.63
Grand Total	$40,180.22

Figure 3-39: You can easily adapt this report to produce any combination of views.

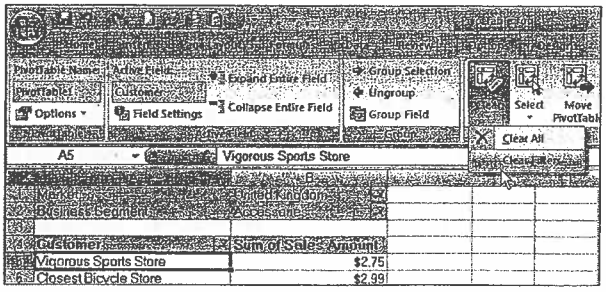
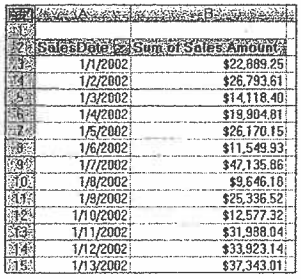


Figure 3-40: Select Clear Filters to clear the applied filters in a field.

Creating views by month, quarter, and year

Raw transactional data is rarely aggregated by month, quarter, or year for you. This type of data is often captured by the day. However, managers often want reports by month or quarters instead of detail by day. Fortunately, pivot tables make it easy to group date fields into various time dimensions. Here's how:

1. **Build a pivot table with Sales Date in the row area and Sales Amount in the values area; similar to the one in Figure 3-41.**
2. **Right-click any date and select Group, as demonstrated in Figure 3-42.**



SalesDate	Sum of Sales Amount
1/1/2002	$22,889.25
1/2/2002	$26,793.61
1/3/2002	$14,118.40
1/4/2002	$19,904.81
1/5/2002	$26,170.15
1/6/2002	$11,549.93
1/7/2002	$47,135.86
1/8/2002	$9,646.18
1/9/2002	$25,336.52
1/10/2002	$12,577.32
1/11/2002	$31,988.04
1/12/2002	$33,923.14
1/13/2002	$37,343.01

Figure 3-41: Build this pivot table to start.

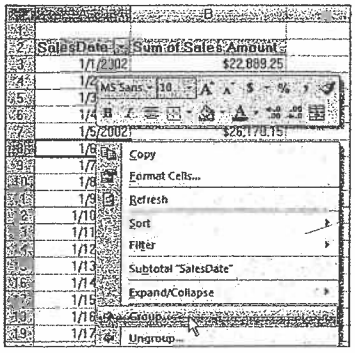


Figure 3-42: Select the Group option.

The Grouping dialog box appears, as shown in Figure 3-43.

3. **Select the time dimensions you want.**

   In this example, you can select Months, Quarters, and Years.

4. **Click OK to apply the change.**

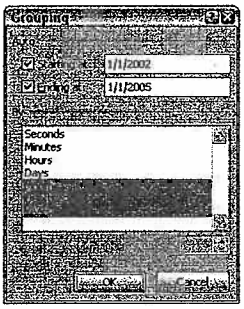


Figure 3-43: Select the time dimensions that suit your needs.

Here are several interesting things to note about the resulting pivot table. First, notice that Quarters and Years have been added to your field list. Keep in mind that your source data hasn't changed to include these new fields; instead, these fields are now part of your pivot table. Another interesting thing to note is that by default, the Years and Quarters fields are automatically added next to the original date field in the pivot table layout, as shown in Figure 3-44.

After your date field is grouped, you can use each added time grouping just as you would any other field in your pivot table. In Figure 3-45, I use the newly created time groupings to show sales for each market by quarter for 2004.

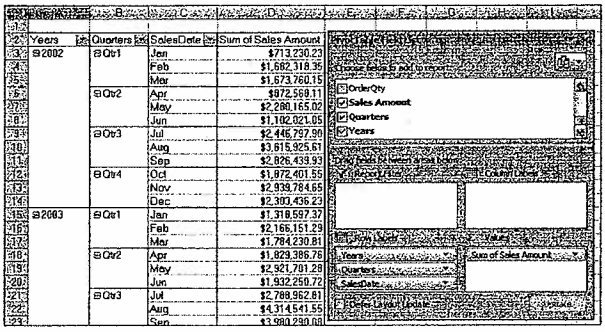


Figure 3-44: Adding Years and Quarters fields.

Sum of Sales Amount	Years	Quarters			
	⊖2004				2004 Total
Market	Qtr1	Qtr2	Qtr3	Qtr4	
Australia	$340,521.71	$236,578.01	$170,142.42		$747,242.14
Canada	$1,024,563.94	$1,114,588.51	$884,515.64	$886,390.73	$3,910,058.83
Central	$626,423.96	$481,199.50	$565,002.03	$608,210.36	$2,280,835.85
France	$597,772.96	$680,722.44	$101,900.89		$1,380,396.29
Germany	$406,366.75	$399,498.00	$100,772.43		$906,637.18
Northeast	$475,563.24	$508,589.07	$288,912.08	$353,647.68	$1,626,712.07
Northwest	$1,166,060.82	$1,162,232.16	$931,870.76	$1,072,927.37	$4,333,091.10
Southeast	$500,399.17	$532,449.38	$719,665.56	$872,692.49	$2,625,206.61
Southwest	$1,441,357.21	$1,457,835.15	$1,069,881.55	$1,109,502.48	$5,078,576.39
United Kingdom	$542,586.65	$511,904.93	$225,600.34		$1,280,091.93

Figure 3-45: You can use your newly created time dimensions just like a normal pivot field.

Creating a percent distribution view

A percent distribution (or percent contribution) view allows you to see how much of the total is made up of a specific data item. This view is useful when you're trying to measure the general impact of a particular item.

The pivot table, as shown in Figure 3-46, gives you a view into the percent of sales that comes from each business segment. Here, you can tell that Bikes make up 81 percent of Canada's sales whereas only 77 percent of France's sales come from Bikes.

Region	(All)				
Sales Amount	Segment				
Market	Accessories	Bikes	Clothing	Components	Grand Total
Australia	1%	83%	3%	13%	100%
Canada	1%	81%	3%	16%	100%
Central	1%	86%	2%	12%	100%
France	1%	77%	3%	19%	100%
Germany	2%	78%	4%	16%	100%
Northeast	1%	82%	2%	15%	100%
Northwest	0%	84%	2%	14%	100%
Southeast	1%	85%	2%	12%	100%
Southwest	1%	83%	2%	14%	100%
United Kingdom	1%	80%	3%	17%	100%
Grand Total	1%	82%	2%	15%	100%

Figure 3-46: This view shows percent of total for the row.

You'll also notice in Figure 3-46 that this view was created by selecting the % of Row option in the Value Field Settings dialog box. Here are the steps to create this type of view:

1. **Right-click any value within the target field.**

   For example, if you want to change the settings for the Sales Amount field, right-click any value under that field.

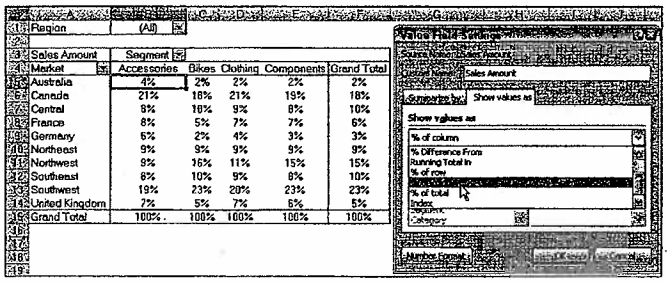
2. **Select Value Field Settings.**

   The Value Field Settings dialog box appears.

3. **Click the Show Values As tab.**

4. **Select % of Row from the drop-down list.**
5. **Click OK to apply your change.**

The pivot table in Figure 3-47 gives you a view into the percent of sales that comes from each market. Here, you have the same type of view, but this time, you use the % of Column option.



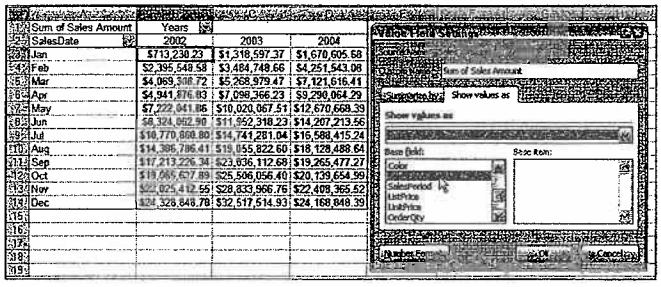
Region	(All)				
Sales Amount	Segment				
Market	Accessories	Bikes	Clothing	Components	Grand Total
Australia	4%	2%	2%	2%	2%
Canada	21%	18%	21%	19%	18%
Central	9%	10%	9%	8%	10%
France	8%	5%	7%	7%	6%
Germany	6%	2%	4%	3%	3%
Northeast	9%	9%	9%	9%	9%
Northwest	9%	16%	11%	15%	15%
Southeast	8%	10%	9%	8%	10%
Southwest	19%	23%	20%	23%	23%
United Kingdom	7%	5%	7%	6%	5%
Grand Total	100%	100%	100%	100%	100%

Figure 3-47: This view shows percent of total for the column.

Again, remember that because you built these views in a pivot table, you have the flexibility to slice the data by region, bring in new fields, rearrange data, and most importantly, refresh this view when new data comes in.

Creating a YTD totals view

Sometimes, it's useful to capture a running-totals view to analyze the movement of numbers on a year-to-date (YTD) basis. Figure 3-48 illustrates a pivot table that shows a running total of revenue by month for each year. In this view, you can see where the YTD sales stand at any given month in each year. For example, you can see that in August 2004, revenues were about a million dollars lower than the same point in 2003.



Sum of Sales Amount	Years		
SalesDate	2002	2003	2004
Jan	$713,230.23	$1,318,597.37	$1,670,605.58
Feb	$2,395,540.58	$3,484,748.66	$4,251,543.06
Mar	$4,069,308.72	$5,268,979.47	$7,121,616.41
Apr	$4,941,876.83	$7,098,366.23	$9,290,064.29
May	$7,222,041.86	$10,020,067.51	$12,670,669.39
Jun	$8,324,062.90	$11,952,318.23	$14,207,213.56
Jul	$10,770,800.80	$14,741,281.04	$15,588,415.24
Aug	$14,386,786.41	$15,055,822.60	$18,128,488.64
Sep	$17,213,226.34	$23,036,112.68	$19,265,477.27
Oct	$19,065,607.89	$25,506,056.40	$20,139,654.99
Nov	$22,025,412.55	$28,833,966.76	$22,409,365.52
Dec	$24,328,848.78	$32,517,514.93	$24,168,848.39

Figure 3-48: This view shows a running total of sales for each month.

In the sample data for this chapter, you don't see Months and Years. You have to create them by grouping the SalesDate field. Feel free to review the section, "Creating views by month, quarter, and year," earlier in this chapter to find out how.

To create this type of view, take these actions:

1. **Right-click any value within the target field.**

   For example, if you want to change the settings for the Sales Amount field, right-click any value under that field.

2. **Select Value Field Settings.**

   The Value Field Settings dialog box appears.

3. **Click the Show Values As tab.**

4. **Select Running Total In from the drop-down list.**

5. **In the Base Field list, select the field that you want the running totals to be calculated against.**

   In most cases, this would be a time series such as, in this example, the SalesDate field.

6. **Click OK to apply your change.**

Creating a month-over-month variance view

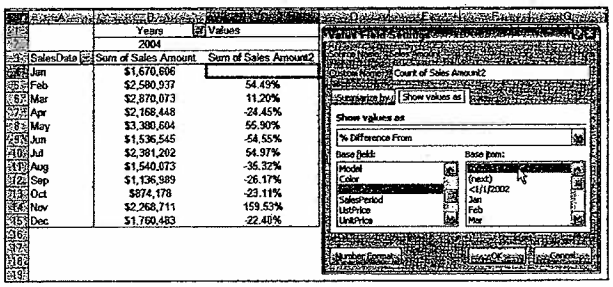
Another commonly requested view is a month-over-month variance. How did this month's sales compare to last month's sales? The best way to create these types of views is to show the raw number and the percent variance together.

In that light, you can start creating this view by building a pivot table similar to the one shown in Figure 3-49. Notice that you bring in the Sales Amount field twice. One of these remains untouched, showing the raw data. The other is changed to show the month-over-month variance.

	A	B	C
1		Years	Values
2		2004	
3	SalesDate	Sum of Sales Amount	Sum of Sales Amount2
4	Jan	$1,670,606	$1,670,606
5	Feb	$2,580,937	$2,580,937
6	Mar	$2,870,073	$2,870,073
7	Apr	$2,168,448	$2,168,448
8	May	$3,380,604	$3,380,604
9	Jun	$1,536,545	$1,536,545
10	Jul	$2,381,202	$2,381,202
11	Aug	$1,540,073	$1,540,073
12	Sep	$1,136,989	$1,136,989
13	Oct	$874,178	$874,178
14	Nov	$2,268,711	$2,268,711
15	Dec	$1,760,483	$1,760,483

Figure 3-49: Build a pivot table that contains the Sum of Sales Amount twice.

Figure 3-50 illustrates the settings that convert the second Sum of Sales Amount field into a month-over-month variance calculation.



	Years	Values
	2004	
SalesDate	Sum of Sales Amount	Sum of Sales Amount2
Jan	$1,670,606	
Feb	$2,580,937	54.49%
Mar	$2,870,073	11.20%
Apr	$2,168,448	-24.45%
May	$3,380,604	55.90%
Jun	$1,536,545	-54.55%
Jul	$2,381,202	54.97%
Aug	$1,540,073	-35.32%
Sep	$1,136,989	-26.17%
Oct	$874,178	-23.11%
Nov	$2,268,711	159.53%
Dec	$1,760,483	-22.40%

Figure 3-50: Configure the second Sum of Sales Amount field to show month over month variance.

As you can see, after the settings are applied, the pivot table gives you a nice view of raw sales dollar and the variance over last month. You can obviously change the field names (see the section, "Customizing field names," earlier in this chapter) to reflect the appropriate labels for each column.

In the sample data for this chapter, you don't see Months and Years. You have to create them by grouping the SalesDate field. Feel free to review the section, "Creating views by month, quarter, and year," earlier in this chapter to find out how.

To create the view in Figure 3-50, take these actions:

1. **Right-click any value within the target field.**

   In this case, the target field is the second Sum of Sales Amount field.

2. **Select Value Field Settings.**

   The Value Field Settings dialog box appears.

3. **Click the Show Values As tab.**

4. **Select % Difference From from the drop-down list.**

5. **In the Base Field list, select the field that you want the running totals to be calculated against.**

   In most cases, this is a time series like, in this example, the SalesDate field.

6. **In the Base Item list, select the item you want to compare against when calculating the percent variance.**

   In this example, you want to calculate each month's variance to the previous month. Therefore, select the (previous) item.

Chapter 4

Excel Charts for the Uninitiated

In This Chapter

- Building basic charts
- Performing common chart tasks
- Using the best practices to build dashboard charts
- Using pivot charts

No other tool is more synonymous with dashboards and reports than your old friend, the *chart*. Fast-paced business environments and new technologies have helped move charts from nice-to-have to a vital part of most business analyses. Charts offer instant gratification, allowing users to immediately see relationships, point out differences, and observe trends. No doubt about it; few mechanisms allow you to absorb data faster than a chart.

For those of you who have not yet been initiated to the world of Excel 2007 charting, this chapter gives you the basics of creating and customizing charts in Excel. This chapter also gives you a few best practices when it comes to creating charts for use in dashboards.

Chart Building Basics

Building a chart in Excel in and of itself is not a terribly difficult thing to do. The hard part is getting your mind around what types of chart to use and how best to display your data in a chart. While you go through each chapter of this book, you discover various imaginative ways to give these charts utility and functionality. For now, I start this look at building basic charts by reviewing the most-commonly-used chart types and discussing the customary ways each chart type is employed.

A review of the most-commonly-used chart types

Excel has 11 major chart types with variations on each type. For most business dashboards and reports, you need only a handful of the chart types available in Excel. Take a moment to review some of the chart types most commonly used for reporting:

- **Line chart:** The line chart is one of the most-frequently-used chart types, typically used to show trends over a period of time. Figure 4-1 demonstrates a line chart being used to show revenue by year for three different regions.
- **Pie chart:** Another frequently used chart is the old pie chart. A pie chart represents the distribution or proportion of each data item over a total value (represented by the overall pie). For example, in the pie chart shown in Figure 4-2, you can easily see how much of the total value is made up by each region.

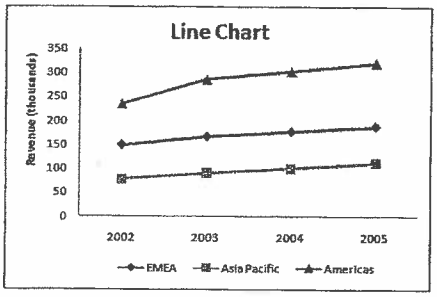


Figure 4-1: Line charts are ideal for showing trends over time.

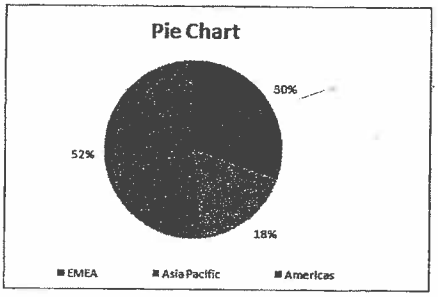


Figure 4-2: Pie charts show the distribution of values within an overall value.

- **Column chart:** Column charts are typically used to compare several items in a specific range of values. Figure 4-3 demonstrates how a column chart could be used to compare the overall revenue performance for each region.
- **Stacked column chart:** A stacked column chart allows you to compare items in a specific range of values as well as show the relationship of the individual sub-items with the whole. For instance, the stacked column chart in Figure 4-4 shows not only the overall revenue for each year but also the proportion of the total revenue made up by each region.
- **Bar chart:** Bar charts are typically used to compare several items in a specific range of values. Figure 4-5 demonstrates how a bar chart could be used to compare the overall revenue performance for a given set of years.

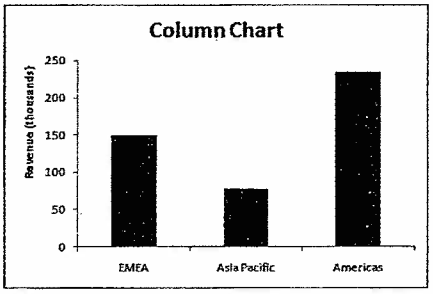


Figure 4-3: Use a column chart to visually compare the values of items.

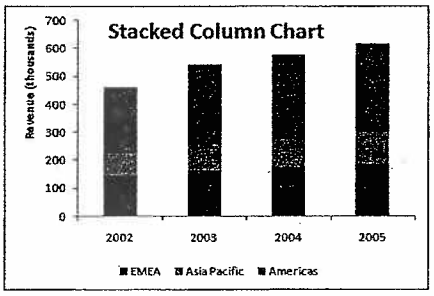


Figure 4-4: Use stacked column charts to show the relationship of sub-items within the compared data values.

- **Stacked bar chart:** Like a bar chart, the stacked bar chart is used for illustrating comparisons between data items. The difference is that a stacked bar chart allows you to show the relationship of individual sub-items in the overall bar that is compared with other bars. For instance, the bar chart in Figure 4-6 shows not only the revenue for each year but also the proportion of the total revenue made up by each region.
- **XY scatter plot chart:** Scatter charts in Excel (also known as XY scatter plot charts) are ideal for showing correlations between two sets of values. The *x* and *y* axes work together to represent data plots on the chart based on the intersection of *x* and *y* values. Figure 4-7 illustrates the correlation between employee performance and competency, demonstrating that employee performance rises when competency improves.
- **Area chart:** Area charts are ideal for clearly illustrating the magnitude of change between two or more data points. For instance, the chart in Figure 4-8 effectively gives a reader a visual feel for the degree of variance between the high and low price for each month.

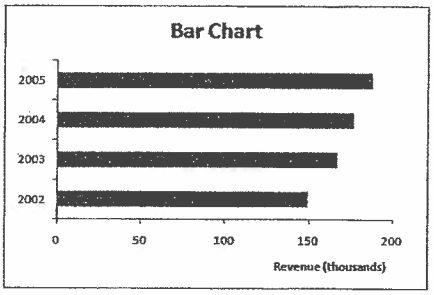


Figure 4-5: Bar charts are ideal for showing differences between data items.

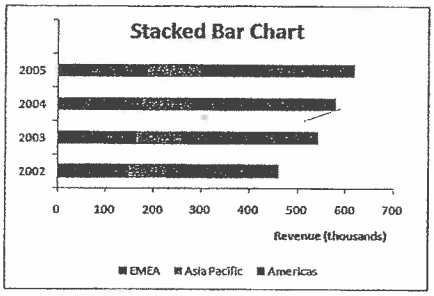


Figure 4-6: Stacked bar charts show the relationship of sub-items within the compared data values.

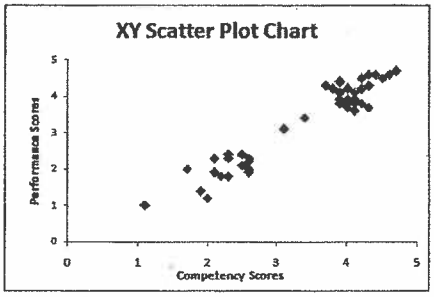


Figure 4-7: Use an XY scatter plot chart to illustrate correlations between two sets of values.

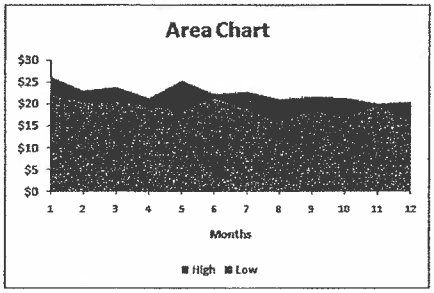


Figure 4-8: Area charts are perfect for illustrating magnitude of change.

To get a detailed review of all chart types available in Excel 2007, pick up a copy of *Excel 2007 Charts* by John Walkenbach (Wiley). This book provides an excellent introduction to every aspect of charting with Excel.

Preparing data for different chart types

The trick to creating a data table to feed your charts is knowing where each value in your table will be used by Excel in the chart. In this section, I show you the appropriate data setup for each chart type and how Excel plots each value in data tables.

Preparing data for line, column, bar, and area charts

Figure 4-9 illustrates the ideal data table for basic line, column, bar, and area charts.

As you can see in Figure 4-9, the ideal data table is laid out in rows and columns — with no blanks within the data range. Also notice that there are both column headers that label each year and row headers that label each region.

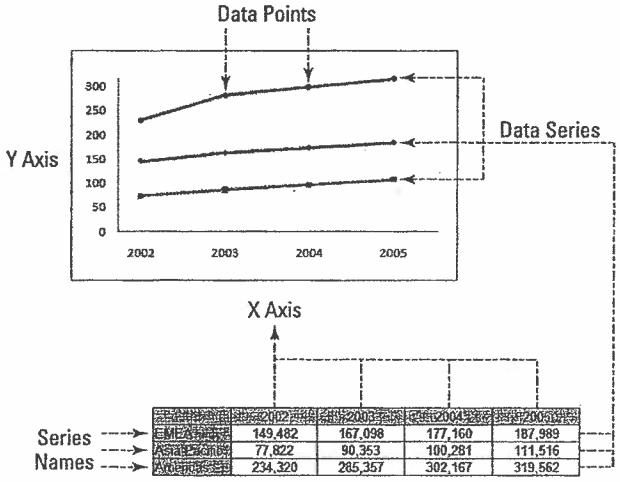


Figure 4-9: The ideal data table for charting line, column, bar, and area charts.

Here is how Excel uses each value in the data table:

- Each **row** in the table becomes a separate data series.
- Each **data value** in the rows is used to create the data point in its respective data series. Excel also creates the *y*-axis scaling based on the data values in your table.
- The **row headers** are used for series names, identifying each series in the legend and other places in the chart.

Preparing data for pie charts

For pie charts, the table setup is a bit different. Because you can have only one data series in a pie chart, the data table would consist of only one column of data with column and row headers. Figure 4-10 illustrates the ideal data table for a pie chart and how each value is used by Excel.

Here's how Excel uses each value in the data table:

- Each **data value** in the table becomes a data point (or slice) in the pie chart.
- The **row headers** are used for category names, identifying each pie slice in the legend and other places in the chart.
- The **column header** is used as the series name.

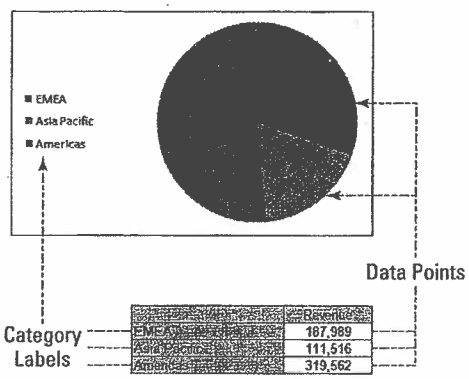


Figure 4-10: The ideal data table for charting pie charts.

Preparing data for XY scatter charts

For XY charts, the table setup consists of two columns, as shown in Figure 4-11. Together, the two columns make up a data point in the scatter chart. The first column holds the *x*-axis coordinates for the data point whereas the second column holds the *y*-axis coordinates for the data point.

Here's how Excel uses each value in this table:

- The **first column** defines the *x*-axis coordinates for each data point.
- The **second column** defines the *y*-axis coordinates for each data point.
- Each **row** in the table is used to plot a data point on the chart.

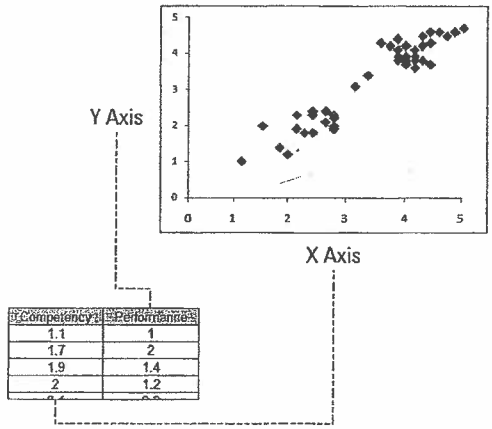


Figure 4-11: The ideal data table for charting XY scatter charts consists of two columns.

Creating a chart from scratch

Enough chitchat. Let's walk through the creation of a basic line chart. Follow these steps:

1. **Start with a data table similar to the one shown in Figure 4-12 (which is conducive to creating line charts, as I discuss earlier in this chapter) and then select the entire range of data.**
2. **Select the Insert tab in the Ribbon.**
3. **In the Charts group, click the drop-down arrow under the Line chart icon and select your desired chart type. (See Figure 4-13.)**

   As soon as you select your desired chart type, Excel creates an embedded chart directly on the same worksheet your data is on. (See Figure 4-14.) From here, you can move, size, and format the chart to suit your needs.

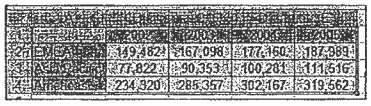


Figure 4-12: Select all the data in your data table.

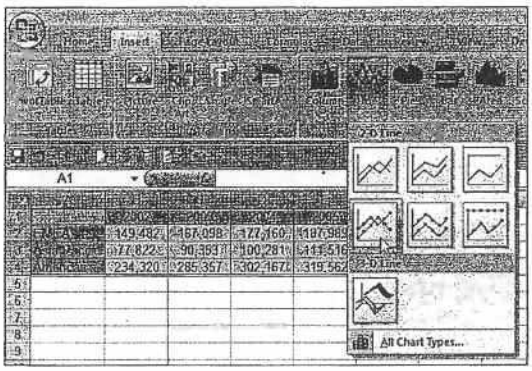


Figure 4-13: Select the desired chart type.

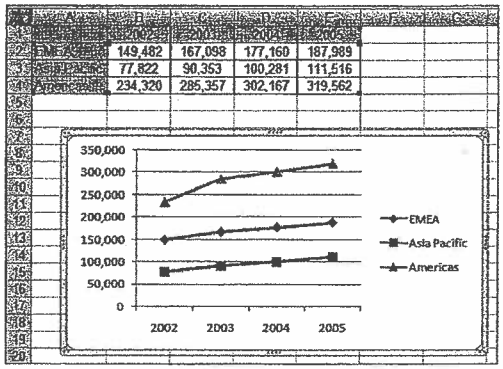


Figure 4-14: By default, Excel creates your charts on the same sheet your data is on.

Charting disparate data

It may not always be convenient to force your data into clean contiguous tables for charting. For example, Figure 4-15 illustrates a table that displays quarter totals along with annual totals for the years 2002, 2003, and 2004.

Imagine you want to use this table to chart only the annual totals (not the quarter totals). It'd be downright inconvenient to create another table that shows only annual totals. That would be one more table you'd have to create and maintain processes for.

The answer to dilemmas like this is to manually select the data you need to chart while holding down the Ctrl key on your keyboard. When you hold down the Ctrl key while you select data ranges, Excel automatically strings the ranges together, recognizing them as one contiguous range.

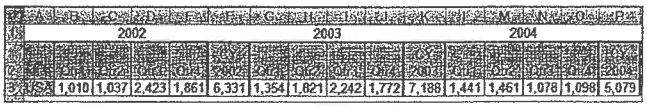


Figure 4-15: What do you do when your data table isn't ideal for charting?

Here are the steps to create a chart using non-standard, disparate data:

1. **Hold down the Ctrl key on your keyboard while you select the data you need to chart.**

   Your goal is to select data that will get you as close to a table that is conducive to charting as possible. Figure 4-16 demonstrates the selection of non-contiguous values.

   From here, you can continue creating your chart as normal.

2. **Select the Insert tab in the Ribbon.**
3. **In the Charts group, select your desired chart type.**

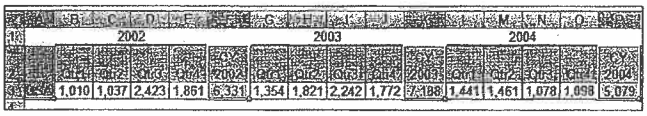


Figure 4-16: Holding down the Ctrl key on your keyboard while selecting data allows you to define a dataset Excel can use for charting.

Common Chart Tasks

It's rare that Excel creates charts so perfect that you don't have to touch them after they're created. In fact, you often have to perform various tasks on your chart to get them looking the way you want them to. This section covers some of those tasks.

Resizing and moving charts

The most common tasks you perform on your charts are to resize and to move them. Here, you find some of the ways you can resize and move your charts.

- **Resizing a chart:** After you create your chart, click it once and a border of sorts appears around it. At certain points around the border, you see chart handles (identified with arrows in Figure 4-17), which you can click and drag to resize your chart in various directions.
- **Moving a chart within the same worksheet:** To move your chart in the same sheet, you can click between the chart handle, as illustrated in Figure 4-17, and drag the chart where you need it.
- **Moving a chart to a different worksheet:** If you need your chart to be placed on a different worksheet within the same workbook, you can use the Move Chart button on the Ribbon. Here's how:

  1. *Click your chart to reveal the Chart Tools context tabs, as shown here in Figure 4-18.*

     These context tabs contain all the commands and functions used to create and format charts.

  2. *Select the Design tab and click the Move Chart.*

     This opens the Move Chart dialog box, as shown in Figure 4-19.

  3. *Use the Object In drop-down list to select the worksheet where you want to move the chart.*

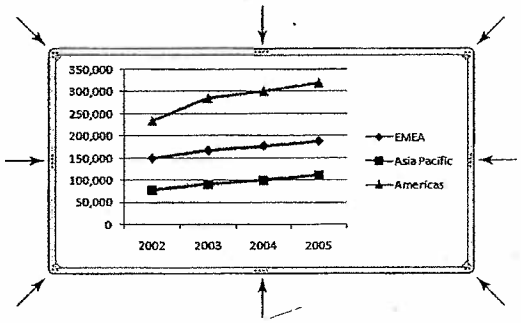


Figure 4-17: Use the chart handles to resize your charts. Click between the handles to move your chart within the same worksheet.

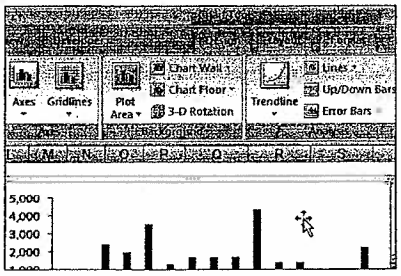


Figure 4-18: Clicking any chart reveals the Chart Tools context tabs.

You can also activate the Move Chart dialog box by right-clicking your chart and selecting Move Chart.

- **Making multiple charts the same size:** When creating multiple charts for a dashboard, you often want to make all charts the same size. Excel makes it easy to resize multiple charts at one time. Here's how:

  1. *Press and hold down the Ctrl key on your keyboard and select all your charts.*

     Interestingly enough, selecting multiple charts activates the Drawing Tools context menu, which exposes formatting options for shapes.

  2. *Under the Format tab, find and adjust the height and width selectors under the Size group, as demonstrated in Figure 4-20.*

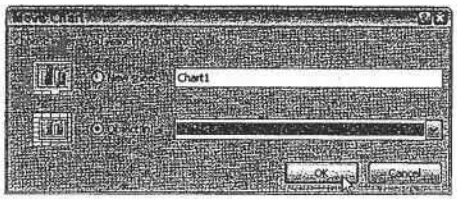


Figure 4-19: Use the Move Chart dialog box to move a chart from one sheet to another.

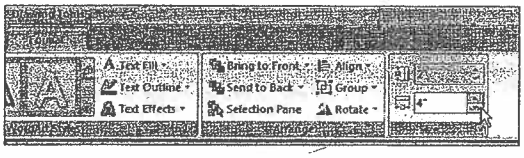


Figure 4-20: Adjust the height and width selectors to resize multiple charts at one time.

Changing chart type

When you create charts, you'll find that it's useful to test how your data looks in various chart types. For example, you may initially create a bar chart but decide a line chart would better display your data. You can easily change the chart type without having to create the chart from scratch.

1. **Click your chart to activate the Chart Tools context tabs.**
2. **Under the Design tab, find and click the Change Chart Type button, as demonstrated in Figure 4-21.**

   The Change Chart Type dialog box appears. (See Figure 4-22.)

   You can also activate the Change Chart Type dialog box by right-clicking your chart and selecting Change Chart Type.
3. **Select the type of chart you want to switch to.**

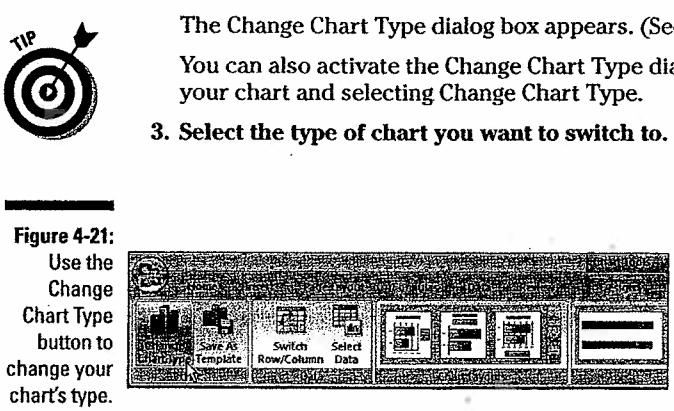


Figure 4-21: Use the Change Chart Type button to change your chart's type.

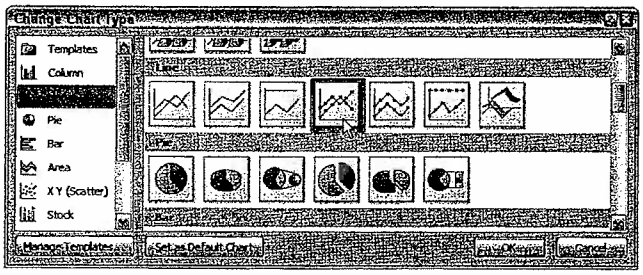


Figure 4-22: The Change Chart Type dialog box.

Creating a combination chart

A *combination chart* is essentially two or more chart types melded into one chart. For example, Figure 4-23 illustrates a combination chart that shows number of households with a computer (column chart) and the number of households with Internet access (line chart).

Why bother with a combination chart? Sometimes showing a data series in a in a different chart type makes it stand out, getting the message across faster and in a more effective way.

Take the example shown in Figure 4-23. The original chart for that example is shown here in Figure 4-24. This chart is okay, but the growth trend for Internet usage is subdued when shown as bars.

To create a combination chart, follow these steps:

1. **Right-click the data you want changed and select Change Series Chart Type. (See Figure 4-25.)**

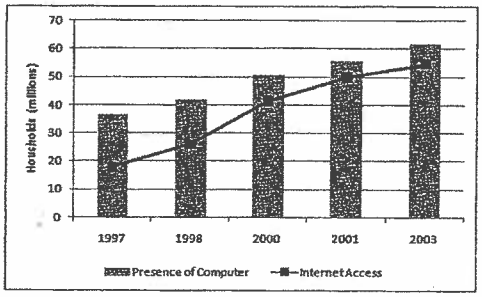


Figure 4-23: A combination chart holds two or more chart types.

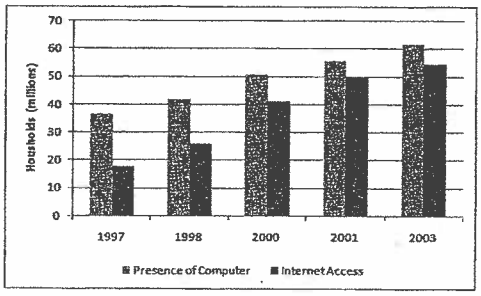


Figure 4-24: This chart shows the same data, but the growth trend for Internet usage is subdued.

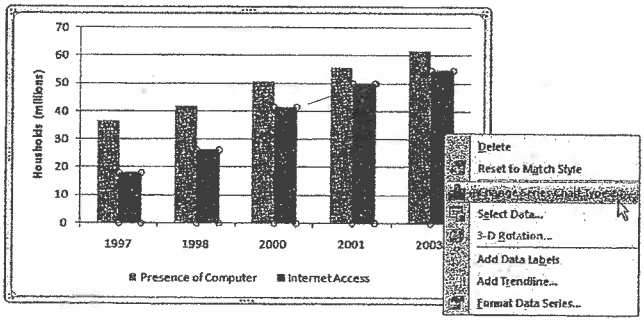


Figure 4-25: To change the chart type of only one data series, right-click that series and select Change Series Chart Type.

The Change Chart Type dialog box appears.

2. **Select the type of chart you want to switch to.**

Selecting and formatting chart elements

All your charts have elements that you can format and customize. Take a moment to review the various ways to get to the formatting options for the elements in your charts.

Selecting elements

The first step in formatting an element of your chart is selecting that element. The easiest way to select an element is to simply right-click it. Why right-click? This way, the shortcut menu that activates gives you a clue to which element you selected and exposes the formatting options for that element. For example, Figure 4-26 demonstrates what you'd get if you right-clicked the gridlines in a chart.

It may sometimes be difficult to physically right-click the chart element you need to format. In this case, you can use Excel's nifty little element selector. To get to it, click your chart and select the Layout tab.

As Figure 4-27 demonstrates, you can use the drop-down list provided to select hard-to-reach elements.

When the desired element is selected, click the Format Selection button (see Figure 4-28) to activate the formatting dialog box for the selected element.

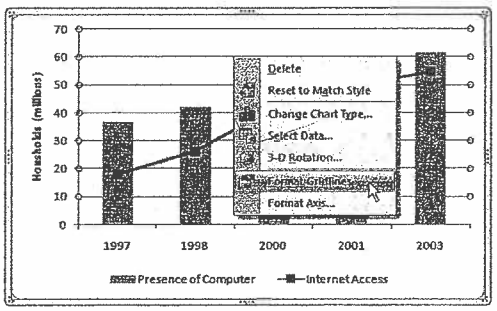


Figure 4-26: Right-clicking a chart element exposes the formatting options for that element.

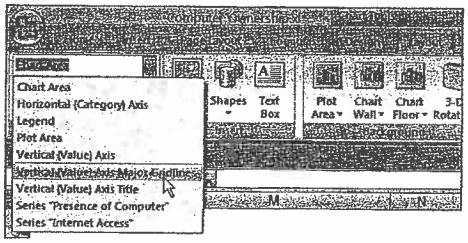


Figure 4-27: Use the Chart Elements drop-down box to select hard-to-reach elements.

Figure 4-28: The Format Selection button activates the formatting dialog box for the selected chart element.

Each data element has its own formatting dialog box that provides various formatting options (that is, fill color, border color, line style, shadow options, 3D options, and so on). Alas, the scope and focus of this book isn't on charting per se, so I don't go through detailed explanations of every formatting option available. To get a detailed review of all formatting options available in Excel 2007, pick up a copy of *Excel 2007 Charts For Dummies* by Ken Bluttman (Wiley). In his book, Ken does an excellent job of reviewing every aspect of charting with Excel.

Using the chart tools context tabs to apply formatting

As I discuss earlier in this chapter, clicking a chart activates the Chart Tools context tabs. In these tabs, a plethora of formatting options allows you to easily customize your charts. Here's a high-level overview of the options on each tab:

- **The Design Tab:** The Design tab (see Figure 4-29) provides tools that allow you to quickly apply predefined layouts and styles to your charts. Although some the available layouts and styles don't comply with standard dashboarding best practices (see Chapter 16), the ability to apply predefined settings can often give you a one-touch head start on applying formatting that can be adjusted appropriately.
- **The Layout Tab:** The Layout tab provides tools that allow for one-touch formatting of major chart elements, such as axes, labels, and backgrounds. For instance, Figure 4-30 demonstrates how you can turn off gridlines simply by using the options under the Gridlines button. Here, you can practically format your entire chart with just a few clicks of the mouse.
- **The Format Tab:** The Format tab (see Figure 4-31) is based on the Format tab used for shapes in Office. The idea behind the Format tab is to choose any chart element and format it as if it was an independent shape, applying effects, such as Glow, Chiseled, and Soft Edges. This tab also holds WordArt effects, allowing you to apply effects to your chart titles and labels. As a matter of design principle, many of the options on the Format tab don't comply with standard charting best practices (see Chapter 16). It's best to avoid this tab when building charts for use in dashboards.

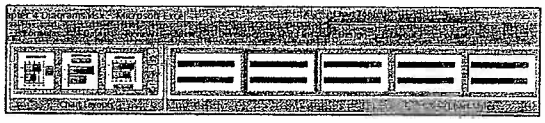


Figure 4-29: The Design tab holds predefined layouts and styles, which you can apply to your charts.

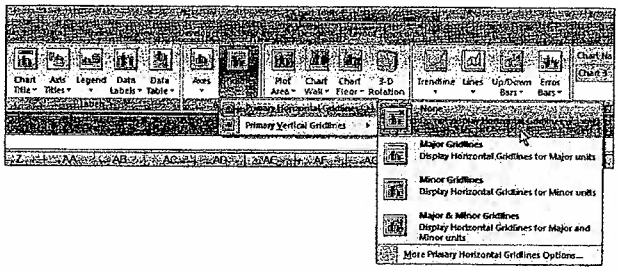


Figure 4-30: The Layout tab allows for one-touch formatting of your charts.

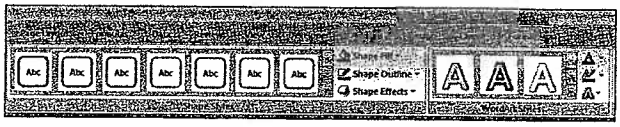


Figure 4-31: The Format tab holds the cosmetic formatting options for shapes and WordArt.

Working with Pivot Charts

No chapter on Excel charts would be complete without a look at one of the more amazing charts in Excel — the pivot chart. As the name implies, a *pivot chart* is a graphical representation of the data in a pivot table. What makes a pivot chart so amazing is that it's directly tied to a pivot table, allowing you to *interactively* add, remove, filter, and refresh data fields inside the chart just as you would do in your pivot table. There's no easier way to create a dynamic reporting tool in Excel than using the powerful combination of pivot tables and pivot charts.

In this section, you explore pivot charts and discover just how easy it can be to build interactive charting into your reporting mechanisms.

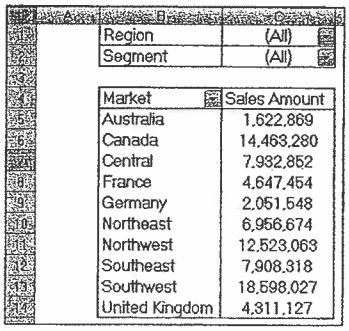
If you're unfamiliar with pivot tables, you may find this section on pivot charts a bit confusing. Feel free to visit Chapter 3 for a detailed look at pivot tables and how they work.

Pivot chart fundamentals

To demonstrate how simple it is to create a pivot chart, look at the pivot table in Figure 4-32.

As you can see, this pivot table provides for a simple view of sales by market. The Region and Segment fields in the Filter Area let you parse out sales by region and business segment.

Building a pivot chart on top of this pivot table would do two things. First, it'd allow for an instant view of the performance of each market. Second, it'd create an interactive charting mechanism that allows you to filter by region and business segment.



Region	(All)
Segment	(All)

Market	Sales Amount
Australia	1,622,869
Canada	14,463,280
Central	7,932,852
France	4,647,454
Germany	2,051,548
Northeast	6,956,674
Northwest	12,523,063
Southeast	7,908,318
Southwest	18,598,027
United Kingdom	4,311,127

Figure 4-32: Start with an existing pivot table.

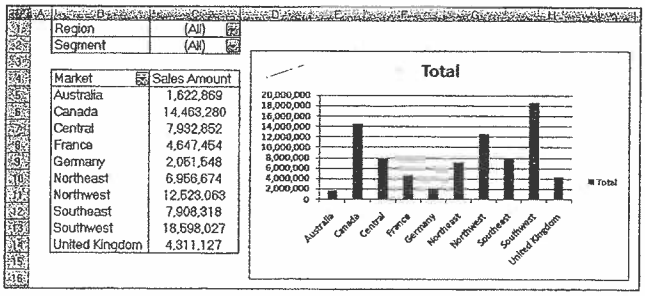
You can find the sample file for this chapter on this book's companion Web site.

Follow these steps to create the pivot chart:

1. **Place your cursor anywhere inside the pivot table and click the Insert tab on the Ribbon.**
2. **In the Charts group, choose the chart type you want to use for your pivot chart, just as you would when charting standard data. (In this example, click the Column chart icon and select the first 2D column chart.)**

   As you can see in Figure 4-33, choosing the chart type immediately causes a column chart to appear on the same sheet as your pivot table.

You now have a chart that's a visual representation of your pivot table. More than that, because the pivot chart is tied to the underlying pivot table, changing the pivot table in any way changes the chart.



Region	(All)
Segment	(All)

Market	Sales Amount
Australia	1,622,869
Canada	14,463,280
Central	7,932,852
France	4,647,454
Germany	2,051,548
Northeast	6,956,674
Northwest	12,523,063
Southeast	7,908,318
Southwest	18,598,027
United Kingdom	4,311,127

Figure 4-33: A visual representation of your pivot table.

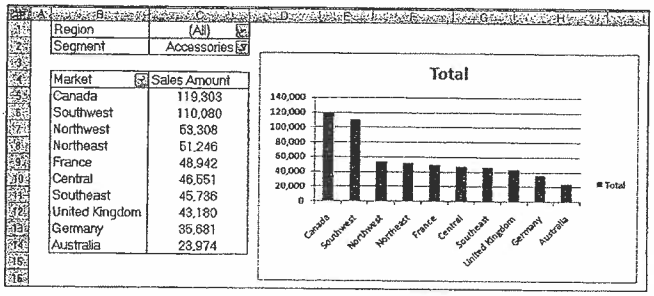
For instance, try sorting the pivot table by Sales Amount and filtering for Accessories in the Segment field. Figure 4-34 illustrates how your pivot chart keeps up with those changes.

Again, if you're unfamiliar with actions such as sorting and filtering in a pivot table, you may find it valuable to check out Chapter 3 for a refresher.

In addition to being able to reflect the existing data in a pivot table, a pivot chart also captures any new data you add to the pivot table. For example, Figure 4-35 demonstrates how adding the Region field to the pivot table adds a region dimension to your chart.

Notice that pivot charts don't display the subtotals shown in their underlying pivot tables. Pivot charts ignore all subtotals and the grand total.

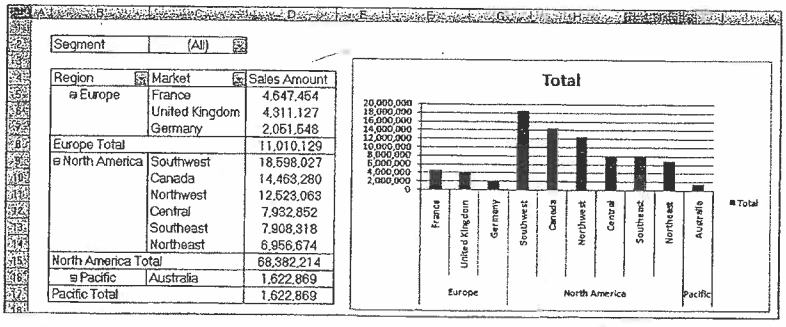
The cool thing is that your pivot table doesn't even have to be visible. Take a look at Figure 4-36. Notice that rows 3–15 are hidden. Those rows hold the pivot table. All I have showing here is the Filter Area and the pivot chart. This gives me the look and feel of an interactive reporting tool.



Region	(All)
Segment	Accessories

Market	Sales Amount
Canada	119,303
Southwest	110,080
Northwest	63,308
Northeast	51,246
France	48,942
Central	46,551
Southeast	45,736
United Kingdom	43,180
Germany	35,681
Australia	23,974

Figure 4-34: Your pivot chart reflects what's in your pivot table.



Segment	(All)

Region	Market	Sales Amount
⊟ Europe	France	4,647,464
	United Kingdom	4,311,127
	Germany	2,051,548
Europe Total		11,010,129
⊟ North America	Southwest	18,598,027
	Canada	14,463,280
	Northwest	12,523,063
	Central	7,932,852
	Southeast	7,908,318
	Northeast	6,956,674
North America Total		68,382,214
⊟ Pacific	Australia	1,622,869
Pacific Total		1,622,869

Figure 4-35: Your pivot chart displays the same fields your underlying pivot table displays, even if the fields are layered.

Going straight to pivot chart

You don't have to build a pivot table before creating a pivot chart. You can go straight from your raw data to a pivot chart by following these steps:

1. Click any single cell in your data source and select the Insert tab.
2. Select PivotTable from the tables group and choose PivotChart from the drop-down list.
3. When the PivotChart dialog box activates, go through the same steps you'd take if you were building a standard pivot table.

And remember, because pivot charts are essentially a graphical representation of their source pivot tables, they automatically update when you refresh your pivot tables. Think about the possibilities. On the power of pivot tables and pivot charts alone, you can create a fairly robust reporting mechanism without one line of programming.

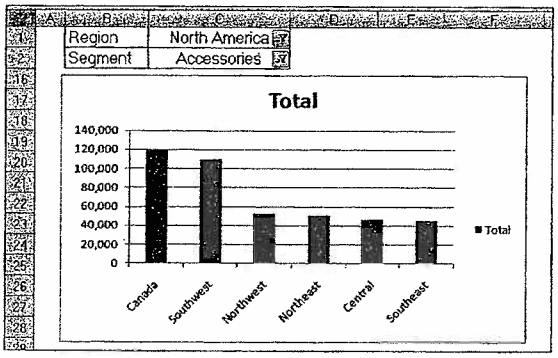


Figure 4-36: You can hide your pivot table to get the look and feel of an interactive reporting tool.

Pivot charts and the *x* and *y* axes

One mistake most people naturally make with pivot charts is to assume Excel places the values in the column area of the pivot table in the *x*-axis of the pivot chart. After all, the column area of a pivot table is oriented to go across like the *x*-axis of a chart.

Take Figure 4-37, for instance. The structure chosen shows the SalesPeriods in the column area and the Region in the row area. This structure works fine in the pivot table view.

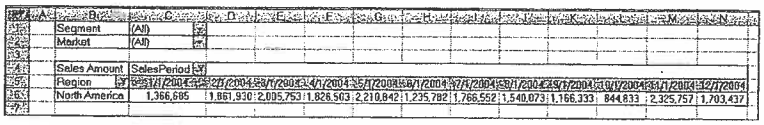
Now, you would instinctively expect to see sales periods across the *x*-axis and lines of business along the *y*-axis. However, as shown in Figure 4-38, building a pivot chart on top of this format results in the Region in the *x*-axis and the SalesPeriod in the *y*-axis.

So why does the structure in your pivot table not translate to a clean pivot chart? Well in a pivot chart, both the *x*-axis and the *y*-axis correspond to specific areas in your pivot table.

- ***x*-axis:** Corresponds to the row area in your pivot table and makes up the *x*-axis of your pivot chart.
- ***y*-axis:** Corresponds to the column area in your pivot table and makes up the *y*-axis of your pivot chart.

Although it may seem counterintuitive at times, following these guidelines ensures you have a clean pivot chart. Figure 4-39 shows the same pivot table rearranged to show SalesPeriod in the row area and Region in the column area. Although this format isn't ideal for a pivot table view, it does allow your pivot chart to give you the effect you're looking for.

This new arrangement generates the pivot chart shown in Figure 4-40.



Segment	(All)												
Market	(All)												
Sales Amount	SalesPeriod												
Region	1/1/2004	2/1/2004	3/1/2004	4/1/2004	5/1/2004	6/1/2004	7/1/2004	8/1/2004	9/1/2004	10/1/2004	11/1/2004	12/1/2004	
North America	1,366,685	1,861,930	2,005,753	1,826,503	2,210,842	1,235,782	1,766,552	1,540,073	1,166,333	844,833	2,325,757	1,703,437	

Figure 4-37: The placement of data works in a pivot table.

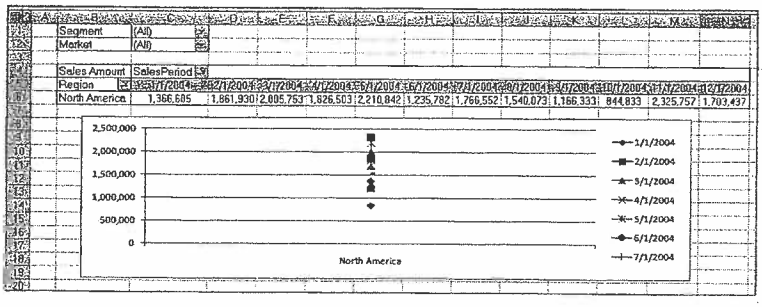
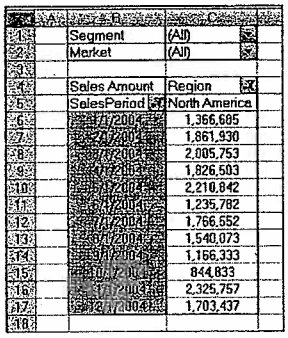


Figure 4-38: Although the pivot table is nicely structured, it doesn't work in a pivot chart.



	Segment	(All)
	Market	(All)
	Sales Amount	Region
	SalesPeriod	North America
	1/1/2004	1,366,685
	2/1/2004	1,861,930
	3/1/2004	2,005,753
	4/1/2004	1,826,503
	5/1/2004	2,210,842
	6/1/2004	1,235,782
	7/1/2004	1,766,552
	8/1/2004	1,540,073
	9/1/2004	1,166,333
	10/1/2004	844,833
	11/1/2004	2,325,757
	12/1/2004	1,703,437

Figure 4-39: Rearranged data to better support pivot charts.

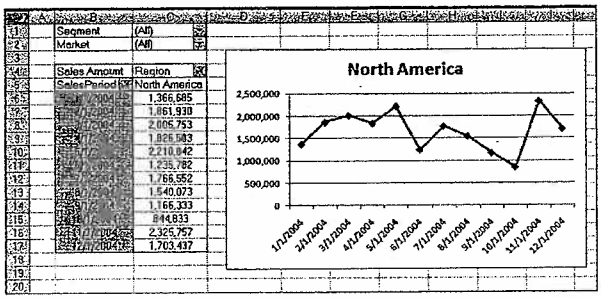


Figure 4-40: You now have a pivot chart that makes sense.

Pivot charts formatting limitations

Microsoft has worked hard to ensure that the overall look and feel of pivot charts in Excel 2007 are very much that of standard charts. As a result, you can customize your pivot charts just as you would a standard chart, formatting each element of a pivot chart using the same actions and commands outlined earlier in this chapter.

That being said, keep in mind a few formatting limitations when working with pivot charts:

- **Chart types:** You can't use XY (scatter) charts, bubble charts, or stock charts when creating a pivot chart.
- **Trend lines:** Applied trend lines are lost when the underlying pivot table changes.
- **Data label:** The data labels in the pivot chart can't be resized. However, you can change the font of a data label, and making the font bigger or smaller indirectly resizes the data label.

Chapter 5

The New World of Conditional Formatting

In This Chapter

- Using predefined formatting scenarios
- Creating custom formatting rules
- Useful ways to implement conditional formatting
- Applying conditional formatting to pivot tables

Conditional formatting is the term given to the functionality whereby Excel dynamically changes the formatting of a value, a cell, or a range of cells based on a set of conditions you define. Conditional formatting allows you to look at your Excel reports and make split-second determinations as to which values are *good* and which are *bad,* all based on formatting.

Microsoft has dramatically enhanced this functionality in Excel 2007. In Excel 2007, conditional formatting includes a more robust set of visualizations and predefined formatting rules. These enhancements allow you to quickly and easily build dashboard-style reporting that goes far beyond the traditional red, yellow, and green designations.

In this chapter, you're introduced to the new world of conditional formatting in Excel 2007, discovering how to leverage this functionality to enhance your dashboards and reports.

Applying Basic Conditional Formatting

Thanks to the many predefined scenarios offered with Excel 2007, you can literally apply some basic conditional formatting with a few mouse clicks. To get a first taste of what you can do with this functionality, click the Conditional Formatting button found on the Home tab of the Ribbon. (See Figure 5-1.)

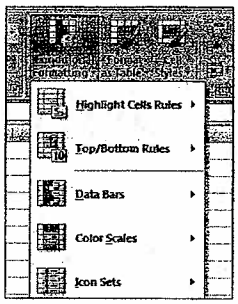


Figure 5-1: The predefined conditional formatting scenarios available in Excel.

As you can see, there are five categories of predefined scenarios: Highlight Cells Rules, Top/Bottom Rules, Data Bars, Color Scales, and Icon Sets.

Take a moment to review what each category of predefined scenarios allows you to do.

Highlight Cells Rules

The formatting scenarios under the Highlight Cells Rules category, as shown in Figure 5-2, allow you to highlight those cells whose values meet a specific condition.

The thing to remember about these scenarios is that they work very much like an `If . . then . . else` statement. That is to say if the condition is met, the cell is formatted; if the condition is not met, the cell is not touched.

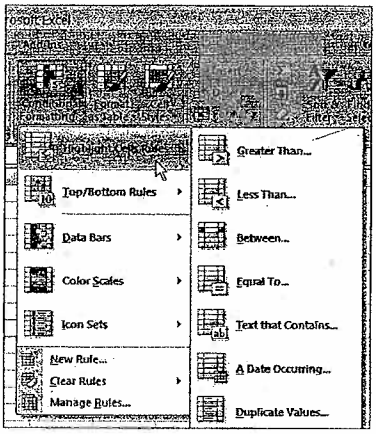


Figure 5-2: The Highlight Cells Rules scenarios apply formats if specific conditions are met.

The scenarios under the Highlight Cells Rules category are pretty self-explanatory. Here's a breakdown of each scenario:

- **Greater Than:** This scenario allows you to conditionally format a cell whose value is greater than a specified amount. For instance, you can tell Excel to format those cells that contain a value greater than 50.
- **Less Than:** This scenario allows you to conditionally format a cell whose value is less than a specified amount. For instance, you can tell Excel to format those cells that contain a value less than 100.
- **Between:** This scenario allows you to conditionally format a cell whose value is between two given amounts. For example, you can tell Excel to format those cells that contain a value between 50 and 100.
- **Equal To:** This scenario allows you to conditionally format a cell whose value is equal to a specified amount. For instance, you can tell Excel to format those cells whose values are exactly 100.
- **Text That Contains:** This scenario allows you to conditionally format a cell that contains any form of a given text you specify as a criterion. For example, you can tell Excel to format those cells that contain the text *North*.
- **A Date Occurring:** This scenario allows you to conditionally format a cell whose contents contain a date occurring in a specified period relative to today's date. For example, Yesterday, Last Week, Last Month, Next Month, Next Week, and so on.
- **Duplicate Values:** This scenario allows you to conditionally format both duplicate values and unique values in a given range of cells. This rule was designed more for data cleanup than dashboarding, enabling you to quickly identify either duplicates or unique values in your dataset.

For your first encounter with conditional formatting, take a moment to go through an example of how to apply one of these scenarios. In this example, you highlight all values greater than a certain amount. Follow these steps:

1. **Start with a set of data similar to the one illustrated in Figure 5-3 and select the range of cells to which you need to apply the conditional formatting.**

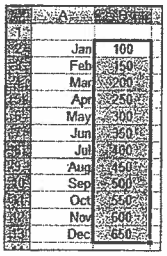


Figure 5-3: Select the cells you need formatted.

Be sure to select all the cells to which you want to apply the conditional formatting rule. Selecting one cell results in only that one cell being conditionally formatted.

2. **Choose the Greater Than scenario found under the Highlight Cells Rules category. (Refer to Figure 5-2.)**

   The Greater Than dialog box appears. (See Figure 5-4.)

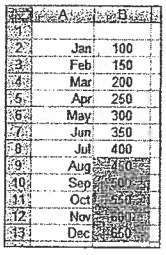
3. **Define a value that triggers the conditional formatting.**

   You can either type the value (400 in this example) or you can reference a cell that contains the trigger value. Also in this dialog box, you can use the drop-down list to specify the format you want applied.

4. **Click OK and you immediately see the formatting rule applied to the selected cells. (See Figure 5-5.)**

Now you may be thinking, what's the point? Wouldn't it have been just as easy to manually format the cells greater than zero? Sure, but the benefit of a conditional formatting rule is that Excel automatically re-evaluates the rule each time a cell is changed (provided that cell has a conditional formatting rule applied to it).

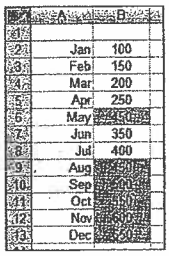
Figure 5-4: Each scenario has its own dialog box that you can use to define the trigger values and the format for each rule.



	A	B
1		
2	Jan	100
3	Feb	150
4	Mar	200
5	Apr	250
6	May	300
7	Jun	350
8	Jul	400
9	Aug	450
10	Sep	500
11	Oct	550
12	Nov	600
13	Dec	650

Figure 5-5: Cells greater than 400 are now formatted.

For instance, if I changed a value in the example dataset to 450, as in the value for May in Figure 5-6, the formatting would automatically change because all the cells in the dataset have the conditional formatting applied to them.



	A	B
1		
2	Jan	100
3	Feb	150
4	Mar	200
5	Apr	250
6	May	450
7	Jun	350
8	Jul	400
9	Aug	550
10	Sep	600
11	Oct	650
12	Nov	600
13	Dec	550

Figure 5-6: Cells with a conditional formatting rule applied are re-evaluated each time their value changes.

Top/Bottom Rules

The formatting scenarios under the Top/Bottom Rules category, as shown in Figure 5-7, allow you to highlight those cells whose values meet a given threshold.

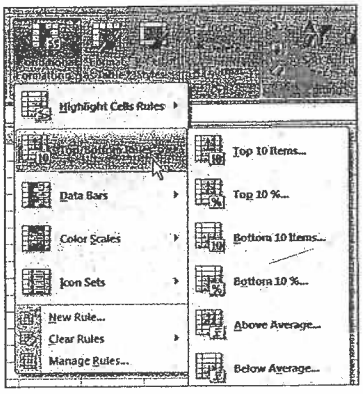


Figure 5-7: The Top/Bottom Rules scenarios apply formats if specific thresholds are met.

Like the Highlight Cells Rules scenarios, these scenarios work like If . . . then . . . else statements — if the condition is met, the cell is formatted; if the condition is not met, the cell remains untouched.

Here's a breakdown of each scenario under the Top/Bottom Rules category:

- **Top 10 Items:** Although the name doesn't suggest it, this scenario allows you to specify any number of cells to highlight based on individual cell values (not just ten). For example, you can highlight the top five cells whose values are among the five largest numbers of all the cells selected.
- **Top 10 %:** This scenario is similar to the Top 10 Items scenario, except the selected cells are evaluated on a percentage basis. Again, don't let the name fool you; the percent selection doesn't have to be ten. For instance, you can highlight the cells whose values make up the top 20 percent of the total values of all the selected cells.
- **Bottom 10 Items:** This scenario allows you to specify the number of cells to highlight based on the lowest individual cell values. Again, don't let the name fool you. You can specify any number of cells to highlight — not just ten. For example, you can highlight the bottom 15 cells whose values are within the 15 smallest numbers among all the cells selected.
- **Bottom 10 %:** This scenario is similar to the Bottom 10 Items scenario, expect the selected cells are evaluated on a percentage basis. For instance, you can highlight the cells whose values make up the bottom 15 percent of the total values of all the selected cells.
- **Above Average:** This scenario allows you to conditionally format each cell whose value is above the average of all cells selected.
- **Below Average:** This scenario allows you to conditionally format each cell whose value is below the average of all cells selected.

In this example, you conditionally format all cells whose values are within the top 40 percent of the total values of all cells.

To avoid overlapping different conditional formatting scenarios, you may want to clear any conditional formatting you have previously applied before applying a new scenario. That is to say, you can delete the conditional formatting you may have already applied.

To clear the conditional formatting for a given range of cells, select the cells and then select Conditional Formatting from the Home tab of the Ribbon. Here you find the Clear Scenarios selection. Click Clear Scenarios and select whether you want to clear conditional formatting for the entire sheet or only the selected cells.

Then follow these steps to apply your first Top/Bottom Rules scenario:

1. **Start with a set of data similar to the one illustrated in Figure 5-8 and select the range of cells to which you need to apply the conditional formatting.**
2. **Choose the Top 10 % scenario found under the Top/Bottom Scenarios category. (Refer to Figure 5-7.)**

   The Top 10% dialog box appears. (See Figure 5-9.)
3. **Define the threshold that triggers the conditional formatting.**

   In this example, I enter **40**. Also, in this dialog box, you can use the drop-down list to specify the format you want applied.
4. **Click OK and you immediately see the formatting scenario applied to the selected cells. (See Figure 5-10.)**

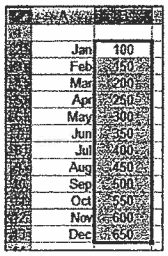
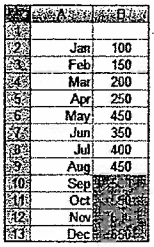


Figure 5-8: Select the cells you need formatted.

Figure 5-9: Each scenario has its own dialog box that you can use to define the trigger values and the format for each scenario.



	A	B
1		
2	Jan	100
3	Feb	150
4	Mar	200
5	Apr	250
6	May	450
7	Jun	350
8	Jul	400
9	Aug	450
10	Sep	1,250
11	Oct	1,450
12	Nov	1,300
13	Dec	1,550

Figure 5-10: With conditional formatting, you can easily see that September through December makes up 40 percent of the total value in this dataset.

Data Bars, Color Scales, and Icon Sets

Data Bars, Color Scales, and Icon Sets are new to Excel and present you with some new and interesting ways to highlight data. Here are a few examples of the types of formatting you can get from these scenarios:

- **Data Bars:** Data Bars fill each cell you're formatting with mini-bars in varying length, indicating the value in each cell relative to other formatted cells. Excel essentially takes the largest and smallest values in the selected range and calculates the length for each bar. To apply Data Bars to a range, do the following:

  1. *Select the target range of cells to which you need to apply the conditional formatting.*
  2. *Choose Data Bars from the Conditional Formatting menu in the Home tab on the Ribbon. (See Figure 5-11.)*

  As you can see in Figure 5-12, the result is essentially a mini-chart within the cells you selected.

- **Color Scales:** Color Scales fill each cell you're formatting with a color, varying in scale based on the value in each cell relative to other formatted cells. Excel essentially takes the largest and smallest values in the selected range and determines the color for each cell. To apply Color Scales to a range, do the following:

  1. *Select the target range of cells to which you need to apply the conditional formatting.*

2. *Choose Color Scales from the Conditional Formatting menu in the Home tab on the Ribbon. (See Figure 5-13.)*

As you can see in Figure 5-14, the result is a kind of heat-map within the cells you selected.

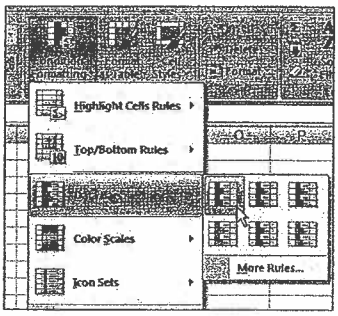


Figure 5-11: Applying Data Bars.

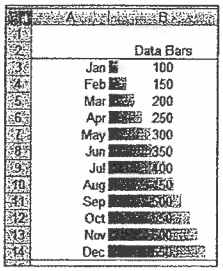


Figure 5-12: Conditional formatting with Data Bars.

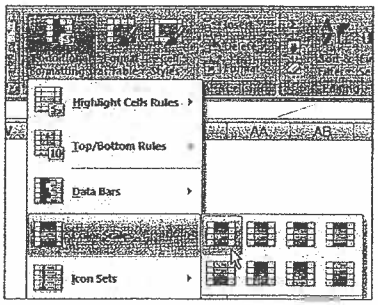


Figure 5-13: Applying Color Scales.

- **Icon Sets:** Icon Sets are sets of symbols that are inserted in each cell you're formatting. Excel determines which symbol to use based on the value in each cell relative to other formatted cells. To apply an Icon Set to a range, do the following:

  1. *Select the target range of cells to which you need to apply the conditional formatting.*
  2. *Choose Icon Set from the Conditional Formatting menu in the Home tab on the Ribbon.*

  As you can see in Figure 5-15, you can choose from a menu of Icon Sets varying in shape and colors.

  Figure 5-16 illustrates how each cell is formatted with a symbol indicating each cell's value based on the other cells.

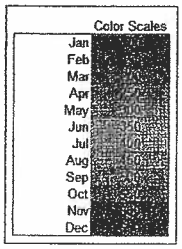


Figure 5-14: Conditional formatting with Color Scales.

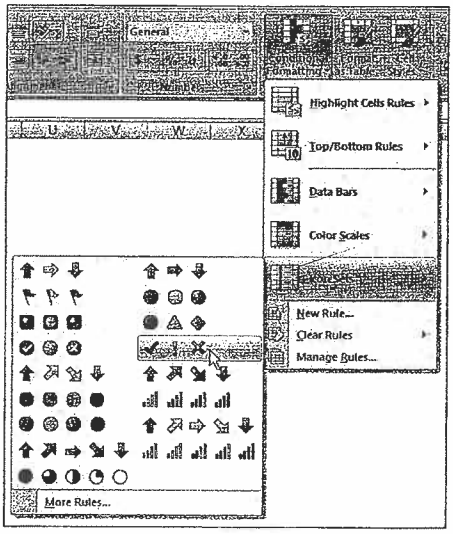


Figure 5-15: Applying Icon Sets.

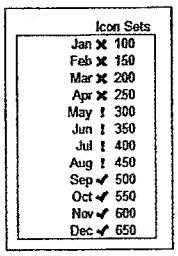


Figure 5-16: Conditional formatting with Icon Sets.

Conditional formatting is one of those functions in Excel that offers countless ways of achieving a result. The examples you just covered only scratch the surface of the myriad of things you can do with conditional formatting. Alas, the focus of this book doesn't include a detailed look into every aspect of conditional formatting.

For a more comprehensive treatment of conditional formatting, take a gander at *Excel 2007 For Dummies* by Greg Harvey (Wiley). There, you find a whole chapter dedicated to the ins and outs of conditional formatting.

Getting Fancy with Conditional Formatting

The title says it all, folks. In this section, you explore a few techniques that allow you to get fancy with your conditional formatting. The next few examples are geared toward using conditional formatting to enhance your dashboards and reports.

Adding your own formatting rules manually

In this first example, I want to show you that you can create your own formatting rules manually. That is to say, you don't have to use one of the predefined scenarios offered by Excel. Why would you want to go through manually creating a formatting rule? Well, creating your own formatting rules helps you better control how cells are formatted and allows you to do things you couldn't do with the predefined scenarios.

For example, a useful conditional formatting rule is to tag all above average values with a check icon, and all below average values get an X icon. Figure 5-17 demonstrates this.

Now, the *above average* and *below average* scenarios built into Excel allow you to format only cell and font attributes; they don't enable the use of Icon Sets. You can imagine why Icon Sets would be better on a dashboard than just color variances. Icons and shapes do a much better job at conveying your message, especially when your dashboard is printed in black and white.

To get started in creating your first custom formatting rule, open the `Chapter 5 Sample File` found among the sample files on this book's companion Web site. When the file is open, go to the Create Rule by Hand tab. Then follow these steps:

1. **Select the target range of cells to which you need to apply the conditional formatting, select** the Conditional Formatting button found on the Home tab of the Ribbon, then **select New Rule (see Figure 5-18).**

   This opens the New Formatting Rule dialog box, as shown in Figure 5-19. When you look through the rule types at the top of this dialog box, you'll recognize some of them from the predefined scenario choices that I discuss earlier in this chapter.

	A	B	C	D
1	REGION	MARKET		Sales
2	North	Great Lakes	✗	70,261
3	North	New England	✓	217,858
4	North	New York North	✗	157,774
5	North	New York South	✗	53,670
6	North	North Carolina	✗	124,600
7	North	Ohio	✗	100,512
8	North	Shenandoah Valley	✗	149,742
9	South	Florida	✗	111,606
10	South	Gulf Coast	✓	253,703
11	South	Illinois	✗	129,148
12	South	Indiana	✗	152,471
13	South	Kentucky	✓	224,524
14	South	South Carolina	✓	249,535
15	South	Tennessee	✓	307,490
16	South	Texas	✓	180,167
17	West	California	✓	190,264
18	West	Central	✗	133,628
19	West	Colorado	✗	134,039
20	West	North West	✗	120,143
21	West	Southwest	✓	248,098
22	West	Topeka	✓	222,389

Figure 5-17: With custom formatting, you can tag above-average values with a check and the below-average values with an X.

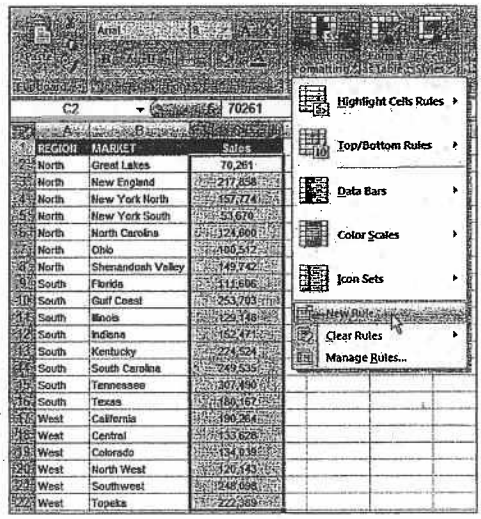


Figure 5-18: Select the target range and then select New Rule.

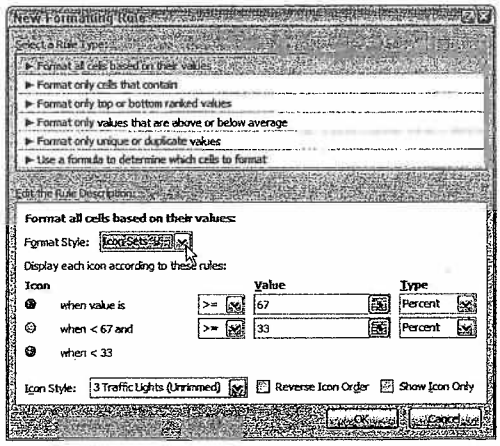


Figure 5-19: Select Icon Sets from the Format Style drop-down list.

Format All Cells Based On Their Values: This selection measures the values in the selected range against each other. This selection is handy for finding general anomalies in your dataset.

Format Only Cells That Contain: This selection applies conditional formatting to those cells that meet a specific criterion you define. This selection is perfect for comparing values against a defined benchmark.

Format Only Top or Bottom Ranked Values: This selection applies conditional formatting to those cells that are ranked in the top or bottom *n*th number or percent of all the values in the range.

Format Only Values That are Above or Below the Average: This applies conditional formatting to those values that are mathematically above or below the average of all values in the selected range.

Format Only Unique and or Duplicate Values: This selection allows you to highlight unique and/or duplicate values in the selected range. This rule comes in handy in the data-cleanup and analysis phase of reporting.

Use a Formula to Determine Which Cells to Format: This selection evaluates values based on a formula you specify. If a particular value evaluates to true, the conditional formatting is applied to that cell. This selection is used typically when applying conditions based on the results of an advanced formula or mathematical operation.

Data Bars, Color Scales, and Icon Sets can be used only with the Format All Cells Based On Their Values rule type.

2. **Ensure that the Format All Cells Based On Their Values rule type is selected and then use the Format Style drop-down list to switch to Icon Sets. (Refer to Figure 5-19.)**

   Use the various inputs and drop-down lists to define exactly what you're looking for, as follows.

3. **Click the Icon Style drop-down list to select your desired Icon Set.**

   In this example, select 3 Symbols (Uncircled).

4. **Change both Type drop-down lists to Formula.**

   At this point, your dialog box should look similar to Figure 5-20.

5. **Put a formula in each of the Value boxes, as shown in Figure 5-20.**

   Let me explain the idea here. Excel assesses every cell in your target range to see if its contents match the logic in each Value box in order (top box first). If a cell contains a number or text that evaluates true to the first Value box, the first icon is applied and Excel moves on to the next cell in your range. If not, Excel continues down each Value box until one of them evaluates to true. If the cell being assessed doesn't fit any of the logic placed in the Value boxes, Excel automatically tags that cell with the last icon.

   In this example, you want your cells to get a check icon only if the value of that cell is greater than (or equal to) the average of the total values. Otherwise, you want Excel to skip right to the X icon and apply the X.

6. **In each Value Box, enter** =Average($C$2:$C$22).

This tells Excel that the value in each cell must be greater than the average of the entire dataset in order to get the check icon.

When a condition is met for a cell, Excel stops evaluating that cell and moves on to the next one.

At this point, your dialog box should look like the one shown in Figure 5-21.

7. **Press OK to apply your conditional formatting.**

If all went well, your table should look like Figure 5-17.

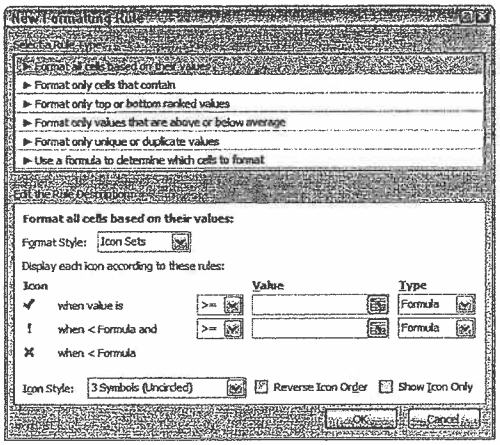


Figure 5-20: The New Formatting Rule dialog box, completed to the end of step 4.

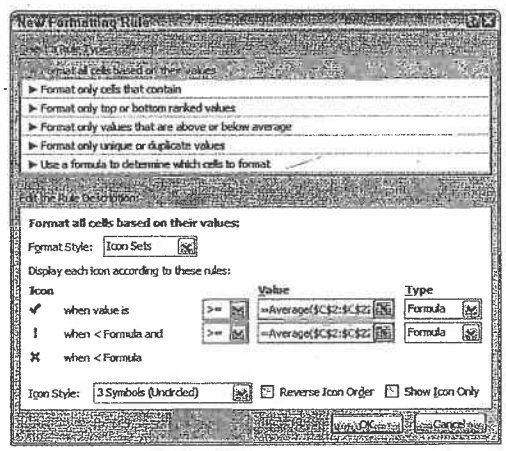


Figure 5-21: Add a formula to check if the value of that cell is greater than (or equal to) the average of the total values.

Showing only one icon

In many cases, you may not need to show all icons when applying the Icon Set. In fact, showing too many icons at one time may only serve to obstruct the data you're trying to convey in your dashboard.

Here's a simple example. The table in Figure 5-22 shows a table that has conditional formatting already applied. Here, all values less than zero are tagged with an X whereas values greater than zero are tagged with a check. Imagine that you only want to show the X icons because those are the ones you want to draw attention to.

	A		B
1			
2	Market		2003 vs 2002
3	Connecticut	✗	(22,976)
4	Maine	✓	1,068
5	Massachusetts	✓	8,230
6	New Hampshire	✗	(74,195)
7	Rhode Island	✗	(21,130)
8	Vermont	✗	(2,830)
9	Delaware	✗	(10,759)
10	District of Columbia	✓	3,428
11	Maryland	✗	(6,506)
12	New Jersey	✓	31,452
13	New York	✗	(25,166)
14	Pennsylvania	✗	(5,170)
15	Illinois	✓	58,156
16	Indiana	✗	(56,991)
17	Michigan	✓	1,936
18	Ohio	✗	(6,430)
19	Wisconsin	✗	(2,217)

Figure 5-22: Too many icons can hide the items you want to draw attention to.

The trick to showing only one icon is to add a second conditional formatting rule where the items you don't want formatted are given a blank formatting rule.

In this example, you want to remove the check icons. The cells that contain those icons all have values above zero. Therefore, you first need to add a condition for all cells whose values are greater than zero.

1. **Highlight all the cells in the table.**
2. **Choose the Greater Than scenario found under the Highlight Cells Rules category.**

   Refer to Figure 5-2 if you have trouble finding the Greater Than scenario.

   The Greater Than dialog box opens.
3. **Enter 0 in the input, select Custom Format from the drop-down list, and click OK twice to close all dialog boxes.**

4. **Select the target range of cells and then select Manage Rules, as demonstrated in Figure 5-23.**

   This opens the Conditional Formatting Rules Manager dialog box, as shown in Figure 5-24. Here notice that both rules are shown. The idea is to tell Excel to stop evaluating those cells that meet the first condition. This way, they'll never be evaluated by the second condition.

5. **Place a check in the Stop if True check box. (See Figure 5-24.)**

6. **Click OK to apply your changes.**

   As you can see in Figure 5-25, only the X icons are now shown.

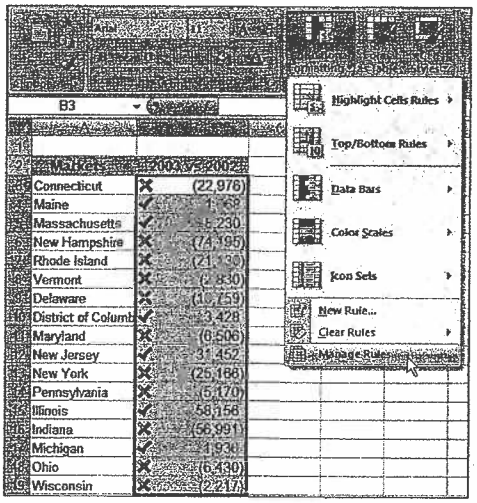


Figure 5-23: Select the target range and then select Manage Rules.

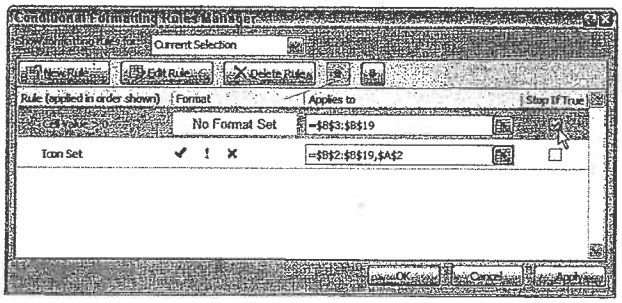


Figure 5-24: Select Stop if True to tell Excel to stop evaluating those cells that meet the first condition.

	A	B
1		
2	Markets	2003 - 2002
3	Connecticut	(22,976)
4	Maine	1,068
5	Massachusetts	8,230
6	New Hampshire	(74,195)
7	Rhode Island	(21,130)
8	Vermont	(2,830)
9	Delaware	(10,759)
10	District of Columb	3,428
11	Maryland	(6,506)
12	New Jersey	31,452
13	New York	(25,166)
14	Pennsylvania	(5,170)
15	Illinois	58,156
16	Indiana	(56,991)
17	Michigan	1,936
18	Ohio	(6,430)
19	Wisconsin	(2,217)

Figure 5-25: This table is now formatted to show only one icon.

Showing Data Bars and icons outside cells

Although Data Bars and Icon Sets give you a snazzy way of adding visualizations to your dashboards, you don't have a lot of say in where they appear within your cell. Take a look at Figure 5-26 to see what I mean.

	A	B
1	MARKET	Sales
2	Great Lakes	70,261
3	New England	117,858
4	New York North	57,774
5	New York South	53,670
6	Ohio	100,512
7	Shenandoah Valley	49,742
8	South Carolina	89,535
9	Florida	111,606
10	Gulf Coast	83,203
11	Illinois	129,148
12	Indiana	82,471
13	Kentucky	225,524
14	North Carolina	124,600
15	Tennessee	130,430
16	Texas	80,167
17	California	80,264
18	Central	33,628
19	Colorado	34,039
20	North West	120,143
21	Southwest	49,098
22	Topeka	22,389

Figure 5-26: Showing Data Bars inside the same cell as your values can make it difficult to analyze the data.

The Data Bars are, by default, placed directly inside each cell, almost obfuscating the data. From a dashboarding perspective, this is less than ideal for two reasons. First, the numbers themselves can get lost in the colors of the Data Bars, making them difficult to read — especially when printed in black and white. Second, it's difficult to see the ends of each bar. It's bad enough that Data Bars end in a gradient, you don't need overlapping numbers to compound the problem.

The solution to this problem is to show the Data Bars outside the cell that contains the value. Let's start with a fresh table with all conditional formatting removed and walk through a few steps:

1. **To the right of each cell, enter a formula that references the cell that contains your data value.**

   For example, if your data is in B2, go to cell C2 and enter **=B2**.

2. **Apply the Data Bars conditional formatting to the formulas you just created.**

   At this point, you have something that looks like Figure 5-27.

3. **Select the formatted range of cells and then select Manage Rules under the Conditional Formatting button in the Home tab of the Ribbon.**

4. **In the dialog box that opens, click the Edit Rule button.**

   The Edit Formatting Rule dialog box appears.

	A	B	C
1	Market	Sales	
2	Great Lakes	70,261	70,261
3	New England	217,858	217,858
4	New York North	157,774	157,774
5	New York South	53,670	53,670
6	Ohio	100,512	100,512
7	Shenandoah Valley	149,742	149,742
8	South Carolina	249,535	249,535
9	Florida	111,606	111,606
10	Gulf Coast	253,703	253,703
11	Illinois	129,148	129,148
12	Indiana	152,471	152,471
13	Kentucky	224,524	224,524
14	North Carolina	124,600	124,600
15	Tennessee	307,490	307,490
16	Texas	180,167	180,167
17	California	190,264	190,264
18	Central	133,628	133,628
19	Colorado	134,039	134,039
20	North West	120,143	120,143
21	Southwest	248,098	248,098
22	Topeka	222,389	222,389

Figure 5-27: Create a new column of data and apply Data Bars to the new column.

5. **Place a check in the Show Bar Only option box, as demonstrated in Figure 5-28.**
6. **Click OK to apply your change.**

The reward for your efforts is a view that is cleaner and much better suited for reporting in a dashboard environment. Figure 5-29 illustrates the improvement gained with this technique.

Using the same technique, you can separate Icon Sets from the data, allowing you to position the icons where they best suit your dashboard. Here in Figure 5-30, the icons are shown to the right of the data.

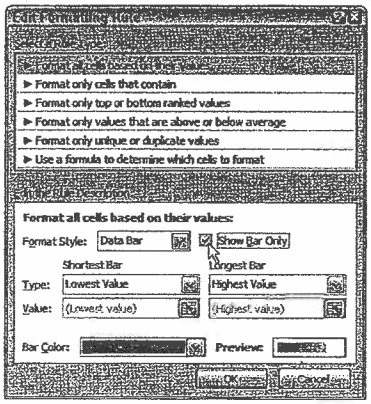
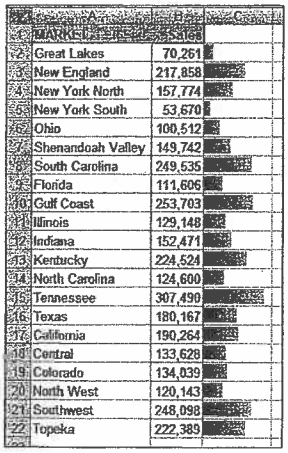
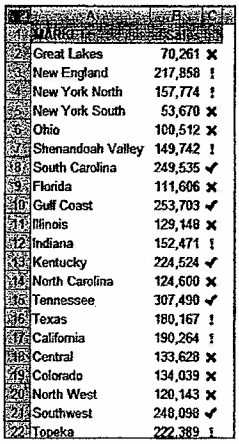


Figure 5-28: Edit the formatting rule to show only the Data Bars, not the data.



Great Lakes	70,261
New England	217,858
New York North	157,774
New York South	53,670
Ohio	100,512
Shenandoah Valley	149,742
South Carolina	249,535
Florida	111,606
Gulf Coast	253,703
Illinois	129,148
Indiana	152,471
Kentucky	224,524
North Carolina	124,600
Tennessee	307,490
Texas	180,167
California	190,264
Central	133,628
Colorado	134,039
North West	120,143
Southwest	248,098
Topeka	222,389

Figure 5-29: Your Data Bars are now outside the cell, making them much easier to see.



	A	B	C
1	MARKET		
2	Great Lakes	70,261	✗
3	New England	217,858	!
4	New York North	157,774	!
5	New York South	53,670	✗
6	Ohio	100,512	✗
7	Shenandoah Valley	149,742	!
8	South Carolina	249,535	✓
9	Florida	111,606	✗
10	Gulf Coast	253,703	✓
11	Illinois	129,148	✗
12	Indiana	152,471	!
13	Kentucky	224,524	✓
14	North Carolina	124,600	✗
15	Tennessee	307,490	✓
16	Texas	180,167	!
17	California	190,264	!
18	Central	133,628	✗
19	Colorado	134,039	✗
20	North West	120,143	✗
21	Southwest	248,098	✓
22	Topeka	222,389	!

Figure 5-30: The same technique can be applied to Icon Sets.

Representing trends with Icon Sets

In a dashboard environment, there may not always be enough space available to add a chart that shows trending. In these cases, Icon Sets are an ideal replacement, enabling you to visually represent the overall trending without taking up a lot of space. Take a moment to walk through a simple example of how Icon Sets help display overall trends.

Trending refers to the measuring of variances over some defined interval — typically time periods like days, months, or years.

In the `Chapter 5 Sample File` found among the sample files on this book's companion Web site, you'll find the Represent Trending with Icons tab. In this tab, you'll see a table (as shown in Figure 5-31) that shows numbers for the previous and current months. As you can see by looking at the formula bar, a simple formula calculates the variance between the two months.

In some situations, you'll want to do the same type of thing. The key is to create a formula that gives you a variance or trending of some sort.

Follow these steps to create that formula:

1. **Select the target range of cells to which you need to apply the conditional formatting.**

   In this case, the target range is the cells that hold your variance formulas.

2. **Choose Icon Set from the Conditional Formatting menu in the Home tab and then choose the most appropriate icons for your situation.**

   In this example, the set with three arrows works. (See Figure 5-32.)

Figure 5-31: Ensure you have a column containing a formula that calculates a variance or trend of some sort.

E2 =D2/C2-1

	A	B	C	D	E
1	REGION	MARKET	Previous Month	Current Month	Variance
2	North	Great Lakes	70,261	72,505	3.2%
3	North	New England	217,858	283,324	30.0%
4	North	New York North	157,774	148,790	-5.7%
5	North	New York South	53,670	68,009	26.7%
6	North	Ohio	100,512	98,308	-2.2%
7	North	Shenandoah Valley	149,742	200,076	33.6%
8	South	South Carolina	249,535	229,473	-8.0%
9	South	Florida	111,606	136,104	22.0%
10	South	Gulf Coast	253,703	245,881	-3.1%
11	South	Illinois	129,148	131,538	1.9%
12	South	Indiana	152,471	151,699	-0.5%
13	South	Kentucky	224,524	225,461	0.4%
14	North	North Carolina	124,600	130,791	5.0%
15	South	Tennessee	307,490	268,010	-12.8%

Figure 5-32: The up arrow indicates an upward trend, a down arrow indicates a downward trend, and a right-pointing arrow indicates a flat trend.

	A	B	C	D	E
21	REGION	MARKET	Previous Month	Current Month	Variance
22	North	Great Lakes	70,261	72,505	⇨ 3.2%
23	North	New England	217,858	283,324	⇧ 30.0%
24	North	New York North	157,774	148,790	⇩ -5.7%
25	North	New York South	53,670	68,009	⇧ 26.7%
26	North	Ohio	100,512	98,308	⇨ -2.2%
27	North	Shenandoah Valley	149,742	200,076	⇧ 33.6%
28	South	South Carolina	249,535	229,473	⇩ -8.0%
29	South	Florida	111,606	136,104	⇧ 22.0%
30	South	Gulf Coast	253,703	245,881	⇩ -3.1%
31	South	Illinois	129,148	131,538	⇨ 1.9%
32	South	Indiana	152,471	151,699	⇨ -0.5%
33	South	Kentucky	224,524	225,461	⇨ 0.4%
34	North	North Carolina	124,600	130,791	⇨ 5.0%
35	South	Tennessee	307,490	268,010	⇩ -12.8%
36	South	Texas	180,167	195,791	⇨ 8.7%
37	West	California	190,264	176,648	⇩ -7.2%
38	West	Central	133,628	132,262	⇨ -1.0%
39	West	Colorado	134,039	106,361	⇩ -20.6%
40	West	North West	120,143	125,260	⇨ 4.3%
41	West	Southwest	248,098	235,494	⇩ -5.1%
42	West	Topeka	222,389	265,720	⇧ 19.5%

In most case, you'll want to adjust the thresholds that define what up, down, and flat mean. Imagine that you need any variance above 3 percent to be tagged with an up arrow, any variance below 3 percent to be tagged with a down arrow, and all others to show flat.

3. **Select the target range of cells and then select Manage Rules under the Conditional Formatting button in the Home tab of the Ribbon.**
4. **In the dialog box that opens, click the Edit Rule button.**

   The Edit Formatting Rule dialog box appears.
5. **Adjust the properties, as shown in Figure 5-33.**

In Figure 5-33, notice the Type property for the formatting rule is set to Number even though the data (the variance) you're working with are percentages. You'll find that working with the Number setting gives you more control and predictability when setting thresholds.

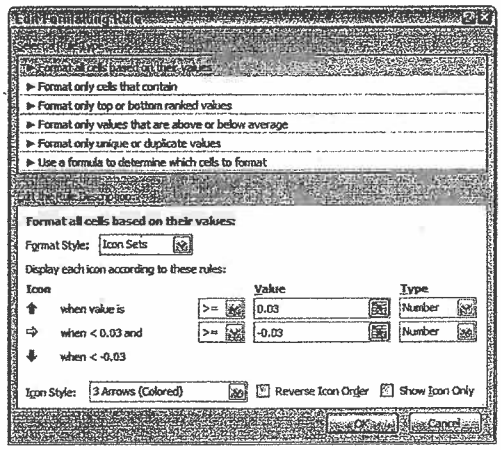


Figure 5-33: You can adjust the thresholds that define what up, down, and flat mean.

Building a legend for your conditional formatting

Many of the icons offered in Excel 2007 are self-describing — you can tell what they mean by virtue of their color or shape. The meaning of some icons, however, will leave your clients confused unless you tell them explicitly. When building a dashboard or report that uses any kind of Icon Set, it's generally good practice to add some sort of legend defining what each icon means. Figure 5-34 demonstrates how a legend can help clear up confusion. Here's how you do it:

1. **Build a legend table.**

   This table should contain a description for each icon in the set you're using and a number that triggers the icon for that description. Confused? Look at Figure 5-35 to see what I mean.

REGION	MARKET	Q1	Q2	Q3	Q4
North	Great Lakes	70,261	72,505	64,713	75,285
North	New England	217,858	283,324	215,198	248,467
North	New York North	157,774	148,790	165,334	146,866
North	New York South	53,670	68,009	51,089	74,706
North	Ohio	100,512	96,308	135,573	118,035
North	Shenandoah Valley	149,742	200,076	189,628	155,859
South	South Carolina	249,535	229,473	289,796	253,763
South	Florida	111,606	136,104	141,823	146,365
South	Gulf Coast	253,703	245,881	255,357	242,288
South	Illinois	129,148	131,538	136,073	117,814
South	Indiana	152,471	151,699	168,647	158,505
South	Kentucky	224,524	225,461	244,968	216,274
North	North Carolina	124,600	130,791	127,287	129,758
South	Tennessee	307,490	268,010	270,421	218,104
Total		2,362,894	2,389,969	2,456,107	2,302,687

Excellent
Good
Average
Bad
Poor

Figure 5-34: A legend can shed light on what your icons mean.

Figure 5-35: Build a legend table and apply the same conditional format you applied to your dataset.

2. **Apply the same conditional formatting to the legend you applied to your dataset.**

   The numbers you use in the legend table don't really matter. The idea is just to trigger the icon that matches associated description. When the conditional formatting is applied to the legend table, you can adjust the numbers to force a match.

   You then want to hide the numbers because they don't really mean anything.

3. **Select the formatted range of cells in the legend table and choose Manage Rules under the Conditional Formatting button in the Home tab of the Ribbon.**

4. **In the dialog box that opens, click the Edit Rule button.**

5. **Place a check in the Show Icon Only option and click OK to apply your change.**

   Voilà! You now have an instant legend for your conditional formatting.

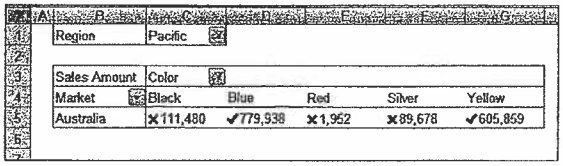
Using conditional formatting with pivot tables

In previous versions of Excel, conditional formatting couldn't be cleanly and predictably used with pivot tables. Oh, you could apply conditional formatting to the cells in and around the pivot table, but if something changed or the pivot table was rearranged, your conditional formatting wouldn't be applied to the correct cells.

In Excel 2007, Microsoft has made a brilliant effort to integrate conditional formatting into pivot tables. This gives you the ability to tie conditional formatting to the actual pivot table itself, not just the cells it occupies. This means you can rearrange, refresh, sort, and adjust your pivot table without affecting the integrity of your conditional formatting. The best part is that you can apply conditional formatting to your pivot table just as you would with standard cells — no special processes.

In the sample file for this chapter on this book's companion Web site, you'll find a simple example of conditional formatting applied to a pivot table. (See Figure 5-36.)

In this example, an Icon Set has been applied to easily pick the most popular colors for each region. As you can see, blue and yellow are the most popular product colors. The Pacific Region Manager may want to take this into account when planning for next year's product line.



Region	Pacific				
Sales Amount	Color				
Market	Black	Blue	Red	Silver	Yellow
Australia	✗111,480	✓779,938	✗1,952	✗89,678	✓605,859

Figure 5-36: Conditional formatting applied to a pivot table.

And because this is a pivot table, you get the benefit of interactively changing regions (via the Filter Area drop-down list) and applying the same conditional formatting to a different set of data without having to adjust the formatting rule.

Chapter 6

The Art of Dynamic Labeling

In This Chapter

- Creating dynamic labels
- Using the Camera tool
- Working with formula-driven visualizations
- Getting fancy with fonts

Up to this point, I've covered the major tools you can use to build basic dashboard components: pivot tables, charts, and conditional formatting. In this chapter, I focus on functionality that is less apparent — *dynamic labeling.*

Dynamic labeling is less a function in Excel than it is a concept. *Dynamic labels* are labels that change to correspond to the data you're viewing. With dynamic labeling, you can interactively change the labeling of data, consolidate many pieces of information into one location, and easily add layers of analysis.

In this chapter, you explore the various techniques that can be used to create dynamic labels.

Creating a Basic Dynamic Label

A common use for dynamic labels is labeling interactive charts. In Figure 6-1, I have a pivot chart that shows the Top 10 Categories by market. When the market is changed in the Filter drop-down list, the chart changes. Now, it'd be nifty to have a label on the chart itself that shows the market for which the data is currently being displayed.

Don't know what a pivot chart is? Feel free to take a gander at Chapter 4 for a discussion of pivot charts.

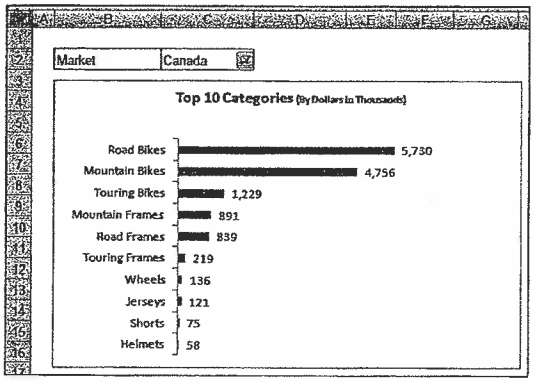


Figure 6-1: Interactive charts, such as this pivot chart, are ideal places to use dynamic labels that change based on current selection.

To create a dynamic label within your chart, follow these steps:

1. **On the Insert tab in the Ribbon, select the Text Box icon, as shown in Figure 6-2.**

Figure 6-2: Select the Text Box Icon.

2. **Click inside the chart to create an empty text box.**
3. **While the text box is selected, go up to the formula bar, type the equal sign (=), and then click the cell that contains the text for your dynamic label.**

   Again, type the formula into the formula bar, *not* directly into the text box.

   In the example shown in Figure 6-3, the text box is linked to cell C2. You'll notice that cell C2 holds the Filter drop-down list for the pivot table.
4. **Format the text box so that it looks like any other label.**

   You can format the text box using the standard formatting options found on the Home tab.

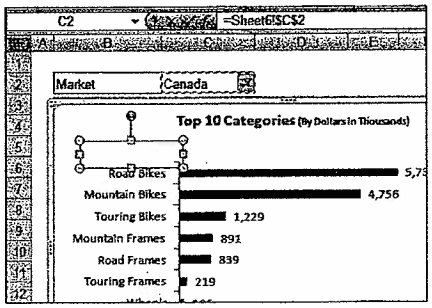


Figure 6-3: Link the text box to the cell that contains the text for your dynamic label.

If all goes well, you'll have a label on your chart that changes to correspond with the cell to which it's linked. Figure 6-4 illustrates how the dynamic label can be made to blend in with your chart.

Be aware that text boxes can't display any more than 255 characters.

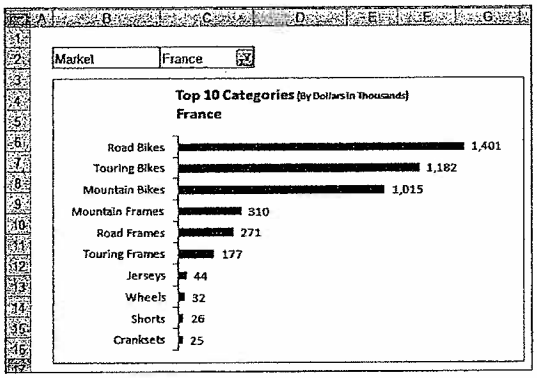


Figure 6-4: The France label within the chart is actually a dynamic label that changes when a new market is selected in the drop-down list.

Adding Layers of Analysis with Dynamic Labels

What would happen if you were to link your text boxes to cells that contained formulas instead of simple labels? A whole new set of opportunities would open up. With text boxes linked to formulas, you could add a layer of analysis into your charts and dashboards without a lot of complex hocus pocus.

Figure 6-5 illustrates a simple example. Here, you see two views of the same pivot chart. On the top, the Northwest market is selected, and you see that the pivot chart is labeled with a layer of analysis around Q4 variance. On the bottom, Southeast is selected, and you can see that the label changes to correspond with the analysis around Q4 variance for the Southeast market.

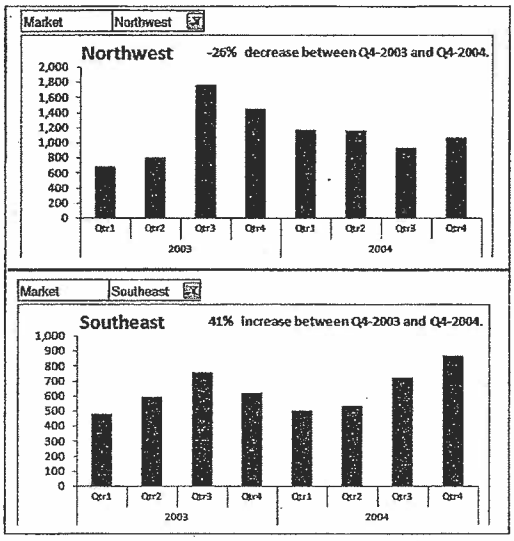


Figure 6-5: This is two views of the same pivot chart; notice how the chart labels change when the market changes.

This example can be found in the Chapter 6 sample file on this book's companion Web site.

The example shown in Figure 6-5 actually uses three dynamic labels. One to display the current selected market, one to display the actual calculation of Q4-2003 versus Q4-2003, and one to add some contextual text that describes the analysis.

Figure 6-6 illustrates the behind-the-scenes links. Take a moment to examine what's happening here. The label showing 41% is linked to cell B13, which contains a formula returning the variance analysis. The label showing the contextual text is linked to cell C13, which contains an `IF` formula that returns a different sentence, depending on whether the variance percent is an increase or decrease.

Together, these labels provide your audience with a clear message about the variance for the selected market. This is one of countless ways you can implement this technique.

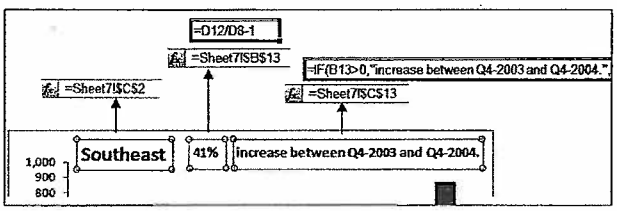


Figure 6-6: This pivot chart actually uses three dynamic labels; each linked to a different cell.

Excel's Mysterious Camera Tool

Excel's Camera tool enables you to take a live picture of a range of cells that updates dynamically while the data in that range updates. I call it the *mysterious* Camera tool because it's been hidden away in the last few versions of Excel. Although Microsoft has chosen not to include this tool in the mainstream Ribbon, it's actually quite useful for those of us endeavoring to build dashboards and reports.

Finding the Camera tool

Before you can use the Camera tool, you have to find it and add it to your Quick Access Toolbar (QAT).

The *Quick Access Toolbar* is a customizable toolbar in which you can store frequently used commands so that they're always accessible with just one click. You can add commands to the QAT by dragging them directly from the Ribbon or by going through the Customize menu.

Follow these steps to add the Camera tool to the QAT:

1. **Click the Office icon in the upper-left corner of Excel.**
2. **Select the Excel Options button to activate the Excel Options dialog box.**
3. **Click the Customize button.**
4. **In the Choose Commands From drop-down list, select Commands Not in the Ribbon.**

5. **Scroll down the alphabetical list of commands (see Figure 6-7) and find Camera; double-click to add it to QAT.**
6. **Click OK to close the Excel Options dialog box.**

When you've taken these steps, you'll see the Camera tool in your Quick Access Toolbar, as shown in Figure 6-8.

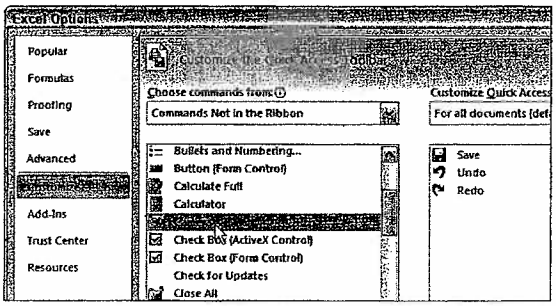


Figure 6-7: Add the Camera tool to the Quick Access Toolbar.

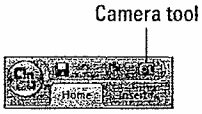


Figure 6-8: Not surprisingly, the icon for the Camera tool looks like a camera.

The basics of using the Camera tool

The idea behind the Camera tool is simple. You highlight a range of cells, and everything in that range is captured in a live picture. When I say "everything," I mean *everything:* charts, conditional formatting, shapes, whatever you see in that range of cells, and so on. The cool thing about the Camera tool is that you're not limited to showing a single cell's value like you are with a linked text box. And because the picture is live, any updates made to the source range automatically change the picture.

Enough chitchat. Let me walk you through a basic example using the Camera tool. In Figure 6-9, I entered some simple numbers and created a chart based on those numbers — nothing fancy. The goal here is to create a live picture of the range that holds both the numbers and the chart.

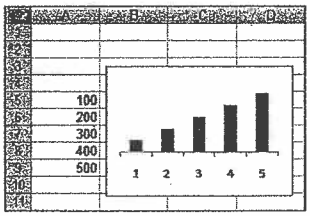


Figure 6-9: Enter some simple numbers in a range and create a basic chart from those numbers.

1. **Highlight the entire range containing all the information you want to capture.**

   In this scenario, I highlight the range spanning from A3–D11.

2. **Click the Camera tool icon (added to the QAT in the preceding section, "Finding the Camera tool").**

3. **Click the spreadsheet in the location where you want the picture to be placed.**

   Excel immediately creates a live picture of the entire range, as shown in Figure 6-10.

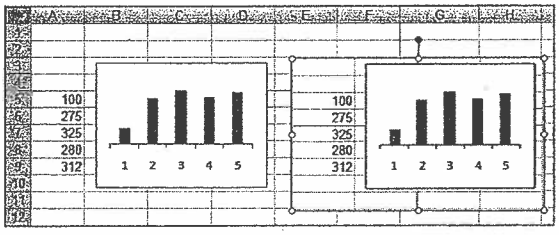


Figure 6-10: A live picture is created via the Camera tool.

Changing any number in the original range automatically causes the picture to update.

By default, the picture that's created has a border around it. To remove the border, simply right-click the picture and select Format Picture. This activates the Format Picture dialog box. In the Colors and Lines tab, you see a Line Color drop-down list. Here you can select No Color, thereby removing the border.

On a similar note, to get a picture without gridlines, simply remove the gridlines from the source range.

Creating a live picture without the Camera tool

Did you know you can create a live picture without actually using the Camera tool? That's right, Excel 2007 has made it relatively easy to mimic the Camera tool functionality manually.

1. Select the target range and copy it.
2. Go to the Home tab on the Ribbon and choose Paste ➪ As Picture ➪ Paste Picture Link.

Of course, the advantage of using the Camera tool is that you can do the same thing with two clicks. Call me lazy, but two-click functionality is just too good to pass up.

Cool uses for the Camera tool

In this section, I go beyond the basics and share with you a few of the ways you can use the Camera tool to enhance your dashboards and reports. You can use the Camera tool to perform the following functions:

- **Consolidate disparate ranges into one print area.**
- **Rotate objects to save time.**
- **Create small charts.**

All these are discussed in the following sections.

Consolidating disparate ranges into one print area

Sometimes a reporting model gets so complex that it's difficult to keep all the final data in one printable area. This often forces the printing of multiple pages that are inconsistent in layout and size. Given that dashboards are most effective when contained in a compact area that can be printed in a page or two, complex models prove to be problematic when it comes to layout and design.

The Camera tool can be used in these situations to create live pictures of various ranges that you can place on a single page. Figure 6-11 demonstrates a workbook that contains data from various worksheets. The secret here is that these are nothing more than linked pictures created by the Camera tool.

When you create pictures with the Camera Tool, you can size and move the pictures around freely. This gives you the freedom to test different layouts without the need to worry about column widths, hidden rows, or other such nonsense. In short, you can create and manage multiple analyses on different tabs and then bring together all your presentation pieces into a nicely formatted presentation layer.

Rotating objects to save time

Again, because the Camera tool outputs pictures, you can rotate the pictures in situations where placing the copied range on its side can help save time. A great example is a chart. Certain charts are relatively easy to create in a vertical orientation but extremely difficult to create in a horizontal orientation.

Figure 6-12 shows a vertical bullet graph (on the left). This graph is relatively easy to create in this vertical format. However, creating a horizontal bullet graph involves lots of intricate steps with multiple chart types. It's basically a pain to create a horizontal bullet graph.

The Camera tool to the rescue! When the live picture of the chart is created, all you have to do is rotate the picture using the rotate handle to create a horizontal version.

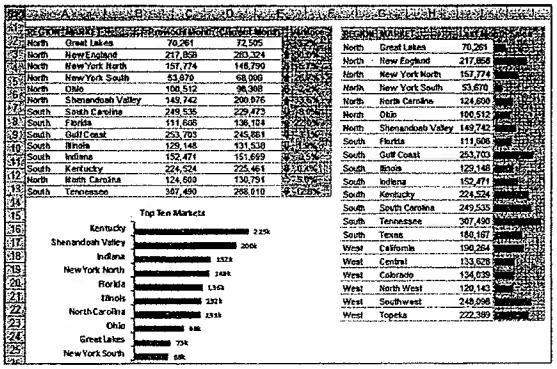


Figure 6-11: Use the Camera tool to get multiple disparate ranges into a compact area.

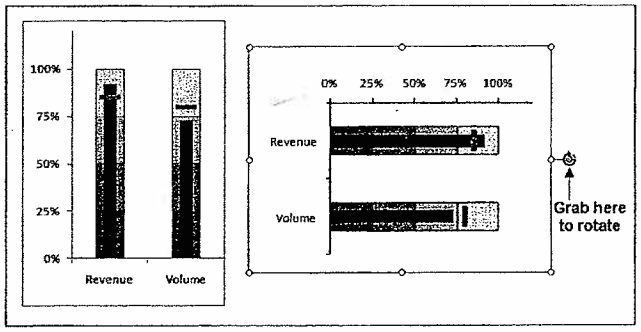


Figure 6-12: You can use the rotation handle to rotate your live pictures to a horizontal orientation, as seen here on the right.

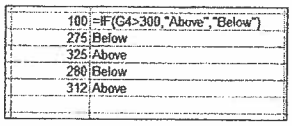
Creating small charts

Another useful thing you can do with the Camera tool is create small charts. Although you can resize charts easily enough through other means, you typically would have to spend time tweaking the scaling, font, and other elements on the chart after you get the chart small enough. Because the Camera tool creates a picture that keeps its pixel ratios intact while you resize, it allows you to achieve small chart sizes without tweaking a single chart element.

Formula-Driven Visualizations

A *formula-driven label* is a label or text resulting from a formula, which can be used to further analysis and reporting. The idea here is that you build some logic into a formula and then use the resulting value as a new dimension of data which can used to sort, conditionally format, and chart.

Take a look at the simple example illustrated in Figure 6-13. Beside each number is a formula that determines whether the number is above 300. If it is, the word *Above* is displayed, else the word *Below* is displayed. The results of the formula can be sorted, conditionally formatted, used in charting, and so on.



100	=IF(G4>300,"Above","Below")
275	Below
325	Above
280	Below
312	Above

Figure 6-13: Adding the results of the formula next to each number.

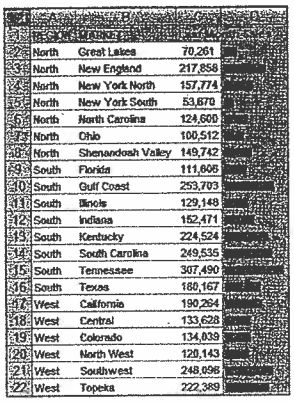
Now I realize that even to the average Excel user this is a fairly intuitive concept. You hardly need me to point out various examples of how you can implement formulas in your analysis and reporting.

I do, however, want to take this concept further and show you a few examples of how you can add a visual element to your formulas, thereby creating a *formula-driven visualization.* That is, creating formulas which return visualizations instead of just text.

In-cell charting without charts or conditional formatting

Figure 6-14 shows a table that contains in-cell charting, providing a visualization of the numbers shown. The cool thing is that the in-cell charting achieved here is the result of a simple formula.

This effect was achieved by using Excel's REPT function. The REPT repeats a given character a specified number of times. For example, if you went to a cell and entered **=REPT("s",10)**, the returned value would be ssssssssss (the "s" character repeated ten times).



2	North	Great Lakes	70,261
3	North	New England	217,858
4	North	New York North	157,774
5	North	New York South	53,679
6	North	North Carolina	124,600
7	North	Ohio	100,512
8	North	Shenandoah Valley	149,742
9	South	Florida	111,606
10	South	Gulf Coast	253,703
11	South	Illinois	129,148
12	South	Indiana	152,471
13	South	Kentucky	224,524
14	South	South Carolina	249,535
15	South	Tennessee	307,490
16	South	Texas	180,167
17	West	California	190,264
18	West	Central	133,628
19	West	Colorado	134,039
20	West	North West	128,143
21	West	Southwest	248,896
22	West	Topeka	222,389

Figure 6-14: The in-cell charting seen here is nothing more than formulas.

The idea is instead of using a letter, you use a character that, when repeated, looks kind of like a chart. The *pipe character* (the | shown above the backslash on your keyboard) is a perfect character for this kind of thing. If you went to a cell and entered **=REPT("|",10)**, the returned value would be ||||||||||. That looks very similar to a bar in a chart.

You may be wondering why you'd even use this. Why wouldn't you just use the Data Bars conditional formatting feature or for that matter, a chart?

First, Data Bars are not *backwards-compatible* — anyone who doesn't have Excel 2007 can't use them. Second, their gradient style may not conform to the overall look and feel of your dashboard. As for standard charts, they take up much more space than in-cell charting. Plus, they add overhead to your file.

In-cell charting gives you an easy-to-implement alternative that doesn't require a lot of real estate or setup.

To push this further, imagine that you had then number 30 in cell A1. You could, in cell B1, enter **=REPT("|", A1)**. This would show 30 pipe characters in cell B1, giving you a visualization of the number in A1.

This is all dandy until you get to really big numbers. For instance, you can imagine that repeating the pipe character 200 times just isn't that useful. In situations where you have large values, you can cut the number down to size by dividing it by 10, 100, 1000, or whatever makes sense.

So if Cell A1 contains 200, you can use `=REPT("|",A1/10)`. This effectively returns 20 pipe characters instead of 200. Figure 6-15 demonstrates this concept; note the formula being used in the formula bar.

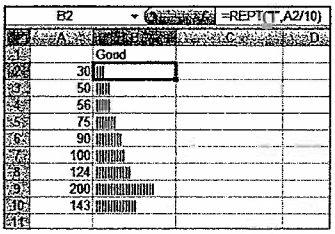


Figure 6-15: When using the REPT function with large values, divide the values into smaller increments that can be used in the REPT function.

Another way to limit the number of times a character is repeated is to define a maximum for the formula. You can do this by getting a bit fancy and using Excel's `MAX` function. To understand this, take a look at Figure 6-16.

In Figure 6-16, note the formula in the formula bar:

```
=REPT("|",A2/MAX($A$2:$A$9)*25)
```

Be sure to make the range used in the `MAX` function an *absolute reference*. That is to say, be sure to include a dollar sign ($) in front of the column and row references, such as `MAX($A$2:$A$9)`. With the `$` character, you tell Excel to not increment the column and row references when you copy a range. This ensures that the range being referenced is locked when you copy the formula.

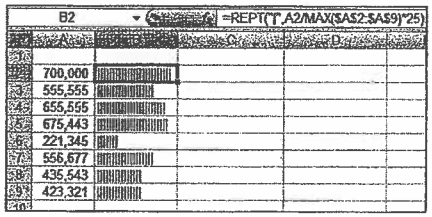


Figure 6-16: You can incorporate a MAX function into your formula to limit the number of characters repeated.

This formula basically tells Excel to take the value being referenced and divide it by the maximum value for entire range. Then take that answer and multiply it by 25. The value shown in A2, 700000, is indeed the maximum value in the entire range. So in the case of Cell A2 the formula essentially translates to `=REPT("|",700000/700000*25)`. Mathematically, `700000/700000*25` gives you 25.

In the case of Cell A3, the formula would translate to `=REPT("|",555555/700000*25)`. Mathematically, `555555/700000*25` gives you 19.84.

Stand back and think about what this means. The maximum number of characters that can possibly be returned by this formula is 25. This formula essentially limits the number of pipe characters no matter how big your numbers are.

Because the value returned by the `REPT` function is nothing more than a text string, you can apply formatting to it just as you would any other text. You can change font, change pitch, add color, apply conditional formatting, and even change alignment. Figure 6-17 demonstrates how you can get fancy with in-cell charting to achieve some nifty looking analysis just by adjusting various formatting options.

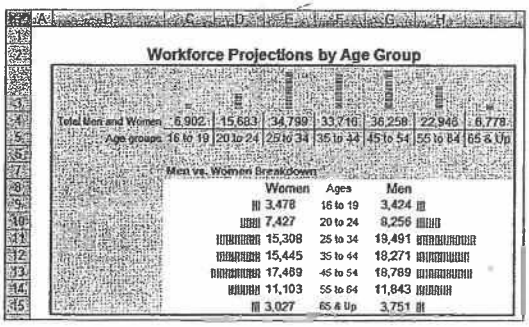


Figure 6-17: Experiment with various formatting options to create different visualizations.

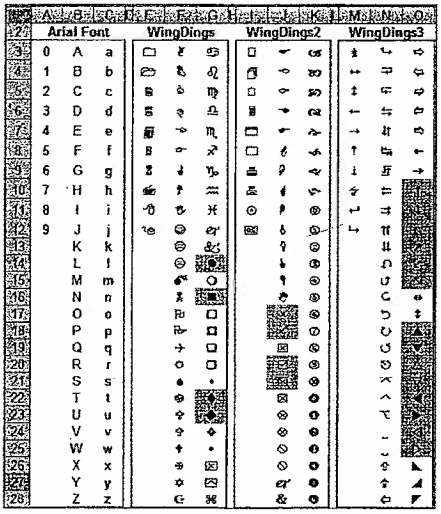
Creating visualizations with Wingdings and things

If you read Chapter 5, you know that Excel 2007 offers some new conditional formatting rules that allow you add icons to your cells. With icons, you can distinguish values from one another by using different shapes and colors. The problem is that Icon Sets aren't backwards-compatible — anyone who doesn't have Excel 2007 can't use them.

A creative alternative to using the Icon Sets offered with conditional formatting is to use the various symbol fonts that come with Office. The symbol fonts are Wingdings, Wingdings2, Wingdings3, and Webdings. These fonts display symbols for each character instead of the standard numbers and letters.

Take a look at Figure 6-18 to see what I mean. Columns A–C list numbers and letters in the standard Arial font. The same numbers and letters are shown in the various symbol fonts. As you can see, a few of the symbols (highlighted in Figure 6-18) look similar to the Icons Sets offered with conditional formatting.

The idea here is simple: Make a formula that returns a character and then change the font so that the symbol for that character is shown based on the font you select. For instance, if you entered the uppercase **P** in cell A1 and then change the font to Windings2, you get a checkmark symbol. Looking at the table in Figure 6-19, see that the equivalent of the uppercase P is indeed a checkmark in Windings2 font.



	Arial Font			WingDings			WingDings2			WingDings3		
3	0	A	a									
4	1	B	b									
5	2	C	c									
6	3	D	d									
7	4	E	e									
8	5	F	f									
9	6	G	g									
10	7	H	h									
11	8	I	i									
12	9	J	j									
13		K	k									
14		L	l									
15		M	m									
16		N	n									
17		O	o									
18		P	p									
19		Q	q									
20		R	r									
21		S	s									
22		T	t									
23		U	u									
24		V	v									
25		W	w									
26		X	x									
27		Y	y									
28		Z	z									

Figure 6-18: You can use symbol fonts to return symbols instead of numbers and letters.

	=IF(Q3>50,"True","False"	=IF(Q3>50,"J","L")	=IF(Q3>50,"O","P")	=IF(Q3>50,"p","q")
	Arial	Windings	Windings2	Windings3
10	False	⊖	×	▼
20	False	⊖	×	▼
30	False	⊖	×	▼
40	False	⊖	×	▼
50	False	⊖	×	▼
60	True	⊖	✓	▲
70	True	⊖	✓	▲
80	True	⊖	✓	▲
90	True	⊖	✓	▲
100	True	⊖	✓	▲

Figure 6-19: Adjust your formulas to return characters formatted into a symbol font.

Here's a simple example of how you use this concept. Imagine you have the number 55 in cell A1. In cell B1, you can enter **=IF(A1>50,"P","O")**. In a standard font, this formula returns the letter P because the value in cell A1 is indeed greater than 50. However, if you change the font to Windings2, you'd see a checkmark.

Figure 6-19 expands this concept, showing you how you can adjust your formulas to return characters that you can then format to show as a symbol.

To change the font, select the cell or range of cells in which you want the visualizations displayed, then choose the appropriate font from the Font group on the Home tab of the Ribbon. Remember that you only need to change the font for those cells in which you want the icons to be shown.

Be aware that not all fonts are available on all systems internationally. If you work for an international company where many people in different countries will use your dashboards, you will want to ensure that the font you use renders properly in each of your users' versions of Excel.

Part III

Building Advanced Dashboard Components

The 5th Wave By Rich Tennant

"Well, shoot! This eggplant chart is just as confusing as the butternut squash chart and the gourd chart. Can't you just make a pie chart like everyone else?"

In this part . . .

The chapters in this section take you beyond the basics to take a look at some of the advanced components you can create with Excel 2007. This part consists of three chapters, starting with Chapter 7, in which I demonstrate how to represent time trending, seasonal trending, moving averages, and other types of trending in dashboards. That chapter also introduces you to Sparklines. In Chapter 8, I explore the many methods used to *bucket* data, or to put data into groups for reporting. Chapter 9 demonstrates some of the charting techniques that help you display and measure values versus goals.

Chapter 7

Components That Show Trending

In This Chapter

- Understanding basic trending concepts
- Highlighting specific periods of time
- Using directional trending
- Smoothing data for trending
- Exploring sparklines

No matter what business you're in, you can't escape the tendency to trend. In fact, one of the most common concepts used in dashboards and reports is the concept of *trending*. A *trend* is a measure of variance over some defined interval — typically time periods, like days, months, or years.

The reason trending is so popular is that trending provides a rational expectation of what might happen in the future. If I know this book has sold 10,000 copies a month over the last 12 months (I wish), I have reasonable expectation to believe sales next month will be around 10,000 copies. In short, trending tells you where you've been and where you might be going.

In this chapter, you explore basic trending concepts and some of the advanced techniques you can use to take your trending components beyond simple line charts.

Trending Dos and Don'ts

As with all aspects of reporting with Excel, building trending components has some dos and don'ts. This section helps you avoid some common trending *faux pas*.

Using chart types appropriate for trending

Yes, you do have the freedom to use any chart type you want when building your trending components. After all, it's your data. But, the truth is, no chart

type is the silver bullet for all situations. As overwhelming as it may sound, for effective trending, you'll want to understand which chart types are most effective in different trending scenarios.

Trending with line charts

Line charts are the kings of trending. In business reporting, a line chart almost always indicates movement across time. Even in areas not related to business, the concept of lines is used to indicate time — consider timelines, family lines, bloodlines, and so on. The benefit of using a line chart for trending is that it instantly is recognized as a trending component, avoiding any delay in information processing.

Line charts are especially effective in presenting trends with many data points — as the chart at the top of the Figure 7-1 shows. You can also use a line chart to present trends for more than one time period, as shown in the chart at the bottom of Figure 7-1.

Trending with area charts

An *area chart* is essentially a line chart that's been filled in. So, technically, area charts are appropriate for trending. They're particularly good at highlighting trends over a large time span. For example, the chart in Figure 7-2 trends over 120 days of data.

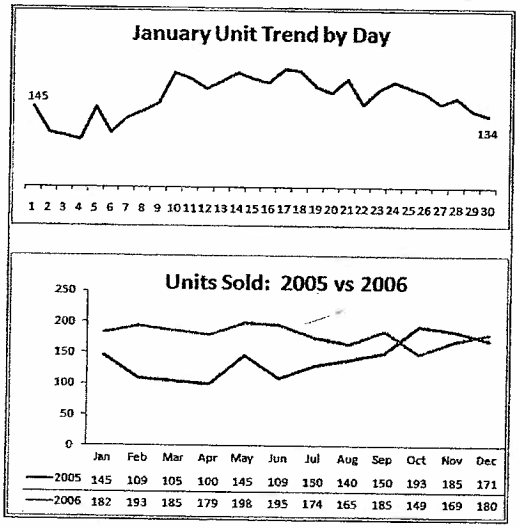


Figure 7-1: Line charts are the chart of choice when you need to show trending over time.

Trending with column charts

If you're trending one series of time, a line chart is absolutely the way to go. However, if you're comparing two or more time periods on the same chart, columns may best bring out the comparisons.

Figure 7-3 demonstrates how a combination chart can instantly call attention to the exact months when 2006 sales fell below 2005. A combination of line and column charts is an extremely effective way to show the difference in trending between two time periods. I show you how to create this type of chart later in this chapter (in the section, "Creating stacked time comparisons").

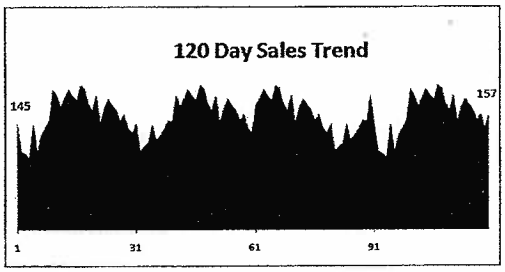


Figure 7-2: Area charts can be used to trend over a large time span.

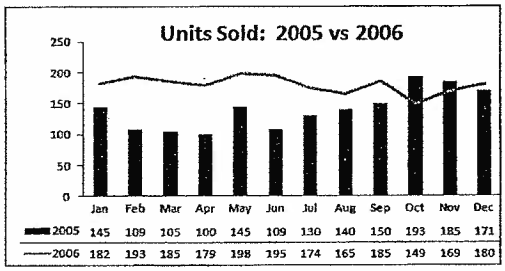


Figure 7-3: Using columns and lines emphasize the trending differences between two time periods.

Starting the vertical scale at zero

This point will no doubt cause a bit of controversy, but I am of the opinion that the vertical axis on trending charts should almost always start at zero. The reason I say *almost,* though, is because you may have trending data that contains negative values or fractions. In those situations, it's generally best to keep Excel's default scaling. However, in situations where there are only non-negative integers, ensure that your vertical axis starts at zero.

The reason is that the vertical scale of a chart can have a significant impact on the representation of a trend. For instance, the two charts shown in Figure 7-4 contain the same data. The only difference is that in the top chart, I did nothing to fix the vertical scale assigned by Excel (it starts at 96), but in the bottom chart, I fixed the scale to start at zero.

Now you may think the top chart is more accurate because it shows the ups and downs of the trend. However, if you look at the numbers closely, you see that the units represented went from 100 to 107 in 12 months. That's not exactly a material change, and it certainly doesn't warrant such a dramatic chart. In truth, the trend is relatively flat, yet the top chart makes it look as though the trend is way up.

The bottom chart more accurately reflects the true nature of the trend. I achieved this effect by locking the Minimum value on the vertical axis to zero.

To adjust the scale of your vertical axis, follow these simple steps:

1. **Right-click the vertical axis and choose Format Axis.**

   The Format Axis dialog box appears. (See Figure 7-5.)

2. **In the Format Axis dialog box, click the Fixed radio button next to the Minimum property, and then set the Minimum value to 0.**

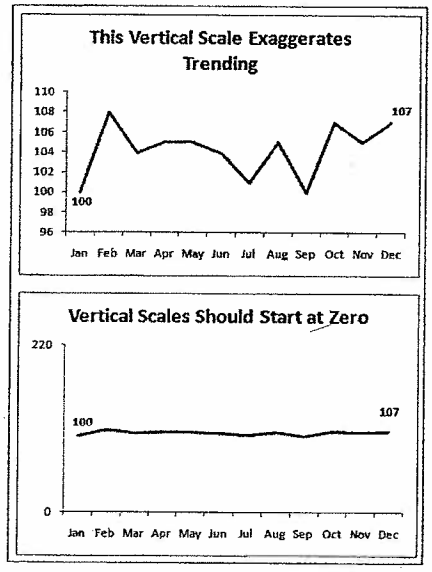


Figure 7-4: Vertical scales should always start at zero.

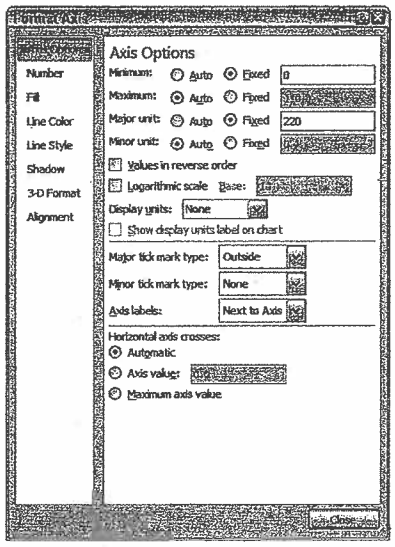


Figure 7-5: Always set the Minimum value of your vertical axis to zero.

3. **(Optional) You can set the Major Unit value to twice the Maximum value in your data.**

   This ensures that your trend line gets placed in the middle of your chart.

4. **Click the Close button to apply your changes.**

Many would argue that the bottom chart shown in Figure 7-4 hides the small-scale trending that may be important. That is to say, a seven unit difference may be very significant in some businesses. Well, if that's true, why use a chart at all? If each unit has such an impact on the analysis, why use a broad-sweep representation like a chart? A table with conditional formatting would do a better job at highlighting small-scale changes than any chart ever could.

Leveraging Excel's logarithmic scale

There may be situations when your trending starts with very small numbers and ends with very large numbers. In these cases, you'll end up with charts that don't accurately represent the true trend. Take Figure 7-6, for instance. In this figure, you see the unit trending for both 2006 and 2007. As you can see in the data table, 2006 started with a modest 50 units. As the months progressed, the monthly unit count increased to 11,100 units through December 2007. Because the two years are on such different scales, it's difficult to discern a comparative trending for the two years together.

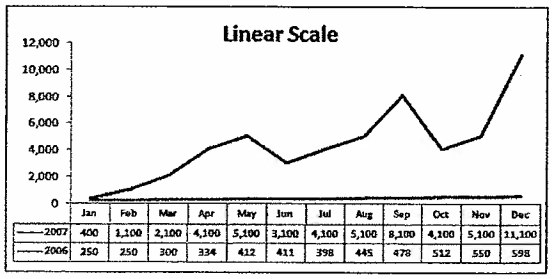


Figure 7-6: A standard linear scale doesn't allow for accurate trending in this chart.

The solution is to use a logarithmic scale instead of a standard linear scale.

Without going into high school math, a logarithmic scale allows your axis to jump from 1 to 10, to 100 to 1000, and so on without changing the spacing between axis points. In other words, the distance between 1 and 10 is the same as the distance between 100 and 1000.

Figure 7-7 shows the same chart as that in Figure 7-6, but in a logarithmic scale. Notice that the trending for both years is now clear and accurately represented.

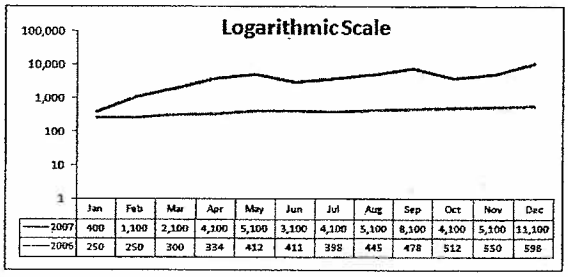


Figure 7-7: Using the logarithmic scale helps bring out trending in charts that contain very small and very large values.

To change the vertical axis of a chart to logarithmic scaling, follow these steps:

1. **Click anywhere on the chart.**

   This activates the Chart Tools tab on the Ribbon.

2. **Select the Layout tab found under the Chart Tools sub tab.**
3. **Click the Axis button and select Primary Vertical Axis.**
4. **Click the Show Axis with Log Scale option. (See Figure 7-8.)**

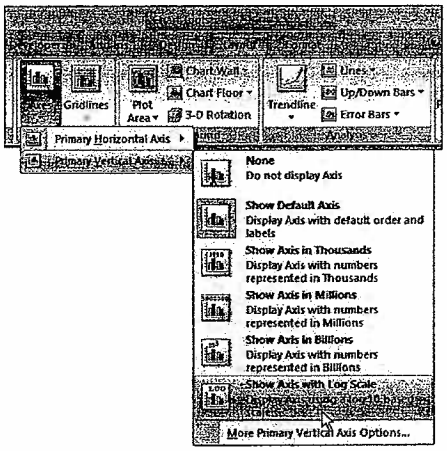


Figure 7-8: Setting the vertical axis to Log scale.

Logarithmic scales work only with positive numbers.

Applying creative label management

As silly as it may sound, one of the sticking points to creating trending components is the labeling. Trending charts tend to hold lots of data points, whose category axis labels take up lots of room. In this section, you find a few tips to help manage the labels in your trending components.

Abbreviating instead of changing alignment

Month names look and feel very long when you have to place them in a chart — especially when that chart has to fit on a dashboard. However, the solution isn't to change their alignment, as shown in Figure 7-9. Words that are placed on their sides inherently cause a reader to stop for a moment and read the labels. This isn't ideal when you want them to think about your data and not spend time reading with their heads tilted.

Although it's not always possible, the first option is always to keep your labels normally aligned. So instead of jumping right to the alignment option to squeeze them in, try abbreviating the month names. As you can see in Figure 7-9, even using the first letter of the month name is appropriate.

Implying labels to reduce clutter

When you're listing the same months over the course of multiple years, you may be able to imply the labels for months instead of labeling each and every one of them.

Take Figure 7-10, for example. In this figure, you see a chart that shows trending through two years. There are so many data points that the labels are forced to be vertically aligned. To reduce clutter, as you can see, only certain months are explicitly labeled. The others are implied by a dot. To achieve this effect, you can simply replace the label in the original data table with a dot (or whatever character you like).

Going vertical when you have too many data points for horizontal

Trending data by day is common, but it does prove to be painful if the trending extends to 30 days or more. In these scenarios, it becomes difficult to keep the chart to a reasonable size and even more difficult to effectively label it.

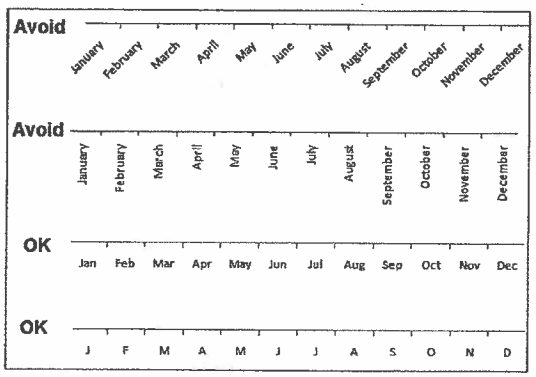


Figure 7-9: Choose to abbreviate category names instead of changing alignment.

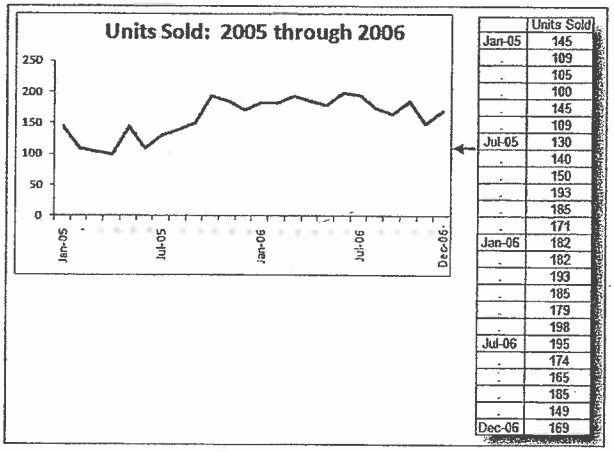


Figure 7-10: To save real estate on your dashboard, try labeling only certain data points.

One solution is to show the trending vertically using a bar chart. (See Figure 7-11.) With a bar chart, you have room to label the data points and keep the chart to a reasonable size. This isn't something to aspire to, however. Trending vertically isn't as intuitive and may not convey your information in a very readable form. Nevertheless, this solution can prove to be just the workaround you need when the horizontal view proves to be impractical.

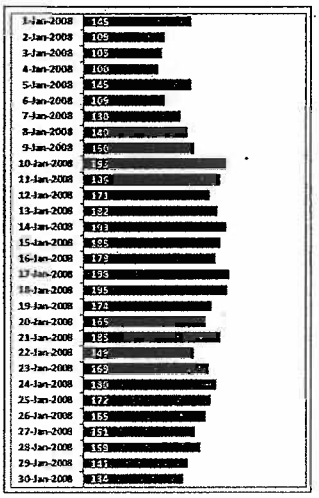


Figure 7-11: A bar chart can prove to be effective when trending days extending to 30 or more data points.

Comparative Trending

Although the name is fancy, *comparative trending* is a simple concept. You chart two or more data series on the same chart so that the trends from those series can be visually compared. In this section, you walk through a few techniques that allow you to build components that present comparative trending.

Creating side-by-side time comparisons

Figure 7-12 shows a chart that presents a side-by-side time comparison of three time periods. With this technique, you can show different time periods in different colors without breaking the continuity of the overall trending.

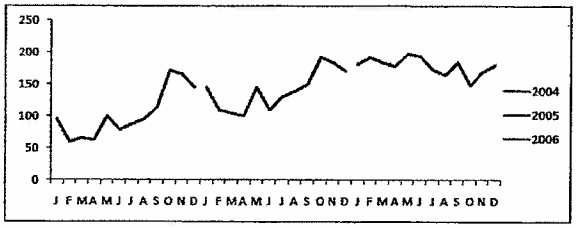


Figure 7-12: You can show trends for difference periods side-by-side.

1. **To create this type of chart, you would structure a table similar to the one shown in Figure 7-13.**

   Note that instead of placing the all the data into one column, you're staggering the data into respective years. This tells the chart to create three separate lines (allowing for the three colors).

	2004	2005	2006
J	96		
F	60		
M	67		
A	63		
M	101		
J	78		
J	88		
A	95		
S	115		
O	172		
N	165		
D	146		
J		145	
F		109	
M		105	
A		100	
M		145	
J		109	
J		130	
A		140	
S		150	
O		193	
N		185	
D		171	
J			182
F			193
M			185
A			179

Figure 7-13: The data table needed to create side-by-side trending.

2. **When you have your data in the correct structure, simply highlight the entire table and create a line chart.**

   This automatically creates the chart shown in Figure 7-12.

3. **If you want to get a bit fancy, click the chart to select it, and then right-click. Choose Change Chart Type from the context menu that activates.**

4. **When the Change Chart Type dialog box opens, select Stacked Column Chart.**

   As you can in Figure 7-14, your chart now shows the trending for each year in columns.

   Would you like a space in between the years? Adding a space in the data table (between each 12 month sequence) adds a space in the chart. (See Figure 7-15.)

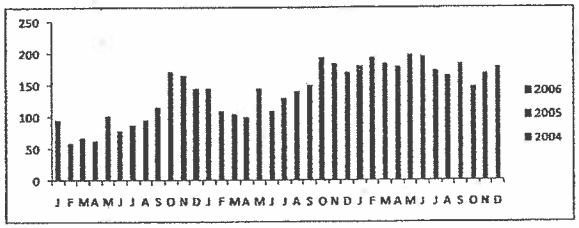


Figure 7-14: Change the chart type to Stacked Column Chart to present columns instead of lines.

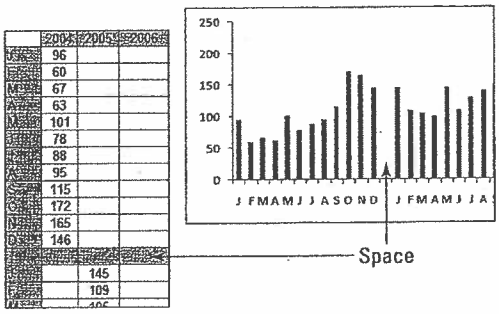


Figure 7-15: If you want to separate each year with a space, simply add a space into the source data table.

Creating stacked time comparisons

The stacked time comparison places two series on top of each other instead of side-by-side. Although this removes the benefit of having an unbroken overall trending, it replaces it with the benefit of an at-a-glance comparison within a compact space. Figure 7-16 illustrates a common stacked time comparison.

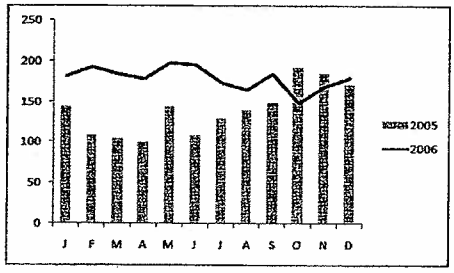


Figure 7-16: A stacked time comparison allows you to view and compare two years of data in a compact space.

1. **To create this chart, create a new table and structure it like the one shown in Figure 7-17.**

	2005	2006
	145	182
	109	193
	105	185
	100	179
	145	198
	109	195
	130	174
	140	165
	150	185
	193	149
	185	169
	171	180

Figure 7-17: Start with a table containing the data for two time periods.

2. **Highlight the entire table and create a column chart.**
3. **Select and right-click any of the bars for the 2006 data series and then choose Change Chart Type.**
4. **When the Change Chart Type dialog box opens, select the Line with Markers type.**

This technique works well with two time series. You generally want to avoid stacking any more than that. Stacking more than two series often muddies the view and causes users to constantly reference the legend to keep track of the series they're evaluating.

Trending with a secondary axis

In some trending components, you'll have series that trends two very different units of measure. For instance, in Figure 7-18, you have a table that shows a trend for People Count and a trend for % of Labor Cost.

	People Count	% Labor Cost
2	145	20%
3	109	21%
4	105	23%
5	100	23%
6	145	24%
7	109	25%
8	130	24%
9	140	25%
10	150	24%
11	193	26%
12	185	28%
13	171	29%

Figure 7-18: You often need to trend two very different units of measure, such as counts and percentages.

These are two very different units of measure, that when charted, produce the unimpressive chart you see in Figure 7-19. Because Excel builds the vertical axis to accommodate the largest number, the percentage of labor cost trending gets lost at the bottom of the chart. Even a logarithmic scale doesn't help in this scenario.

Because the default vertical axis (or primary axis) doesn't work for both series, the solution is to create another axis to accommodate the series that doesn't fit into the primary axis. This other axis is the *secondary axis.*

To place a data series on the secondary axis, follow these steps:

1. **Right-click the data series and choose Format Data Series.**

   The Format Data Series dialog box appears. (See Figure 7-20.)

Technically, it doesn't matter which data series you place on the secondary axis. A general rule is to place the problem data series on the secondary axis. In this scenario, because the data series for percentage of labor cost seems to be the problem, I place that series on the secondary axis.

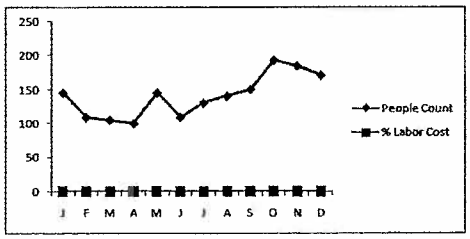


Figure 7-19: The trending for percentage of labor cost gets lost at the bottom of the chart.

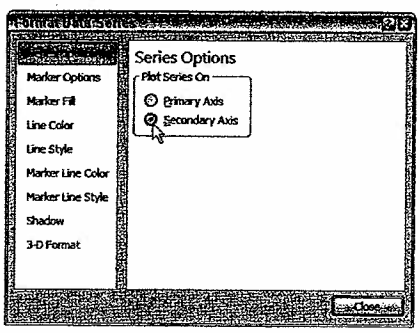


Figure 7-20: Placing a data series on the secondary axis.

2. **In the Format Data Series dialog box, select the Series Options button in the left pane and then select the Secondary Axis radio button.**

   In Figure 7-21, notice a newly-added axis to the right of the chart. Any data series on the secondary axis has its vertical axis labels shown on the right.

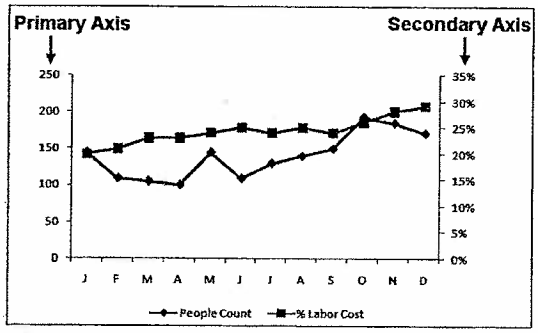


Figure 7-21: Thanks to the secondary axis, both trends are clearly defined.

Again, changing the chart type of any one of the data series can help in comparing the two trends. In Figure 7-22, the chart type for the People Count trend has been changed to a column. Now you can easily see that although the number of people has gone down in November and December, the percentage of labor cost continues to rise.

To change the chart type of any data series, right-click the data series and then choose Change Chart Type.

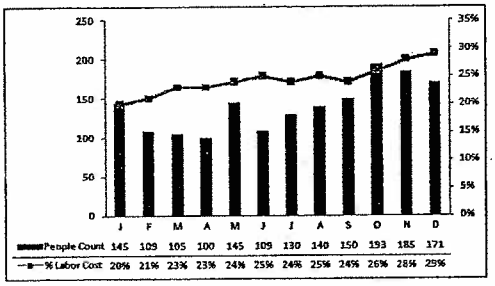


Figure 7-22: Changing the chart type of one data series can underscore comparisons.

Highlighting Periods of Time

Some of your trending components may contain certain periods where a special event occurred, causing an anomaly in the trending pattern. For instance, you may have an unusually large spike or dip in the trend caused by some occurrence in your organization. Or maybe you need to mix actual data with forecasts in your charting component. In such cases, it could be helpful to highlight specific periods in your trending with special formatting.

Formatting specific periods

Imagine you just created the chart component illustrated in Figure 7-23 and you want to explain the spike in October. You could, of course, use a footnote somewhere, but that would force your audience to look for an explanation elsewhere on your dashboard. Calling attention to an anomaly directly on the chart helps give your audience context without the need to look away from the chart.

A simple solution is to format the data point for October to display in a different color and then add a simple text box that explains the spike.

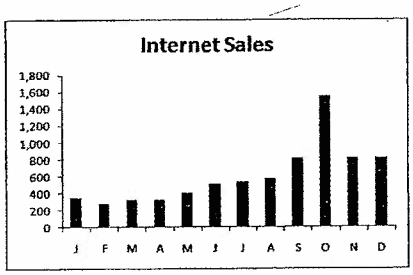


Figure 7-23: The spike in October warrants highlighting.

To format a single data point:

1. **Click the data point once.**

   This places dots on all the data points in the series.

2. **Click the data point again to ensure Excel knows you're formatting only that one data point.**

   The dots disappear from all but the target data point.

3. **Right-click and choose Format Data Point.**

   This opens the Format Data Point dialog box, as shown in Figure 7-24.

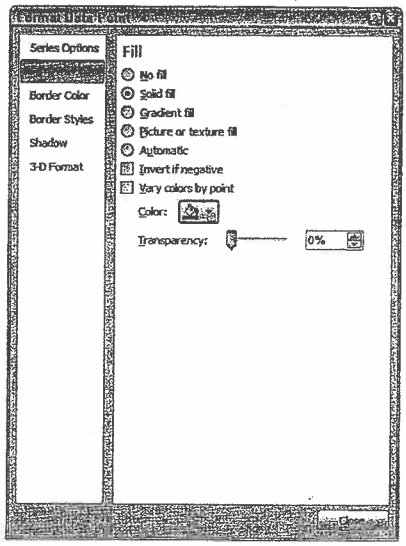


Figure 7-24: The Format Data Point dialog box gives you formatting options for a single data point.

The idea is to adjust the formatting properties of the data point as you see fit.

The dialog box shown in Figure 7-24 is for a column chart. Different chart types have different options in the Format Data Point dialog box. Nevertheless, the idea remains the same in that you can adjust the properties in the Format Data Point dialog box to change the formatting of a single data point.

After changing the fill color of the October data point and adding a text box with some context, the chart nicely explains the spike. (See Figure 7-25.)

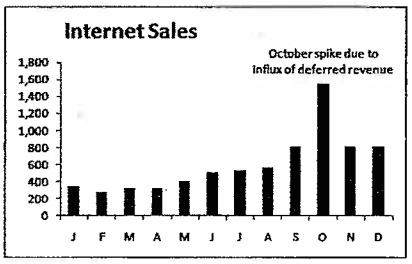


Figure 7-25: The chart now draws attention to the spike in October and provides instant context via a text box.

To add a text box to a chart, click the Insert tab in the Ribbon and select the Text Box icon. Then click inside the chart to create an empty text box, which you can fill with your words. Visit Chapter 6 for a detailed refresher on dynamic labeling.

Using dividers to mark significant events

Every now and then a particular event shifts the entire paradigm of your data permanently. A good example is a price increase. The trend shown in Figure 7-26 has permanently been affected by a price increase implemented in October. As you can see, a dividing line (along with some labeling) provides a distinct marker for the price increase, effectively separating the old trend from the new.

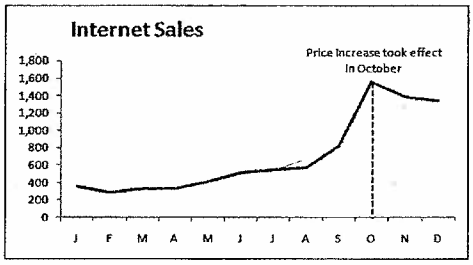


Figure 7-26: Use a simple line to mark particular events along a trend.

Although there are lots of fancy ways to create this effect, I find that I rarely need to get any fancier that manually drawing a line myself. To draw a dividing line inside a chart, take the following steps:

1. **Click the chart to select it.**
2. **Select the Insert tab on the Ribbon and click the Shapes button.**

3. **Select the line shape, go to your chart, and draw the line where you want it.**
4. **Right-click your newly-drawn line and choose Format Shape.**
5. **Use the Format Shape dialog box to format your line's color, thickness, and style.**

Representing forecasts in your trending components

It's common to be asked to show both actual data and forecast as a single trending component. When you do show the two together, you want to ensure that your audience can clearly distinguish where actual data ends and where forecasting begins. To see what I mean, take a look at Figure 7-27.

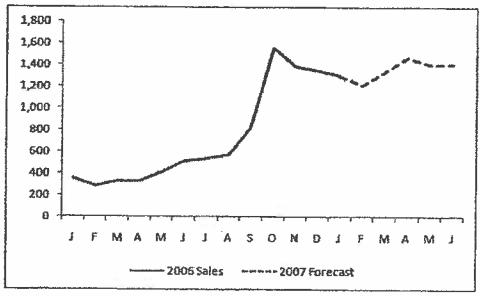


Figure 7-27: You can easily see where sales trending ends and forecast trending begins.

The best way to achieve this effect is to start with a data structure similar to the one shown in Figure 7-28. As you can see, sales and forecasts are in separate columns so that when charted, you get two distinct data series. Also note that the value in cell B14 is actually a formula referencing C14. This value serves to ensure a continuous trend line (with no gaps) when the two data series are charted together.

When you have the appropriately structured dataset, you can create a line chart. At this point, you can apply special formatting to the 2007 Forecast data series. Follow these steps:

1. **Click the data series that represents 2007 forecast.**

   This places dots on all the data points in the series.

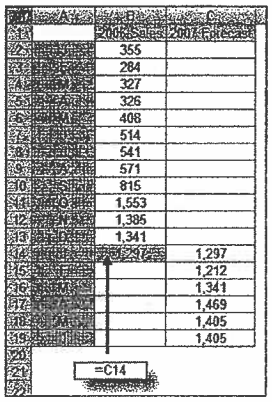


Figure 7-28: Start with a table that places your actual data and your forecasts in separate columns.

2. **Right-click and choose Format Data Series.**

   This opens the Format Data Series dialog box.

   When the Format Data Series dialog box activates, you can adjust the properties to format the series color, thickness, and style.

Other Trending Techniques

In this section, I show you a few techniques that go beyond the basic concepts I've covered so far.

Avoiding overload with directional trending

Do you work with a manager that's crazy for data? Are you getting headaches from trying to squeeze three years of monthly data into a single chart? Although it's understandable to want to see a three-year trend, placing too much information on a single chart can make for a convoluted trending component that tells you almost nothing.

When you're faced with the need to display impossible amounts of data, step back and think about the true purpose of the analysis. When your manager asks for a three-year sales trend by month, what's he really looking for? It could be that he's really asking whether current monthly sales are declining versus history. Do you really need to show each and every month or can you show the directional trend?

A *directional trend* is one that uses simple analysis to imply a relative direction of performance. The key attribute of a directional trend is that the data used is often a set of calculated values as opposed to actual data values. For instance, instead of charting each month's sales for a single year, you could chart the average sales for Q1, Q2, Q3, and Q4. With such a chart, you'd get a directional idea of monthly sales, without the need to look into detailed data.

Take a look at Figure 7-29, which shows two charts. The top chart trends each year's monthly data in a single trending component. You can see how difficult it is to discern much from this chart. It looks like monthly sales are dropping in all three years. The bottom chart shows the same data in a directional trend, showing average sales for key time periods. The trend really jumps at you, showing that sales have flattened out after healthy growth in 2004 and 2005.

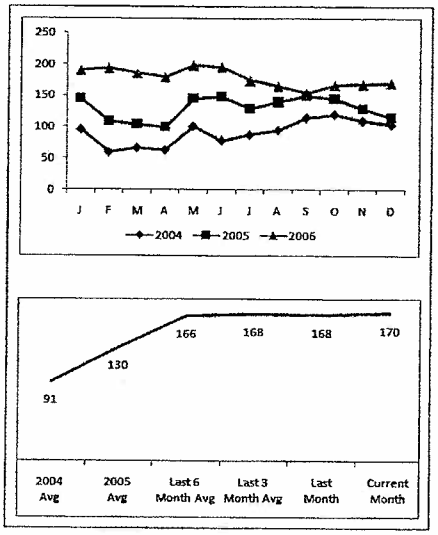


Figure 7-29: Directional trending (bottom) can help you reveal trends that may be hidden in more complex charts.

Smoothing data

Certain lines of business lend themselves to wide fluctuations in data from month to month. For instance, a consulting practice may go months without a steady revenue stream before a big contract comes along and spikes the sales figures for a few months. Some call these ups and downs *seasonality* or *business cycles*.

Whatever you call them, wild fluctuations in data can prevent you from effectively analyzing and presenting trends. Figure 7-30 demonstrates how highly volatile data can conceal underlying trends.

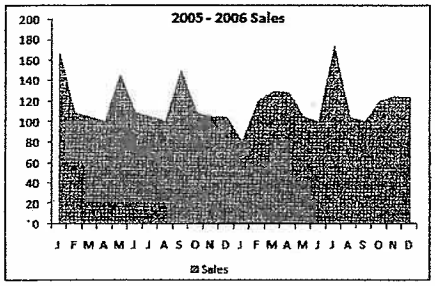


Figure 7-30: The volatile nature of this data makes it difficult to seek the underlying trend.

This is where the concept of *smoothing* comes in. Smoothing does just what it sounds like — it forces the range between the highest and lowest values in a dataset to smooth to a predictable range without disturbing the proportions of the dataset.

Now, you can use lots of different techniques to smooth a dataset. Take a moment to walk through one of the easier ways to apply smoothing.

Start a new column in the data source for the chart. In Figure 7-31, the new column is appropriately called Smoothing. In the second row of the smoothing column, create a simple average formula that averages the first data point and the second data point. Note that the reference to the first data point (cell D2) is locked as an absolute value with dollar ($) signs. This ensures that when this formula is copied down, the range grows to include all previous data points.

After you copy the formula down to fill the entire smoothing column, you can plot its data add a new data series to your chart. Figure 7-32 illustrates the smoothed data plotted as a line chart.

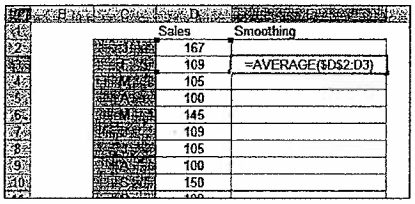


Figure 7-31: The smoothing column feeds a new series to your chart.

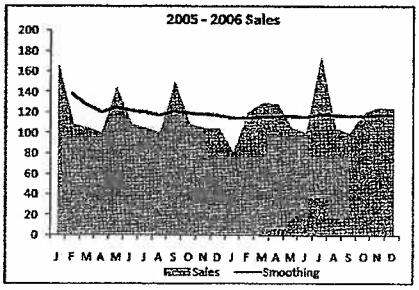


Figure 7-32: Plotting the smoothed data reveals the underlying trend.

Catching sparkline fever

Sparklines, developed by visualization guru Edward Tufte, are mini word-sized charts placed in and among textual data, allowing you to see trends and patterns at a glance with minimal space. With the sparkline concept, Tufte provides a mechanism that allows you to get visual context for data without the need to take up a lot of real estate on your dashboards.

Figure 7-33 illustrates how trending sparklines help provide an additional layer of context to the month-over-month analysis provided. You can see that the month-over-month variance for the year 2006 is 8 percent. Without the sparkline, this variance would seem like cause for celebration. However, the 12-month trend provided by the sparkline allows you to quickly see that the data has been in a long, slow decline for some time.

Figure 7-33: Sparklines allow you to see trends and patterns at a glance with minimal space.

	Last Month	This Month	Variance	12 Mo Trend
2005	179	186	4%	
2006	130	141	8%	

In terms of Excel, a sparkline is simply a miniature chart. The steps in creating a sparkline natively in Excel are relatively simple. Just follow these steps:

1. **Create a normal-sized chart that displays the trending you need to see.**
2. **Remove anything from the chart that isn't part of the data series: gridlines, labels, axes, titles, and so on.**

3. **Under the Format tab, find and adjust the height and width selectors under the Size group to resize the chart so that the height is about .50 inches wide and .25 inches tall.**
4. **Click and drag the chart where you want it displayed.**

If you really want to get fancy with sparklines, you may want to explore any one of the Excel add-in applications that specialize in creating sparklines. My favorite sparkline add-in is MicroCharts from BonaVista Systems. The MicroCharts add-in integrates directly into the Excel Ribbon and offers plenty of sparklines that are both effective and attractive. (See Figure 7-34.)

With MicroCharts, you can point to your data and then sparklines are placed where you specify. No need to create and maintain separate charts. When you have a data model prepared, creating a dashboard, like the one shown in Figure 7-35, becomes a matter of pointing the MicroCharts add-in to the data.

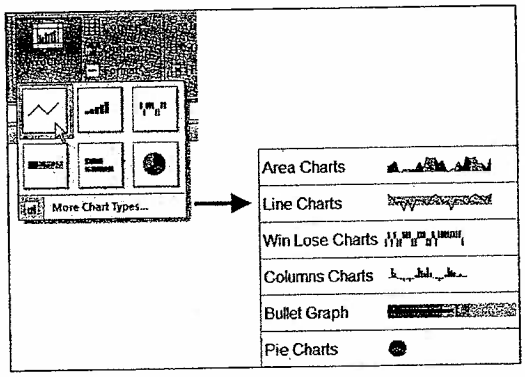


Figure 7-34: Third-party Excel add-ins create fancy sparklines.

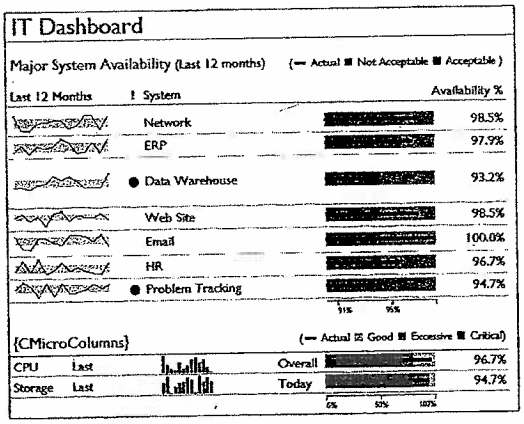


Figure 7-35: A dashboard created with the MicroCharts sparkline add-in.

To take a test drive of the MicroCharts add-in, download the free trial from www.bonavistasystems.com/DownloadMicroCharts.html.

Chapter 8

Components That Group and Bucket Data

In This Chapter

- Making top and bottom displays
- Using histograms to track groups
- Creating histograms with pivot tables
- Highlighting top and bottom values in charts

It's often helpful to organize your analyses into logical groups of data. Grouping allows you to focus on manageable sets that have key attributes. For example, instead of looking at all customers in one giant view, you can analyze customers who buy only one product. This allows you to focus attention and resources on those customers who have the potential of buying more products.

The benefit of grouping data is that it allows you to more easily pick out groups that fall outside the norm for your business.

In this chapter, I explore some of the techniques you can use to create components that group and bucket data.

Creating Top and Bottom Displays

When I look at the list of Fortune 500 companies, I immediately look to see the top 20 companies. Then I look to see who just eked in at the bottom 20. I rarely check to see who's number 251. It's not because I don't care about number 251; it's just that I don't have the time or energy to process all 500 companies. So I process the top and bottom of the list.

This is the same concept behind creating top and bottom displays. Your audience has only a certain amount of time and resources to dedicate to solving any issues you can highlight in your reporting mechanism. Showing them the top and bottom values in a dataset can help them pinpoint where and how they can have the most impact with the time and resources they do have.

Incorporating top and bottom displays into dashboards

The top and bottom displays you create can be as simple as tables you incorporate into your dashboards. These tables are typically placed to the right of a dashboard to highlight some detailed data a manager can use to take action on a metric. For example, the simple dashboard shown in Figure 8-1 shows sales information with top and bottom Sales Reps.

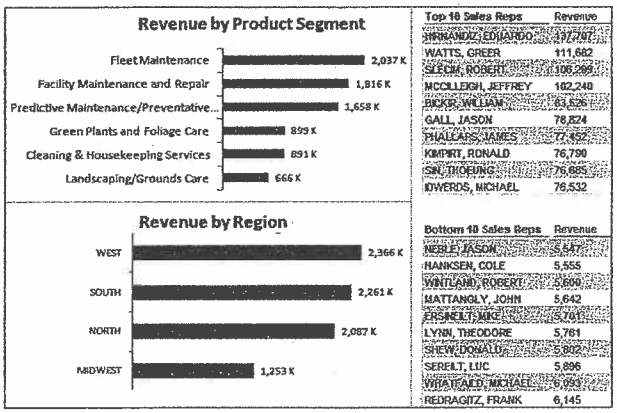


Figure 8-1: Top and bottom displays can be as simple as tables that highlight details.

To get a little fancier, you can supplement your top and bottom displays with some ranking information, some in-cell bar charts, or some conditional formatting. (See Figure 8-2.)

You can create the in-cell bar charts with the REPT function, which I cover in Chapter 6. The arrows are simple conditional formatting rules that are evaluated against the variance in current and last months' ranks.

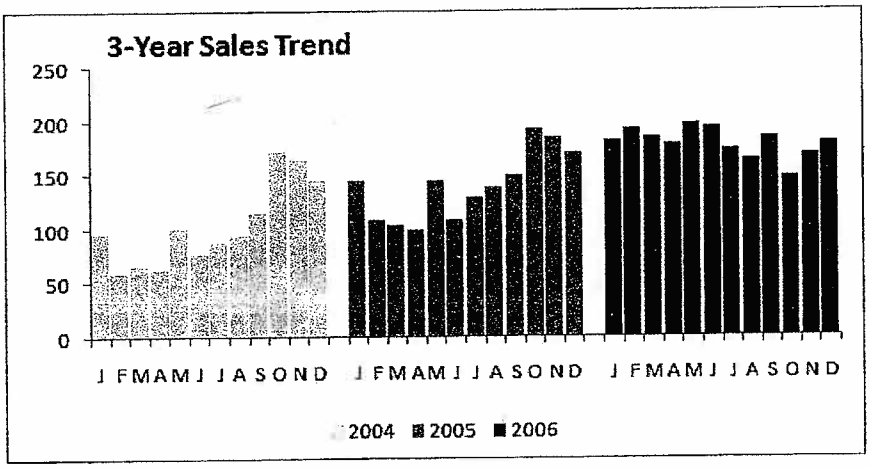
This gallery shows you some of the components you will find within the black and white pages of this book. Here you'll see them in full Technicolor! Ooooh! I've also included a few sample dashboards you may be able to use as inspiration for your next project. Enjoy!

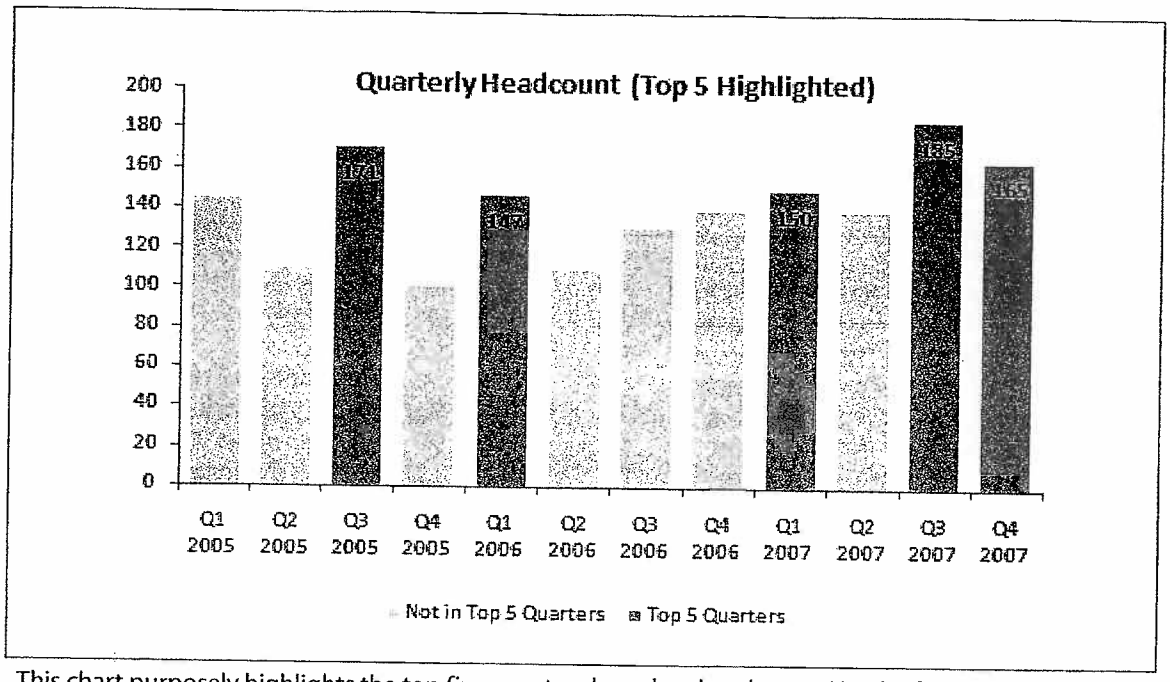
Top 10 Sales Reps	Sales	Rank	Last Month	vs Last Month
HIRNANDIZ, EDUARDO	$137,707	1	1	0
WATTS, GREER	$111,682	2	3	1
SLECIM, ROBERT	$106,299	3	5	2
MCCILLEIGH, JEFFREY	$102,240	4	2	-2
BICKIR, WILLIAM	$83,526	5	3	-2
GALL, JASON	$78,824	6	12	6
PHALLAPS, JAMES	$77,452	7	7	0
KIMPIRT, RONALD	$76,790	8	9	1
SIN, THOEUNG	$76,685	9	8	-1
IDWERDS, MICHAEL	$76,532	10	4	-6

Bottom 10 Sales Reps	Sales	Rank	Last Month	vs Last Month
NEBLE, JASON	$5,547	244	244	0
CELIMAN, WILLIAM	$9,779	243	241	-2
KRIZILL, ADAM	$11,454	242	235	-7
MIDANA, FRANK	$15,044	241	221	-20
GRANGIR, DAVID	$16,129	240	240	0
DALLEARE, ANDRE	$16,265	239	239	0
HICKLIBIRRY, JERRY	$16,670	238	225	-13
VAN HUILE, KENNETH	$18,821	237	242	5
RACHERDSEN, KENNETH	$19,675	236	237	1
STIGALL, DAVID	$20,092	235	243	8

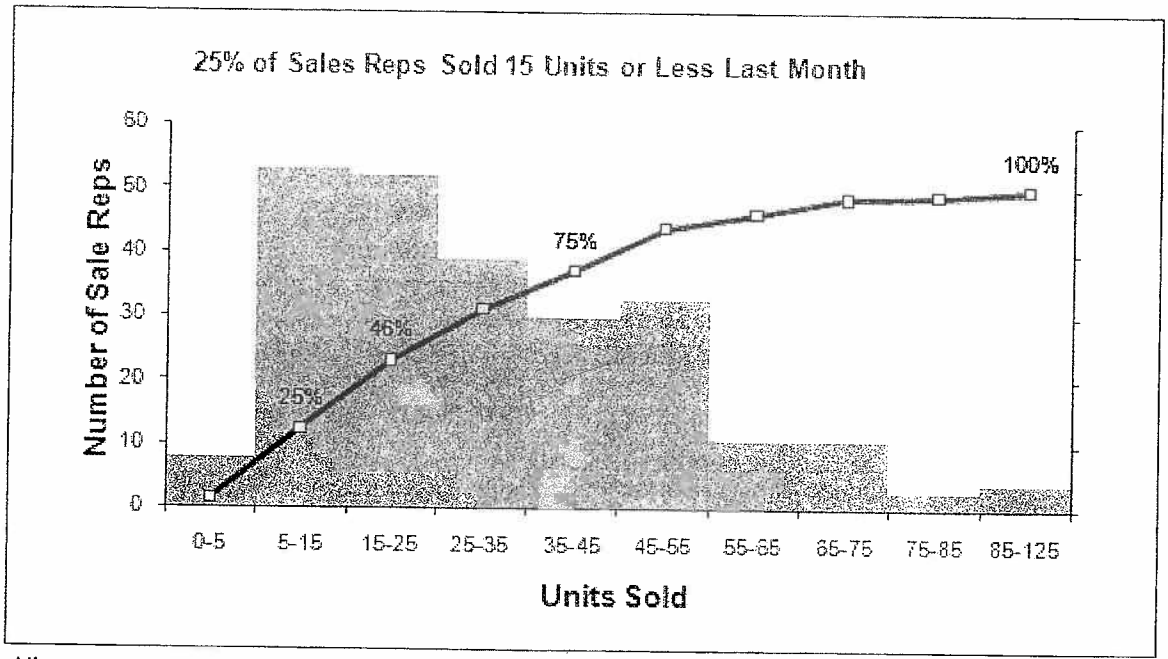
In Chapter 8, I talk about the benefits of including top and bottom views in your dashboard. This figure shows how you can supplement your top and bottom displays with some ranking information, some in-cell bar charts, and conditional formatting. These kinds of tables are typically placed to the right of a dashboard to highlight detailed data for top and bottom groups.

This technique, pulled from Chapter 7, shows how it can be far more effective to chart trend data side-by-side as opposed to jamming three lines on top of each other. Yes, this is all one chart!

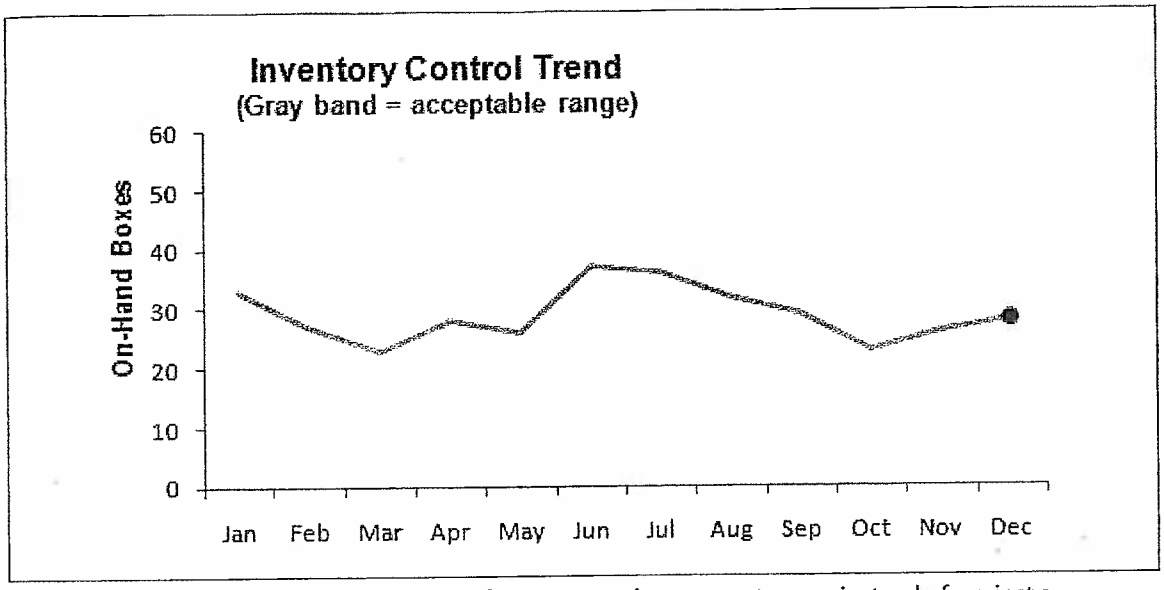




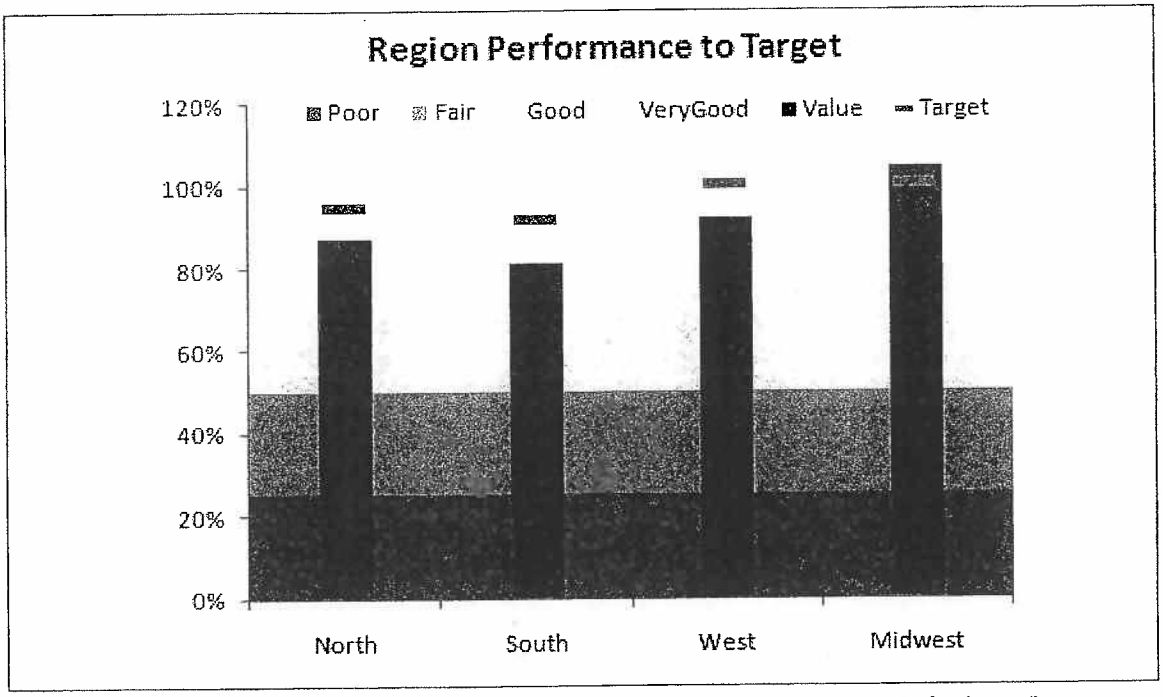
This chart purposely highlights the top five quarters based on headcount. No, the formatting and labeling was not done by hand. Excel actually calculates which quarters are in the top five and formats them automatically. You can find out how in Chapter 8.



Histograms are awesome grouping components, helping you see the general distribution of a particular category or event. In Chapter 8, I show you how to create histograms from a pivot table!



In some situations, you'll need to track performance against a target range instead of against a single target value. In this chart, monthly on-hand inventory is compared to an acceptable range. The cool thing about this component is that the target range can be adjusted by simply editing two cells. Check out Chapter 9 to see how this works.



In Chapter 9, I introduce you to the amazing bullet graph. A bullet graph is a type of column/bar graph developed by visualization expert Stephen Few to display multiple perspectives in an incredibly compact space.

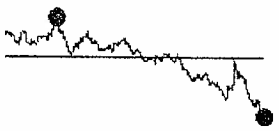
Exchange Rate Report

Foreign Exchange Dashboard - latest 24 months

November 1, 2007

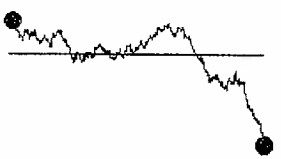
Value of the US Dollar

Euro per USD		30-day Change	6-month Change	1-year Change
Latest	0.683	-4%	-8%	-13%
High	0.857	11/17/2005		
Low	0.683	11/8/2007		
Average	0.776			



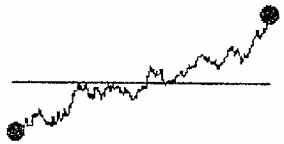
Australian $ per USD		30-day Change	6-month Change	1-year Change
Latest	1.070	-4%	-10%	-18%
High	1.420	3/30/2006		
Low	1.070	11/8/2007		
Average	1.278			

British Pound per USD		30-day Change	6-month Change	1-year Change
Latest	0.477	-3%	-5%	-9%
High	0.584	11/30/2005		
Low	0.477	11/8/2007		
Average	0.528			



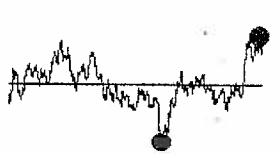
Canadian $ per USD		30-day Change	6-month Change	1-year Change
Latest	0.915	-7%	-14%	-19%
High	1.194	11/15/2005		
Low	0.915	11/8/2007		
Average	1.118			

Value of the Euro

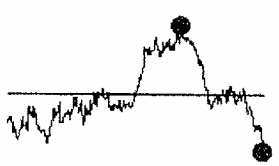


USD per Euro		30-day Change	6-month Change	1-year Change
Latest	1.463	4%	9%	15%
High	1.463	11/8/2007		
Low	1.167	11/17/2005		
Average	1.293			

Australian $ per Euro		30-day Change	6-month Change	1-year Change
Latest	1.566	0%	-2%	-6%
High	1.729	6/8/2006		
Low	1.556	7/27/2007		
Average	1.647			



British Pounds per Euro		30-day Change	6-month Change	1-year Change
Latest	0.698	1%	3%	4%
High	0.702	10/28/2007		
Low	0.655	1/24/2007		
Average	0.681			



Canadian $ per Euro		30-day Change	6-month Change	1-year Change
Latest	1.338	-4%	-6%	-7%
High	1.567	3/19/2007		
Low	1.338	11/8/2007		
Average	1.442			

Interactive National Park Comparison Report

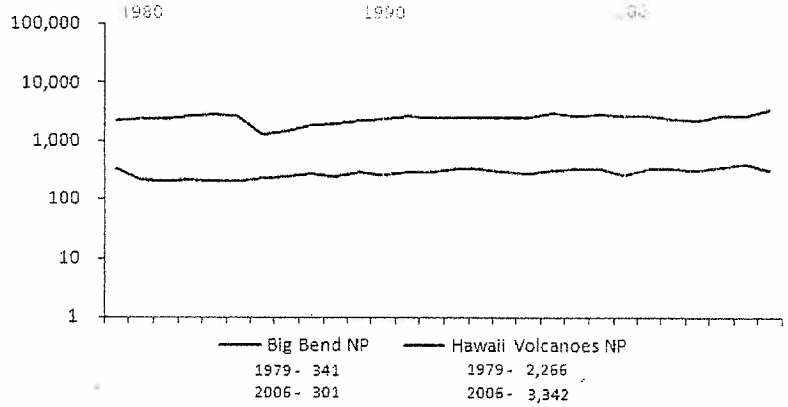
Interactive National Park Attendance Comparison Report

Select 2 parks to compare:

1 Big Bend NP

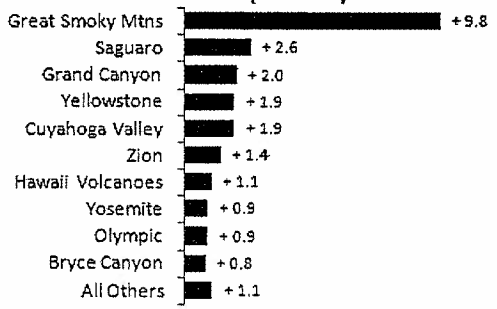
2 Hawaii Volcanoes NP

National Park Annual Attendance (thousands)

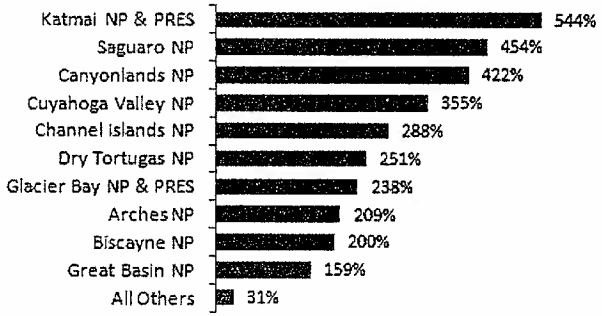


	% Change, 1979 to 2006		
	Total	Annual	vs. Avg.
Big Bend NP	- 12%	- 0%	- 2%
Hawaii Volcanoes NP	+ 47%	+ 1%	+ 0%
Average, all National Parks	+ 40%	+ 1%	

Largest Annual Attendance Increases 1979 to 2006 (millions)



Largest Annual % Increase 1979 to 2006



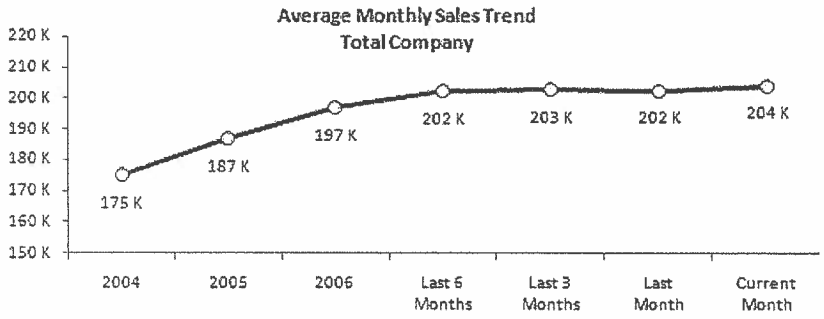
H-000198

Division Sales Summary

Div Sales Summary

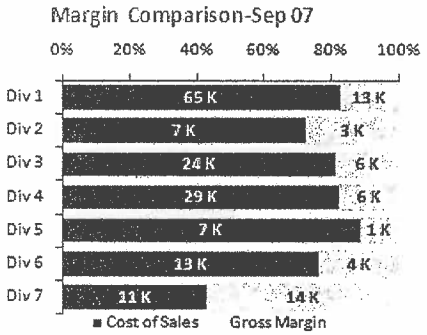
Sales

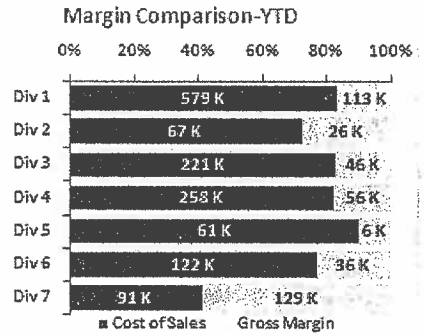
	Month Sep 07	vs. Last Month		Year-to-Date Sep 07	vs. Last Year	
Div 1	$ 78,653	+1.2%		$ 692,159	+2.4%	
Div 2	$ 10,293	-0.6%	●	$ 92,982	+2.1%	
Div 3	$ 29,541	+0.1%		$ 266,343	-1.8%	●
Div 4	$ 35,551	+2.0%		$ 313,965	+1.7%	
Div 5	$ 7,565	-0.7%	●	$ 67,084	+2.2%	
Div 6	$ 17,461	-0.5%	●	$ 157,879	-1.1%	●
Div 7	$ 25,027	+1.1%		$ 219,650	+8.6%	
Total	$ 204,091	+0.9%		$ 1,810,062	+2.0%	



Gross Margin

	Month Sep 07	vs. Last Month		Year-to-Date Sep 07	vs. Last Year	
Div 1	$ 13,450	+6.2%		$ 113,376	+4.9%	
Div 2	$ 2,810	-2.0%	●	$ 25,719	+8.6%	
Div 3	$ 5,554	+11.3%		$ 45,518	+2.9%	
Div 4	$ 6,257	+1.4%		$ 55,540	+5.9%	
Div 5	$ 840	+16.0%		$ 6,480	+23.4%	
Div 6	$ 4,086	+1.3%		$ 36,375	+7.5%	
Div 7	$ 14,240	-2.5%	●	$ 129,132	+4.7%	
Total	$ 47,236	+2.6%		$ 412,141	+5.4%	





H-000199

Airline Route Analysis

Airline Route Analysis

Top 10 Domestic Routes by Revenue

Legend ✕ <10% Margin

From	To	Revenue (000's), % Domestic Revenue		Margin (000's), % Domestic Margin		Revenue per Passenger	Margin per Passenger
New York	Detroit	12,180	11%	2,408	11%	177	35
New York	Washington	6,355	6%	1,230	6%	186	36
Chicago	New York	4,674	4%	337	2%	222	✕ 16
Atlanta	New York	3,602	3%	956	5%	245	65
New York	Philadelphia	3,583	3%	(717)	-3%	loss	125	✕ -25
New York	San Francisco	3,221	3%	1,856	9%	590	340
New York	Phoenix	2,847	3%	1,436	7%	555	280
New York	Toronto	2,800	3%	1,089	5%	450	175
New York	Seattle	2,792	3%	467	2%	448	75
Columbus (Ohio)	New York	2,483	2%	1,537	7%	202	125
Total Domestic routes		108,891		21,049	19%	272	53

Top 10 International Routes by Revenue

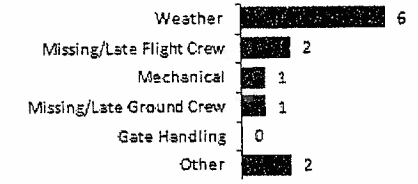
Legend ✕ <20% Margin

From	To	Revenue (000's), % Domestic Revenue		Margin (000's), % Domestic Margin		Revenue per Passenger	Margin per Passenger
New York	London	22,326	25%	11,163	23%	1,811	906
Detroit	Sao Paolo	5,648	6%	1,977	4%	1,765	618
Atlanta	Lima	3,609	4%	2,346	5%	2,123	1,380
Detroit	Frankfurt	3,584	4%	2,330	5%	2,560	1,664
Phoenix	Sydney	2,504	3%	626	1%	1,565	391
New York	Adelaide	2,042	2%	817	2%	2,722	1,089
New York	Mexico City	1,784	2%	268	1%	555	✕ 83
New York	Lima	1,500	2%	390	1%	1,250	325
New York	Veracruz	1,174	1%	141	0%	485	✕ 58
Denver	Bogota	956	1%	210	0%	956	210
Total International Routes		89,092		49,115	55%	1,324	730

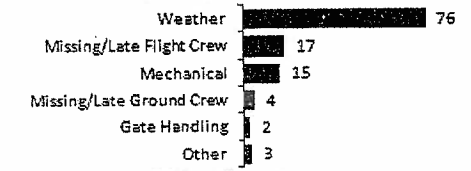
Cancellations & Delays - Worst 10 Routes (last 3 months)

From	To	Cancelation %	Delays %
Detroit	Orlando	5.1%	31.4%
Chicago	Dallas	4.6%	26.3%
Minneapolis	Denver	4.2%	29.7%
Houston	Orlando	4.1%	21.7%
Chicago	Orlando	3.9%	25.6%
Memphis	Detroit	3.2%	15.8%
Salt Lake City	Boston	2.8%	19.7%
Oakland	Orlando	1.9%	14.9%
Dallas	Houston	1.1%	16.7%
Oakland	Seattle	0.9%	14.3%
Total Domestic routes		0.3%	9.8%

Cancellations - Causes (last 30 days)



Delays - Causes (last 30 days)



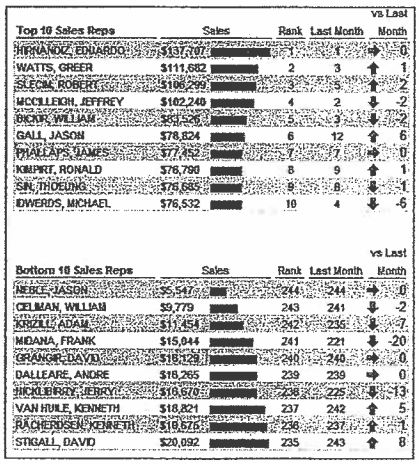
H-000200

Compact KPI Summary (created using Bonavista's Microcharts® Excel add-in)

Compact KPI Summary

Sparklines and mini-charts created with BonaVista's Microcharts® Excel add-in

			Nov 05	Last 3 Mo Avg	Last 12 mo Avg	12 Month Trend	Targets	% of Target	0% 100% 150%
Finance Metrics	$ Revenues		$18,134 K	$17,985 K	$17,728 K		$18,000 K	101%	
	$ Expenses		$11,358 K	$11,186 K	$11,580 K		$12,600 K	90%	
	$ Profits		$6,776 K	$6,799 K	$6,147 K		$5,400 K	125%	
	% Market Share		44%	46%	45%		52%	85%	
Flight Metircs	Flights		446	447	449		500	89%	
	Passengers		63 K	62 K	61 K		65 K	97%	
	Miles		346 K	347 K	349 K		395 K	88%	
	Pssng. Miles		31,206 K	31,376 K	31,510 K		36,000 K	87%	
	Cancelled Flights		9	9	10		15	60%	
	Late Arrivals		63	71	64		45	141%	
	Minutes Late		1,302	1,472	1,337		1,000	130%	
	$ Fuel Costs		$1,293 K	$1,332 K	$1,326 K		$1,080 K	120%	
	Customer Satisfaction		4.52	4.5	4.5		4.80	94%	
	Flight Utilization		92%	91%	91%		94%	98%	
Ratios	Revenue / Pssng. Mile		$0.58	$0.57	$0.56		$0.50	116%	
	Profit / Mile		$19.56	$19.59	$17.61		$15.00	130%	
	Revenue / Mile		$52.34	$51.82	$50.80		$50.00	105%	
	Fuel Costs / Mile		$3.73	$3.84	$3.80		$3.00	124%	
	Profit / Pssng. Mile		$0.22	$0.22	$0.20		$0.15	145%	
	Revenue / Passenger		304	297	294		277	110%	



Top 10 Sales Reps	Sales	Rank	Last Month	vs Last Month
HERNANDEZ, EDUARDO	$137,707	1	1	0
WATTS, GREER	$111,682	2	3	1
SLEGM, ROBERT	$106,299	3	5	2
MCCLLEIGH, JEFFREY	$102,240	4	2	-2
RICKR, WILLIAM	$93,506	5	3	-2
GALL, JASON	$78,824	6	12	6
PHALLAPS, JAMES	$77,252	7	7	0
KIMPRT, RONALD	$76,790	8	9	1
SN, THOEUNS	$76,685	9	8	-1
EWERDS, MICHAEL	$76,532	10	4	-6

Bottom 10 Sales Reps	Sales	Rank	Last Month	vs Last Month
NEBCE, JASON	$5,547	244	244	0
CELMAN, WILLIAM	$9,779	243	241	-2
KRELLY, ADAM	$11,451	242	235	-7
MDANA, FRANK	$15,044	241	221	-20
GRANGE, DAVID	$16,129	240	240	0
DALLEARE, ANDRE	$16,265	239	239	0
HCKLEBRRY, JERRY	$16,670	238	225	-13
VAN HULE, KENNETH	$18,821	237	242	5
RACHERSEN, KENNETH	$18,875	236	237	1
STIGALL, DAVID	$20,092	235	243	8

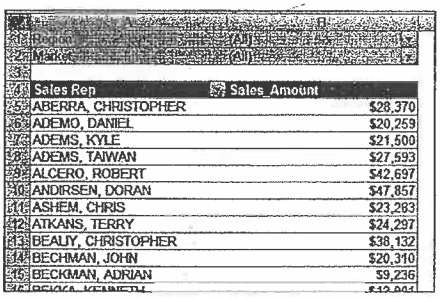
Figure 8-2: You can use the REPT function and some conditional formatting to add visual components to your top and bottom displays.

Using pivot tables to create interactive top and bottom views

If you read Chapter 3, you know that a pivot table is an amazing tool that can help create interactive reporting. Take a moment to walk through an example of how pivot tables can help you build interactive top and bottom displays. You can open the `Chapter 8 Sample File.xlsx` file, found on this book's companion Web site, to follow along. Follow these steps to build a display with a pivot table:

1. **Start with a pivot table that shows the data you want to display with your top and bottom views.**

   In this case, the pivot table shows Sales Rep and Sales_Amount. (See Figure 8-3.)



	A	B
1	Region	(All)
2	Market	(All)
3		
4	Sales Rep	Sales_Amount
5	ABERRA, CHRISTOPHER	$28,370
6	ADEMO, DANIEL	$20,259
7	ADEMS, KYLE	$21,500
8	ADEMS, TAIWAN	$27,593
9	ALCERO, ROBERT	$42,697
10	ANDIRSEN, DORAN	$47,857
11	ASHEM, CHRIS	$23,283
12	ATKANS, TERRY	$24,297
13	BEALIY, CHRISTOPHER	$38,132
14	BECHMAN, JOHN	$20,310
15	BECKMAN, ADRIAN	59,236

Figure 8-3: Start with a pivot table that contains the data you want to filter.

2. **Right-click any Sales Rep name in the table, choose Filter, and then choose Top 10, as demonstrated in Figure 8-4.**

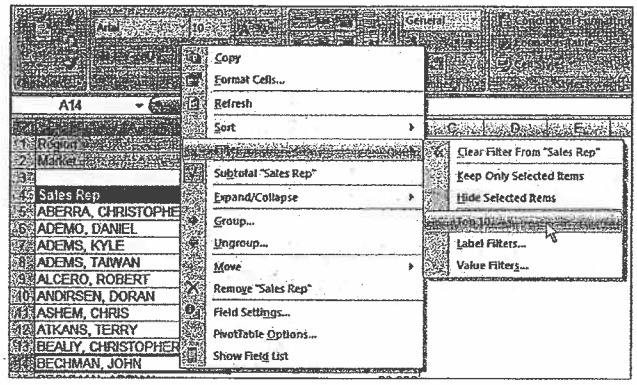


Figure 8-4: Select the Top 10 filter option.

The Top 10 Filter (Sales Rep) dialog box appears. (See Figure 8-5.)

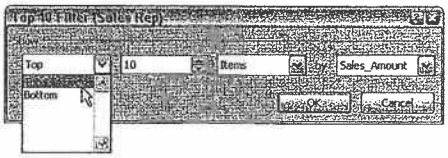


Figure 8-5: Specify the filter you want to apply.

3. **In the Top 10 Filter (Sales Rep) dialog box, define the view you're looking for.**

   In this example, you want the Top 10 Items (Sales Reps) as defined by the Sales_Amount field.

   Note that the drop-down-box in Figure 8-5 contains options for Top and Bottom. You can use the same dialog box to get the bottom ten items.

4. **Click OK to apply the filter.**

   At this point, your pivot table is filtered to show you the top ten sales reps for the selected Region and Market. You can change the Market filter to Charlotte and get the top ten sales reps for Charlotte only. (See Figure 8-6.)

Region	(All)
Market	CHARLOTTE

Sales Rep	Sales_Amount
MCCILLEIGH, JEFFREY	$98,090
CERDWILL, TIMOTHY	$54,883
BRADFERD, JAMES	$49,435
DIDLIY, CHARLES	$47,220
SWANGIR, ADAM	$46,608
SKILTEN, JAMES	$43,569
PIORSEN, HEYWARD	$41,005
CRIOMIR, TIMOTHY	$34,169
PERSENS, GREGORY	$33,026
BIOCH, RONALD	$30,168
Grand Total	$478,172

Figure 8-6: You can interactively filter your pivot table report to instantly show the top ten sales reps for any Region and Market.

5. **To create the bottom ten Sales Rep list, copy the entire pivot table and paste it next to the existing one.**

There's no need to create another pivot table from scratch. You can copy and paste any pivot table to create various views using the same data source. The best part is that when you copy and paste a pivot table, you don't add to your file's memory or file size because you're using the same data cache.

6. **Repeat Steps 2–4 in the newly-copied pivot table except this time choose to filter on the *bottom* ten items as defined by the Sales_Amount field.**

If all went well, you now have two pivot tables similar to Figure 8-7: one that shows the top ten sales reps, and one that shows the bottom ten. You can link back to these two pivot tables using formulas. This way, when the data is refreshed, your top and bottom displays are updated.

Top Sales Reps

Region	(All)
Market	CHARLOTTE

Sales Rep	Sales_Amount
MCCILLEIGH, JEFFREY	$98,090
CERDWILL, TIMOTHY	$54,883
BRADFERD, JAMES	$49,435
DIDLIY, CHARLES	$47,220
SWANGIR, ADAM	$46,608
SKILTEN, JAMES	$43,569
PIORSEN, HEYWARD	$41,005
CRIOMIR, TIMOTHY	$34,169
PERSENS, GREGORY	$33,026
BIOCH, RONALD	$30,168
Grand Total	$478,172

Bottom Sales Reps

Region	(All)
Market	CHARLOTTE

Sales Rep	Sales_Amount
MEERE, RUSSELL	$6,635
GERRUIS, ROBERT	$7,786
BECKMAN, ADRIAN	$9,236
REBIRTS, ADAMS	$13,237
HELT, CHRISTOPHER	$15,147
HERVIY, CHRISTOPHER	$15,260
WALLAEMS, SHAUN	$15,477
CRAVIY, ANTHONY	$22,761
BRAGHT, THOMAS	$25,005
MEERE, TERRY	$27,149
Grand Total	$157,693

Figure 8-7: You now have two pivot tables that show top and bottom displays.

If there's a tie for any rank in the top or bottom values, Excel shows you all the tied records. This means you may get more than the number you filtered for. In other words, if you filtered for the top 10 sales reps and there's a tie for number the number 5 rank, Excel shows you 11 sales reps (both reps ranked at number 5 will be shown).

Using Histograms to Track Relationships and Frequency

A *histogram* is essentially a graph that plots frequency distribution. What's a frequency distribution, you ask? A *frequency distribution* shows how often an event or category of data occurs. With a histogram, you can visually see the general distribution of a certain attribute.

To see what I mean, take a look at the histogram shown in Figure 8-8. This histogram represents the distribution of units sold in one month among your sales reps. As you can see, most reps sell somewhere between 5 and 25 units a month. As a manager, you want the hump in the chart to move to the right — more people selling a higher number of units per month. So you set a goal to have a majority of your sales reps sell between 15 and 25 units within the next three months. With this histogram, you can visually track the progress toward that goal.

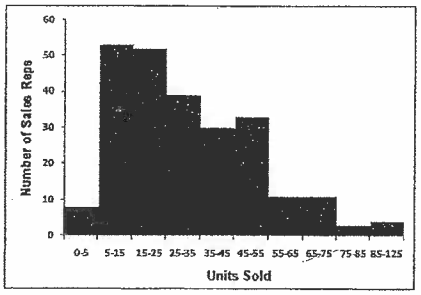


Figure 8-8: A histogram showing the distribution of units sold per month among your sales force.

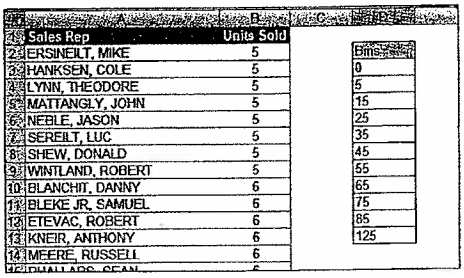
Before you get started creating your first histogram, it's important to note the several ways to do this in Excel. In this chapter, I show you how to create a histogram using formulas and pivot tables. The techniques I cover here fit nicely in reporting data models where there is a separation of data, analysis, and presentation. In addition, these techniques allow for a level of automation and interactivity that come in handy when refreshing reports each month.

Creating formula-driven histograms

First, you need a table that contains your raw data. The raw data should ideally consist of records that represent unique counts for the data you want to group. For instance, the raw data table in Figure 8-9 contains unique sales reps and the number of units each has sold. Follow these steps to create a formula-driven histogram:

1. **Before you create your histogram, you need to create a Bin table.**

   The Bin table dictates the grouping parameters that are used to break your raw dataset into the frequency groups. The Bin table in Figure 8-9 tells Excel to cluster all sales reps selling less than 5 units into the first frequency group, any sales reps selling 5 to 14 units in the second frequency group, and so on.



	A	B	C	D	E
1	Sales Rep	Units Sold		Bins	
2	ERSINEILT, MIKE	5		0	
3	HANKSEN, COLE	5		5	
4	LYNN, THEODORE	5		15	
5	MATTANGLY, JOHN	5		25	
6	NEBLE, JASON	5		35	
7	SEREILT, LUC	5		45	
8	SHEW, DONALD	5		55	
9	WINTLAND, ROBERT	5		65	
10	BLANCHIT, DANNY	6		75	
11	BLEKE JR, SAMUEL	6		85	
12	ETEVAC, ROBERT	6		125	
13	KNEIR, ANTHONY	6			
14	MEERE, RUSSELL	6			

Figure 8-9: Start with your raw data table and a Bin table.

You can freely set your own grouping parameters when you build your Bin table. However, it's generally a good idea to keep your parameters as equally spaced as possible. I typically end my Bin tables with the largest number in my dataset. This allows me to have clean groupings that end in a finite number — not in an open-ended *greater than* designation.

2. **After your raw data and Bin tables are ready, you must create a new column that holds the FREQUENCY formulas. Name the new column Frequency Formulas as seen in Figure 8-10.**

   Excel's FREQUENCY function counts how often values occur within the ranges you specify in a Bin table.

3. **Highlight a number of cells equal to the cells in your Bin table.**

4. **Type the FREQUENCY formula you see in Figure 8-10 and then press Ctrl+Shift+Enter on your keyboard.**

The FREQUENCY function does have a quirk that often confuses first-time users. The FREQUENCY function is an *array formula* — that is, it's a formula that returns many values at one time. In order for this formula to work properly, you have to press Ctrl+Shift+Enter on your keyboard after typing the formula. If you simply hit the Enter key, you won't get the results you need.

	A	B	C	D	E
1	Sales Rep	Units Sold			
2	ERSINEILT, MIKE	5			
3	HANKSEN, COLE	5			
4	LYNN, THEODORE	5			
5	MATTANGLY, JOHN	5			
6	NEBLE, JASON	5			
7	SEREILT, LUC	5			
8	SHEW, DONALD	5			
9	WINTLAND, ROBERT	5			
10	BLANCHIT, DANNY	6			
11	BLEKE JR, SAMUEL	6			
12	ETEVAC, ROBERT	6			
13	KNEIR, ANTHONY	6			
14	HEEDE, RUSSELL	6			

Bins	Frequency Formulas
0	=FREQUENCY(B2:B245,D3:D13)
5	
15	
25	
35	
45	
55	
65	
75	
85	
125	

Figure 8-10: Enter the FREQUENCY formula you see here.

At this point, you should have a table that shows the number of sales reps that fall into each of your Bins. You could chart this table, but the data labels would come out wonky. For the best results, build a simple chart feeder table that creates appropriate labels for each Bin. You do this in the next step.

5. **Create a new table that feeds the charts a bit more cleanly (see Figure 8-11).**

   Use a simple formula that concatenates Bins into appropriate labels. Use another formula to bring in the results of your FREQUENCY calculations.

   In Figure 8-11, I made the formulas in the first record of the chart feeder table visible. These formulas are essentially copied down to create a table appropriate for charting.

	C	D	E	F	G	H
11	Frequency Formulas			Chart Feeder		
12	Bins	Frequency Formulas		Units Sold	Count of Sales Reps	
13	0	0		=D3& "-" &D4	=E4	
14	5	8		5-15	53	
15	15	53		15-25	52	
16	25	52		25-35	39	
17	35	39		35-45	30	
18	45	30		45-55	33	
19	55	33		55-65	11	
20	65	11		65-75	11	
21	75	11		75-85	3	
22	85	3		85-125	4	
23	125	4				

Figure 8-11: Build a simple chart feeder table that creates appropriate labels for each Bin.

6. **Use your newly-created chart feeder table to plot the data into a column chart.**

   Figure 8-12 illustrates the resulting chart.

Units Sold	Count of Sales Reps
0-5	8
5-15	53
15-25	52
25-35	39
35-45	30
45-55	33
55-65	11
65-75	11
75-85	3
85-125	4

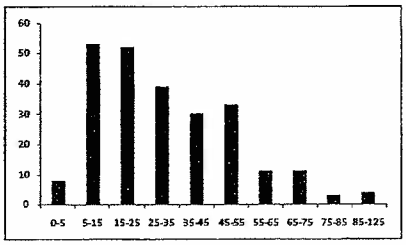


Figure 8-12: Plot your histogram data into a column chart.

   You can very well use the initial column chart as your histogram. If you like your histograms to have spaces between the data points, you're done.

   If you like the continuous blocked look you get with no gaps between the data points, follow the next few steps.

7. **Right-click any of the columns in the chart and choose Format Data Series.**

   The Format Data Series dialog box appears.

8. **In the dialog box, select the Series Options button and adjust the Gap Width property to 0%. (See Figure 8-13.)**

Adding a cumulative percent to your histogram

A nice feature to add to your histograms is a cumulative percent series. With a cumulative percent series, you can show the percent distribution of the data points to the left of the point of interest.

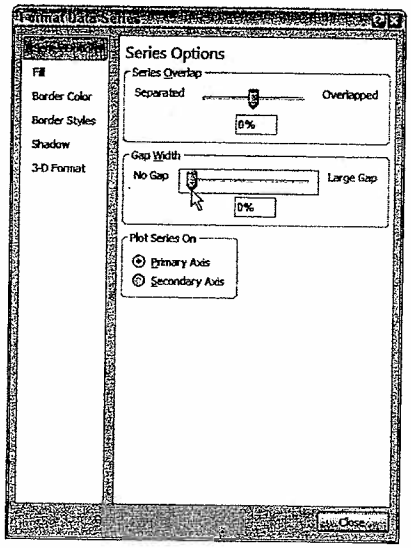


Figure 8-13: To eliminate the spaces between columns, set the Gap Width to 0%.

Figure 8-14 shows an example of a cumulative percent series. At each data point in the histogram, the cumulative percent series tells you the percent of the population that fills all the Bins up to that point. For instance, you can see that 25% of the sales reps represented sold 15 units or less. In other words, 75% of the sales reps sold more than 15 units.

Take another look at the chart in Figure 8-14 and find the point where you see 75% on the cumulative series. At 75%, look at the label for that Bin range (you see 35–45). The 75% mark tells you that 75% of sales reps sold between 0 and 45 units. This means that only 25% of sales reps sold more than 45 units.

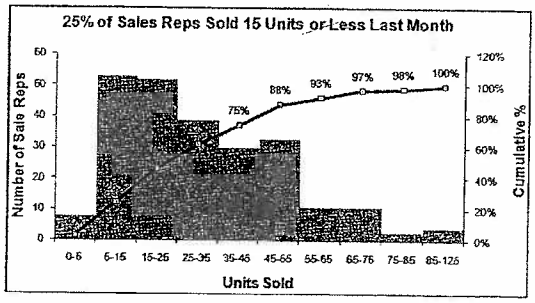


Figure 8-14: The cumulative percent series shows the percent of the population that fills all the Bins up to each point in the histogram.

To create a cumulative percent series for your histogram, follow these steps:

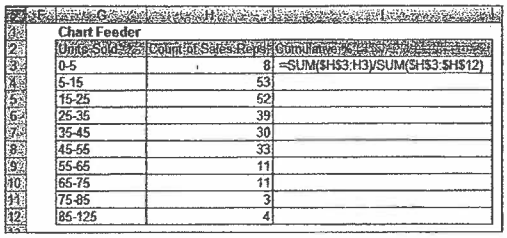
1. **After you perform Steps 1 through 5 of creating a histogram (which I outline in the earlier section, "Creating formula-driven histograms"), add a column to your chart feeder table that calculates the percent of total sales reps for the first Bin (See Figure 8-15).**

   Note the dollar symbols ($) used in the formula to lock the references while you copy the formula down.

2. **Copy the formula down for all the Bins in the table.**

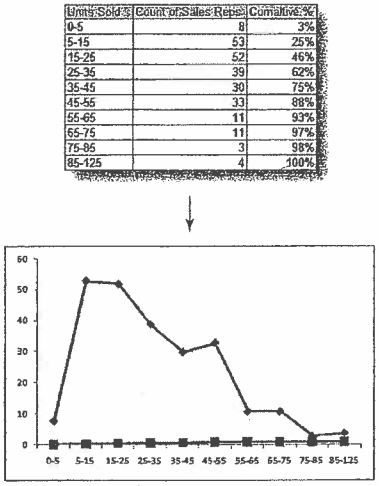
3. **Use the chart feeder table to plot the data into a line chart.**

   As you can see in Figure 8-16, the resulting chart needs some additional formatting.



	E	F	G	H	I
1		Chart Feeder			
2		Units Sold	Count of Sales Reps	Cumulative %	
3		0-5	8	=SUM($H$3:H3)/SUM($H$3:$H$12)	
4		5-15	53		
5		15-25	52		
6		25-35	39		
7		35-45	30		
8		45-55	33		
9		55-65	11		
10		65-75	11		
11		75-85	3		
12		85-125	4		

Figure 8-15: In a new column, create a formula that calculates the percent of total sales reps for the first Bin.



Units Sold	Count of Sales Reps	Cumulative %
0-5	8	3%
5-15	53	25%
15-25	52	46%
25-35	39	62%
35-45	30	75%
45-55	33	88%
55-65	11	93%
65-75	11	97%
75-85	3	98%
85-125	4	100%

Figure 8-16: Just a little formatting fixes this chart.

4. **Right-click the series that makes up your histogram (Count of Sales Rep), select Change Chart Type, and then change the chart type to a column chart.**
5. **Right-click any of the columns in the chart and choose Format Data Series.**
6. **Select the Series Options button and adjust the Gap Width property to 0%, as illustrated in Figure 8-13.**
7. **Right-click Cumulative Percent series and choose Format Data Series.**
8. **In the Format Data Series dialog box, select the Series Options button. Change the Plot Series On option to Secondary Axis.**
9. **Right-click Cumulative Percent series and choose Add Data Labels.**

At this point, your base chart is complete. It should look similar to the one shown at the beginning of this section in Figure 8-14. When you get to this point, you can adjust the colors, labels, and other formatting.

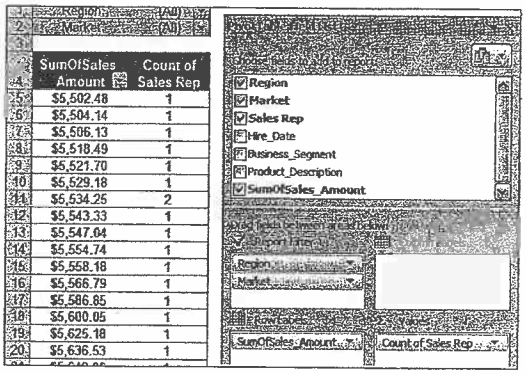
Creating a histogram with a pivot table

Did you know you can use a pivot table as the source for a histogram? That's right. With a little-known trick, you can create a histogram that is as interactive as a pivot chart!

As in the formula-driven histogram, the first step in creating a histogram with a pivot table is to create a frequency distribution. Here's how you do it:

1. **Create a pivot table and plot the data values in the row area (not the data area).**

   As you can see in Figure 8-17, the SumOfSales Amount field is placed in the row area. Place the Sales Rep field in the data area as a Count.



SumOfSales Amount	Count of Sales Rep
$5,502.48	1
$5,504.14	1
$5,506.13	1
$5,518.49	1
$5,521.70	1
$5,529.18	1
$5,534.25	2
$5,543.33	1
$5,547.04	1
$5,554.74	1
$5,558.18	1
$5,566.79	1
$5,586.85	1
$5,600.05	1
$5,625.18	1
$5,636.53	1

Figure 8-17: Place your data values in the row area and the Sales Rep field in the data area as a Count.

2. **Right-click any value in the row area and choose Group.**

   The Grouping dialog box appears. (See Figure 8-18.)

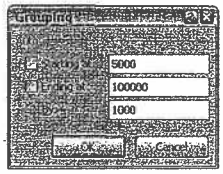


Figure 8-18: The Grouping dialog box.

3. **In the dialog box, set the start and end values and then set the intervals.**

   This essentially creates your frequency distribution. In Figure 8-19, the distribution is set to start at 5,000 and to create groups in increments of 1,000 until it ends at 100,000.

   After you click OK, the pivot table calculates the number of sales reps for each defined increment, just as in a frequency distribution. (See Figure 8-19.) You can now leverage this result to create a histogram!

Figure 8-19: The resulting of grouping the values in the Row area is a frequency distribution that can be charted into a histogram.

	A	B
1	Region	(All)
2	Market	(All)
3		
4	SumOfSales_Amount	Count of Sales Rep
5	5000-6000	69
6	6000-7000	78
7	7000-8000	58
8	8000-9000	66
9	9000-10000	41
10	10000-11000	45
11	11000-12000	39
12	12000-13000	33
13	13000-14000	25
14	14000-15000	25
15	15000-16000	22

The obvious benefit to this technique is that after you have a frequency distribution and a histogram, you can interactively filter the data based on other dimensions, like Region and Market. For instance, you can see the histogram for the Canada market and then quickly switch to see the histogram for the California market.

As far as your humble author can tell, you can't add cumulative percentages to a histogram based on a pivot table.

Highlighting Top Values in Charts

Sometimes a chart is indeed the best way to display a set of data, but you still would like to call attention to the top values in that chart. In these cases, you can use a technique that *actually* highlights the top values in your charts. That is to say, you can use Excel to figure out which values in your data series are in the top *n*th value and then apply special formatting to them. Figure 8-20 illustrates an example where the top five quarters are highlighted and given a label.

The secret to this technique lies in Excel's obscure LARGE function. The LARGE function returns the *n*th largest number from a dataset. In other words, you tell it where to look and the number rank you want.

To find the largest number in the dataset, you'd enter the formula `LARGE(Data_Range, 1)`. To find the fifth largest number in the dataset, you'd use `LARGE(Data_Range, 5)`. Figure 8-21 illustrates how the LARGE function works.

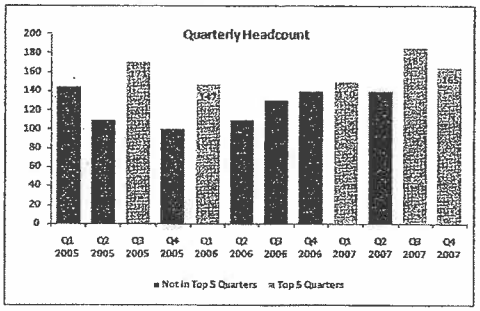


Figure 8-20: This chart highlights the top five quarters with different font and labeling.

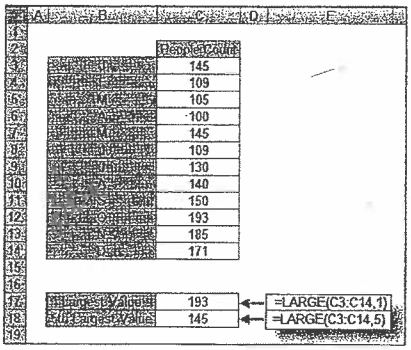


Figure 8-21: Using the LARGE function returns the *n*th largest number from a dataset.

The idea is fairly simple. In order to identify the top five values in a dataset, you first need to identify the fifth largest number (LARGE function to the rescue) and then test each value in the dataset to see if it's bigger than the fifth largest number. Here's what you do:

1. **Build a chart feeder that consists of formulas that link back to your raw data.**

   The feeder should have two columns: one to hold data that isn't in the top five, and one to hold data that is in the top five. (See Figure 8-22.)

2. **In the first row of the chart feeder, enter the formulas shown in Figure 8-22.**

   The formula for the first column (F4) checks to see if the value in cell C4 is less than the number returned by the LARGE formula (the fifth largest value). If it is, the value in Cell C4 is returned. Otherwise, NA is used. The formula for the second column works in the same way except the IF statement is reversed: If the value in cell C4 is less than the number returned by the LARGE formula, NA is used; otherwise the value is returned.

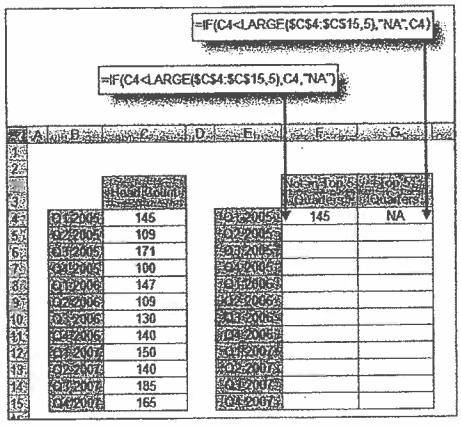


Figure 8-22: Build a new chart feeder that consists of formulas that plots values into one of two columns.

3. **Copy the formulas down to fill the table.**

4. **Use the chart feeder table to plot the data into a stacked column chart.**

   You immediately see a chart that displays two data series: one for data points not in the top five, and one for data points in the top five. (See Figure 8-23.)

5. **Right-click the top five data series and choose Add Data Label.**

   Notice in Figure 8-23 that the chart shows some rogue zeros. You can fix the chart so that the zeros don't display by performing the next few steps.

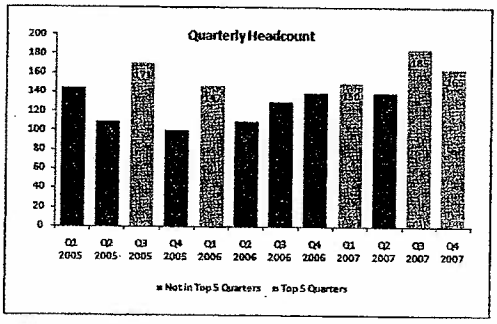


Figure 8-23: After adding data labels to the top five data series and doing a bit of formatting, your chart should look similar to the one shown here.

6. **Right-click any of the data labels for the top five series and choose Format Data Labels.**
7. **In the Format Data Labels dialog box, select the Numbers button and select Custom in the Category list.**
8. **Enter `#,##0;;` as the custom number format, as demonstrated in Figure 8-24.**

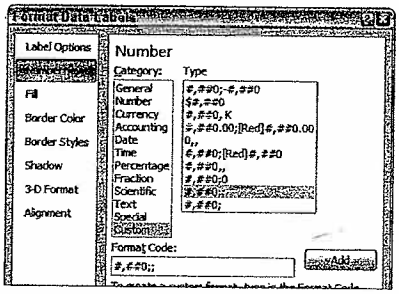


Figure 8-24: Entering `#,##0;;` as the custom format for a data label renders all zeros in that data series hidden.

9. **Click the Add button and then click Close.**

When you go back to your chart, you see that the rogue zeros are now hidden and your chart is ready for colors, labels, and other formatting you want to apply.

You can apply the same technique to highlight the bottom five values in your data set. The only difference is that instead of using the LARGE function, you

use the SMALL function. Whereas the LARGE function returns the largest *n*th value from a range, the SMALL function returns the smallest *n*th value.

Figure 8-25 illustrates the formulas you'd use to apply the same technique outlined here for the bottom five values.

The formula for the first column (F4) checks to see if the value in cell C4 is greater than the number returned by the SMALL formula (the fifth smallest value). If it is, the value in Cell C4 is returned. Otherwise, NA is used. The formula for the second column works in the same way except the IF statement is reversed: If the value in cell C4 is greater than the number returned by the SMALL formula, NA is used; otherwise the value is returned.

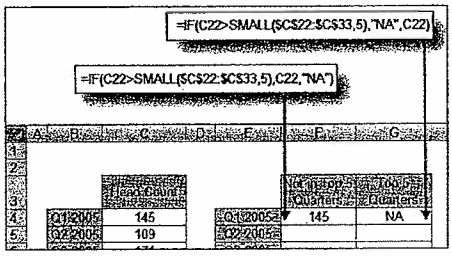


Figure 8-25: Use the SMALL function to highlight the bottom values in a chart.

Chapter 9

Components That Display Performance against a Target

In This Chapter

- Using variance displays
- Using progress bars
- Creating bullet graphs
- Showing performance against a range

Hopefully, this is an easy one to grasp. Someone sets a target, and someone else tries to reach that target. The target could be anything from a certain amount of revenue to a number of boxes shipped or to phone calls made. The business world is full of targets and goals. Your job is to find effective ways to represent performance against those targets.

What do I mean by "performance against a target"? Imagine your goal is to break the land speed record, which is currently 763 miles per hour. That makes your target 764 miles per hour, which will break the record. After you jump into your car and go as fast as you can, you will have a final speed of some number. That number is your performance against the target.

In this chapter, I explore some new and interesting ways to create components that show performance against a target.

Showing Performance with Variances

The standard way of displaying performance against a target is to plot the target and then plot the performance. This is usually done with a line chart or a combination chart, such as the one shown in Figure 9-1.

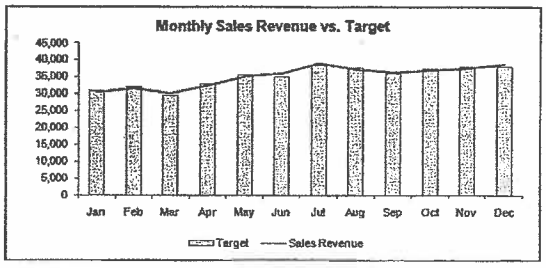


Figure 9-1: A typical chart showing performance against a target.

Although this chart allows you to visually pick the points where performance exceeded or fell below targets, it gives you a rather one-dimensional view and provides minimal information. Even if this chart offered labels that showed the actual percent of revenue versus target, you'd still get only a mildly informative view.

I've always thought that a more impactful and informative way of displaying performance against a goal is to plot the variances between the target and the performance. Figure 9-2 shows the same performance data you see in Figure 9-1, but includes the variances (sales revenue minus target). This way, you not only see where performance exceeded or fell below targets, but you get an extra layer of information showing the dollar impact of each rise and fall.

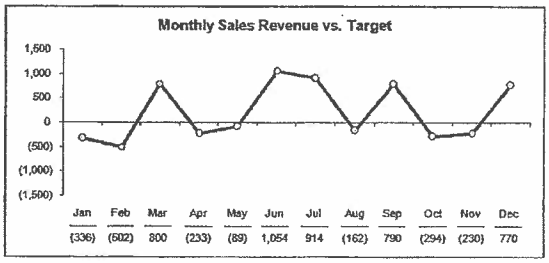


Figure 9-2: Consider using variances to plot performance versus target.

Showing Performance against Organizational Trends

The target you use to measure performance doesn't necessarily have to be one that is specifically set by management or organizational policy. In fact, some of the things you measure may never have a target or goal set for them. In situations where you don't have a target to measure against, it's often helpful to measure performance against some organizational statistic.

For example, the component in Figure 9-3 measures the sales performance for each division against the median sales for all the divisions. You can see that divisions 1, 3, and 6 fall well below the median for the group.

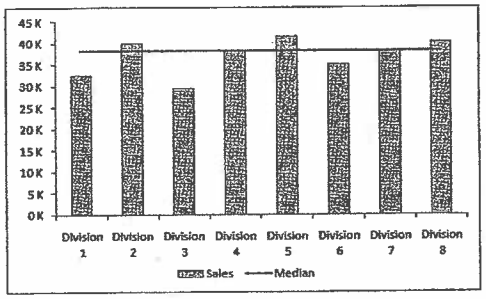


Figure 9-3: Measuring data when there's no target for a measure.

Here's how you'd create a median line similar to the one you see in Figure 9-3:

1. **Start a new column next to your data and enter a simple `MEDIAN` formula, as shown in Figure 9-4.**

   Note that this formula can be any mathematical or statistical operation that works with the data you are representing. Just ensure that the values returned are the same for the entire column. This gives you a straight line.

2. **Copy the formula down to fill the table.**

   Again, all the numbers in the newly-created column should be the same.

3. **Plot the table into a column chart.**

4. **Right-click the Median data series and choose Change Chart Type.**

5. **Change the chart type to a line chart.**

	A	B	C
1		Sales	Median
2	Division 1	32,526	=MEDIAN($B$2:$B$9)
3	Division 2	39,939	
4	Division 3	29,542	
5	Division 4	38,312	
6	Division 5	41,595	
7	Division 6	35,089	
8	Division 7	38,270	
9	Division 8	40,022	

Figure 9-4: Start a new column and enter a formula.

Using Thermometer-Style Charts to Display Performance

A *thermometer-style chart* offers a unique way to view performance against a goal. As the name implies, the data points shown in this type of chart resemble a thermometer. Each performance value and its corresponding target are stacked on top of one another, giving an appearance similar to that of mercury rising in a thermometer. In Figure 9-5, you see an example of a thermometer-style chart.

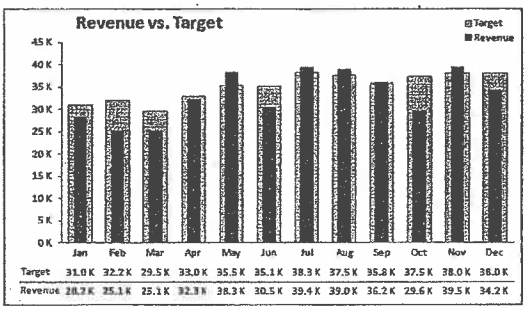


Figure 9-5: Thermometer-style charts offer a unique way to show performance against a goal.

To create this type of chart, follow these steps:

1. **Starting with a table that contains revenue and target data, plot the data into a new column chart.**
2. **Right-click the Revenue data series and choose Format Data Series.**

   The Format Data Series dialog box appears.
3. **In the dialog box, select the Series Options button and click Secondary Axis.**
4. **Go back to your chart and delete the new axis that was added; it's the vertical axis to the right of the chart.**
5. **Right-click the Target series and choose Format Data Series.**

   The Format Data Series dialog box appears again.
6. **In the dialog box, select the Series Options button and adjust the Gap Width property so that the Target series is slightly wider than the Revenue series — between 45% and 55% is typically fine.**

An Introduction to the Bullet Graph

A *bullet graph* is a type of column/bar graph developed by visualization expert Stephen Few to serve as a replacement for dashboard gauges and meters. He developed bullet graphs to allow for the clear display of multiple layers of information without occupying a lot of space on a dashboard. A bullet graph, as illustrated in Figure 9-6, contains a single performance measure (such as YTD [year-to-date] revenue), compares that measure to a target, and displays it in the context of qualitative ranges, such as `Poor`, `Fair`, `Good`, and `Very Good`.

Figure 9-7 breaks down the three main parts of a bullet graph. The *performance bar* represents the performance measure. The *target marker* represents the comparative measure. And the *background fills* represent the qualitative range.

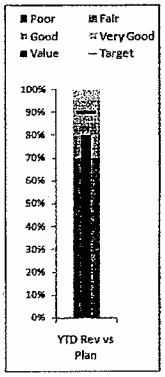


Figure 9-6: Bullet graphs allow you to display multiple perspectives in an incredibly compact space.

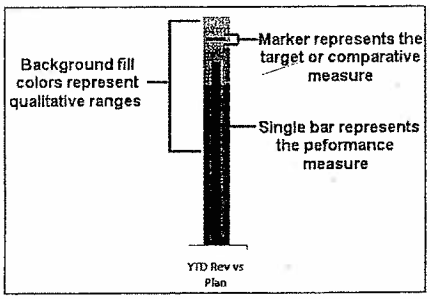


Figure 9-7: The parts of a bullet graph.

Creating your first bullet graph

Creating a bullet graph in Excel isn't necessarily difficult, but it can be a bit tricky. Don't let "tricky" scare you, though. Follow these steps to create your first bullet graph:

1. **Start with a data table that gives you all the data points you need to create the three main parts of the bullet graph.**

   Figure 9-8 illustrates what that data table looks like. The first four values in the data set (`Poor`, `Fair`, `Good`, and `Very Good`) make up the qualitative range. You don't have to have four values — you can have as many or as few as you need. In this scenario, I want my qualitative range to span from 0 to 100%. Therefore, the percentages (75%, 15%, 10%, and 5%) must add up to 100%. Again, this can be adjusted to suit your needs.

   The fifth value in Figure 9-8 (`Value`) creates the performance bar. The sixth value (`Target`) makes the target marker.

2. **Highlight the entire table and plot the data on a stacked column chart.**

   The chart that's created is initially plotted in the wrong direction.

3. **To fix this, click the chart and select the Switch Row/Column button, as shown in Figure 9-9.**

4. **Right-click the Target series and choose Change Chart Type. Change the chart type to a line chart (with markers).**

5. **Right-click the Target series again and choose Format Data Series.**

   The Format Data Series dialog box appears.

6. **In the dialog box, click the Series Options button and click Secondary Axis.**

7. **Still in the Format Data Series dialog box, click the Marker Options button and adjust the marker to look like a dash, as demonstrated in Figure 9-10.**

8. **Still in the Format Data Series dialog box, click the Marker Fill button and select the Solid Fill property to set the color of the marker to black.**

9. **Still in the Format Data Series dialog box, click the Line Color button and select the No Line option.**

	A	B
1		YTD Rev vs Plan
2	Poor	70%
3	Fair	15%
4	Good	10%
5	Very Good	5%
6	Value	80%
7	Target	90%

Figure 9-8: Start with a dataset that contains the data points for the main parts of the bullet graph.

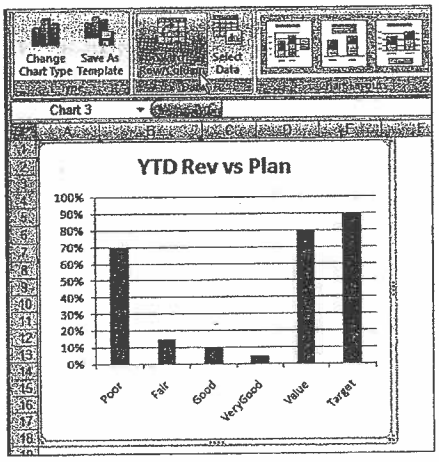


Figure 9-9: Switch the orientation of the chart to read from columns.

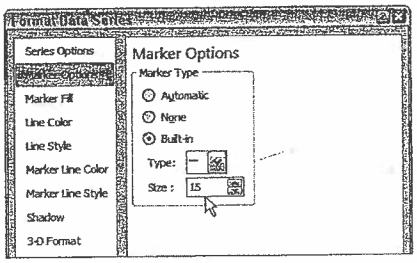


Figure 9-10: Adjust the marker to a dash.

10. **Go back to your chart and delete the new secondary axis that was added to the right of your chart. (See Figure 9-11.)**

    This is an important step to ensure that the scale of the chart is correct for all data points.

11. **Right-click the Value series and choose Format Data Series.**

    The Format Data Series dialog box appears again.

12. **In the Format Data Series dialog box, click the Series Options button and click Secondary Axis.**

13. **Still in the Format Data Series dialog box under Series Options, adjust the Gap Width property so that the Value series is slightly narrower than the other columns in the chart — between 205% and 225% is typically okay.**

14. **Still in the Format Data Series dialog box, click the Fill button and select the Solid Fill property to set the color of the Value series to black.**

15. **You're almost done! All that's left to do is change the color for each qualitative range to incrementally lighter hues.**

At this point, your bullet graph is essentially done! You can apply whatever minor formatting adjustments to size and shape of the chart to make it look the way you want.

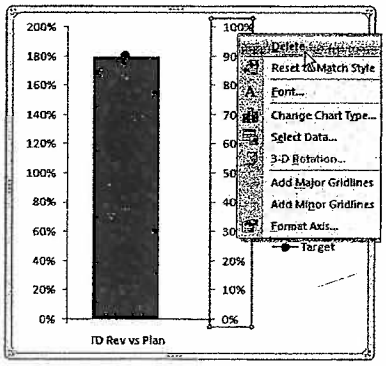


Figure 9-11: Be sure to delete the newly-created secondary vertical axis.

Adding data to your bullet graph

Now, here's the cool part. After you've built your chart for the first performance measure, you can simply use the same chart for any additional measures. Take a look at Figure 9-12 to see what I mean.

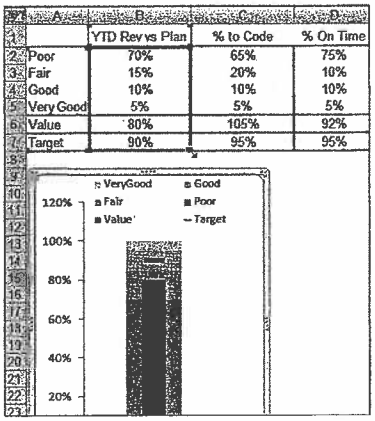


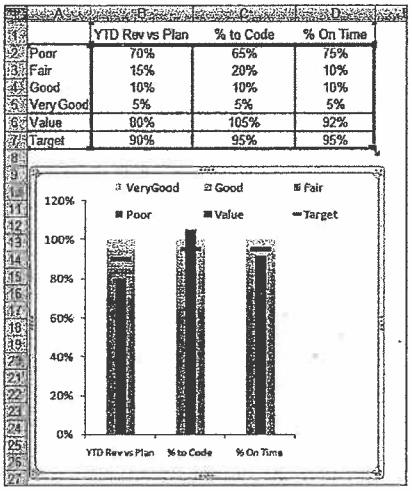
Figure 9-12: You can easily add more data to your chart by manually expanding the chart's data source range.

As you can see in Figure 9-12, you've already created this bullet graph with the first performance measure. Imagine you add two more measures and you want to graph those. Here's the easy way to do it:

1. **Click the chart so that the blue outline appears around the original data set.**
2. **Hover your mouse over the blue dot in the lower-right corner of the blue box.**

   Your cursor turns into a diagonal double arrow, as demonstrated in Figure 9-12.
3. **Click and drag the blue dot to the last column in your expanded data set.**

Figure 9-13 illustrates how the new data points are added without one ounce of extra work!



	YTD Rev vs Plan	% to Code	% On Time
Poor	70%	65%	75%
Fair	15%	20%	10%
Good	10%	10%	10%
VeryGood	5%	5%	5%
Value	80%	105%	92%
Target	90%	95%	95%

Figure 9-13: Expanding the data source automatically creates new bullet graphs.

Final thoughts on formatting bullet graphs

Before wrapping up this introduction to bullet graphs, I want to cover two final thoughts I have on formatting:

- **Creating qualitative bands**
- **Creating horizontal bullet graphs**

These are discussed in the next two sections.

Creating qualitative bands

First, if the qualitative ranges are the same for all the performance measures in your bullet graphs, you can format the qualitative range series to have no gaps between them. For instance, Figure 9-14 shows a set of bullet graphs where the qualitative ranges have been set to 0 Gap Width. This creates the clever effect of qualitative bands.

1. **Right-click any one of the qualitative series and choose Format Data Series.**

   The Format Data Series dialog box appears.

2. **In the dialog box, select Series Options and adjust the Gap Width property to 0%.**

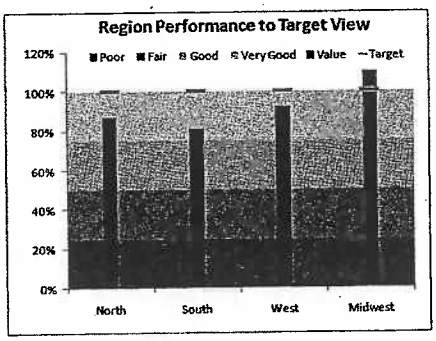


Figure 9-14: Try setting gap widths to zero to create clean-looking qualitative bands.

Creating horizontal bullet graphs

For those of you who are waiting on the section about horizontal bullet graphs, I have good and bad news. The bad news is that creating a horizontal bullet graph from scratch in Excel is a much more complex endeavor than creating a vertical bullet graph — one that doesn't warrant the time and effort it takes to create them.

The good news is that your clever author has come up with a way get a horizontal bullet graph from a vertical one — and in three steps, no less. Here's how you do it:

1. **Create a vertical bullet graph.**

   See the section, "An Introduction to the Bullet Graph," earlier in this chapter, for more on creating bullet graphs.

2. **Change the alignment for the axis and other labels on the bullet graph so that they're rotated 270 degrees. (See Figure 9-15.)**

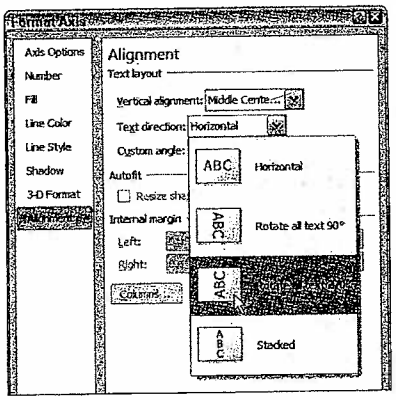


Figure 9-15: Rotate all labels so that they're on their sides.

3. **Use Excel's Camera tool to take a picture of the bullet graph.**

   When you have a picture, you can rotate it to be horizontal! Figure 9-16 illustrates a horizontal bullet graph.

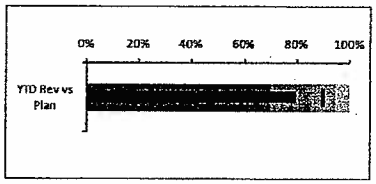


Figure 9-16: A horizontal bullet graph.

The nifty thing about this trick is that because the picture is taken with the Camera tool, the picture automatically updates when the source table changes.

Never heard of the Camera tool? Check out Chapter 6 for a detailed look at Camera tool.

Showing Performance against a Target Range

In some businesses, a target isn't one value — it's a range of values. That is to say, the goal is to stay within a defined target range. Imagine you manage a small business selling boxes of meat. Part of your job is to keep your inventory stocked between 25 and 35 boxes in a month. If you have too many boxes of meat, the meat will go bad. If you have too few boxes, you'll lose money.

To track how well you do at keeping your inventory of meat between 25 and 35 boxes, you need a performance component that displays on-hand boxes against a target range.

Figure 9-17 illustrates a component you can build to track performance against a target range. The gray band represents the target range you must stay within each month. The line represents the trend of on-hand meat.

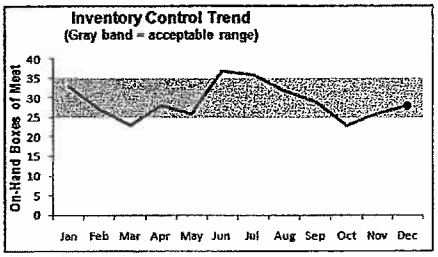


Figure 9-17: You can create a component that plots performance against a target range.

Obviously, the trick to this type of component is to set up the band that represents the target range. Here's how you do it:

1. **First, set up a *limit table* where you can define and adjust the upper and lower limits of your target range.**

   Cells B2 and B3 in Figure 9-18 serve as the place to define the limits for the range.

2. **Build a chart feeder that's used to plot the data points for the target range.**

   This feeder consists of the formulas revealed in cells B8 and B9 in Figure 9-18.

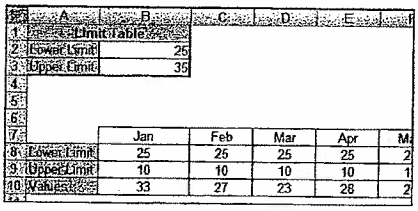
   The idea is to copy these formulas across the entire dataset. The values you see for Feb, Mar, and Apr are the results of these formulas.

Figure 9-18: Create a chart feeder that contains formulas that define the data points for the target range.

	A	B	C	D	E
1					
2		Limit table			
3		Lower Limit	25		
4		Upper Limit	35		
5					
6					
7					
8		Jan	Feb	Mar	Apr
9	Lower Limit	=$B$2	25	25	25
10	Upper Limit	=$B$3-$B$2	10	10	10

3. **Add a row for the actual performance values. (See Figure 9-19.)**

   These data points create the performance trend line.



	A	B	C	D	E
1	Limit Table				
2	Lower Limit	25			
3	Upper Limit	35			
4					
5					
6					
7		Jan	Feb	Mar	Apr
8	Lower Limit	25	25	25	25
9	Upper Limit	10	10	10	10
10	Values	33	27	23	28

Figure 9-19: Add a row for the performance values.

4. **Highlight the entire chart feeder table and plot the data on a stacked area chart.**
5. **Right-click the Values series and choose Change Chart Type. Change the chart type to a line chart (no markers).**
6. **Right-click the Values data series again and choose Format Data Series.**

   The Format Data Series dialog box appears.

7. **In the dialog box, click the Series Options button and click Secondary Axis.**
8. **Go back to your chart and delete the new axis that was added; it's the vertical axis to the right of the chart.**
9. **Right-click the Lower Limit data series and choose Format Data Series.**

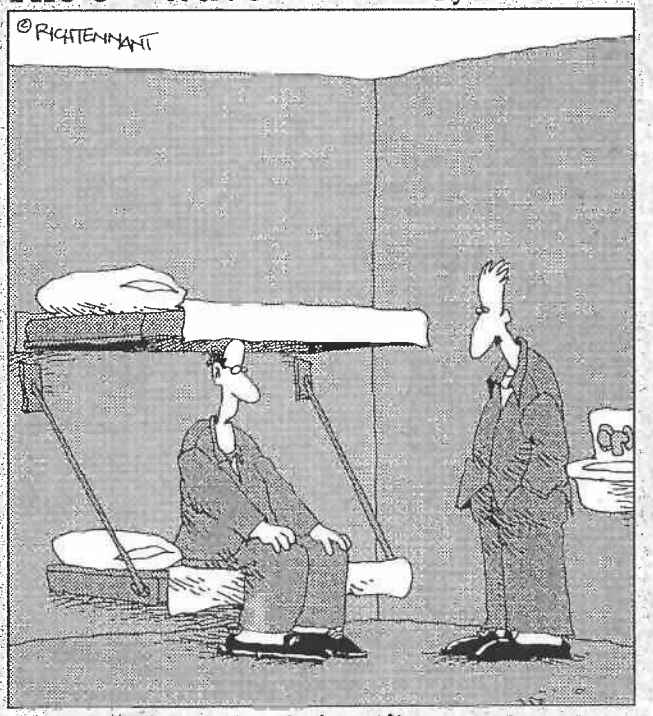
   The Format Data Series dialog box appears again.

10. **In the dialog box, click the Fill button and select the No Fill option.**

That's it. All that's left to do is apply the minor formatting adjusts to colors, labels, and other formatting.

Part IV
Advanced Reporting Techniques

The 5th Wave By Rich Tennant



"I started running 'what if' scenarios on my spreadsheet, like, 'What if I were sick of this dirtwad job and funneled some of the company's money into an off-shore account?'"

In this part . . .

This section focuses on techniques that help you automate your reporting processes and gives your users an interactive user interface. Chapter 10 provides a clear understanding of how macros can be leveraged to supercharge and automate your reporting systems. Chapter 11 illustrates how you can provide your clients with a simple interface, allowing them to easily navigate through and interact with their reporting systems.

Chapter 10

Macro-Charged Reporting

In This Chapter

- Introducing macros
- Discovering two methods of recording a macro
- Dealing with Excel security
- Understanding some macro examples

A *macro* is essentially a set of instructions or code that you create to tell Excel to execute any number of actions. In Excel, macros can be written or recorded. The key word here is *recorded.*

The analogy I often use is that recording a macro is like programming a phone number into your cell phone. You first manually dial and save a number. Then when you want, you can redial those numbers with the touch of a button. Just as on a cell phone, you can record your actions in Excel while you perform them. While you record, Excel gets busy in the background, translating your keystrokes and mouse clicks to written code (also known as *VBA; Visual Basic for Applications*). After a macro is recorded, you can play back those actions anytime you wish.

In this chapter, I explore macros and reveal how you can use macros to automate your recurring processes to simplify your life.

Why Use a Macro?

The first step in using macros is admitting you have a problem. Actually, you have several problems:

- **Problem 1: You're making donuts:** You do the same tasks over and over again. As each new month rolls around, you have to *make the donuts* (that is, crank out those reports). You have to import that data. You have to refresh those pivot tables. You have to delete those columns, jump up, turn around, and do the hokey pokey. Who needs it? Wouldn't it be nice if you could fire up a macro and have those more redundant parts of your reporting processes done automatically?

- **Problem 2: You're making mistakes:** Admit it, your hand-to-hand combat style of using Excel leaves room for mistakes. When you're repeatedly applying formulas, sorting, and moving things around manually, there's always that risk of catastrophe. Add to that the looming deadlines and constant change requests, and your error rate goes up.

  Why not calmly record a macro, ensure that everything is running correctly, and then forget it? The macro is sure to perform every action the same way every time you run it; reducing the chance of errors.

- **Problem 3: You're making people mad:** Remember that you're creating these dashboards and reports for an audience that probably has a limited knowledge of Excel. If your reports are a bit too difficult to use and navigate, you'll find that you'll slowly lose support for your cause.

It's always helpful to make your reports a bit more user-friendly. Here are some ideas for macros that make things easier for everyone:

- A macro to format and print a worksheet or range of worksheets at the touch of a button
- Macros that navigate a multi-sheet worksheet with a navigation page or with a *go to* button for each sheet in your workbook
- A macro that saves the open document in a specified location and then closes the application at the touch of a button

Obviously, each of the preceding examples can be performed in Excel without the aid of a macro. However, your audience will appreciate these little touches that help make perusal of your report a bit more pleasant.

Introducing the Macro Recorder

If you tried to skip ahead and create your own macro before reading this chapter, you may have found it difficult to pinpoint the *Macro Recorder* (the mechanism that lets you record macros). This is because the macro functionality is on the Developer tab, which is initially hidden in Excel 2007. By hidden, I mean you don't see a tab called Developer when you first open Excel 2007. You have to explicitly tell Excel to make it visible.

To enable the Developer tab, follow these steps:

1. **Select the Office icon (in the upper-left corner of Excel).**
2. **Click the Excel Options button.**

   The Excel Options dialog box appears.

3. **Make sure the Popular options are showing and ensure that the Show Developer Tab in the Ribbon option has a check beside it. (See Figure 10-1.)**

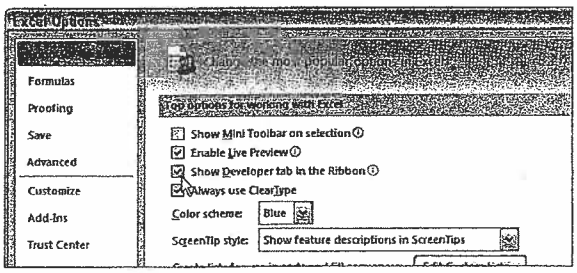


Figure 10-1: Enabling the Developer tab.

The Macro Recorder user interface

Now that you have the Developer tab showing in the Excel Ribbon, you can fire up the Macro Recorder and examine other critical macro options. Start up the Macro Recorder by selecting Record Macro from the Developer tab. This activates the Record Macro dialog box, as shown in Figure 10-2.

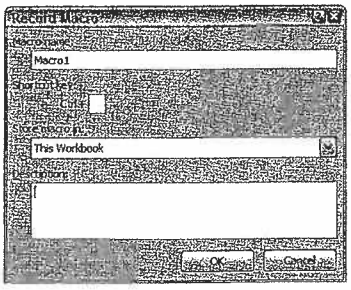


Figure 10-2: The Record Macro dialog box.

Here are the four parts of the Record Macro dialog box:

- **At the top is a space for your macro name.** This should be self-explanatory. Excel gives a default name to your macro, such as Macro1, but I find it's best practice to give your macro a name more descriptive of what it actually does. For example, you might name a macro that formats a generic table as FormatTable.
- **Below the macro name field is the Shortcut Key field.** Every macro or piece of code needs an *event,* or something to happen, for it to run. This event can be a button press, a workbook opening, or in this case, a keystroke combination. When you assign a shortcut key to your macro, entering that combination of keys triggers your macro to run. This is an optional field. You need not enter a shortcut key to run your macro.

- **Next, you find the Store Macro In field.** This Workbook is the default option. Storing your macro in This Workbook simply means that the macro is stored along with the active Excel file. The next time you open that particular workbook, the macro will be available to run. Similarly, if you send the workbook to another user, that user can run the macro as well (provided the macro security is properly set by your user — but more on that later).
- **Last, you see an option to enter a description for your macro.** This is an optional field, but it can come in handy if you have numerous macros in a spreadsheet or if you need to give a user a more detailed description about what the macro does.

Recording macros with absolute references

Now that you've read about the basics of the Macro Recorder interface, it's time to go deeper and begin recording macros. The first thing you need to understand before you begin is that Excel has two modes for recording — absolute reference and relative reference.

Excel's default recording mode is in absolute reference. As you may know, the term *absolute reference* is often used in the context of cell references found in formulas. When a cell reference in a formula is an absolute reference, it does not automatically adjust when the formula is pasted to a new location.

The best way to understand how this concept applies to macros is to try it out. Open the Chapter 10 SampleFile.xlsx file and record a macro that counts the rows in the Branchlist worksheet. (See Figure 10-3.)

	B	C	D	G	H	I
1	Region	Market	Branch	Region	Market	Branch
2	NORTH	BUFFALO	601419	SOUTH	CHARLOTTE	173901
3	NORTH	BUFFALO	701407	SOUTH	CHARLOTTE	301301
4	NORTH	BUFFALO	802202	SOUTH	CHARLOTTE	302301
5	NORTH	CANADA	910181	SOUTH	CHARLOTTE	601306
6	NORTH	CANADA	920681	SOUTH	DALLAS	202600
7	NORTH	MICHIGAN	101419	SOUTH	DALLAS	490260
8	NORTH	MICHIGAN	501405	SOUTH	DALLAS	490360
9	NORTH	MICHIGAN	503405	SOUTH	DALLAS	490460
10	NORTH	MICHIGAN	590140	SOUTH	FLORIDA	301316
11	NORTH	NEWYORK	801211	SOUTH	FLORIDA	701309
12	NORTH	NEWYORK	802211	SOUTH	FLORIDA	702309
13	NORTH	NEWYORK	804211	SOUTH	NEWORLEANS	601310
14	NORTH	NEWYORK	805211	SOUTH	NEWORLEANS	602310
15	NORTH	NEWYORK	806211	SOUTH	NEWORLEANS	801607

Figure 10-3: Your pre-totaled worksheet containing two tables.

The sample dataset used in this chapter can be found on this book's companion Web site.

Follow these steps to record the macro:

1. **Before recording, make sure cell A1 is selected.**
2. **Select Record Macro from the Developer tab.**
3. **Name the macro AddTotal.**
4. **Choose This Workbook for the save location.**
5. **Click OK to start recording.**

   At this point, Excel is recording your actions. While Excel is recording, perform the following steps:

6. **Select cell A16 and type** Total **in the cell.**
7. **Select the first empty cell in Column D (D16) and type** =COUNTA(D2:D15).

   This gives a count of branch numbers at the bottom of column D. You need to use the COUNTA function because the branch numbers are stored as text.

8. **Press Stop Recording from the Developer tab to end recording the macro.**

The formatted worksheet should look like something like the one in Figure 10-4.

	Region	Market	Branch			Region	Market	Branch
2	NORTH	BUFFALO	601419			SOUTH	CHARLOTTE	173901
3	NORTH	BUFFALO	701407			SOUTH	CHARLOTTE	301301
4	NORTH	BUFFALO	802202			SOUTH	CHARLOTTE	302301
5	NORTH	CANADA	910181			SOUTH	CHARLOTTE	601306
6	NORTH	CANADA	920681			SOUTH	DALLAS	202600
7	NORTH	MICHIGAN	101419			SOUTH	DALLAS	490260
8	NORTH	MICHIGAN	501405			SOUTH	DALLAS	490360
9	NORTH	MICHIGAN	503405			SOUTH	DALLAS	490460
10	NORTH	MICHIGAN	590140			SOUTH	FLORIDA	301316
11	NORTH	NEWYORK	801211			SOUTH	FLORIDA	701309
12	NORTH	NEWYORK	802211			SOUTH	FLORIDA	702309
13	NORTH	NEWYORK	804211			SOUTH	NEWORLEANS	601310
14	NORTH	NEWYORK	805211			SOUTH	NEWORLEANS	602310
15	NORTH	NEWYORK	806211			SOUTH	NEWORLEANS	801607
16	Total		14					
17								

Figure 10-4: Your post-totaled worksheet.

There you have it; you've recorded your first macro!

To see your macro in action, delete the total row you just added and play back your macro by following these steps:

1. **Select Macros from the Developer tab.**
2. **Find and select the AddTotal macro you just recorded.**
3. **Click the Run button.**

Pretty cool huh? The macro played back your actions to a T and gave your table a total.

Now here's the thing. No matter how hard you try, you can't make the AddTotal macro work on the second table. Why? Because you recorded it as an absolute macro.

To understand what this means, examine the underlying code. Don't run for the hills just yet; it's not as scary as it seems.

To examine the code, select Macros from the Developer tab to get the Macro dialog box you see in Figure 10-5.

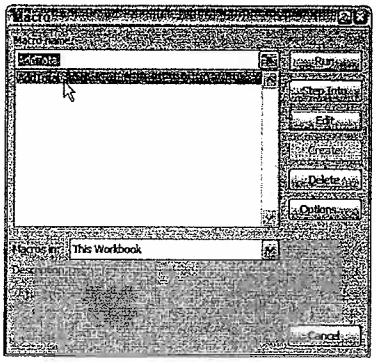


Figure 10-5: The Excel Macro dialog box.

Select the AddTotal macro and click the Edit button. This opens the Visual Basic Editor to show you the code that was written when you recorded your macro:

```
Sub AddTotal()

 Range("A16").Select

 ActiveCell.FormulaR1C1 = "Total"

 Range("D16").Select

 ActiveCell.FormulaR1C1 = "=COUNTA(R[-14]C:R[-1]C)"

End Sub
```

Pay particular attention to lines two and four of the macro. When you asked Excel to select cell range A16 and then D16, those cells are exactly what it selected. Because the macro was recorded in absolute reference mode, Excel

interpreted your range selection as absolute. In other words, if you select cell A16, that cell is what Excel gives you. In the next section, you take a look at what the same macro looks like when recorded in relative reference mode.

Recording macros with relative references

In the context of Excel macros, *relative* means relative to the currently active cell. So you should use caution with your active cell choice — both when you record the relative reference macro and when you run it.

First, make sure the Chapter 10 SampleFile.xlsx file is open. (This file is available on this book's companion Web site.) Then, use the following steps to record a relative-reference macro:

1. **Select the Use Relative References option from the Developer tab, as demonstrated in Figure 10-6.**

Figure 10-6: Select relative reference macro recording.

2. **Before recording, make sure cell A1 is selected.**
3. **Select Record Macro from the Developer tab.**
4. **Name the macro AddTotalRelative.**
5. **Choose This Workbook for the save location.**
6. **Click OK to start recording.**
7. **Select cell A16 and type** Total **in the cell.**
8. **Select the first empty cell in Column D (D16) and type** =COUNTA(D2:D15).
9. **Press Stop Recording from the Developer tab to end recording the macro.**

At this point, you have two macros recorded. Take a moment to examine the code for your newly-created macro.

Select Macros from the Developer tab to get the Macro dialog box. Here, choose the AddTotalRelative macro and click Edit.

Again, this opens the Visual Basic Editor to show you the code that was written when you recorded your macro. This time, your code looks something like the following:

```
Sub AddTotalRelative()

  ActiveCell.Offset(15, 0).Range("A1").Select

  ActiveCell.FormulaR1C1 = "Total"

  ActiveCell.Offset(0, 3).Range("A1").Select

  ActiveCell.FormulaR1C1 = "=COUNTA(R[-14]C:R[-1]C)"

End Sub
```

Do you notice anything different about code lines two and four? There are no references to any specific cell ranges at all! Of course you see `"A1"`, but that's just the starting point. How does this code define where to *make* the changes? Well, without getting too technical, let's take a quick look at what the relevant parts of this VBA code really mean.

Notice that in line 2, Excel uses the `Offset` property of the active cell. This property tells the cursor to move a certain number of cells up or down and a certain number of cells left or right.

The `Offset` property code tells Excel to move 15 rows down and 0 columns across from the active cell (in this case, A1). So there's no need for Excel to explicitly select a cell as it did when recording an absolute reference macro.

To see this macro in action, delete the total row for both tables and do the following.

1. **Select cell A1.**
2. **Select Macros from the Developer tab.**
3. **Find and select the AddTotalRelative macro.**
4. **Click the Run button.**
5. **Select cell F1.**
6. **Select Macros from the Developer tab.**
7. **Find and select the AddTotalRelative macro.**
8. **Click the Run button.**

Notice that this macro, unlike your previous macro, works on both sets of data! Because the macro applies the totals *relative* to the currently active cell, the totals are applied correctly.

For this macro to work, you simply need to ensure that

- You've selected the correct starting cell before running the macro.
- The block of data has the same number of rows and columns as the data on which you recorded the macro.

Hopefully this simple example has given you a firm grasp of macro recording with both absolute and relative references.

Assigning a macro to a button

When you create macros, you want to give your audience a clear and easy way to run each macro. A basic button, used directly in the dashboard or report, can provide a simple but effective user interface.

As luck would have it, Excel offers a set of controls — *Form controls* — designed specifically for creating user interfaces directly on spreadsheets. There are several different types of Form controls, from buttons (the most-commonly-used control) to scrollbars.

The idea behind using a Form control is simple. You place a Form control on a spreadsheet and then assign a macro to it — that is, a macro you've already recorded. When a macro is assigned to the control, that macro is executed, or *played,* when the control is clicked.

Take a moment to create a button for the AddTotalRelative macro you created earlier. Here's how:

1. **Click the Insert drop-down list under the Developer tab. (See Figure 10-7.)**
2. **Select the Button Form Control.**

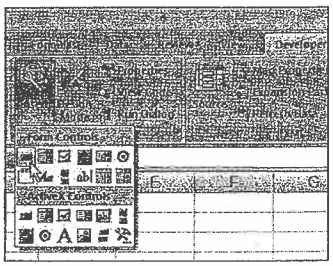


Figure 10-7: You can find the Form controls in the Developer tab.

Form controls versus ActiveX controls

Notice the Form controls and ActiveX controls in Figure 10-7. Although they look similar, they're quite different. Form controls are designed specifically for use on a spreadsheet, and ActiveX controls are typically used on Excel Userforms. As a general rule, you always want to use Form controls when working on a spreadsheet. Why? Form controls need less overhead, so they perform better, and configuring Form controls is far easier than configuring their ActiveX counterparts.

3. **Click the location you want to place your button.**

   When you drop the button control onto your spreadsheet, the Assign Macro dialog box, as shown in Figure 10-8, activates and asks you to assign a macro to this button.

4. **Select the macro you want to assign to the button and then click OK.**

At this point, you have a button that runs your macro when you click it! Keep in mind that all the controls in the Forms toolbar work in the same way as the command button, in that you assign a macro to run when the control is selected.

The buttons you create come with a default name, such as Button3. To rename your button, right-click the button and then click the existing name. Then you can delete the existing name and replace it with a name of your choosing.

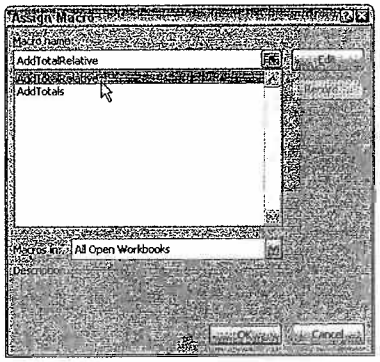


Figure 10-8: Assign a macro to the newly-added button.

Macro Security in Excel 2007

For better or worse, Microsoft has introduced some significant security changes for Office 2007. It's important to understand the impact of these changes so that you can help your audience use your macros without crashing and burning.

One of the most significant changes for Excel 2007 is that macros are disabled by default under certain circumstances. For example, if you create the Excel macro file and use it on your computer, your macros work fine. However, when another user tries to use macros in a file you've created, the macros are disabled.

With earlier versions of Excel, you'd often see a pop-up box informing you that the file contains macros. Depending on your Excel security settings, you'd have the option to enable or disable macros in the file. This is no longer the case for 2007.

If users open one of your Excel 2007 file, they get a small message under the Ribbon stating that Macros Have Been Disabled. The message looks like Figure 10-9.

As noble as the aim of these security features are, I have to admit it's a little annoying. There are actually two ways to overcome this security block. That is, there's a short-term solution and a long-term solution. These are discussed in the next two sections.

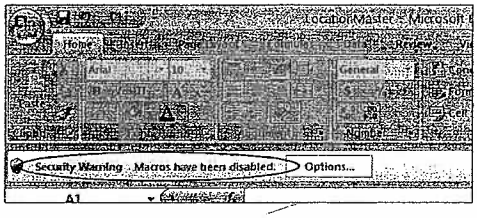


Figure 10-9: Security warning when macros are present.

The short-term solution to disabled macros

The short-term solution is to temporarily enable the macro content in the current workbook. This allows you to use the macros during the current session, but Excel blocks the macros each time the workbook is opened.

To temporarily enable the content, simply click the Options button beside the warning message to activate the Microsoft Office Security Options dialog box, as shown in Figure 10-10.

Here, they can select the Enable This Content option to activate the use of macros for this session.

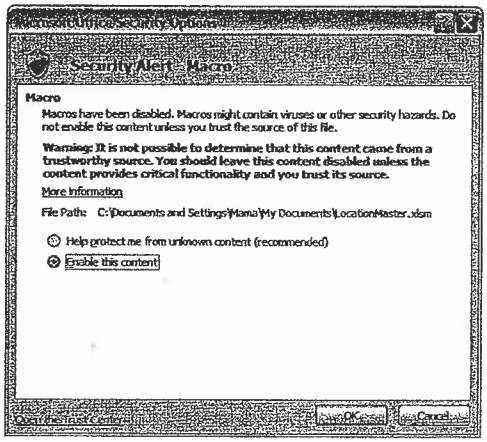


Figure 10-10: Enabling macros option.

The long-term solution to disabled macros

The long-term solution is to set up a trusted location for your files. A *trusted location* is a directory that is deemed a safe zone where only trusted workbooks are placed. A trusted location allows you and your clients to run a macro-enabled workbook with no security restrictions as long as the workbook is in that location.

To set up a trusted location, follow these steps:

1. **Select the Macro Security button on the Developer tab.**

   This activates the Trust Center dialog box.

2. **Select the Trusted Locations button.**

   This opens the Trusted Locations menu (see Figure 10-11), which shows you all the directories that are considered trusted.

3. **Click the Add New Location button.**

4. **Click Browse to find and specify the directory that will be considered a trusted location.**

After you specify a trusted location, any Excel file that's opened from this location will have macros automatically enabled. The idea is to have your clients specify a trusted location and use your Excel files from there.

The new macro-enabled file extensions

As another security feature, Microsoft has created a separate file extension for workbooks that contain macros. By default, Excel 2007 workbooks have the file extension .xlsx. Well, standard Excel 2007 .xlsx files can't contain macros. If you workbook contains macros and you then save the workbook as an .xlsx file, your macros are removed automatically. Of course, Excel warns you that macro content will be disabled when saving a workbook with macros as an .xlsx file.

If you want to retain the macros, you must save your file as an *Excel Macro-Enabled Workbook*. This gives your file an .xlsm extension. The idea is that all workbooks with an .xlsx file extension are automatically known to be safe whereas you can recognize .xlsm files as a potential threat.

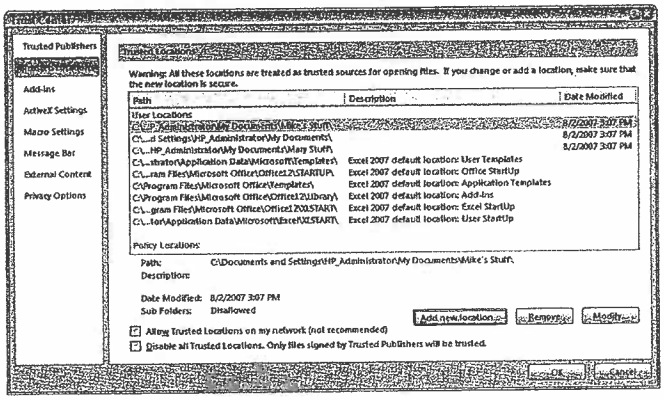


Figure 10-11: The Trusted Locations menu allows you to add directories that are considered trusted.

Excel Macro Examples

Covering the fundamentals of building and using macros is one thing. Coming up with good ways to incorporate them into your reporting processes is another. Take a moment to review a few examples of how you can implement macros in your dashboards and reports. Open the Chapter 10 SampleFile.xlsx file found on this book's companion Web site to follow along in the next section.

Building navigation buttons

The most common use of macros is navigation. Workbooks that have many worksheets or tabs can be frustrating to navigate. To help your audience, you can create some sort of a switchboard, like the one shown in Figure 10-12. When a user clicks the Example 1 button, he's taken to the Example 1 sheet.

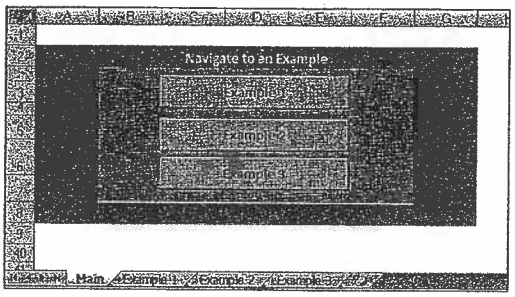


Figure 10-12: Use macros to build buttons that help users navigate your reports.

Creating a macro to navigate to a sheet is quite simple. You start at the sheet that will become your switchboard or starting point and then start recording a macro. While recording, click the destination sheet (the sheet this macro will navigate to). After you click the destination sheet, stop recording the macro. It's as easy as that.

It's useful to know that Excel has a built-in Hyperlink feature, allowing you to convert the contents of a cell into a hyperlink that links to another location. That location can be a separate Excel workbook, a Web site, or even another tab in the current workbook. Although using a hyperlink may be easier than setting up a macro, you can't apply a hyperlink to Form controls (like buttons). Instead of a button, you'd use text to let users know where they'll go when they click the link.

Dynamically rearranging pivot table data

In the example illustrated in Figure 10-13, macros allow a user to change the perspective of the chart simply by selecting any one of the buttons shown.

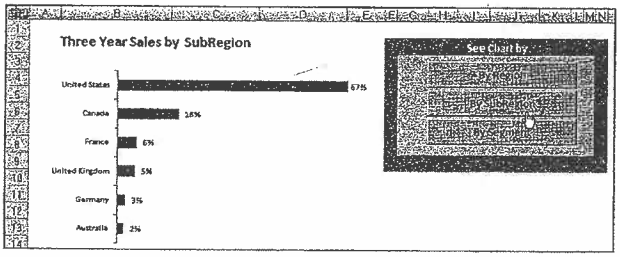


Figure 10-13: This report allows users to choose their perspective.

Figure 10-14 reveals that the chart is actually a pivot chart tied to a pivot table. The recorded macros assigned to each button are doing nothing more than rearranging the pivot table to slice the data using various pivot fields.

To create this type of setup, you first create a pivot table and a pivot chart. Next, start recording a macro. While recording, move a pivot field from one area of the pivot table to the other. When you're done, stop recording the macro. Record another macro to move the data field back to its original position. After both macros are set up, you can fire them in turn to see your pivot field dynamically move back and forth.

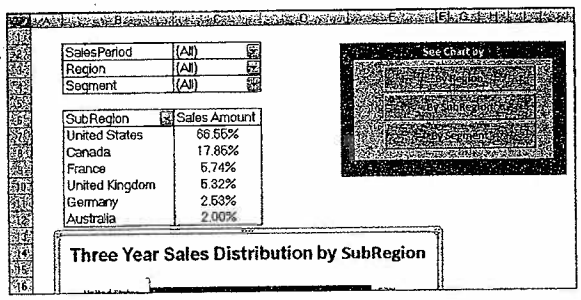


Figure 10-14: The macros behind these buttons rearrange the data fields in a pivot table.

Offering one-touch reporting options

The last two examples demonstrate that you can record any action that you find of value. That is, if you think users would appreciate a certain feature being automated for them, why not record a macro to do so?

In Figure 10-15, notice that you can filter the pivot table for top or bottom 20 customers. Because I pre-recorded the steps to filter a pivot table for the top and bottom 20, my users don't have to. This not only saves them time and effort, but it also allows users that don't know how to take these actions to benefit from them.

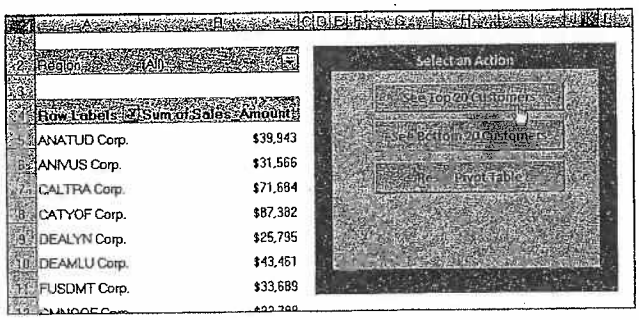


Figure 10-15: Help your audience save time and effort by offering pre-recorded views.

Feel free to visit Chapter 3 for a refresher on how create the top and bottom reports you see in Figure 10-15.

Figure 10-16 demonstrates how you can give your audience a quick and easy way to see the same data on different charts. Don't laugh too quickly at the uselessness of this example. I actually worked for a guy who wanted to see two different charts with the same data. Instead of taking up real estate, I just recorded a macro that changed the Chart Type of his chart. He could switch views to his heart's content.

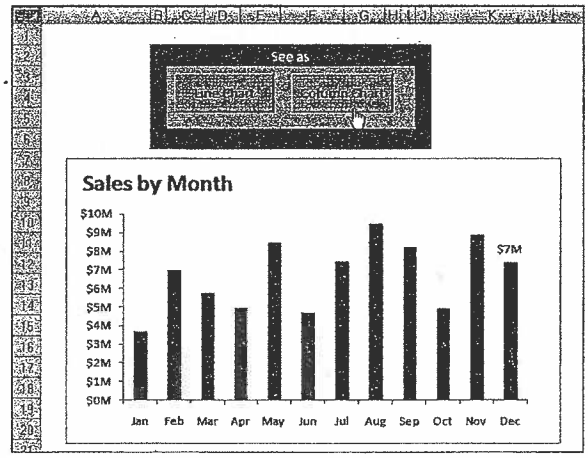


Figure 10-16: You can give your audience a choice in how they see data.

Chapter 11

Giving Users an Interactive Interface

In This Chapter

- Introducing, adding, and configuring Form controls
- Using Check Box controls
- Using Option Buttons
- Offering choices with Combo Boxes and List Boxes

Ah, life was so much simpler in the days of one-view reports and static dashboards. Remember the good old days when a static report was enough to have managers carrying you on their shoulders?

Today, managers increasingly want to be *empowered* to switch from one view of data to another with a simple selection from a menu of choices. For those of us who build dashboards and reports, this *empowerment* comes with migraines and acid reflux. How do you handle a manager that wants to see multiple views for multiple regions or markets?

Fortunately, Excel does offer a handful of tools that enable you to add interactivity into your reports. With these tools and a bit of creative data modeling, you can give your managers the choices they crave with relative ease.

In this chapter, I show you how to incorporate menus, options, and selectors into your reporting mechanisms and offer a few useful examples you can implement into your processes.

Introducing Form Controls

Excel offers a set of controls called *Form controls,* designed specifically for creating user interfaces directly on a spreadsheet. The idea behind using a Form control is simple. You place a Form control on a spreadsheet and then configure it to give it a specific task.

Excel's Form controls can be found on the Developer tab, which is initially hidden in Excel 2007. By hidden, I mean you don't see a tab called Developer when you first open Excel 2007. You have to explicitly tell Excel to make it visible. To enable the Developer tab, follow these steps:

1. **Select the Office icon (in the upper-left corner of Excel).**
2. **Click the Excel Options button.**

   The Excel Options dialog box appears.
3. **Make sure the Popular options are showing and ensure that the Show Developer Tab in the Ribbon option has a check beside it. (See Figure 11-1.)**

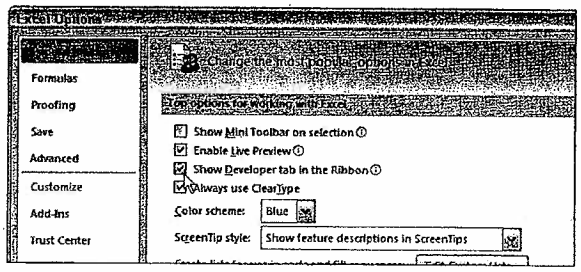


Figure 11-1: Enabling the Developer tab.

When the Developer tab is visible, click it and select the Insert Icon button, as shown in Figure 11-2. Here you find two sets of controls: Form controls and ActiveX controls. Form controls are designed specifically for use on a spreadsheet whereas ActiveX Controls are typically used on Excel Userforms. Because Form controls need less overhead and can be configured far easier than their ActiveX counterparts, you generally want to use Form controls.

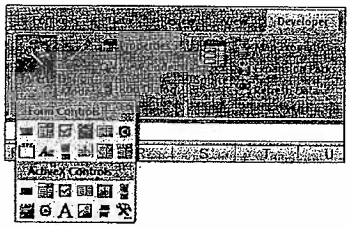


Figure 11-2: Form controls and ActiveX controls

Here are the nine form controls you can use directly on a spreadsheet (see Figure 11-3). They are as follows:

- **Button:** Provides users with a button that, when clicked, executes an assigned macro.
- **Combo Box:** Gives users an expandable list of options from which to choose.
- **Check Box:** Provides a mechanism for a select/unselect scenario. When the Check Box is selected, it returns a value of `True`. When it isn't selected, `False` is returned.
- **Spin Button:** Enables users to easily increment or decrement a value by clicking the arrow buttons provided.
- **List Box:** Gives users a list of options from which to choose.
- **Option Button:** Enables users to toggle through several options one at a time. The idea is to have two or more Option Buttons in a group. Then selecting one Option Button automatically deselects the others.
- **Scroll Bar:** Provides users a mechanism to scroll to a value or position using a sliding scale that can be moved by clicking and dragging the mouse.
- **Label:** True to its name, this control allows you to add text labels to your spreadsheet. You can also assign a macro to the label, effectively using it as a button of sorts.
- **Group Box:** Typically used for cosmetic purposes, this control serves as a container for groups of controls.

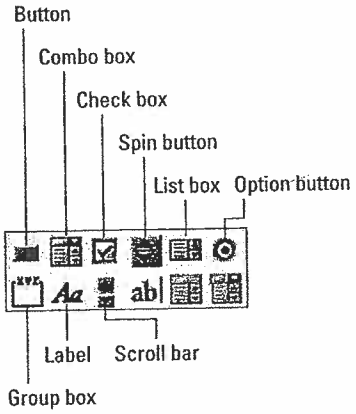


Figure 11-3: The nine Form controls labeled.

Adding and Configuring Controls

To add a control onto the spreadsheet, simply click the control you require and click the spreadsheet in the approximate location you want the control placed. You can easily move and resize the control just as you would a chart or shape.

After you add a control, you want to configure it to define its look, behavior, and utility. Each control has its own set of configuration options that allow you to customize it for your purposes. To get to these options, right-click the control and select Format Control, as demonstrated in Figure 11-4. This opens the Format Control dialog box with all the configuration options for that control.

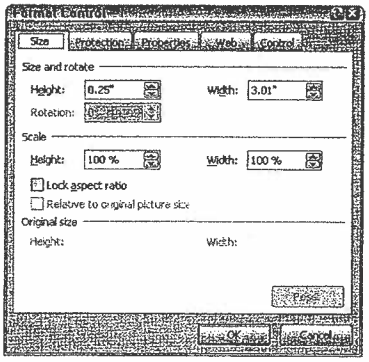


Figure 11-4: Right-clicking and selecting Format Control opens a dialog box with the configuration options.

You'll notice in Figure 11-4 that there are five tabs listed in the Format Control dialog box: Size, Protection, Properties, Web, and Control.

All but two controls have the Size, Protection, Properties, Web, and Control tabs in their configuration options (the Button and label controls don't have the Control tab). These tabs work the same way for each control. A handful of controls do have additional formatting-oriented tabs used to configure formatting options.

These tabs are as follows:

- **The Size tab:** Gives you options for detailed sizing and scaling of controls.
- **The Protection tab:** Allows you to specify how the control will behave when the worksheet is in a protected state. Here you can choose to disable or enable the control when the worksheet is protected.
- **The Properties tab:** Lets you control how the control is positioned in relation to the cells and columns in your spreadsheet. Here, you can specify

whether you want the control to be resized or re-positioned when the worksheet cells are adjusted. You can also specify whether you want the control to be printed.

- **The Web tab:** Expose some options that determine how the control will behave when the worksheet is saved as an HTML Web page.
- **The Control tab:** This tab, which is different for each control, is where the meat of the configuration lies. Here, you find the variables and settings that need to be defined in order for the control to function.

Now that I've covered the administrative aspects of how Form controls work, you're ready for the rest of this chapter. Throughout, I offer some examples of how to use the most practical controls, demonstrating how each one works. Plus, I walk you through a scenario for each control, showing how the control can enhance your reporting mechanisms.

Using the Button Control

The Button control gives your audience a clear and easy way to execute the macros you've recorded. To insert and configure a Button control, follow these steps:

1. **Click the Insert drop-down list under the Developer tab.**
2. **Select the Button Form control.**
3. **Click the location in your spreadsheet where you want to place your button.**

   The Assign Macro dialog box appears and asks you to assign a macro to this button. (See Figure 11-5.)
4. **Select the macro you want to assign to the button and then click OK.**

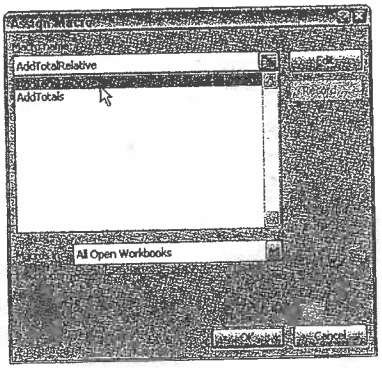


Figure 11-5: Assign a macro to the newly-added button.

5. **Edit the text shown on the button by right-clicking the button, highlighting the existing text, and then overwriting it with your own.**

To assign a different macro to the button, simply right-click and select Assign Macro to reactivate the Assign Macro dialog box, as shown in Figure 11-5.

Using the Check Box Control

The Check Box control provides a mechanism for selecting/deselecting options. When a Check Box is selected, it returns a value of `True`. When it isn't selected, `False` is returned. To add and configure a Check Box control, follow these steps:

1. **Click the Insert drop-down list under the Developer tab.**
2. **Select the Check Box Form control.**
3. **Click the location in your spreadsheet where you want to place your Check Box.**
4. **After you drop the Check Box control onto your spreadsheet, right-click the control and select Format Control.**
5. **Click the Control tab to see the configuration options, as shown in Figure 11-6.**
6. **First, select the state in which the Check Box control should open.**

   The default selection (Unchecked) typically works for most scenarios, so it's rare you have to update this selection.

7. **Next, in the Cell Link box, enter the cell to which you want the Check Box to output its value.**

   By default, a Check Box control outputs either `True` or `False`, depending on whether it's checked. Notice in Figure 11-6 that this particular Check Box outputs to cell A5.

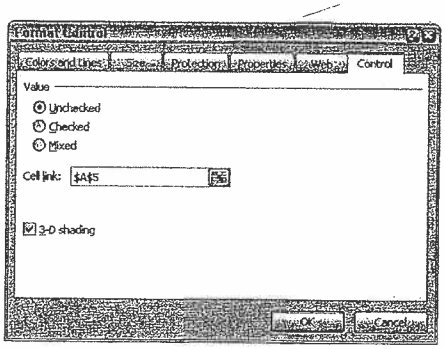


Figure 11-6: Formatting the Check Box Control.

8. **(Optional) You can check the 3D property if you want the control to have a three-dimensional appearance.**
9. **Click OK to apply your changes.**

To rename the Check Box control, right-click the control, select Edit Text, and then overwrite the existing text with your own.

As Figure 11-7 illustrates, the Check Box outputs its value to the specified cell. If the Check Box is selected, a value of `TrueTrue` is output. If the Check Box isn't selected, a value of `FalseFalse` is output.

If you're having a hard time figuring out how this could be useful, fear not. I have an example that illustrates how a Check Box can be used to toggle a chart series on and off!

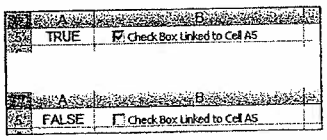


Figure 11-7: The two states of the Check Box.

Check Box Example: Toggling a Chart Series On and Off

Figure 11-8 shows the same chart twice. Notice that the top chart contains only one series, with a Check Box offering to Show 2004 Trend data. The bottom chart shows the same chart with the Check Box selected. The on/off nature of the Check Box control is ideal for when interactivity calls for a visible/not visible state.

To see all the examples in this chapter live, open the `Chapter 11 Sample File` available on this book's companion Web site.

To create this example, I start with raw data that contains both 2004 and 2005 data (see Figure 11-9). Next to the raw data, I reserve a cell where the Check Box control will output its value (Cell A12 in this example). This cell will either contain `TrueTrue` or `False`.

I then create a shadow dataset that consists of all formulas, as shown here in Figure 11-10. The idea is that the chart actually reads from this data, not the raw data. This way, I can control what the chart sees.

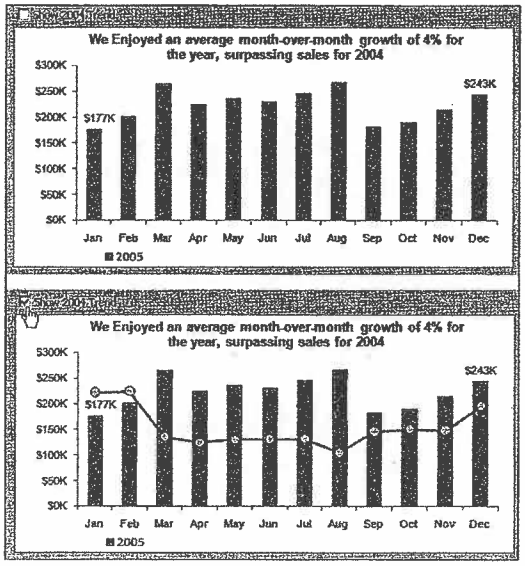


Figure 11-8: A Check Box can help create the disappearing data series effect.

	A	B	C	D	E	F	G
10			Raw Data				
11	Toggle for 2004 Data		Jan	Feb	Mar	Apr	May
12	TRUE	2004	$222,389	$224,524	$136,104	$125,260	$130,791
13		2005	$176,648	$201,000	$265,720	$225,461	$235,494

Figure 11-9: Start with raw data and a cell where a Check Box can output its value.

			Jan	Feb	Mar	
6		2004	=IF($A$12,C12,NA())	=IF($A$12,D12,NA())	=IF($A$12,E12,NA())	=IF($A$12,F12,NA())
7		2005	=C13	=D13	=E13	=F13
8						
9						
10			Raw Data			
11	Toggle for 2004 Data		Jan	Feb	Mar	
12	TRUE	2004	222389	224524	136104	12
13		2005	176648	201000	265720	22

Figure 11-10: Create a shadow dataset that will feed the chart. The values of this dataset are all formulas.

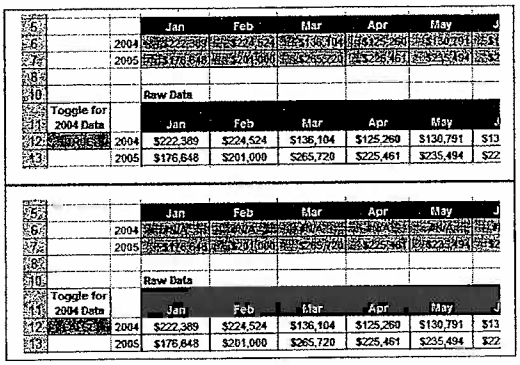
As you can see in Figure 11-10, the formulas for the 2005 row simply reference the cells in the raw data for each respective month. I do that because I want the 2005 data to show at all times.

For the 2004 row, I test the value of Cell A12 (the cell that contains the output from the Check Box). If A12 reads `True`, I reference the respective 2004 cell in the raw data. If A12 doesn't read `True`, the formula uses Excel's `NA()` function to return an #N/A error. Excel charts can't read any cell with the #N/A error. Therefore, they simply don't show the data series for any cell that contains #N/A. This is ideal when you don't want a data series to be shown at all.

Notice that the formula shown in Figure 11-10 uses an absolute reference with cell A12. That is, the reference to cell A12 in the formula is prefixed with a $ sign (`$A12`). This ensures that the column references in the formulas don't shift when they're copied across.

Figure 11-11 illustrates the two scenarios in action. In the scenario shown at the top of Figure 11-11, Cell A12 is `True`, so the shadow dataset actually brings in 2004 data. In the scenario shown at the bottom of Figure 11-11, Cell A12 is `False`, so the shadow dataset returns #N/A for 2004.

After this setup is created, all that's left to do is create the chart using the shadow data. As you can see, the combination of clever data modeling and a Check Box control can produce some pretty cool effects.



		Jan	Feb	Mar	Apr	May
2004		$222,389	$224,524	$136,104	$125,260	$130,791
2005		$176,648	$201,000	$265,720	$225,461	$235,494

Raw Data

Toggle for 2004 Data		Jan	Feb	Mar	Apr	May
	2004	$222,389	$224,524	$136,104	$125,260	$130,791
	2005	$176,648	$201,000	$265,720	$225,461	$235,494

Figure 11-11: When Cell A12 reads True, 2004 data is displayed; when it reads False, the 2004 row shows only #N/A errors.

Using Option Button Controls

Option Buttons allow users to toggle through several options one at a time. The idea is to have two or more Option Buttons in a group. Then selecting one Option Button automatically deselects the others. To add Option Buttons to your worksheet, follow these steps:

1. **Click the Insert drop-down list under the Developer tab.**
2. **Select the Option Button Form control.**
3. **Click the location in your spreadsheet where you want to place your Option Button.**
4. **After you drop the control onto your spreadsheet, right-click the control and select Format Control.**
5. **Click the Control tab to see the configuration options, as shown in Figure 11-12.**
6. **First, select the state in which the Option Button should open.**

   The default selection (Unchecked) typically works for most scenarios, so it's rare you have to update this selection.
7. **Next, in the Cell Link box, enter the cell to which you want the Option Button to output its value.**

   By default, an Option Button control outputs a number that corresponds to the order it was put onto the worksheet. For instance, the first Option Button you place on your worksheet outputs a number 1; the second outputs a number 2; the third outputs a number 3; and so on. Notice in Figure 11-12 that this particular control outputs to cell A1.
8. **(Optional) You can check the 3D property if you want the control to have a three-dimensional appearance.**
9. **Click OK to apply your changes.**
10. **To add another Option Button, simply copy the button you created and paste as many Option Buttons as you need.**

    The cool thing about copying and pasting is that all the configurations you made to the original persist in all the copies.

To give your Option Button a meaningful label, right-click the control, select Edit Text, and then overwrite the existing text with your own.

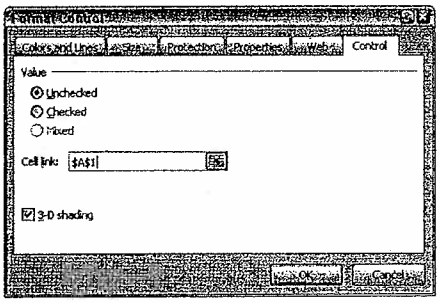


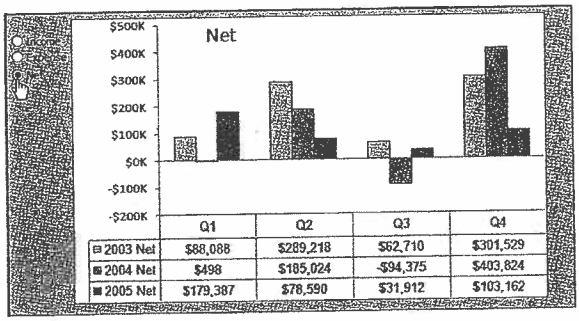
Figure 11-12: Formatting the Option Button control.

Option Button Example: Showing Many Views through One Chart

One of the ways you can use Option Buttons is to feed a single chart with different data, based on the option selected. Figure 11-13 illustrates an example of this. When each category is selected, the single chart is updated to show the data for that selection.

Now, you could create three separate charts and show them all on your dashboard at the same time. However, using this technique as an alternative saves on valuable real estate by not having to show three separate charts. Plus, it's much easier to troubleshoot, format, and maintain one chart than it is three.

To create this example, I start with three raw datasets (as shown in Figure 11-14) that contain three categories of data: Income, Expense, and Net. Near the raw data, I reserve a cell where the Option Buttons output their values (Cell A8 in this example). This cell contains the ID of the option selected: 1, 2, or 3.



	Q1	Q2	Q3	Q4
2003 Net	$88,088	$289,218	$62,710	$301,529
2004 Net	$498	$185,024	-$94,375	$403,824
2005 Net	$179,387	$78,590	$31,912	$103,162

Figure 11-13: This chart is dynamically fed different data based on the selected Option Button.

	A	B	C	D	E	F
7	Option Button Trigger					
8			Q1	Q2	Q3	Q4
9		2005 Income	$399,354	$573,662	$244,661	$790,906
10		2004 Income	$219,967	$495,072	$212,749	$687,744
11		2003 Income	$159,832	$289,825	$181,961	$456,016
12						
13		2005 Expense	$219,967	$495,072	$212,749	$687,744
14		2004 Expense	$219,468	$310,048	$307,124	$283,920
15		2003 Expense	$71,744	$607	$119,251	$154,487
16						
17		2005 Net	$179,387	$78,590	$31,912	$103,162
18		2004 Net	$498	$185,024	-$94,375	$403,824
19		2003 Net	$88,088	$289,218	$62,710	$301,529

Figure 11-14: Start with the raw datasets and a cell where the Option Buttons can output their values.

I then create a shadow dataset that consists of all formulas, as shown in Figure 11-15. The idea is that the chart reads from this shadow dataset, allowing you to control what the chart sees. The first cell of the shadow dataset contains the following formula:

```
=IF($A$8=1,B9,IF($A$8=2,B13,B17))
```

This formula tells Excel to check the value of cell A8 (the cell where the Option Buttons output their values). If the value of cell A8 is 1, which represents the value of the Income option, the formula returns the value in the Income dataset (cell B9). If the value of cell A8 is 2, which represents the value of the Expense option, the formula returns the value in the Expense dataset (cell B13). If the value of cell B1 is not 1 or 2, the value in cell B17 is returned.

Notice that the formula shown in Figure 11-15 uses absolute references with cell A8. That is, the reference to cell A8 in the formula is prefixed with $ signs ($A$8). This ensures that the cell references in the formulas don't shift when they're copied down and across.

To test that the formula is working fine, you could change the value of cell A8 manually, from 1 to 3. When the formula works, you'd simply copy the formula across and down to fill the rest of the shadow dataset.

When the setup is created, all that's left to do is create the chart using the shadow data. Again, the major benefits you get from this type of setup is that any formatting changes can be made to one chart, and it's easy add another dataset by adding another Option Button and editing your formulas.

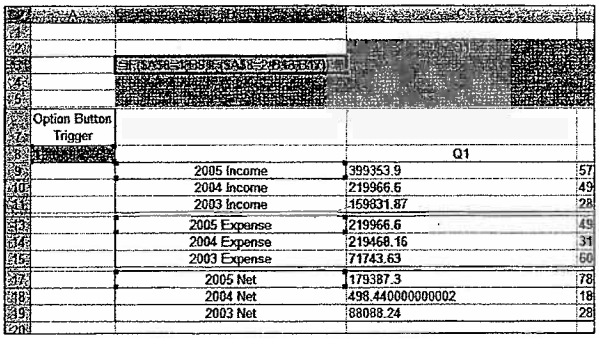


Figure 11-15: Create a shadow dataset and enter this formula in the first cell.

Using the Combo Box Control

The Combo Box control allows users to select from a list of predefined options from a drop-down list. The idea is that when an item from the Combo

Box control is selected, some action is taken with that selection. To add a Combo Box to your worksheet, follow these steps:

1. **Click the Insert drop-down list under the Developer tab.**
2. **Select the Combo Box Form control.**
3. **Click the location in your spreadsheet where you want to place your Combo Box.**
4. **After you drop the control onto your spreadsheet, right-click the control and select Format Control.**
5. **Click the Control tab to see the configuration options, as shown in Figure 11-16.**
6. **In the Input Range setting, identify the range that holds the predefined items you want to present as choices in the Combo Box.**

   As you can see in Figure 11-16, this Combo Box is filled with months.
7. **Next, in the Cell Link box, enter the cell to which you want the Combo Box to output its value.**

   By default, a Combo Box control outputs the index number of the selected item. This means if the second item on the list was selected, the number 2 would be output. If the fifth item on the list was selected, the number 5 would be output. Notice in Figure 11-16 that this particular control outputs to cell E15.
8. **In the Drop Down Lines box, enter the number of items you want shown at one time.**

   As you can see in Figure 11-6, this control is formatted to show 12 items at one time. This means when the Combo Box is expanded, the user sees 12 items.
9. **(Optional) You can check the 3D property if you want the control to have a three-dimensional appearance.**
10. **Click OK to apply your changes.**

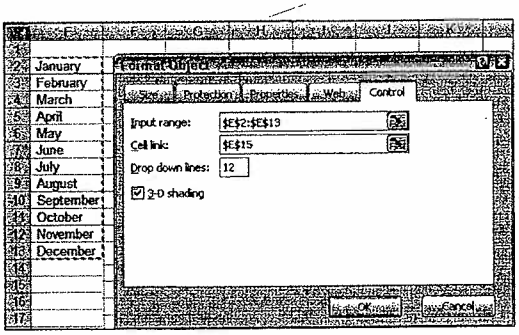
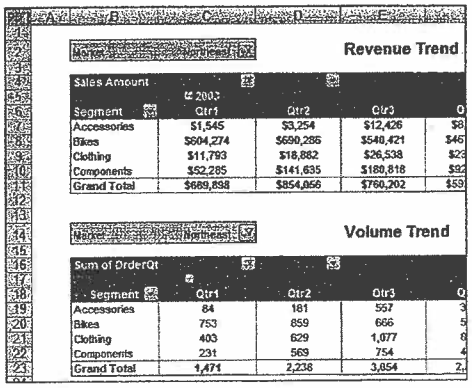


Figure 11-16: Formatting the Combo Box control.

Combo Box Example: Controlling Multiple Pivot Tables with One Combo Box

Here's the deal. The report in Figure 11-17 contains two pivot tables — one showing revenue for the selected market and one showing volume. Note that each pivot table has its own Filter field, allowing for the selection of a Market. The problem is that each time a market is selected from the Filter field in one pivot table, the same market from the Filter field in the other pivot table must be selected to ensure the correct Volume versus Revenue.



Revenue Trend

Sales Amount				
Segment	Qtr1	Qtr2	Qtr3	Q
Accessories	$1,545	$3,254	$12,426	$8
Bikes	$604,274	$690,285	$548,421	$46
Clothing	$11,793	$18,882	$26,538	$23
Components	$52,285	$141,635	$180,818	$92
Grand Total	$669,898	$854,056	$768,202	$59

Volume Trend

Sum of OrderQt				
Segment	Qtr1	Qtr2	Qtr3	Q
Accessories	84	181	557	3
Bikes	753	859	666	5
Clothing	403	629	1,077	8
Components	231	569	754	4
Grand Total	1,471	2,238	3,054	2,

Figure 11-17: You must synchronize multiple pivot table reports to get the correct analysis.

Not only is it annoying to have to synchronize both pivot tables each time you want to analyze a new market's data, but there's a chance you, or your audience, may forget to do so.

A Combo Box control can help in this situation. The idea is to record a macro that automatically selects a market from the Market field of both tables. Then alter the macro to filter both pivot tables, using the value selected from a Combo Box control.

Using the `Chapter 11 Sample File` that appears on this book's companion Web site, take a moment to walk through this example with me. For this example, use the pivot tables found in the Using Combo Box Controls tab of the sample file.

1. **Create a new macro and call it SwitchMarkets. When recording starts, select the Southwest market from the Market field in both pivot tables and then stop recording.**

Feel free to review Chapter 10 for a refresher on how to record macros.

2. **Place a Combo Box onto your spreadsheet.**
3. **Right-click your Combo Box and select Format Control.**

   The Format Control dialog box appears.

4. **Specify an Input Range for the list you're using to fill your Combo Box.**

   In this case, reference the list of markets already created in column Q.

5. **Next, specify a Cell Link.**

   This is the cell that shows the index number of the item you select (cell O2 is the cell link in this example). When you've configured your Combo Box, your dialog box should look similar to Figure 11-18.

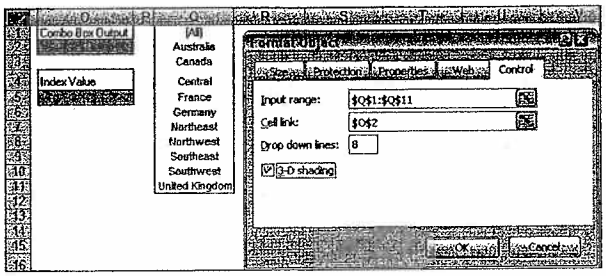


Figure 11-18: Configure the settings for your Combo Box.

At this point, you can now select a market from your Combo Box and see the associated index number in cell O2. In order to make use of this index number, you have to pass it through the `INDEX` function. The `INDEX` function converts an index number to a value that can be recognized.

An `INDEX` function requires two arguments in order to work properly. The first argument is the range of the list you're working with. In most cases, use the same range that's feeding your Combo Box. The second argument is the index number. If the index number is in a cell (like in cell O2), you can simply reference the cell.

6. **In cell O5, enter an `INDEX` function that converts the index number in cell O2 to a value.**

   As you can see in Figure 11-19, the formula used is `=INDEX(Q1:Q11,O2)`.

   The trick now is to edit the SwitchMarkets macro you recorded earlier to use the value in cell O5, instead of a hard-coded value. This calls for editing the macro-generated code via the Visual Basic Editor. Don't worry, it won't get too crazy.

7. **Click the Macros button on the Developer tab.**

   This activates the Macro dialog box, as shown in Figure 11-20. From here, you can select the SwitchMarkets macro and then click the Edit button.

   Remember that when you recorded your macro, you selected the Southwest market from the Market field in both pivot tables. As you can see in Figure 11-21, the text `"Southwest"` is indeed hard-coded in the macro-generated code.

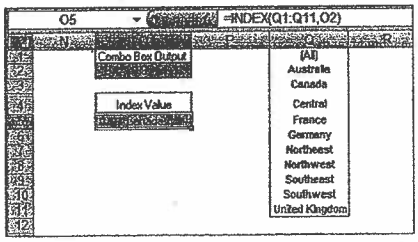


Figure 11-19: Use an INDEX formula to convert the index number output by the Combo Box to a textual value.

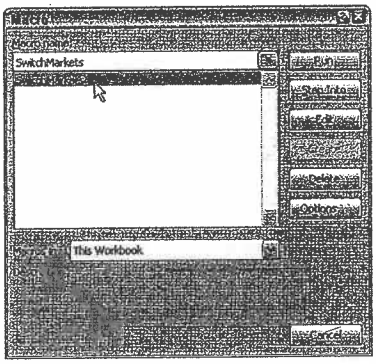


Figure 11-20: Select the SwitchMarkets macro and click the Edit button.

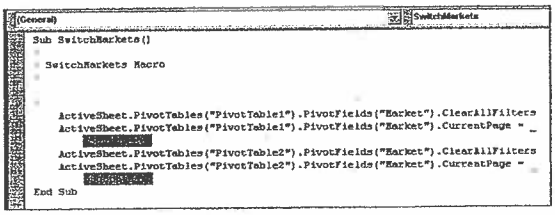


Figure 11-21: The Southwest market is hard-coded in the macro code.

8. **Replace `"Southwest"` with `ActiveSheet.Range("O5").Value` as demonstrated in Figure 11-22.**

   This tells the macro to get the market name from cell O5. After you've edited the macro, close the Visual Basic Editor to get back to the spreadsheet.

   The final step is to ensure the macro plays each time you select a market from the Combo Box.

9. **Right-click the Combo Box and select Assign Macro. Select the SwitchMarkets macro and then click OK.**

10. **(Optional) You can clean up the formatting on your newly-created report by hiding the rows and columns that hold the Filter fields in your pivot tables, plus any lists or formulas you don't want your audience to see.**

As you can see in Figure 11-23, this setup provides an easy and reliable way to navigate pivot tables using one control.

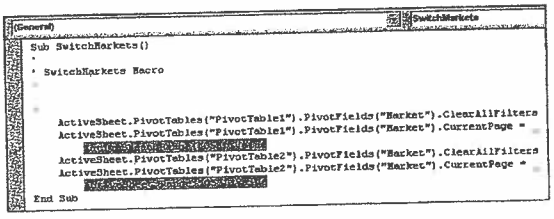


Figure 11-22: Replace "Southwest" with ActiveSheet.Range("O5").Value.

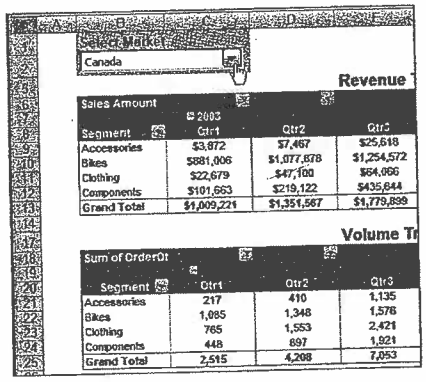


Figure 11-23: You can now navigate two pivot tables with just one Combo Box!

You may notice your pivot table automatically adjusts the columns to fit the data each time you select a new market. This default behavior can be bothersome to someone using your pivot table reports. You can suppress this behavior by right-clicking each pivot table and selecting Table Options. This activates the PivotTable Options dialog box, where you can deselect the Autofit Column Widths On Update selection. Remember, you have to do this for each pivot table individually.

Using the List Box Control

The List Box control allows users to select from a list of predefined choices. The idea is that when an item from the List Box control is selected, some action is taken with that selection. To add a List Box to your worksheet, follow these steps:

1. **Click the Insert drop-down list under the Developer tab.**
2. **Select the List Box Form control.**
3. **Click the location in your spreadsheet where you want to place your List Box.**
4. **After you drop the control onto your spreadsheet, right-click the control and select Format Control.**
5. **Click the Control tab to see the configuration options, as shown in Figure 11-24.**
6. **In the Input Range setting, identify the range that holds the predefined items you want to present as choices in the combo box.**

   As you can see in Figure 11-24, this List Box is filled with region selections.
7. **Next, in the Cell Link box, enter the cell where you want the List Box to output its value.**

   By default, a List Box control outputs the index number of the selected item. This means if the second item on the list was selected, the number 2 would be output. If the fifth item on the list was selected, the number 5 would be output. Notice in Figure 11-24 that this particular control outputs to cell P2.

   The Selection Type setting allows users to choose more than one selection in the List Box. The choices here are Single, Multi, and Extended.

   Always leave this setting on Single, as Multi and Extended work only in the VBA (Visual Basic for Applications) environment.
8. **(Optional) You can check the 3D property if you want the control to have a three-dimensional appearance.**
9. **Click OK to apply your changes.**

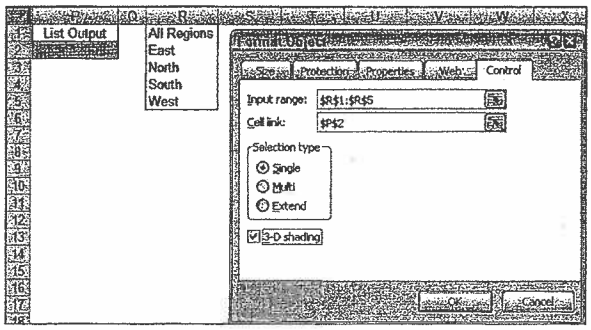


Figure 11-24: Formatting the List Box control.

List Box Example: Controlling Multiple Charts with One Selector

One of the more useful ways to use a List Box is to control multiple charts with one selector. Figure 11-25 illustrates an example of this. As a region selection is made in the List Box, all three charts are fed the data for that region, adjusting the charts to correspond with the selection made. Happily, all this is done without VBA code, just a handful of formulas and a List Box.

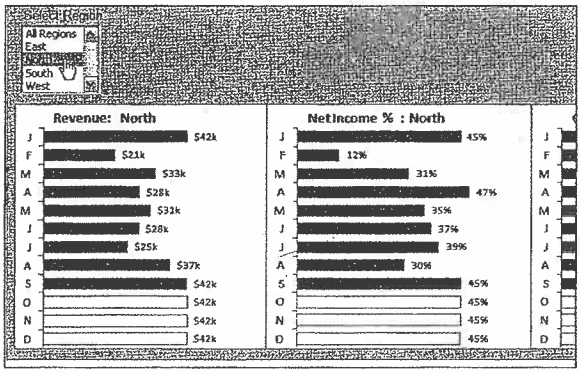


Figure 11-25: This List Box feeds the region selection to multiple charts, changing each chart to correspond with the selection made.

To create this example, I start with three raw datasets (as shown in Figure 11-26) that contain three categories of data; Revenues, Net Income %, and Gross Margin. Each dataset contains a separate line for each region.

I then add a List Box that outputs the index number of the selected item to cell P2. (See Figure 11-27.)

I then create a shadow dataset that will consist of all formulas. In this shadow dataset, I use the Excel's CHOOSE function to select the correct value from the raw data tables based on the selected region.

In Excel, the CHOOSE function returns a value from a specified list of values based on a specified position number. For instance, the formula `CHOOSE(3,"Red", "Yellow", "Green", "Blue")` returns `Green` because `Green` is the third item in the list of values. The formula `CHOOSE(1, "Red", "Yellow", "Green", "Blue")` returns `Red`.

See Chapter 14 to get a detailed look at the CHOOSE function.

As you can see in Figure 11-28, the CHOOSE formula retrieves the target position number from Cell P2 (the cell where the List Box outputs the index number of the selected item) and then matches that position number to the list of cell references given. The cell references come directly from the raw data table.

In the example shown in Figure 11-28, the data that would be returned with this CHOOSE formula would be `98741`. Why? Because cell P2 contains the number `1`, and the first cell reference within the CHOOSE formula is cell B7.

I entered the same type of CHOOSE formula into the Jan column and then copied it across. (See Figure 11-29.)

To test that your formulas are working, change the value of cell P2 manually, entering **1**, **2**, **3**, **4**, or **5**. When the formulas work, all that's left to do is create the charts using the shadow data.

	A	B	C	D	E	F	
5							
6							
7	All Regions	98,741	54,621	96,555	109,625	87,936	84,
8	East	27,474	22,674	35,472	36,292	31,491	27,
9	North	41,767	20,806	32,633	28,023	31,090	27,
10	South	18,911	1,125	17,020	34,196	12,989	18,
11	West	10,590	10,016	11,430	11,115	12,367	10,
12							
13							
14	All Regions	49.9%	50.6%	48.7%	47.8%	41.4%	
15	East	63.1%	53.6%	55.8%	47.4%	41.5%	
16	North	45.3%	11.8%	31.0%	47.5%	35.2%	
17	South	31.2%	61.7%	41.8%	30.9%	9.0%	
18	West	60.1%	75.4%	66.1%	66.2%	79.8%	
19							
20							
21	All Regions	48,508	22,850	44,586	48,340	35,056	37,
22	East	17,326	12,154	19,799	17,206	13,079	11,
23	North	18,914	2,455	10,115	13,299	10,938	10,
24	South	5,904	694	7,115	10,582	1,171	7,
25	West	6,364	7,547	7,557	7,253	9,867	8,

Figure 11-26: Start with the raw datasets that contain one line per region.

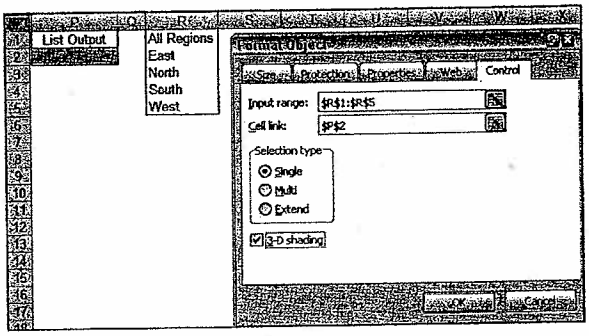


Figure 11-27: Add a List Box and note the cell where the output value will be placed.

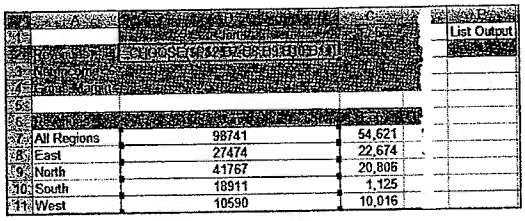


Figure 11-28: Use the CHOOSE function to capture the correct data corresponding to the selected region.

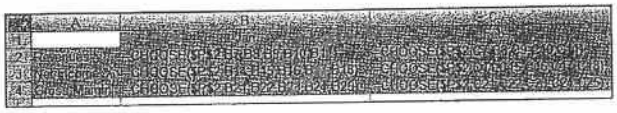
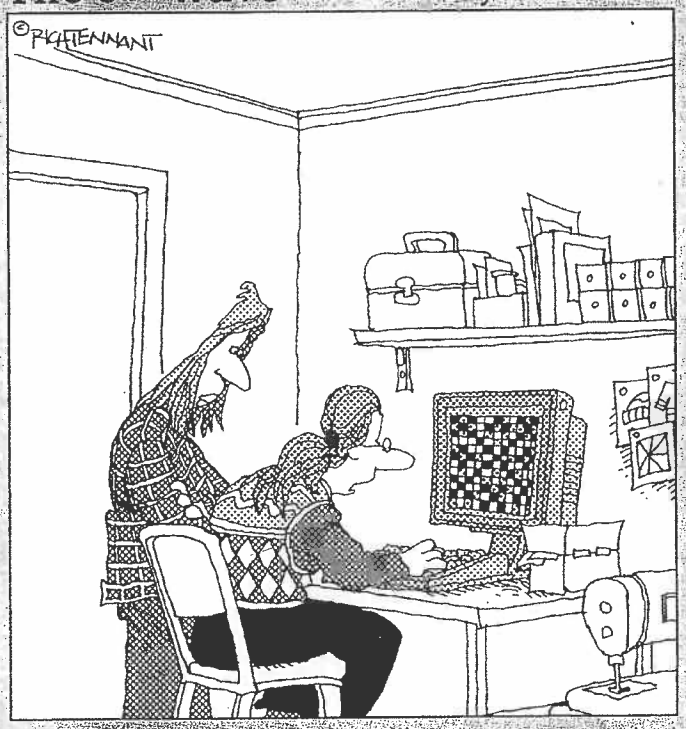


Figure 11-29: Create similar CHOOSE formulas for each row/category of data and then copy the choose formulas across months.

Part V
Working with the Outside World

The 5th Wave By Rich Tennant



"I've used several spreadsheet programs, but this is the best one for designing quilt patterns."

In this part . . .

The theme of this section is importing and exporting information to and from Excel. Chapter 12 explores some of the ways to incorporate data that doesn't originate in Excel. In that chapter, I show you how to import data from external sources as well as how to create systems that allow for the dynamic refreshing of external data sources. Chapter 13 wraps up this look on Excel dashboards and reports by showing you the various ways to distribute and present your work.

Chapter 12

Using External Data for Your Dashboards and Reports

In This Chapter

- Importing Microsoft Access data
- Importing Microsoft SQL Server data
- Using MS Query to get external data

Wouldn't it be wonderful if every dataset you came across were neatly packed in one easy-to-use Excel table? Unfortunately, there are people (and you know who they are) who insist on using platforms other than Excel. Imagine the gall.

Of course, I'm being cheeky. The reality is that you will undoubtedly encounter situations when the data you need comes from external data sources. External data is exactly what it sounds like; data that isn't located in the Excel workbook in which you're operating. Some examples of external data sources are text files, Access tables, SQL Server tables, and even other Excel workbooks.

Throughout this book, I advocate the separation of data and presentation. When dealing with small datasets that are developed and maintained in Excel, you have to make a conscious effort to make that separation. However, in complex models where large volumes of data come from Access or SQL, the effort on your part is eliminated. That data is already separated, baby. The worry in these situations is how to efficiently move that data from over there to over here. This chapter explores the most efficient ways to get external data into Excel.

Before jumping in, however, there are a couple of disclaimers your humble author would like to throw out there. First, the focus of this chapter is on getting data from Access and SQL Server databases; mainly because the data for a typical Excel user resides in Access or SQL Server. Second, there are

numerous ways to get data into Excel. In fact, between the functionality found in the user interface and the VBA/code techniques, there are too many to focus on in one chapter. For this adventure, I focus on two techniques: using the Get External Data group and using MS Query. Why these two techniques? Both of these techniques are easy to grasp, can be implemented in most situations, and don't come with a lot of pitfalls and gotchas. Now that you can't sue me anymore, let's get started.

Using the Get External Data Group

Although the option to import external data was available in earlier versions of Excel, this functionality was buried several layers deep. In Excel 2007 however, Microsoft made importing Access data from the Excel user interface very simple — it's right on the Ribbon! Click the Data tab on the Ribbon to expose the Get External Data group, as shown in Figure 12-1.

Clicking any one of the data source types (each represented by an icon) activates an easy-to-use wizard that walks you through a process unique to that type. In this section, I walk through the process of importing both Access and SQL Server data using the Get External Data group.

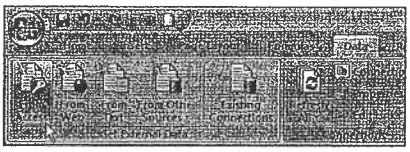


Figure 12-1: The Get External Data group contains the icons for various external data sources.

Importing Access data with the Get External Data Group

The process of importing Access data is unbelievably simple in Excel 2007. Here's what you do:

1. **Select the Data tab from the Ribbon and select the From Access icon.**

   The first step is to browse for our Access database. If the database from which you wish to import is local, simply browse to the file location and

open it. If you have an Access database on a network drive at your employer, you may also select that database as well — provided you have the proper authorization and access.

2. **Select the Access database from which you want to import and select Open. (See Figure 12-2.)**

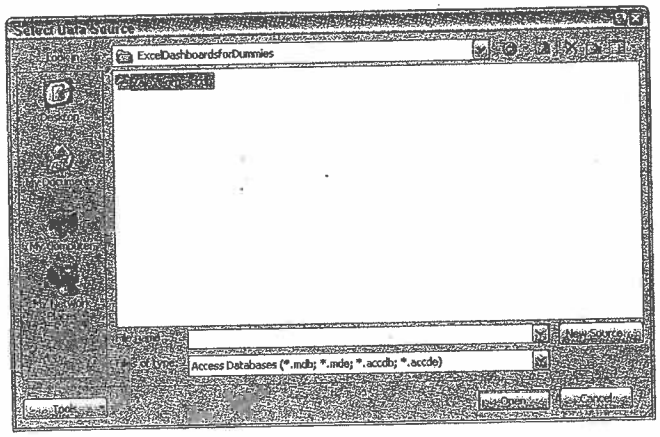


Figure 12-2: Select the target Access database.

Note that you can import the older Access `.mdb` file formats as well as Access 2007 `.accdb` databases.

The Select Table dialog box appears. (See Figure 12-3.)

3. **Choose an existing Access Table or Query.**

Note that both tables and queries are available for you to choose.

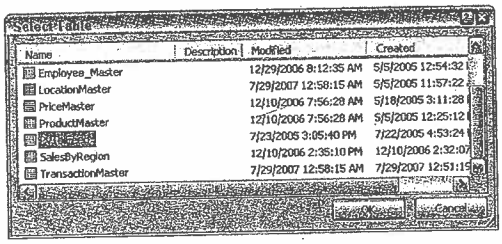


Figure 12-3: Select the needed table or query.

4. **Choose the location and format for data that's to be imported.**

In the example in Figure 12-4, Table is chosen.

5. **Click OK to start the import process.**

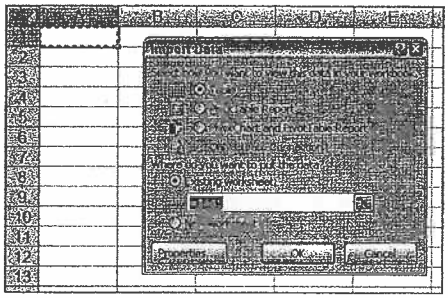


Figure 12-4: Choose where and how you want your imported data.

If you choose the Table option in the step shown in Figure 12-4, the raw data is written directly onto your spreadsheet. If you choose the PivotTable or PivotChart options, the data is saved to a pivot cache without writing the actual data to the spreadsheet. This allows your pivot table to function as normal without having to import potentially hundreds of thousands of data rows twice (once for the pivot cache and once for the spreadsheet). Feel free to review Chapter 3 for a quick explanation of pivot caches.

The incredibly powerful thing about data that has been imported this way is that it's refreshable! That's right. If you import data from Access using this technique, Excel creates a table that can be refreshed by right-clicking and selecting Refresh, as demonstrated in Figure 12-5. When you refresh your imported data, Excel goes out to the external data source and re-imports the data, overwriting the old table or pivot table.

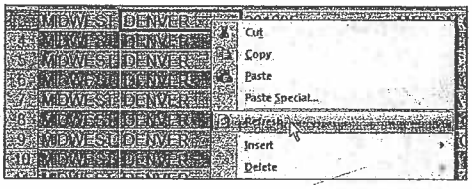


Figure 12-5: Refresh your imported table by right-clicking inside the table.

Think about what this means in terms of building a reporting process. You can create a dashboard or report based on external data that can be refreshed when you need. When your data is refreshed, any charts, matrixes, conditional formatting, or pivot tables that are built on top of this data are automatically updated with the latest data. It's a beautiful thing.

Importing SQL Server data with the Get External Data menu

Although a few more steps are involved with importing SQL Server data in Excel, it's just as easy as importing Access data. Just follow these steps:

1. **Select the Data tab from the Ribbon and click From Other Sources. Choose the From SQL Server option from drop-down list, as shown in Figure 12-6.**

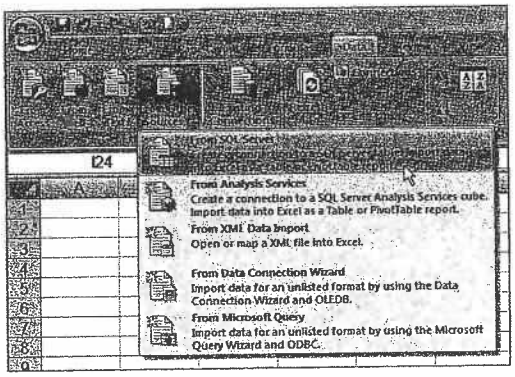


Figure 12-6: Select the From SQL Server option.

Selecting this option activates the Data Connection Wizard, as shown in Figure 12-7. The idea is to configure your connection settings from Excel to the server.

2. **Enter the name of your server as well as your username and password.**

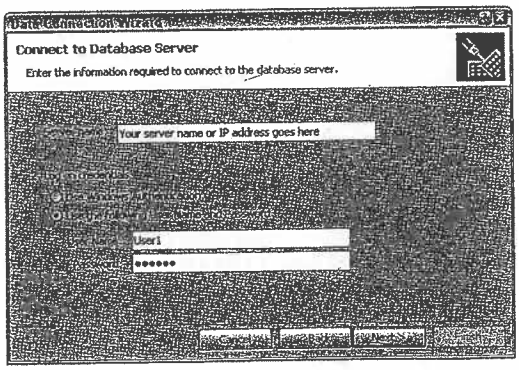


Figure 12-7: Step 1 of the Data Connection Wizard is to enter some authentication information.

If you're typically authenticated via Windows authentication, simply select the Use Windows Authentication option.

3. **Select the database from which you want to import data.**

   As you can see in Figure 12-8, the Facility_Svcs_Database database has been selected.

   After the database is selected, all tables and views in that database are displayed in the list of objects below the drop-down list.

4. **Choose the table or view you want to analyze and then click the Next button.**

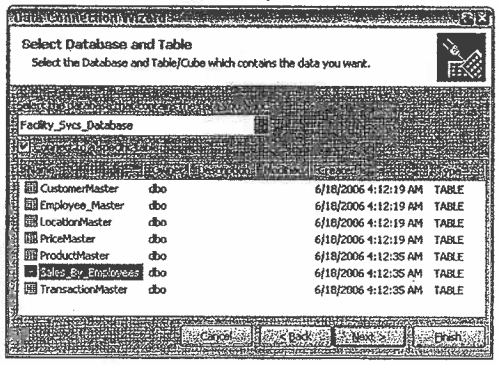


Figure 12-8: Specify the database you're using and then choose the table or view you need to import.

5. **In the next screen in the wizard, shown in Figure 12-9, you can enter some descriptive information about the connection you've just created.**

6. **When you're satisfied with your descriptive edits, click the Finish button to finalize your connection settings.**

   Note that all the fields in the screen shown in Figure 12-9 are optional. That is, if you bypass this screen without editing anything, your data imports just fine. The fields that are most often used on this screen are

   - *File Name:* In the File Name input box, you can change the filename of the `.odc` (Office Data Connection) file generated to store the configuration information for the link you just created.
   - *Save Password in File:* Under the File Name input box, you can save the password for your external data in the file itself (via the Save Password in File check box). Placing a check in this check box actually enters your password in the file. Keep in mind that

this password isn't encrypted, so anyone interested enough could potentially get the password for your data source simply by viewing your file with a text editor.

- *Description:* In the Description field, you can enter a plain description of what this particular data connection does.
- *Friendly Name:* The Friendly Name field allows you to specify your own name for the external source. You typically enter a name that's descriptive and easy to read.

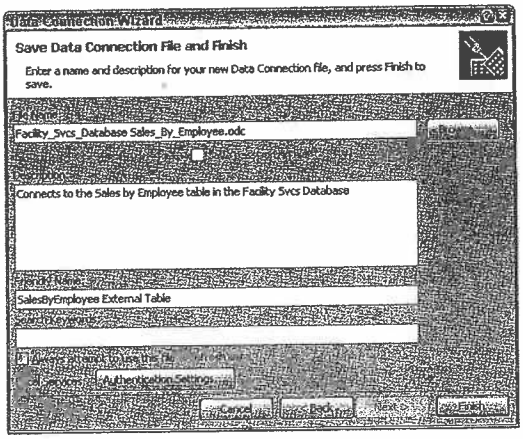


Figure 12-9: Add some descriptive information for your connection.

7. **Choose the location and format for data that's to be imported. (See Figure 12-10.)**
8. **Click OK to start the import process.**

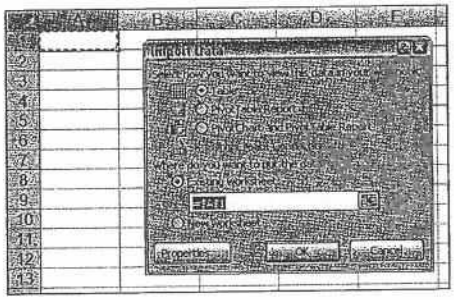


Figure 12-10: Choose where and how you want your imported data.

Using the MS Query Wizard

Microsoft Query (affectionately known as MS Query) is a standalone program that, like the Get External Data option, establishes a refreshable data connection through the Excel user interface. The advantage in using MS Query is that you can manipulate the data you want to import. You can select records from Access objects subject to your own criteria or even user supplied criteria!

MS Query may or may not be installed on your system, based on how you performed your Office installation. Keep in mind that if you don't have the MS Query program installed on your system, you can't link to external data sources in Excel. To install MS Query, you need your Microsoft Office installation disk. Start the Microsoft Office Setup and choose to customize your installation. While you're customizing your installation, look for Office Tools. Find the Microsoft Query under Office Tools entry. Make sure you set it to Run from My Computer and then complete the installation.

You can find the MS Query option under the From Other Sources drop-down list, as shown in Figure 12-11.To import data using the MS Query Wizard, follow these steps:

1. **Select the From Microsoft Query option.**

   After MS Query fires up, you see the Choose Data Source dialog box, as shown in Figure 12-12.

   In this walkthrough, source some data from the `ZalexCorp.accdb` Access database. This file can be found on this book's companion Web site.

2. **Choose <New Data Source> from the Databases tab and click OK.**

   The Create New Data Source dialog box appears.

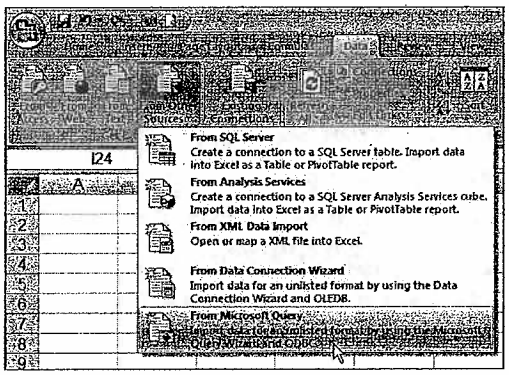


Figure 12-11: Start the MS Query Wizard.

3. **Type a name for your data source at the top of the dialog box.**

   As you can see in Figure 12-13, I call it ZalexCorp.

4. **Choose a type of driver for the database to which you wish to connect.**

   In this walkthrough, I select Microsoft Access Driver (`*.mdb, *.accdb`), as shown in Figure 12-14.

5. **Click the Connect button to activate the ODBC Microsoft Access Setup dialog box.**

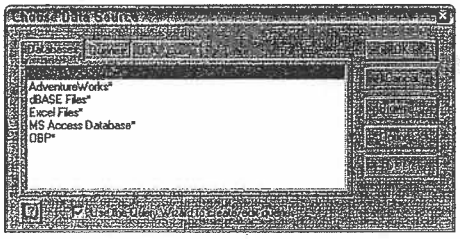


Figure 12-12: The MS Query Wizard starts by asking you to choose your data source.

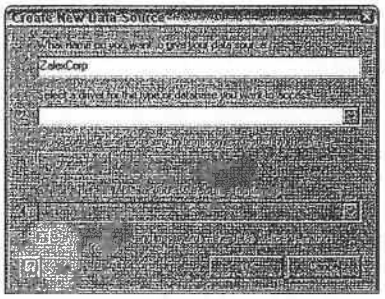


Figure 12-13: Name your new data source.

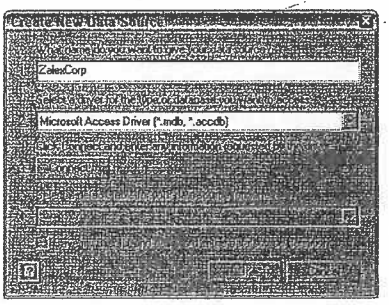


Figure 12-14: Choose the Access database driver.

6. **Click the Select button.**

   The Select Database dialog box appears.

7. **Navigate to the Access database (see Figure 12-15), select it, and click OK.**

8. **After you select your database, continue to press OK until you come back to the Choose Data Source dialog box.**

   As Figure 12-16 illustrates, your newly-linked ZalexCorp database is now displayed in list of data sources. After a database appears in the data sources list, you no longer have to perform Steps 2–8 to access it. You can simply click the name (in this case ZalexCorp) and connect directly. This is somewhat like setting a bookmark to a Web site.

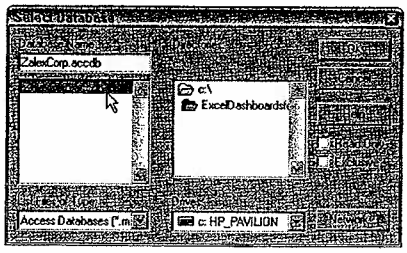


Figure 12-15: Select the database to which you're connecting.

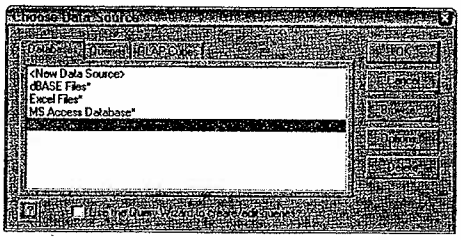


Figure 12-16: ZalexCorp is now in the list of databases.

9. **Select ZalexCorp and click OK to display a list of tables and queries available within the ZalexCorp database.**

10. **Pull the fields you want into your query. To do this, click the expand icon to the left of your chosen table name (see Figure 12-17). Then select each field and click the right-facing arrow to move the field into the Columns in Your Query box.**

   A quick way to choose all the fields in a table is to select the table (without expanding it) and then click the arrow to move the fields in this table over to the Columns in Your Query box.

11. **If you wish to change field ordering after you select your fields, you can use the up and down arrows to the right of the Columns in Your Query box.**

In Figure 12-18, the Market field has been moved to be the first column of the query.

By default, the MS Query Wizard arranges the fields in the order in which you choose them. Changing the order of fields is something you can't do with the Get External Data functionality.

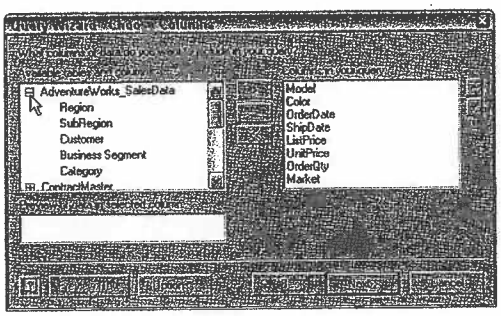


Figure 12-17: Select the fields you want in your query.

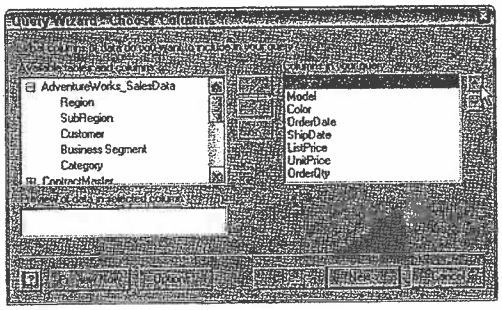


Figure 12-18: MS Query actually lets you reorder the fields you select.

The next pane of the MS Query Wizard gives you options to apply your own criteria to filter your data before importing. (See Figure 12-19.)

To activate a filter, select the field you wish to filter from the Column to Filter box on the left. Doing so activates the filter options on the right side of the wizard. The first field allows you to select a condition from a drop-down list (such as Equals, Does Not Equal, or Greater Than or Equal To). The second field allows you to specify criteria for this condition. This section of the wizard allows you to combine up to three filters with `and/or` logical operators. Again, applying filters on the fly is something you can't do with the Get External Data functionality.

12. **Apply a filter to include only those records that have a UnitPrice greater than 200 and then click Next.**

The next pane of the Query Wizard allows you to provide a custom sort to your data. In this pane, you can apply only three consecutive sorts. (See Figure 12-20.)

13. **Apply a sort on Market in Ascending order and then click Next.**

    You're almost done. The next pane asks whether you wish to return the data to Excel or further modify the query in MS Query. (See Figure 12-21.) Also note the Save Query button. With this button, you can save your query so you can access it from the Queries tab of the Choose Data Source dialog box. In this example, don't save your query and instead choose to view your data in Excel.

14. **Select the Return Data to Microsoft Office Excel option and then click Finish.**

15. **Choose the location and format for data that's to be imported (see Figure 12-22) and then click OK to start the import process.**

    As with tables created with the Get External Data functionality, data imported using MS Query is refreshable! You can refresh the data by right-clicking inside the table and selecting Refresh. When you refresh your imported data, Excel goes out to the external data source and re-imports the existing data.

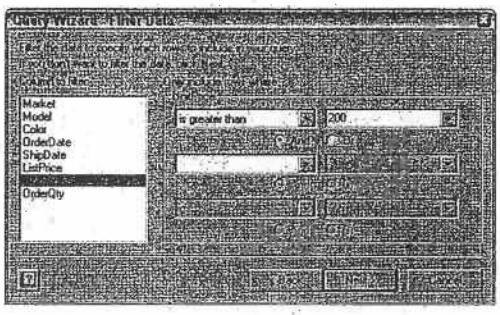


Figure 12-19: MS Query lets you apply criteria to filter data before importing.

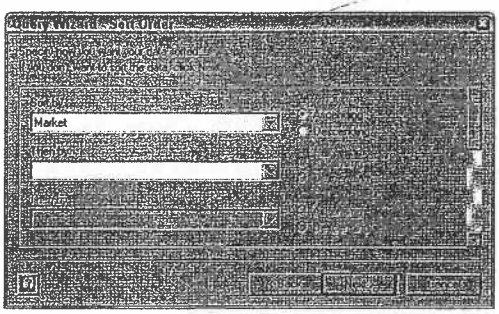


Figure 12-20: Apply a custom sort order.

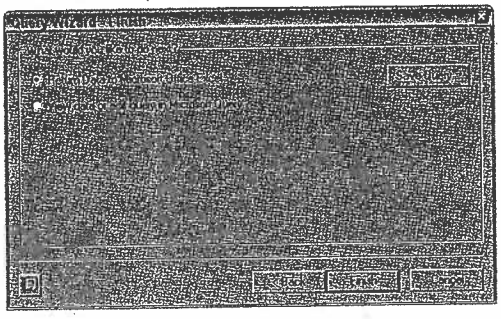


Figure 12-21: Choose to return data to Excel.

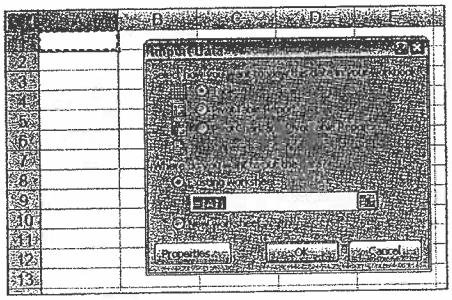


Figure 12-22: Choose where and how you want your imported data.

Managing External Data Properties

External data tables have a few adjustable properties that are exposed via the Properties dialog box. You can get to the properties of a particular External data table by clicking the target table and selecting the Properties icon under the Data tab. (See Figure 12-23.)

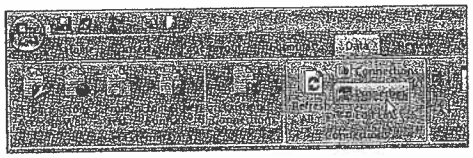


Figure 12-23: Getting to the properties of an external data table.

Activating the properties of an external data table calls up the External Data Properties dialog box, as shown in Figure 12-24. Take a moment to understand what each of these properties does. They are as follows:

- **Include Row Numbers:** This property is unchecked by default. Checking this property creates a dummy column that contains row numbers. The first column of your dataset is this row number column upon refresh.
- **Adjust Column Width:** This property is checked by default, telling Excel to adjust the column widths each time the data is refreshed. Removing this check causes the column widths to remain the same.
- **Preserve Column/Sort/Filter/Layout:** If this is checked, the order of the columns and rows of the Excel range remains unchanged. This way, you can rearrange and sort the columns and rows of the external data in your spreadsheet without worrying about blowing away your formatting each time you refresh.
- **Preserve Cell Formatting:** This is checked by default, telling Excel to keep the applied cell formatting when you refresh.
- **Insert cells for New Data, Delete Unused Cells:** This is the default setting for data range changes. When data rows decrease, you may have errors in adjacent cells that reference your external range. The cells these formulas referenced are deleted, so when you reference them you get a #VALUE error in your formula cells.
- **Insert Rows for New Data, Clear Unused Cells:** This option ensures that unused cells are not deleted, but only cleared when refreshing your data source. This is handy when you have formulas that reference the cells within your query results. When the unused cells are cleared instead of deleted, formulas that reference those cells retain the their reference addresses instead of returning #Ref errors.
- **Overwrite Existing Cells with New Data, Clear Unused Cells:** The third option should be the same as option two when rows decrease as unused cells are cleared.

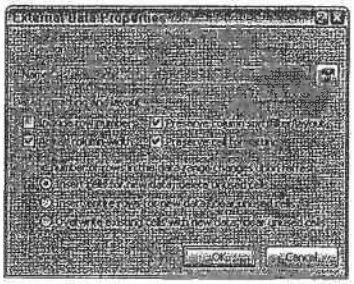


Figure 12-24: The External Data Properties dialog box.

Chapter 13

Sharing Your Work with the Outside World

In This Chapter

- Safeguarding your dashboards and reports
- Displaying your dashboards in PowerPoint
- Saving your dashboards and reports to PDF

Let's face it; you're not making these dashboards and reports for your amusement. At some point, you'll want to share your handiwork with others. The focus of this chapter is preparing your dashboards for life outside your PC. Here, explore the various methods of protecting your work from accidental and purposeful meddling and discover how you can distribute your dashboards via PowerPoint and PDF (Portable Document Format).

Protecting Your Dashboards and Reports

You've put in a ton of hours getting your dashboard and reports to work the way you want them to. The last thing you need is to have a clumsy client or an overzealous power-user botching up your Excel file.

Before distributing any Excel-based work, you should always consider protecting your file by using the protection capabilities native to Excel. Although none of Excel's protection methods are hacker-proof, they do serve to protect the formulas, data structures, and other objects that make your reporting mechanisms tick.

Securing the entire workbook using file protection options

Perhaps the best way to protect your Excel file is to employ Excel's file protection options. These options enable you to apply protection at the workbook level, requiring a password to view or make changes to the file. This method is by far the easiest to apply and manage. With this method, there's no need to protect each worksheet one at a time. You can simply apply a blanket protection to guard against unauthorized access and edits. Take a moment to review the File Sharing options, which are as follows:

- Forcing Read Only mode unless a password is given
- Requiring a password to open an Excel file
- Removing workbook level protection

The next few sections discuss these options in detail.

Forcing Read Only mode unless a password is given

You can force your workbook to go into Read Only mode unless the user has the appropriate password. This way you can keep your file safe from unauthorized changes, yet still allow authorized users to edit the file.

Here are the steps to force Read Only mode:

1. **Open an existing Excel file and click the Office icon in the upper-left corner.**
2. **Select Save As to activate the Save As dialog box.**
3. **In the Save As dialog box, click the Tools button and select General Options, as demonstrated in Figure 13-1.**

   The General Options dialog box appears.

4. **Enter an appropriate password in the Password to Modify input box (as illustrated in Figure 13-2) and click OK.**

   Note that Excel passwords are case-sensitive, so make sure Caps Lock on your keyboard is in the off position when entering your password.

5. **Excel asks you to reenter your password, so reenter your chosen password.**
6. **Save your file to a new name.**

   At this point, your file is password-protected from unauthorized changes. If you were to open your file, you'd see something similar to Figure 13-3. Failing to enter the correct password causes the file to go into Read Only mode.

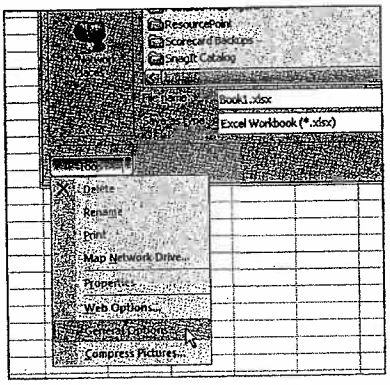


Figure 13-1: The File Sharing options are well hidden in the Save As dialog box under General Options.

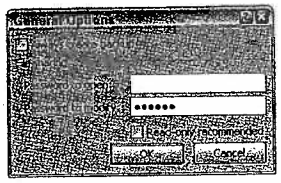


Figure 13-2: Enter the password needed to modify the file.

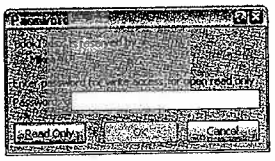


Figure 13-3: A password is now needed to make changes to the file.

Requiring a password to open an Excel file

You may have instances where your Excel dashboards are so sensitive only certain users are authorized to see them. In these cases, you can force your workbook to require a password to open. Here are the steps to employ a password to open the file.

1. **Open an existing Excel file and click the Office icon in the upper-left corner.**
2. **Select Save As to activate the Save As dialog box.**
3. **In the Save As dialog box, click the Tools button and select General Options. (Refer to Figure 13-1.)**

The General Options dialog box opens.

4. **Enter an appropriate password in the Password to Open input box (as illustrated in Figure 13-4) and click OK.**
5. **Excel asks you to reenter your password.**
6. **Save your file to a new name.**

   At this point, your file is password-protected from unauthorized viewing.

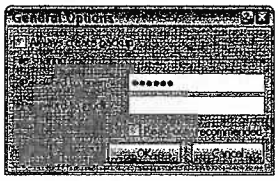


Figure 13-4: Enter the password needed to modify the file.

Removing workbook level protection

Removing workbook level protection is as easy as clearing the passwords from the General Options dialog box. Here's how you do it:

1. **Open an existing Excel file and click the Office icon in the upper-left corner.**
2. **Select Save As to activate the Save As dialog box.**
3. **In the Save As dialog box, click the Tools button and select General Options. (Refer to Figure 13-1.)**

   The General Options dialog box opens.
4. **Clear the Password to Open input box as well as the Password to Modify input box and click OK.**
5. **Save your file.**

Notice the Read-Only Recommended check box in the General Options dialog box (refer to Figure 13-4). When you place a check in this check box, you get a cute but useless message recommending read-only mode upon opening the file. This message is only a recommendation and does not prevent anyone from opening the file as read/write.

Protecting worksheets

You may find that you need to apply protection to specific worksheets, preventing users from taking certain actions. For example, you may not want

users to break your data model by inserting or deleting columns and rows. You can prevent this by applying protection to your worksheet.

Unlocking editable ranges

By default, all cells in a worksheet are set to be locked when you apply worksheet level protection. That is to say, after you protect a worksheet, the cells on that worksheet can't be altered in any way. That being said, you may find you need certain cells or ranges to be editable even in a locked state, like the example shown in Figure 13-5.

1. **Select the cells you need to unlock.**
2. **Right-click and choose Format Cells.**
3. **On the Protection tab, as shown in Figure 13-6, deselect the Locked property.**

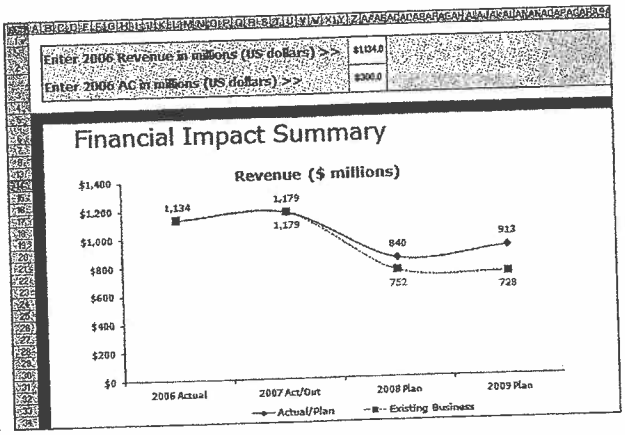


Figure 13-5: Though this sheet needs to be protected, users will need to enter 2006 data into the input cells provided.

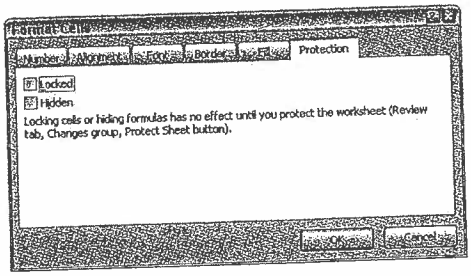


Figure 13-6: To ensure a cell remains unlocked when the worksheet is protected, deselect the Locked property.

4. **Click OK to apply the change.**

Applying worksheet protection

After you've selectively unlocked the necessary cells, you can commence to applying worksheet protection. Just follow these steps:

1. **Click the Protect Sheet button on the Review tab of the Ribbon (see Figure 13-7) to activate the Protect Sheet dialog box.**

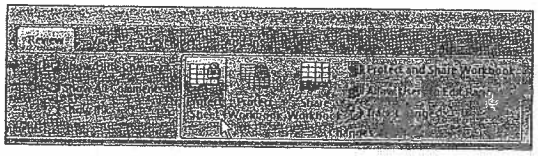


Figure 13-7: Click Protect Sheet in the Review tab.

2. **Enter a password in the given input box, as demonstrated in Figure 13-8, then click the OK button.**

   This is the password that removes worksheet protection. Note that specifying a password is optional, as you can apply and remove worksheet protection without one.

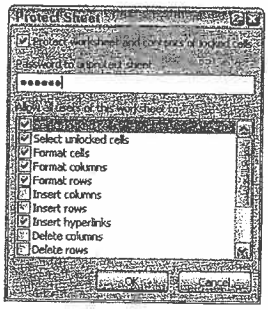


Figure 13-8: Specify a password that removes worksheet protection.

3. **In the list below the password input (see Figure 13-8), specify which elements users are allowed to change when you protect the worksheet.**

   When a check box is cleared for a particular action, Excel prevents users from taking that action.

   Take a moment to familiarize yourself with the some of the actions you can limit when protecting a worksheet. They are as follows:

   - *Select Locked Cells:* Allows or prevents the selection of locked cells.

- *Select Unlocked Cells:* Allows or prevents the selection of unlocked cells.
- *Format Cells:* Allows or prevents the formatting of cells.
- *Format Columns:* Allows or prevents the use of column formatting commands, including changing column width or hiding columns.
- *Format Rows:* Allows or prevents the use of row formatting commands, including changing row height or hiding rows.
- *Insert Columns:* Allows or prevents the inserting of columns.
- *Insert Rows:* Allows or prevents the inserting of rows.
- *Insert Hyperlinks:* Allows or prevents the inserting of hyperlinks.
- *Delete Columns:* Allows or prevents the deleting of columns. Note that if Delete Columns is protected and Insert Columns is *not* protected, you can technically insert columns you can't delete.
- *Delete Rows:* Allows or prevents the deleting of rows. Note that if Delete Rows is protected and Insert Rows is *not* protected, you can technically insert columns you can't delete.
- *Sort:* Allows or prevents the use of Sort commands. Note that this doesn't apply to locked ranges. Users can't sort ranges that contain locked cells on a protected worksheet, regardless of this setting.
- *Use AutoFilter:* Allows or prevents use of Excel's AutoFilter functionality. Users can't create or remove AutoFiltered ranges on a protected worksheet, regardless of this setting.
- *Use PivotTable Reports:* Allows or prevents the modifying, refreshing, or formatting of pivot tables found on the protected sheet.
- *Edit Objects:* Allows or prevents the formatting and altering of shapes, charts, text boxes, controls, or other graphics objects.
- *Edit Scenario:* Allows or prevents the viewing of scenarios.

4. **If you provided a password, reenter the password.**
5. **Click OK to apply the worksheet protection.**

Removing worksheet protection

Just follow these steps to remove any worksheet protection you may have applied:

1. **Click the Unprotect Sheet button on the Review tab.**
2. **If you specified a password while protecting the worksheet, Excel asks you for that password (see Figure 13-9). Enter the password and click OK to immediately remove protection.**

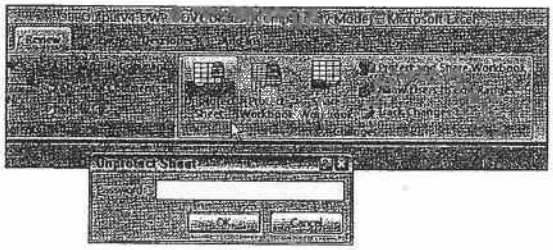


Figure 13-9: The Unprotect Sheet button removes worksheet protection.

Protecting the workbook structure

If you look under the Review tab in the Ribbon, you see the Protect Workbook button next to the Protect Sheet button. Protecting the workbook enables you to prevent users from taking any action that affects the structure of your workbook, such as adding/deleting worksheets, hiding/unhiding worksheets, and naming or moving worksheets. Just follow these steps to protect a workbook:

1. **Click the Protect Workbook button on the Review tab of the Ribbon to activate the Protect Structure and Windows dialog box, as shown in Figure 13-10.**

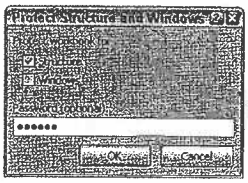


Figure 13-10: The Protect Structure and Windows dialog box.

2. **Choose which elements you want to protect: workbook structure, windows, or both.**

   When a check box is cleared for a particular action, Excel prevents users from taking that action.

   Selecting Structure prevents users from

   - Viewing worksheets that you've hidden
   - Moving, deleting, hiding, or changing the names of worksheets
   - Inserting new worksheets or chart sheets
   - Moving or copying worksheets to another workbook

- Displaying the source data for a cell in a pivot table Data area or displaying pivot table Page field pages on separate worksheets
- Creating a scenario summary report
- Using any Analysis Toolpak utilities that require results to be placed on a new worksheet
- Recording new macros

Choosing Windows prevents users from changing, moving, or sizing the workbook windows while the workbook is opened.

3. **If you provided a password, reenter the password.**
4. **Click OK to apply the worksheet protection.**

Linking Your Excel Dashboards into PowerPoint

There are at least eight different methods to get Excel data into PowerPoint. For our purposes, I'll focus on the method that is most conducive to presenting frequently updated dashboards and reports in PowerPoint — creating a dynamic link. A *dynamic link* allows your PowerPoint presentation to automatically pick up changes you make to your Excel files.

Creating the link between Excel and PowerPoint

When you copy and paste a range of data, you're simply creating a picture of the range. However, when you create a link to a range, PowerPoint stores the location information to your source field and then displays a representation of the linked data. The net effect is that when the data in your source file changes, PowerPoint updates its representation of the data to reflect the changes.

To test this concept of linking to an Excel range, follow these steps:

1. **Open the `Chapter 13 Sample File.xlsx` file.**

   This file is available on this book's companion Web site.

2. **Click the chart once to select it and press Ctrl+C on your keyboard to copy the chart.**

If you're copying multiple charts, you don't have to copy one at a time. Simply select the range of cells that contain the charts and press Ctrl+C to copy. This way, you're copying everything in that range of cells — charts and all.

3. **Open a new PowerPoint document and place your cursor at the location you want the linked table to be displayed.**
4. **On the Home tab in PowerPoint, choose Paste⇨Paste Special, as demonstrated in Figure 13-11.**

   The Paste Special dialog box appears. (See Figure 13-12.)
5. **Select the Paste Link radio button and choose Microsoft Excel Chart Object from the list of document types.**

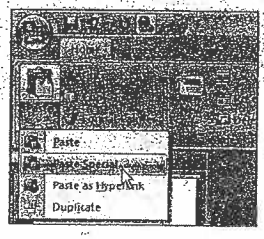


Figure 13-11: Select Paste Special from the home tab in PowerPoint.

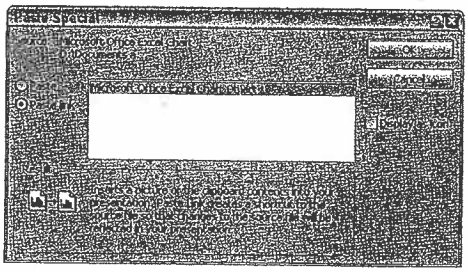


Figure 13-12: Be sure to select Paste Link and set the link as an Excel Chart Object.

6. **Click OK to apply the link.**

   At this point, you have a chart on your PowerPoint presentation that's linked back to your Excel file. (See Figure 13-13.)

This technique of linking Excel charts to PowerPoint is ideal if you aren't proficient at building charts in PowerPoint. Build the chart in Excel and then simply create a link for the chart in PowerPoint.

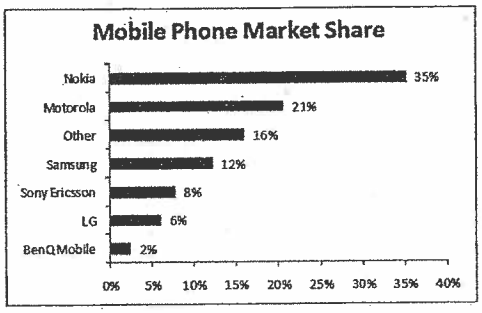


Figure 13-13: Your Excel chart is now linked into your new PowerPoint presentation.

Manually refreshing links to capture updates

The wonderful thing about dynamic links is they can be refreshed, enabling you to capture any updates in your Excel files without recreating the links. To see how this works, follow these steps:

1. **Go back to your Excel file (from the example in the previous section) and change the values for Samsung and Nokia, as demonstrated in Figure 13-14.**

   Note the chart has changed.

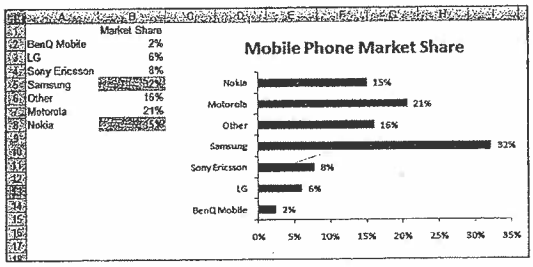


Figure 13-14: With a linked chart, you can make changes to the raw data without worrying about re-exporting the data into PowerPoint.

2. **Return to PowerPoint, right-click the chart link in your presentation and choose Update Link, as demonstrated in Figure 13-15.**

   You see that your linked chart automatically captures the changes.

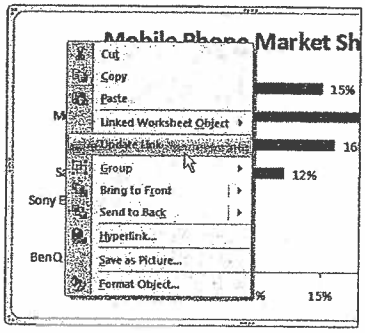


Figure 13-15: You can manually update links.

3. **Save and close both your Excel file and your PowerPoint presentation, and then open only your newly-created PowerPoint presentation.**

   This time you see the message shown in Figure 13-16. Clicking the Update Links button refreshes all links in the PowerPoint presentation. Each time you open any PowerPoint presentation with links, it asks you whether you want to update the links.

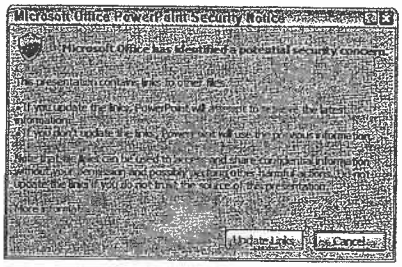


Figure 13-16: PowerPoint, by default, asks if you want to update all links in the presentation.

Automatically refreshing links to capture updates

Having PowerPoint ask you whether you want to update the links each and every time you open your presentation quickly gets annoying. You can avoid this message by specifying that PowerPoint automatically refresh your dynamic links upon opening the file. Here's how:

1. **In PowerPoint, click the Office icon in the upper-left corner.**
2. **Select the Prepare option and then click Edit Links to Files, as shown in Figure 13-17.**

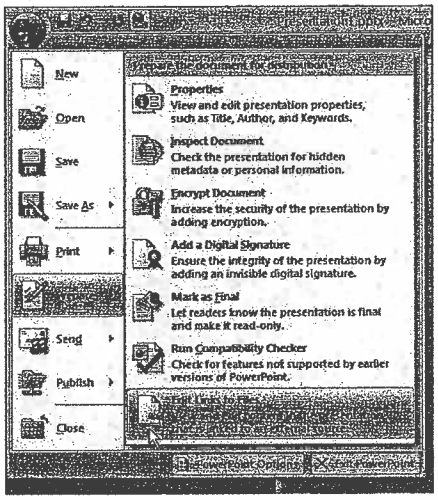


Figure 13-17: Open the dialog box to manage your links.

The Links dialog box appears. (See Figure 13-18.)

3. **Click each of your links and select the Automatic radio button.**

To select multiple links in the Links dialog box, hold down the Ctrl key on your keyboard while you select your links.

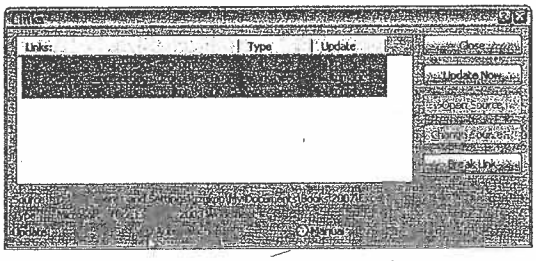


Figure 13-18: Setting the selected links to update automatically.

When your links are set to update automatically, PowerPoint automatically synchronizes with your Excel file and ensures that all your updates are displayed.

Distributing Your Dashboards via PDF

In Excel 2007, Microsoft has made it possible to convert your Excel Worksheets to PDF (Portable Document Format) or XPS (XML Paper Specification). *PDF* is the standard document sharing format developed by Adobe. *XPS* is Microsoft's own open-source competitor to Adobe's PDF file format. Distributing your reports and dashboards as PDF or XPS documents allows you to share your work without sharing your entire workbook.

Due to some legal complications, Microsoft was unable to include the "convert to PDF" functionally natively to Excel. That is, you won't find that option in Excel by default. You'll have to install Microsoft's free utility to convert your work to PDF.

To install this utility, follow these steps:

1. **Click on the Office icon in the upper-left corner of Excel**
2. **Select Save As, then choose Find Add-Ins for Other File Formats.**

   A Help file opens.
3. **In the Help file, select the Install and Use the Publish as PDF or XPS Add-in from Microsoft option.**
4. **Click on the link to go to the Web site for the Microsoft Save as PDF or XPS Add-in.**
5. **When asked for software validation and installation of the Genuine Advantage plug-in, click Continue.**

   This is Microsoft's piracy protection check.
6. **After the Genuine Advantage plug-in has done its check, click the Download button to download the Save as PDF or XPS Add-in. Keep a note of where the file is downloaded.**
7. **Double-click on the downloaded file, accept the user agreement that displays, and follow the installation steps.**

The reward for all your work is a new menu selection in Excel's Save As menu. After you have this selection, you can convert a worksheet to PDF or XPS by clicking on the Office Icon, selecting Save As, and then choosing PDF or XPS.

Part VI
The Part of Tens

The 5th Wave By Rich Tennant

"Nifty chart, Frank, but not entirely necessary."

In this part . . .

Both of the chapters found in this section offer approximately ten pearls of wisdom, delivered in bite-sized pieces. In Chapter 14, I share with you ten (or so) best practices for chart building, helping you to design more effective charts. In Chapter 15, I provide a checklist of questions you should ask yourself before sharing your Excel dashboards and reports.

Chapter 14

Ten Chart Design Principles

In This Chapter

- Avoiding fancy formatting
- Skipping unnecessary chart junk
- Formatting large numbers
- Using data tables instead of data labels
- Using chart titles effectively
- Sorting data before charting
- Limiting the use of pie charts
- Parsing data into separate charts
- Maintaining correct aspect ratios
- Knowing when not to use charts

I'm the first to admit, I've created my share of poorly-designed charts — bar charts with every color known to man, line charts with ten or more lines slapped on top of each other, and pie charts with slices so thin they melded into a blob of black ink. When I look at these early disasters, my look of shame is similar to that of a baby boomer looking at pictures of himself in white bell-bottom jeans.

Excel makes charting so simple, it's often tempting to accept the charts it creates no matter how bad the default colors or settings are. But I'm here to implore you to turn away from the glitzy lure of the default settings. You can easily avoid charting fiascos by following a few basic design principles.

In this chapter, I share with you a few of these principles and help you avoid some of the mistakes I've made in the past. (No thanks needed.)

Avoid Fancy Formatting

One of Microsoft's major selling points of Excel 2007 is the new graphics engine that occupies the new Office suite. Excel 2007 makes it easy to apply effects that make everything look shiny, glittery, and oh-so-pretty. Now don't get me wrong, these new graphics are more-than-okay for charts created for sales and marketing presentations. However, when it comes to dashboards, you definitely want to stay away from them.

Remember that a *dashboard* is a platform to present your case with data. Why dress up your data with superfluous formatting when the data itself is the thing you want to get across? It's like making a speech in a Roman general's uniform. How well will you get your point across when your audience is thinking, "What's the deal with Tiberius?"

Take Figure 14-1, for instance. I created this chart (formatting and all) with just a few clicks. Excel makes it super easy to achieve these types of effects with its new Layout and Style features. The problem is that these effects subdue the very data you're trying to present. Furthermore, if you include this chart on a page with five to ten other charts with the same formatting, you get a blinding mess that's difficult to look at, much less read.

The key to communicating effectively with your charts is to present your data as simply as possible. I promise you, your data is interesting on its own. There's no need to wrap it in eye candy to make it more interesting.

Figure 14-2 shows the same data without the fancy formatting. I think you'll find that not only is the chart easier to read, but you can process the data more effectively from this chart.

Here are some simple tips to keep from overdoing the fancy factor:

- **Don't apply background colors to the Chart or Plot area.** Colors in general should be reserved for key data points in your chart.
- **Don't use 3D charts or 3D effects.** No one's going to give you an Oscar for special effects. Anything 3D doesn't belong on a dashboard.
- **Avoid applying fancy effects, such as gradients, pattern fills, shadows, glow, soft edges, and other formatting.** Again, the word of the day is *focus,* as in "focus on the data and not the shiny happy graphics."
- **Don't try to enhance your charts with clip art or pictures.** Not only do they do nothing to further data presentation, but they often just look tacky.

Figure 14-1: Fancy formatting can be overwhelming, subduing the very data you're trying to present.

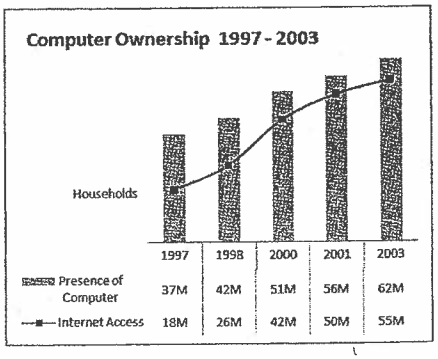


Figure 14-2: Charts should present your data as simply as possible.

Skip the Unnecessary Chart Junk

Data visualization pioneer Edward Tufte introduced the notion of *data to ink ratio.* Tufte's basic idea is that a large percentage of the ink on your chart or dashboard should be dedicated to data. Very little ink should be used to present what he calls *chart junk:* borders, gridlines, trend lines, labels, backgrounds, and so on.

Figure 14-3 illustrates the impact chart junk can have on your ability to communicate your data. At first glance, the top chart in Figure 14-3 may look over-exaggerated in its ambition to show many chart elements at one time, but believe me, there are charts out there that look like this. Notice how convoluted and cramped the data looks.

The bottom chart presents the same information as the top chart. However, the bottom chart more effectively presents the core message that driver registrations in Texas rose from 10+ million to almost 17+ million (a message that was somehow diluted in the top chart). You can see from this simple example how a chart can be dramatically improved by simply removing the elements that don't directly contribute to the core message of the chart.

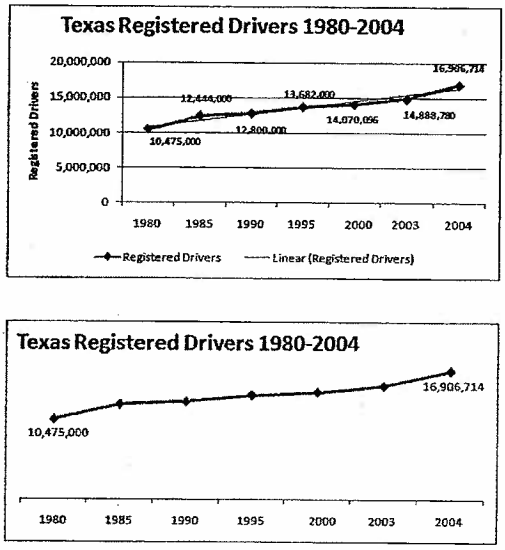


Figure 14-3: Charts with too many chart elements can become convoluted and hard to read. Removing the unnecessary elements clarifies the message.

Here are a few ways to avoid chart junk and ensure your charts clearly present your data:

- **Remove gridlines:** Gridlines (both vertical and horizontal) are almost always unnecessary. The implied reason for gridlines is that they help to visually gauge the value represented by each data point. The truth is, however, we typically gauge the value of a data point by comparing its position to the other data points in the chart. So gridlines become secondary reference points that simply take up ink.
- **Remove borders:** You'll find that eliminating borders and frames gives your charts a cleaner look and helps avoid the dizzying lines you get when placing many charts with borders on a single dashboard. Instead of borders, space your charts to make use of the white space between the charts as implied borders.
- **Skip the trend lines:** Seldom does a trend line provide insight that can't be gained with the already plotted data or a simple label. In fact, trend lines often state the obvious and sometimes confuse readers into thinking they're another data series. Why place a trend line on a line chart when the line chart is in and of itself a trend line of sorts? Why place a trend line on a bar chart when it's just as easy to look at the top of the bars? In lieu of trend lines, add a simple label that states what you're trying to say about the overall trend of the data.
- **Avoid data label overload:** Nothing says you need to show the data label for every value on your chart. It's okay to plot a data point but not display its value. You'll find that your charts have more impact when

you show only numbers that are relevant to your message. For example, Figure 14-3 shows a trend that includes seven years of data. Although all the years are plotted to show the trend, only values of the first and last plotted years are shown. The first and last plotted year's data is enough to fulfill the purpose of this chart, which is to show the trend and ultimate growth of driver registrations.

- **Don't show a legend if you don't have to:** When you're plotting one data series, there's no need to display a space-taking chart legend. If you allow your chart title to identify the one data series in your chart, you can simply delete the legend.
- **Remove any axis that doesn't provide value:** The purpose of the *x*- and *y*-axes are to help a user visually gauge and position the values represented by each data point. However, if the nature and utility of the chart doesn't require a particular axis, you should remove it. In Figure 14-3, there's no real need for the *y*-axis because the two data points I'm trying to draw attention to are labeled already. Again, the goal here isn't to hack away at your chart. The goal is to only include those chart elements that directly contribute to the core message of your chart.

Format Large Numbers Where Possible

It's never fun to count the zeros in a large number, especially when you're staring at 8-pitch font. When plotting very large numbers on a chart, consider formatting the values so that they're truncated for easy reading.

For instance, in Figure 14-4, I've formatted the values to be displayed as `10M` and `17M` instead of the hard-to-read `10,475,000` and `16,906,714`.

You can easily format large numbers in Excel by using the Format Cells dialog box. Here, you can specify a custom number format by selecting Custom in the Category list and entering the desired number format code in the Type input box. If Figure 14-5, the code `"0,,"M"` ensures the numbers are formatted to millions with an `M` appendage.

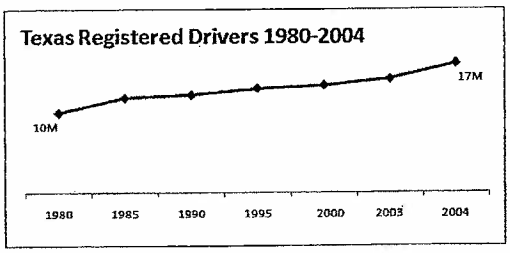


Figure 14-4: Formatting large numbers to millions or thousands makes for a clearer chart.

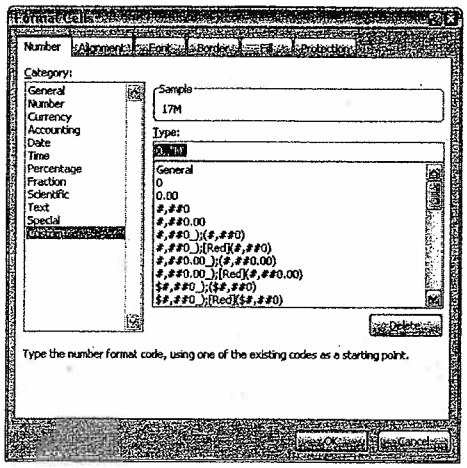


Figure 14-5: Select Custom in the Category list and enter a number format code in the Type input box.

To get to the Format Cells dialog box, highlight the numbers you're formatting, right-click, and then choose Format Cells.

It's generally good practice to format the source data that feeds your chart as opposed to the data labels on your chart. This way, your formatting persists even as you add and remove data labels.

In Chapter 1, you will find a table under the section "A Quick Look at Dashboard Design Principles" which lists some common format codes and how they can affect your numbers.

Use Data Tables instead of Data Labels

There may be situations where it's valuable to show all the data values along with the plotted data points. However, you've already seen how data labels can inundate your users with chart junk.

Instead of using data labels, you can attach a data table to your Excel chart. A *data table* allows you to see the data values for each plotted data point, beneath the chart. Figure 14-6 illustrates a data table, showing the data values for two series. As you can see, a lot of information is shown here without overcrowding the chart itself.

Although it is true that data tables increase the space your charts take up on your dashboard, they respond well to formatting and can be made to meld nicely into your charts. Data tables come in particularly handy if your clients are constantly asking to see the detailed information behind your charts.

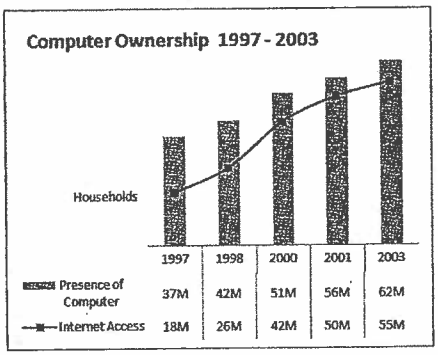


Figure 14-6: Data tables enable you to show data values without overloading your chart with data labels.

Here are the steps you take to add a data table to your chart:

1. **Click your chart and select the Layout tab.**
2. **Click the Data Table icon and select Show Data Table with Legend Keys, as demonstrated in Figure 14-7.**

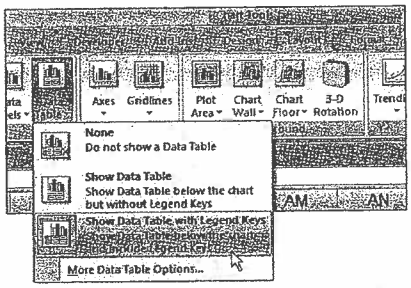


Figure 14-7: Adding a data table to a chart.

3. **Right-click your newly-added data table and choose Format Data Table.**

   The Format Data Table dialog box appears. (See Figure 14-8.)

4. **Apply any additional formatting to your data table.**

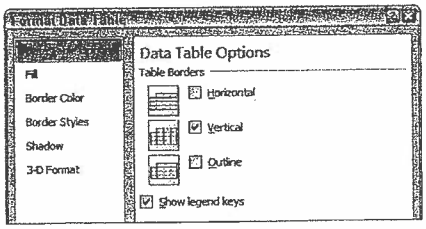


Figure 14-8: The Format Data Table dialog box.

Make Effective Use of Chart Titles

Chart titles don't have to be limited to simple labeling and naming duties. You can use chart titles to add an extra layer of information, presenting analysis derived from the data presented in the chart. Figure 14-9 demonstrates this.

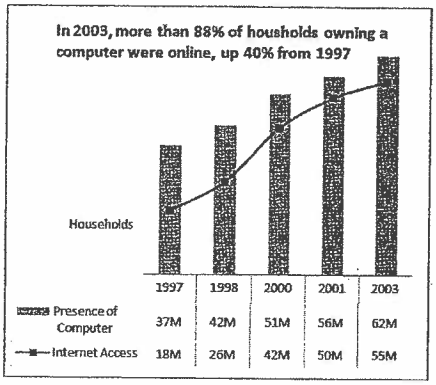


Figure 14-9: Use chart labels to present an extra layer of data without taking up extra space on your dashboard.

Sort Your Data before Charting

Unless there's an obvious natural order, such as age or time, it's generally good practice to sort your data when charting. By *sorting,* I mean sort the source data that feeds your chart in Ascending or Descending order by data value.

As you can see in Figure 14-10, building a chart using a dataset sorted by values enhances its readability and somehow gives the chart a professional look and feel.

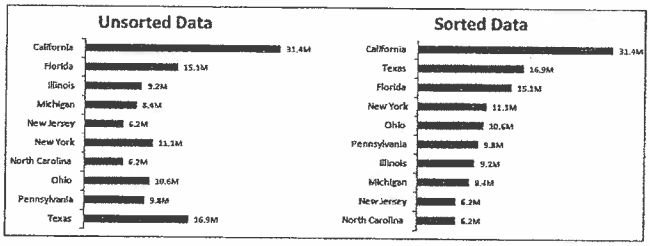


Figure 14-10: Using sorted data in a chart improves readability and clarity.

Limit the Use of Pie Charts

Although pie charts have long been considered a viable charting option for business reporting, they often aren't well suited for dashboard reporting. There are several reasons for this.

First, they typically take up more space than their cousins, the line and bar charts. Sure, you can make them small, but pixel for pixel, you get a lot less bang for your data visualization buck with a pie chart.

Second, pie charts can't clearly represent more than two or three data categories. Figure 14-11 demonstrates this fact.

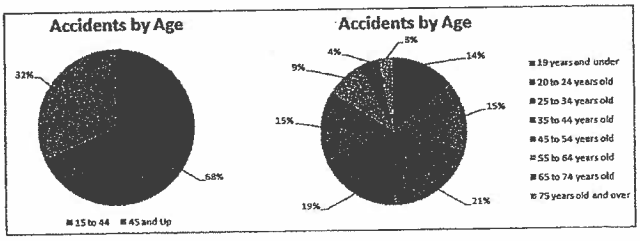


Figure 14-11: Pie charts can't clearly represent more than two or three data categories.

The pie chart on the left does a good job visually representing two data categories. You can easily distinguish the two categories and clearly get a sense of distribution for each category. The pie chart on the right is a different story. As you can see, when you go past two or three categories, a pie chart isn't as effective in relaying the proper sense of percent distribution. The slices are too similar in size and shape to visually compare the categories. Plus, the legend and data categories are disconnected, causing your eyes to jump back and forth from pie to legend (even in color this the legend doesn't help). Sure, you could add category labels, but that would cause the chart to take up more real estate without adding much value.

So what's the alternative? Instead of a pie chart, consider using a bar chart. With a bar chart, you can clearly represent the distribution percentages for many categories without taking the need for extra real estate. In Figure 14-12, you can see the dramatic improvement in clarity you can achieve by using bar charts.

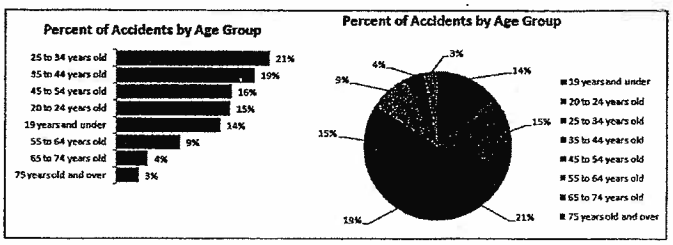


Figure 14-12: Bar charts are an ideal alternative to pie charts.

Don't Be Afraid to Parse Data into Separate Charts

Be aware that a single chart can lose its effectiveness if you try to plot too much data into it. Take Figure 14-13, for example.

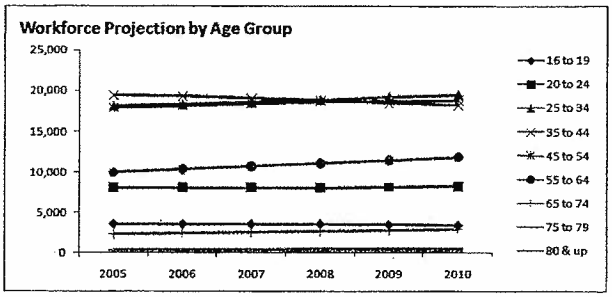


Figure 14-13: Sometimes you work with so much data that your charts no longer make sense.

You have a couple of problems here. First, the data is split into nine age groups, which forces the use of nine lines. When you start plotting more than three lines on a line chart, your chart begins to look jumbled. Second, the age groups themselves have a wide range of data values. This causes the chart's *y*-axis scale to be so spread that each line essentially looks like a straight line.

In situations like this, step back and try to boil down what exactly the chart needs to do. What is the ultimate purpose of the chart? In this case, the ultimate purpose of this chart is to show the growth or decline of the workforce numbers for each age group. Now, you obviously can't show every data point on the same chart, so you have to show each age group in its own chart. That being said, you want to make sure that you can see each age group alongside the other for comparison purposes.

Figure 14-14 shows just one of many solutions for this particular example.

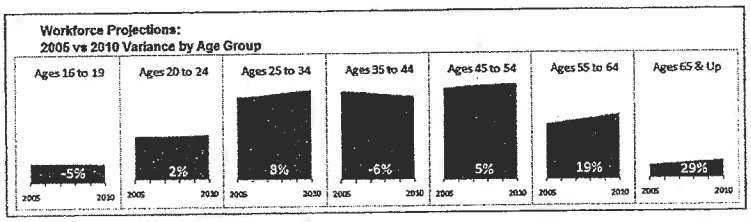


Figure 14-14: Creating separate individual charts is often better than one convoluted chart.

Here, I've created a separate area chart for each age group and then lined them up side by side. Each chart individually shows a general trend from 2005 to 2010. Because they're placed together, you can get an idea of the magnitude of each age group. Also, notice that I grouped the last three age groups into one group called 65 & Up. This groups the three smallest categories into one that's worthy of plotting. Finally, I used data labels to quickly show the growth or decline percentage from 2005 to 2110 for each group.

Again, this isn't the only solution to this problem, but it does do the job of displaying the analysis I chose to present.

It's not always easy to know exactly how to display your data in a chart — especially when the data is multi-layered and complex. Instead of jamming the world into one chart, step back and think about how to show the data separately, but together.

Maintain Appropriate Aspect Ratios

In terms of charts, aspect ratio refers to the ratio of height to width. That is to say, charts should maintain an approximate height to width ratio in order for the integrity of the chart remain intact. Take a look at Figure 14-15 to see what I mean.

The chart at the top of Figure 14-15 is at an appropriate aspect ratio that correctly renders the chart. The bottom two charts display the same data, but the aspect ratios of these charts are skewed. The middle chart is too tall and the bottom chart is too wide. This essentially distorts the visual representation, exaggerating the trend in the chart that's too tall, and flattening the trend in the chart that's too wide.

I've seen lots of people contort their charts just to fit them into the empty space on their dashboards. If you want to avoid distorting your charts, you must keep them at an appropriate aspect ratio. What is that ratio?

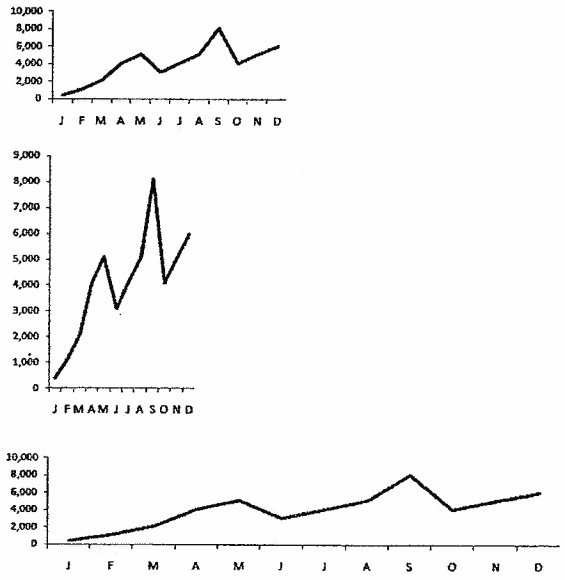


Figure 14-15: A skewed aspect ratio can distort your charts.

Generally speaking, the most appropriate aspect ratio for a chart is one where the width of the chart is about twice as long as the height is tall. For example, 1" tall by 2" wide is an appropriate ratio. 1.5" tall by 3" wide is also appropriate. The actual height and width isn't important. You can make your charts as small or as big as they need to be. What is important is the ratio of height to width.

Don't Be Afraid to Use Something Other Than a Chart

As we've already discussed in Chapter 15, some analyses just don't require a chart. Ask yourself if a simple table will present the data just fine. If the data you are reporting can be more effectively shared in a table, then that's how it should be presented. Remember, the goal of a dashboard is not to present everything in a chart. The goal of a dashboard is to present key data in the most effective way possible.

Chapter 15

Ten Questions to Ask Before Distributing Your Dashboard

In This Chapter

- Does your dashboard present the right information?
- Does everything in your dashboard have a purpose?
- Does your dashboard prominently display the key message?
- Can you maintain your dashboard?
- Does your dashboard clearly display its scope and shelf-life?
- Is your dashboard well documented?
- Does your dashboard use overwhelming graphics?
- Does your dashboard overuse charts?
- Is your dashboard user-friendly?
- Is your dashboard accurate?

You started this book with two chapters that discuss a few design and data modeling principles that, together, make up what could be considered dashboarding's best practices. Before you send out your finished product, it's valuable to check your reporting mechanism against some of the principles covered in this book. Use the ten questions in this chapter as a kind of checklist to ensure your dashboard follows the best practices covered in this book.

Does My Dashboard Present the Right Information?

Look at the information you're presenting and determine if it meets the purpose of the dashboard you identified during the requirements-gathering stage. Don't be timid about clarifying the purpose of the dashboard with the

core users. Avoid building the dashboard in a vacuum. Allow a few test users to see iterations as you develop. This way, clear communication stays open, and you won't go too far in the wrong direction.

Does Everything on My Dashboard Have a Purpose?

Take an honest look at how much information on your dashboard doesn't support its main purpose. In order to keep your dashboard as valuable as possible, you don't want to dilute it with nice-to-know data that's interesting, but not actionable. Remember, if the data doesn't support the core purpose of the dashboard, leave it out. Nothing says you have to fill every bit of white space on the page.

Does My Dashboard Prominently Display the Key Message?

Every dashboard has one or more key messages. You want to ensure that these messages are prominently displayed. To test if the key messages in a dashboard are prominent, stand back and squint your eyes while you look at the dashboard. Look away and look at the dashboard several times. What jumps out at you first? If it's not the key components you want displayed, you'll have to change something. Here are a few actions you can take to ensure your key components have prominence:

- **Place the key components of your dashboard in the upper-left or middle-left portion of the page.** Studies have shown that these areas are attracting the most attention for longer periods of time.
- **De-emphasize borders, backgrounds, and other elements that define dashboard areas.** Try to use the natural white space between your components to partition your dashboard. If borders are necessary, format them to a hue lighter than the one you've used for your data.
- **Format labels and other text to hues lighter than the ones you've used for your data.** Lightly colored labels give your users the information they need without distracting them from the information displayed.

Can I Maintain This Dashboard?

There is a big difference between refreshing a dashboard and rebuilding a dashboard. Before you excitedly send out the sweet-looking dashboard you just built, take a moment to think about the maintenance of such a dashboard. You want to think about the frequency of updates, how often data needs to be refreshed, and what processes you need to go through each time you refresh the data. If it's a one-time reporting event, set that expectation with your users. If you know it'll become a recurring report, you want to really negotiate development time, refresh intervals, and phasing before agreeing to any time table.

Does My Dashboard Clearly Display Its Scope and Shelf Life?

A dashboard should clearly specify its scope and shelf life. That is to say, anyone should be able to look at your dashboard and know the relevant time period and the scope of the information on the dashboard. This comes down to a few simple things you can do to effectively label your dashboards and reports, such as

- **Always include a timestamp on your reporting mechanisms.** This minimizes confusion when distributing the same dashboard or report on regular intervals.
- **Always include some text indicating when the data for the measures was retrieved.** In many cases, timing of the data is a critical piece of information when analyzing a measure.
- **Use descriptive titles for each component in your dashboard.** Be sure to avoid cryptic titles with lots of acronyms and symbols.

Is My Dashboard Well Documented?

It's important to document your dashboard and the data model behind it. Anyone who has ever inherited an Excel spreadsheet knows how difficult it can be to translate the various analytical gyrations that go into a report. If you're lucky, the data model will be small enough to piece together in a week or so. If you're not so lucky, you'll have to ditch the entire model and start from scratch.

By the way, the Excel model doesn't even have to be someone else's to be difficult to read. I've actually gone back to a model that I built, and after six or so months, I'd forgotten what I had done. Without documentation, it took me a few days to remember and decipher my own work.

The documentation doesn't even have to be highfalutin' fancy stuff. A few simple things can help in documenting your dashboard, such as

- **Add a *model map* tab to your data model.** The model map tab is a separate sheet you can use to summarize the key ranges in the data model, and how each range interacts with the reporting components in the final presentation layer.
- **Use comments and labels liberally.** It's amazing how a few explanatory comments and labels can help clarify your model even after you've been away from your data model for a long period of time.
- **Consider using colors to identify the ranges in your data model.** Using colors in your data model enables you to quickly look at a range of cells and get a basic indication of what that range does. Each color can represent a range type. For example, yellow could represent staging tables, grey could represent formulas, and purple could represent reference tables.

Is My Dashboard Overwhelmed with Formatting and Graphics?

By now you've probably gotten the point that, when it comes to formatting dashboards and reports, less is more. Eye candy doesn't make your data more interesting. If you're not convinced, try creating a version of your dashboard without the fancy formatting:

- **Remove distracting colors and background fills.** If you must have colors in charts, use colors that are commonly found in nature: soft grays, browns, blues, and greens.
- **De-emphasize borders by formatting them to hues lighter than the ones you've used for your data.** Light grays are typically ideal for borders. The idea is to indicate sections without distracting from the information displayed.
- **Remove all fancy graphical effects, such as gradients, pattern fills, shadows, glow, soft edges, and other formatting.**
- **Remove the clip art and other pictures.**

I think that when you compare the two versions, you'll find that the toned-down version does a better job of highlighting the actual data.

Does My Dashboard Overuse Charts When Tables Will Do?

Just because you're building a dashboard, doesn't mean everything on it has to be a chart. In some analyses, a simple table will present the data just fine. You typically use a chart when there's some benefit to visually seeing trends, relationships, or comparisons. Ask yourself if there's a benefit to seeing your data in chart form. If the data is relayed better in a table, that's how it should be presented.

Figure 15-1 illustrates a simple example. The chart on the left and the table on the right show the exact same data. The table does a fine job at presenting the key message of the analysis — revenue is at 95 percent of plan. Why use the chart that requires more real estate, not to mention more work and maintenance?

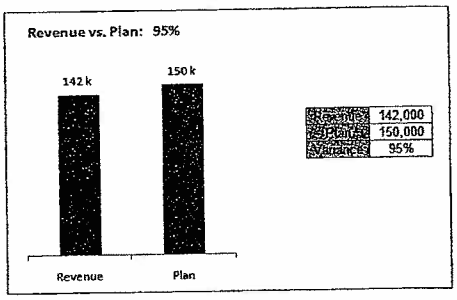


Figure 15-1: Don't use charts for charting's sake.

Is My Dashboard User-Friendly?

Before you distribute your reporting mechanism, you want to ensure that it's user-friendly. It's not difficult to guess what user-friendly means. Usually a user-friendly mechanism has the following characteristics:

- **Intuitive:** Your reporting mechanism should be intuitive to someone who has never seen it before. Test your dashboard on someone and ask him if it makes sense. If you have to start explaining what the dashboard says, something is wrong. Does the dashboard need more labels, fewer complicated charts, a better layout, more data? It's a good idea to get feedback from several users.

- **Easy to navigate:** If your dashboard is dynamic, allowing for interactivity with macros or pivot tables, you should make sure the navigation works well. Does the user have to click several places to get to her data? Is the number of drill-downs appropriate? Does it take too long to switch from one view to another? Again, you want to test your dashboard on several users. Be sure to test any interactive dashboard on several computers other than yours.
- **Prints properly:** Nothing is more annoying than printing a report only to find that the person who created the report didn't take the time to ensure it prints correctly. Be sure you set the print options on your Excel files so that your dashboards print properly.

Is My Dashboard Accurate?

Nothing kills a dashboard or report faster than the perception that its data is inaccurate. It's not within my capabilities to tell you how to determine if your data is accurate. I can, however, highlight three factors that establish the perception that a dashboard is accurate:

- **Consistency with authoritative sources:** It's obvious that if your data doesn't match other reporting sources, you have a data credibility issue, especially if those other sources are deemed to be the authoritative sources. Be sure you're aware of the data sources that are considered to be gospel in your organization. If your dashboard contains data associated with an authoritative source, compare your data with that source to ensure consistency.
- **Internal consistency:** It's never fun to explain why one part of your dashboard doesn't jive with other parts of the same dashboard. You should ensure some level of internal consistency within your dashboard. Be sure comparable components in different areas of your dashboard are consistent with each other. If there's a reason for inconsistency, be sure to clearly notate those reasons. It's amazing how well a simple notation can clear up questions about the data.
- **Personal experience:** Have you ever seen someone look at a report and say, "That doesn't look right"? He's using what some people call *gut feel* to evaluate the soundness of the data. None of us look at numbers in a vacuum. When you look at any analysis, you bring with you years of personal knowledge, interaction, and experience. You subconsciously use these experiences in your evaluation of information. When determining the accuracy of your dashboard, take into consideration organizational *anecdotal knowledge*. If possible, show your dashboard to a few subject-matter experts in your company.

Index

• B •

• C •

• E •

• F •

• G •

• H •

• M •

• N •

• O •

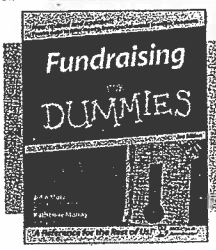
• p •

• Q •

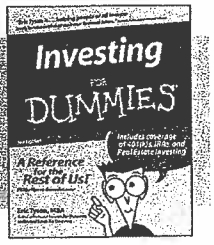
• R •

• S •

BUSINESS, CAREERS & PERSONAL FINANCE



0-7645-9847-3

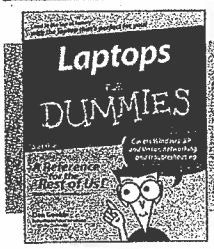


0-7645-2431-3

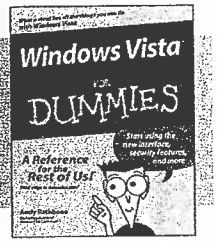
Also available:

- Business Plans Kit For Dummies 0-7645-9794-9
- Economics For Dummies 0-7645-5726-2
- Grant Writing For Dummies 0-7645-8416-2
- Home Buying For Dummies 0-7645-5331-3
- Managing For Dummies 0-7645-1771-6
- Marketing For Dummies 0-7645-5600-2
- Personal Finance For Dummies 0-7645-2590-5*
- Resumes For Dummies 0-7645-5471-9
- Selling For Dummies 0-7645-5363-1
- Six Sigma For Dummies 0-7645-6798-5
- Small Business Kit For Dummies 0-7645-5984-2
- Starting an eBay Business For Dummies 0-7645-6924-4
- Your Dream Career For Dummies 0-7645-9795-7

HOME & BUSINESS COMPUTER BASICS



0-470-05432-8

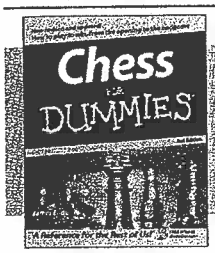


0-471-75421-8

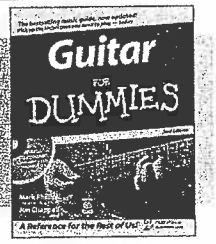
Also available:

- Cleaning Windows Vista For Dummies 0-471-78293-9
- Excel 2007 For Dummies 0-470-03737-7
- Mac OS X Tiger For Dummies 0-7645-7675-5
- MacBook For Dummies 0-470-04859-X
- Macs For Dummies 0-470-04849-2
- Office 2007 For Dummies 0-470-00923-3
- Outlook 2007 For Dummies 0-470-03830-6
- PCs For Dummies 0-7645-8958-X
- Salesforce.com For Dummies 0-470-04893-X
- Upgrading & Fixing Laptops For Dummies 0-7645-8959-8
- Word 2007 For Dummies 0-470-03658-3
- Quicken 2007 For Dummies 0-470-04600-7

FOOD, HOME, GARDEN, HOBBIES, MUSIC & PETS



0-7645-8404-9

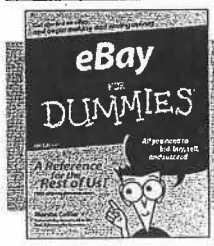


0-7645-9904-6

Also available:

- Candy Making For Dummies 0-7645-9734-5
- Card Games For Dummies 0-7645-9910-0
- Crocheting For Dummies 0-7645-4151-X
- Dog Training For Dummies 0-7645-8418-9
- Healthy Carb Cookbook For Dummies 0-7645-8476-6
- Home Maintenance For Dummies 0-7645-5215-5
- Horses For Dummies 0-7645-9797-3
- Jewelry Making & Beading For Dummies 0-7645-2571-9
- Orchids For Dummies 0-7645-6759-4
- Puppies For Dummies 0-7645-5255-4
- Rock Guitar For Dummies 0-7645-5356-9
- Sewing For Dummies 0-7645-6847-7
- Singing For Dummies 0-7645-2475-5

INTERNET & DIGITAL MEDIA



0-470-04529-9

0-470-04894-8

Also available:

- Blogging For Dummies 0-471-77084-1
- Digital Photography For Dummies 0-7645-9802-3
- Digital Photography All-in-One Desk Reference For Dummies 0-470-03743-1
- Digital SLR Cameras and Photography For Dummies 0-7645-9803-1
- eBay Business All-in-One Desk Reference For Dummies 0-7645-8438-3
- HDTV For Dummies 0-470-09673-X
- Home Entertainment PCs For Dummies 0-470-05523-5
- MySpace For Dummies 0-470-09529-6
- Search Engine Optimization For Dummies 0-471-97998-8
- Skype For Dummies 0-470-04891-3
- The Internet For Dummies 0-7645-8996-2
- Wiring Your Digital Home For Dummies 0-471-91830-X

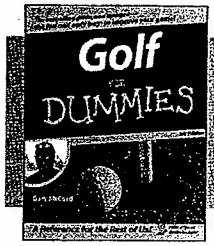
*** Separate Canadian edition also available**
† Separate U.K. edition also available

Available wherever books are sold. For more information or to order direct: U.S. customers visit www.dummies.com or call 1-877-762-2974. U.K. customers visit www.wileyeurope.com or call 0800 243407. Canadian customers visit www.wiley.ca or call 1-800-567-4797.

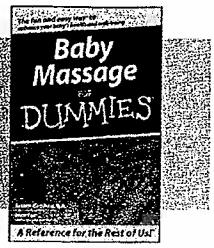
WILEY

H-000342

SPORTS, FITNESS, PARENTING, RELIGION & SPIRITUALITY



0-471-76871-5

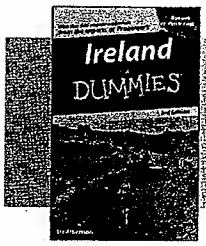


0-7645-7841-3

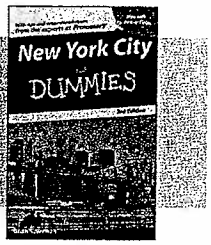
Also available:

- Catholicism For Dummies 0-7645-5391-7
- Exercise Balls For Dummies 0-7645-5623-1
- Fitness For Dummies 0-7645-7851-0
- Football For Dummies 0-7645-3936-1
- Judaism For Dummies 0-7645-5299-6
- Potty Training For Dummies 0-7645-5417-4
- Buddhism For Dummies 0-7645-5359-3
- Pregnancy For Dummies 0-7645-4483-7 †
- Ten Minute Tone-Ups For Dummies 0-7645-7207-5
- NASCAR For Dummies 0-7645-7681-X
- Religion For Dummies 0-7645-5264-3
- Soccer For Dummies 0-7645-5229-5
- Women in the Bible For Dummies 0-7645-8475-8

TRAVEL



0-7645-7749-2

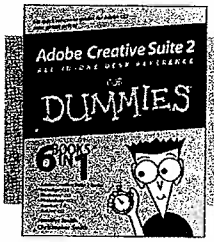


0-7645-6945-7

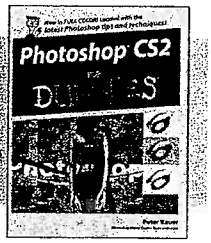
Also available:

- Alaska For Dummies 0-7645-7746-8
- Cruise Vacations For Dummies 0-7645-6941-4
- England For Dummies 0-7645-4276-1
- Europe For Dummies 0-7645-7529-5
- Germany For Dummies 0-7645-7823-5
- Hawaii For Dummies 0-7645-7402-7
- Italy For Dummies 0-7645-7386-1
- Las Vegas For Dummies 0-7645-7382-9
- London For Dummies 0-7645-4277-X
- Paris For Dummies 0-7645-7630-5
- RV Vacations For Dummies 0-7645-4442-X
- Walt Disney World & Orlando For Dummies 0-7645-9660-8

GRAPHICS, DESIGN & WEB DEVELOPMENT



0-7645-8815-X

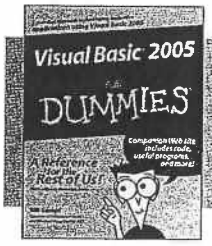


0-7645-9571-7

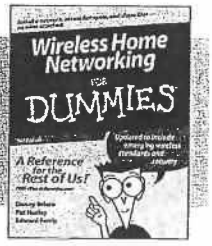
Also available:

- 3D Game Animation For Dummies 0-7645-8789-7
- AutoCAD 2006 For Dummies 0-7645-8925-3
- Building a Web Site For Dummies 0-7645-7144-3
- Creating Web Pages For Dummies 0-470-08030-2
- Creating Web Pages All-in-One Desk Reference For Dummies 0-7645-4345-8
- Dreamweaver 8 For Dummies 0-7645-9649-7
- InDesign CS2 For Dummies 0-7645-9572-5
- Macromedia Flash 8 For Dummies 0-7645-9691-8
- Photoshop CS2 and Digital Photography For Dummies 0-7645-9580-6
- Photoshop Elements 4 For Dummies 0-471-77483-9
- Syndicating Web Sites with RSS Feeds For Dummies 0-7645-8848-6
- Yahoo! SiteBuilder For Dummies 0-7645-9800-7

NETWORKING, SECURITY, PROGRAMMING & DATABASES



0-7645-7728-X

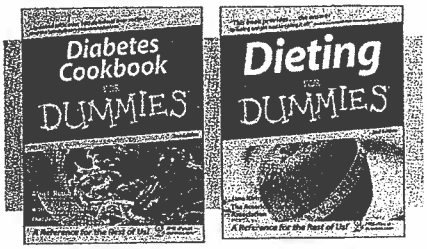


0-471-74940-0

Also available:

- Access 2007 For Dummies 0-470-04612-0
- ASP.NET 2 For Dummies 0-7645-7907-X
- C# 2005 For Dummies 0-7645-9704-3
- Hacking For Dummies 0-470-05235-X
- Hacking Wireless Networks For Dummies 0-7645-9730-2
- Java For Dummies 0-470-08716-1
- Microsoft SQL Server 2005 For Dummies 0-7645-7755-7
- Networking All-in-One Desk Reference For Dummies 0-7645-9939-9
- Preventing Identity Theft For Dummies 0-7645-7336-5
- Telecom For Dummies 0-471-77085-X
- Visual Studio 2005 All-in-One Desk Reference For Dummies 0-7645-9775-2
- XML For Dummies 0-7645-8845-1

HEALTH & SELF-HELP

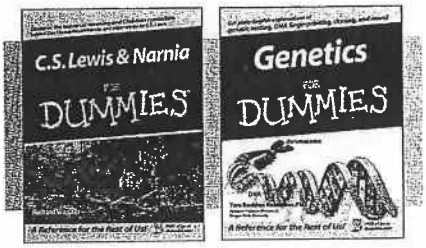


0-7645-8450-2 0-7645-4149-8

Also available:

- Bipolar Disorder For Dummies 0-7645-8451-0
- Chemotherapy and Radiation For Dummies 0-7645-7832-4
- Controlling Cholesterol For Dummies 0-7645-5440-9
- Diabetes For Dummies 0-7645-6820-5* †
- Divorce For Dummies 0-7645-8417-0 †
- Fibromyalgia For Dummies 0-7645-5441-7
- Low-Calorie Dieting For Dummies 0-7645-9905-4
- Meditation For Dummies 0-471-77774-9
- Osteoporosis For Dummies 0-7645-7621-6
- Overcoming Anxiety For Dummies 0-7645-5447-6
- Reiki For Dummies 0-7645-9907-0
- Stress Management For Dummies 0-7645-5144-2

EDUCATION, HISTORY, REFERENCE & TEST PREPARATION



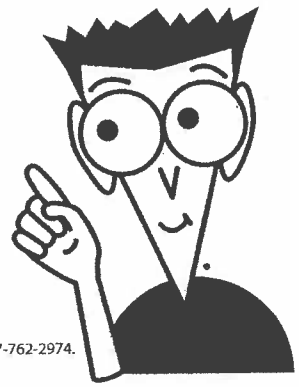
0-7645-8381-6 0-7645-9554-7

Also available:

- The ACT For Dummies 0-7645-9652-7
- Algebra For Dummies 0-7645-5325-9
- Algebra Workbook For Dummies 0-7645-8467-7
- Astronomy For Dummies 0-7645-8465-0
- Calculus For Dummies 0-7645-2498-4
- Chemistry For Dummies 0-7645-5430-1
- Forensics For Dummies 0-7645-5580-4
- Freemasons For Dummies 0-7645-9796-5
- French For Dummies 0-7645-5193-0
- Geometry For Dummies 0-7645-5324-0
- Organic Chemistry I For Dummies 0-7645-6902-3
- The SAT I For Dummies 0-7645-7193-1
- Spanish For Dummies 0-7645-5194-9
- Statistics For Dummies 0-7645-5423-9

Get smart @ dummies.com®

- **Find a full list of Dummies titles**
- **Look into loads of FREE on-site articles**
- **Sign up for FREE eTips e-mailed to you weekly**
- **See what other products carry the Dummies name**
- **Shop directly from the Dummies bookstore**
- **Enter to win new prizes every month!**



*** Separate Canadian edition also available**
† Separate U.K. edition also available

Available wherever books are sold. For more information or to order direct: U.S. customers visit www.dummies.com or call 1-877-762-2974. U.K. customers visit www.wileyeurope.com or call 0800 243407. Canadian customers visit www.wiley.ca or call 1-800-567-4797.

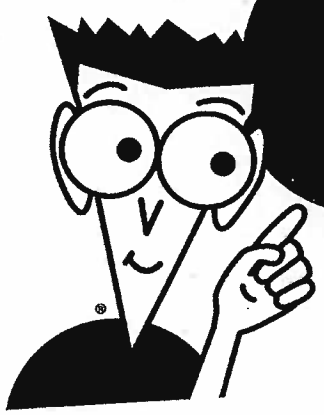
Do More with Dummies

Instructional DVDs • Music Compilations
Games & Novelties • Culinary Kits
Crafts & Sewing Patterns
Home Improvement/DIY Kits • and more!

Check out the Dummies Specialty Shop at www.dummies.com for more information!

WILEY

H-000345



Create dashboards that communicate and get noticed

Use pivot tables and form controls to build reports that mean something

What's the use of putting out reports that no one bothers to read? Properly created dashboards are graphical representations that put data in a context for your audience, and they look really cool. You'll find out when you see the examples in this book, and soon your dashboards and reports will be getting rave reviews.

Michael Alexander is a Microsoft Certified Application Developer who has written seven books on advanced business analysis using Access and Excel. He also runs a free tutorial site, www.datapigtechnologies.com.

Discover how to:

- *Think about your data in a new way*
- *Create dynamic labels that support visualization*
- *Represent time and seasonal trending*
- *Display and measure values versus goals*
- *Give users an active interface*

THE DUMMIES WAY®

- *Explanations in plain English*
- *"Get in, get out" information*
- *Icons and other navigational aids*
- *Tear-out cheat sheet*
- *Top ten lists*
- *A dash of humor and fun*

@www.dummies.com

Companion Web site

- *Go to www.dummies.com/go/dashboards*
- *Find sample files used in the book*
- *Use them in building your dashboards*

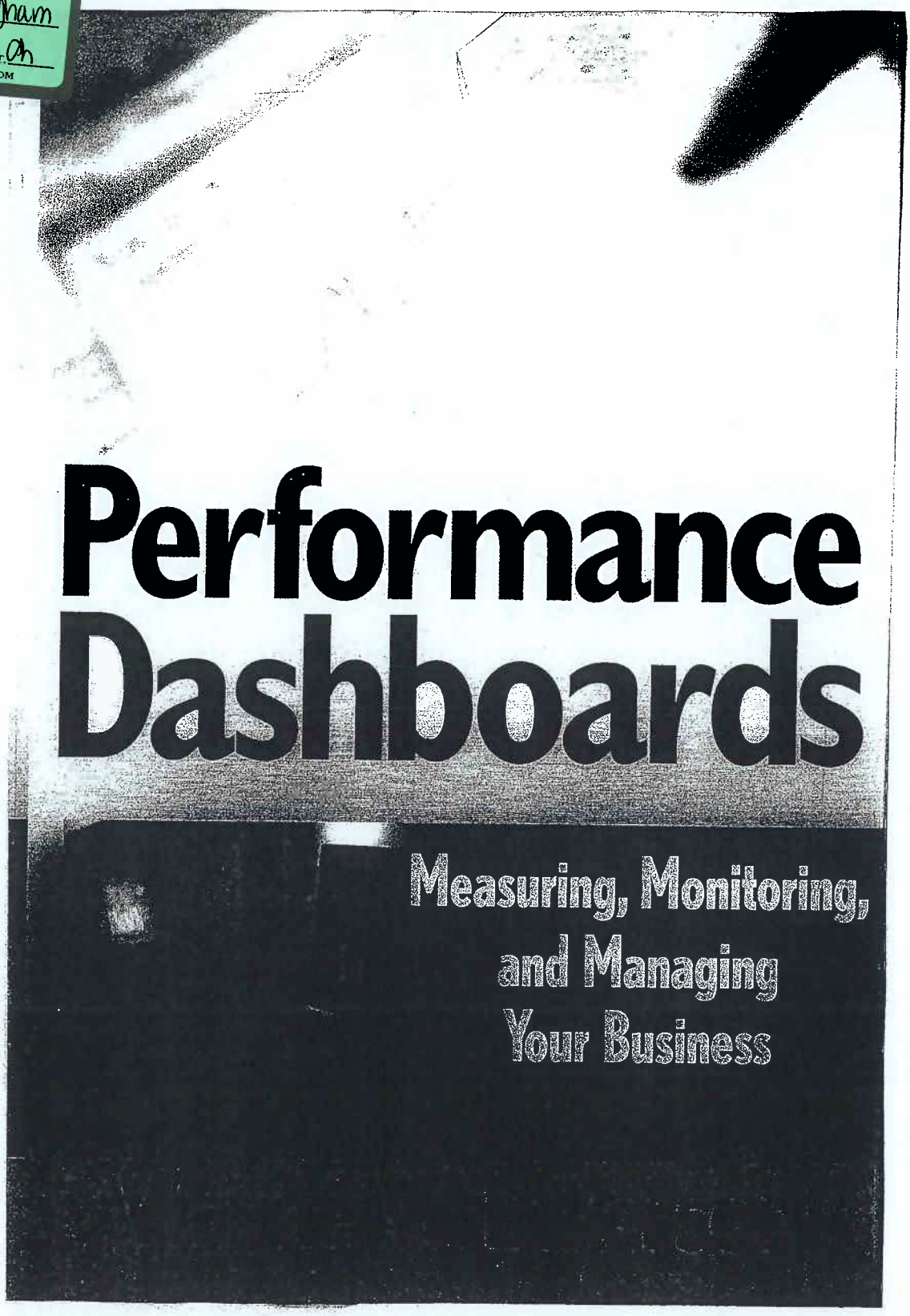
ISBN 978-0-470-22814-2

$24.99 US
$26.99 CN
£15.99 UK

Computers/Spreadsheets

9 780470 228142 52499

For Dummies®
A Branded Imprint of
WILEY



Performance Dashboards

Measuring, Monitoring, and Managing Your Business

$45.00 USA/$58.99 CAN/£27.99 UK

Performance Dashboards

Measuring, Monitoring, and Managing Your Business

Performance dashboards are rapidly becoming the preferred way that business professionals view and analyze information about the performance of their business and the activities they manage. In a nutshell, performance dashboards let busy executives, managers, and staff view the performance of key business metrics at a glance and then move swiftly through successive layers of actionable information in a carefully guided manner, so they get the insight they need to solve problems quickly, efficiently, and effectively. By helping business people keep a pulse on their business and chart progress towards meeting strategic and tactical objectives, performance dashboards are becoming powerful agents of organizational change.

In *Performance Dashboards,* author Wayne Eckerson shows how performance dashboards focus business people on the right things to do and doing things right. As Director of Research and Services for The Data Warehousing Institute, a worldwide association of business intelligence professionals, Eckerson interviewed dozens of organizations that have built various types of performance dashboards in different industries and lines of business. His practical insights provide a road map to help you turbo-charge performance–management initiatives with dashboard technology to optimize performance and accelerate results.

Performance Dashboards addresses common questions that business professionals ask about performance dashboards, such as: What's the difference between dashboards and scorecards? How do I design performance dashboards to handle operational, tactical, and strategic processes? How do I create effective KPIs that drive organizational change and display them in an optimal fashion? Do I build performance dashboards from the top down or bottom up? What political obstacles will I encounter when launching a performance dashboard project and how do I overcome them?

Performance Dashboards clears up much of the confusion and answers your most critical questions. It starts by laying a conceptual foundation, showing how performance dashboards:

- Fit into the larger context of business performance management (BPM), an emerging discipline for linking strategy and performance
- Represent the "new face" of business intelligence (BI), harnessing reporting and analysis software to unleash the power of information to all types of business users
- Do everything in threes: three types of performance dashboards (i.e., operational, tactical, and strategic) each contain three types of applications (i.e., monitoring, analysis, and management) and three layers of information (i.e., graphical, multidimensional, and transactional)

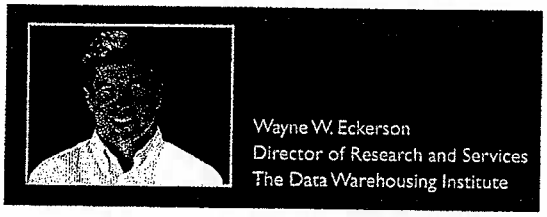
(continued on back flap)

(continued from front flap)

Moving from concept to reality, *Performance Dashboards* showcases each type of performance dashboard using a real-world example from Quicken Loans, International Truck and Engine Corporation, and Hewlett–Packard. These and other case studies show you how to build performance dashboards and what benefits they offer. Finally, *Performance Dashboards* synthesizes the tips and techniques from these case studies and leading practitioners in the field, showing you how to:

- Evaluate your company's organizational and technical readiness to undertake a successful performance dashboard project
- Create effective KPIs that change organizational behavior and improve performance
- Design powerful dashboard screens that communicate relevant facts quickly and concisely
- Integrate existing performance dashboards and metrics using a top-down or bottom-up approach
- Align business and technical teams to deliver a scalable and sustainable solution
- Evangelize a performance dashboard solution and ensure end-user adoption

Whether you are an executive looking to learn more about dashboards or scorecards, an IT professional needing to better understand how to implement dashboards, or a college student preparing for a career armed with the most cutting-edge thinking about how to improve organizational performance, *Performance Dashboards* is for you.



WAYNE W. ECKERSON is the Director of Research and Services for The Data Warehousing Institute (TDWI), a worldwide association of business intelligence and data warehousing professionals that provides education, training, certification, and research. Eckerson has seventeen years of industry experience, most of which has been spent covering business–intelligence issues and technologies. Eckerson is the author of many in-depth reports, a columnist for several business and technology magazines, and a noted speaker and consultant in the business intelligence industry. He can be reached at **weckerson@tdwi.org.**

Jacket Images: © Getty Images

Praise for Performance Dashboards

"The best way that executives can drive their business today is through an interactive dashboard that contains both historic and forward-looking measures. Eckerson's book, with its practical advice, is essential reading for anyone moving forward with a dashboard initiative. Even if you are not yet ready to make the move, it is fascinating to read his insights into how some of the industry's smartest competitors keep their finger on the pulse of their business."

—Craig Schiff, President and CEO, BPM Partners, Inc.

"Wayne Eckerson, in his new book on performance dashboards, has defined what business intelligence really is in a practical and prescriptive manner. His book serves anyone who is looking to understand this complex subject and especially provides value to leaders looking to apply business intelligence at their firm. Wayne defines the subject, explains the methodology, and provides the reader with the incentive to take on this challenging effort."

—Irving H. Tyler, Vice President, Information Services and Chief Information Officer, Quaker Chemical Corporation

"The time is right for a definitive guide to building, managing, and sustaining dashboard and scorecard solutions, and this book fits the bill. As a key ingredient in business performance management, dashboards make it easier to monitor the execution of business strategies and plans, and deliver insight and information to workers across the enterprise. This book is a must-read for business leaders and would-be chief performance officers who want to learn about the tools and techniques needed to harness information and optimize performance."

—Godfrey Sullivan, President and Chief Executive Officer, Hyperion Solutions Corporation

"This book explains what dashboards are, where they can be used, and why they are important to measuring and managing performance. Wayne uses his deep knowledge of the BI market and examples from leading practitioners to show how any organization can use performance dashboards to achieve a competitive advantage."

—Mark Smith, CEO and Senior Vice President of Research, Ventana Research

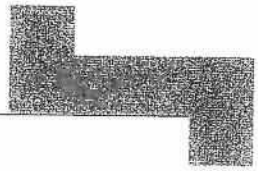
"Performance dashboards are essential to business success. This book provides a complete and thorough overview of performance dashboards for both business users and IT staff who want to be successful in managing the performance of their business."

—Colin White, founder, BI Research

ISBN 0-471-72417-3
54500
9 780471 724179

Performance Dashboards

Measuring, Monitoring, and Managing Your Business



WAYNE W. ECKERSON

WILEY

John Wiley & Sons, Inc.

This book is printed on acid-free paper.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

Library of Congress Cataloging-in-Publication Data:

Eckerson, Wayne W., 1958–
Performance dashboards: measuring, monitoring, and managing your business / Wayne W. Eckerson.
p. cm.
Includes index.
ISBN-13: 978-0-471-72417-9 (cloth)
ISBN-10: 0-471-72417-3 (cloth), ISBN: 0-471-77863-X (Custom Edition)
1. Management—Evaluation. 2. Organizational effectiveness—Evaluation.
I. Title.
HD31.E294 2006
658.4'013—dc22 2005011800

Printed in the United States of America.

10 9 8

To my parents,
Homer and Sally,
who made everything possible.

Contents

Foreword

Two adages help us to understand the power of performance dashboards. The first is: "You cannot manage what you do not measure." When managers do not know how their work units and subordinates are functioning compared with previous performance, goals, and benchmarks, it is difficult to reward superior achievement or take corrective action when performance fails to meet expectations. The second adage is: "What gets watched, gets done." When workers know the metrics used for their evaluation, they will strive to perform well on those measurements.

Effective managers have always at least implicitly understood these adages and have had systems and methods for assessing how their organizations are doing. Even before computer-based systems, many executives had their staffs prepare briefing books to keep a close tab on organizational performance. The critical success factor concept, which is directly related to today's key performance indicators (KPIs), was designed to identify the goals and activities that need to be monitored most closely. Executive information systems, which focus on tracking key metrics important to senior management, are the most immediate precursors to today's performance dashboards.

Performance dashboards integrate much of what has been learned about how computer-based systems can help in the effective management of organizations. For example, the most powerful systems are linked to company objectives. Performance dashboards also benefit from technology advances. An early problem with executive information systems was that the data required were often not readily available; considerable human effort was needed to acquire, analyze, and then enter the data into the system. Data warehouses have now made the sourcing of data much less of a problem. Also, the technology vendors have developed packages that, in the best cases, sit on top of powerful business intelligence platforms providing analysis capabilities beyond the building of simple variance charts.

Despite the growing popularity of performance dashboards, considerable confusion still exists. Common questions include: "What is the difference between dashboards and scorecards?" "Must dashboards be implemented top down, or can they be built bottom up?" Then there are important questions about how to build them successfully, such as: "How should I determine how many and what KPIs to include?" "Are there any political obstacles that I am likely to encounter, and how can I resolve them?"

Wayne Eckerson has written a wonderful book that clears up much of the confusion about performance dashboards, addresses the most important issues, and provides answers to the most critical questions. It is not surprising that Wayne has written such a great book. He combines the conceptualization and writing skills that he honed as a research analyst, the survey data that he has collected in his position as Director of Research and Services for The Data Warehousing Institute, and case studies and examples from hundreds of companies that he has consulted with and interviewed over the years. As a result, the book is wonderfully "textured" and is a "must read" for anyone who wants to understand performance dashboards fully. Whether you are an executive wanting to learn about dashboards, an IT professional who needs to understand how to implement dashboards better, or a college student preparing for a career armed with the latest and best thinking about how to improve organizational performance, you will benefit from reading Wayne's book.

Hugh J. Watson
Terry College of Business
University of Georgia

Preface

A PATH TO PURSUE

False Starts

The original focus of this book was business performance management (BPM). Tim Burgard, my editor at John Wiley & Sons, had read an in-depth report that I wrote on the topic in 2003 and asked whether I would be interested in turning it into a book geared to business professionals. Other than the normal reservations one might have about undertaking a book project in addition to a full-time job, I was not particularly thrilled about exploring BPM in greater depth.

My initial research showed that BPM meant different things to different people. It was a broad, catch-all category of applications and technologies, including everything from financial consolidation and reporting tools to planning, budgeting, and forecasting applications to dashboards and scorecards, among other things. BPM seemed to reflect whatever vendors had in their product portfolios at the time rather than representing a distinct and compelling discipline in itself.

Conceptually, however, most people seem to agree that the purpose of BPM is to *focus* organizations on things that really matter. Too many organizations spread their energies and resources far and wide and consequently never make much progress towards achieving their strategic objectives. The theory behind BPM is that organizations need to identify the key activities that contribute most to their success and make sure they do them well. In short, the purpose of BPM is to help organizations become more focused, aligned, and effective.

Dashboards and Scorecards

Thus, in the spirit of BPM, I decided to cast off BPM as a book topic and *focus* on something more tangible and concrete that organizations could use to implement the *discipline* of BPM. At the time, I did not know any companies that had implemented a BPM solution—whatever that might be—but I did notice that many companies were rolling out dashboards and scorecards. These applications seemed to resonate with workers up and down the organizational hierarchy, from boardrooms to shop floors to customers and suppliers. Better yet, dashboards and scorecards helped companies implement the principles of BPM better than any of the other so-called BPM applications or technologies I saw in the marketplace. Now, here was a topic worth exploring!

As I investigated dashboards and scorecards, I encountered much of the same definitional fuzziness as I did with BPM, albeit on a smaller scale. Every "dashboard" I saw looked and functioned differently and served different purposes. Some looked like reporting portals or electronic briefing books, while others contained mostly text and hand-entered data, and still others featured graphical dials and meters that flickered with real-time data.

The only clarity in the field came from the Balanced Scorecard community, which has well-defined principles and a maturing methodology to help organizations create, display, and manage performance data. However, since there were already many good books about Balanced Scorecards that covered both theory and practice and were written by distinguished consultants and professors, I did not see how I could add much value there!

Nevertheless, I knew that organizations were putting a great deal of energy into building dashboards and scorecards using business intelligence (BI) and data integration tools and technologies—two areas that I have been researching and speaking about for the past ten years. I figured that I could add value by identifying the common threads among these initiatives, create a framework to clarify the discussion about their use, and synthesize best practices for designing, building, and growing these systems from organizations that have already done it. The result is this book.

THE PUZZLE OF PERFORMANCE DASHBOARDS

It took many hours of thought, dozens of interviews, and thousands of words to piece together the puzzle of dashboards and scorecards in a way that provides a clear and complete picture without distorting current perceptions that people have about these systems. In highly abridged form, what I came up with is this: dashboards and scorecards are part of a larger performance management system—which I call a performance dashboard—that enables organizations to measure, monitor, and manage business performance more effectively.

A performance dashboard is more than just a screen with fancy performance graphics on it: it is a full-fledged business information system that is built on a business intelligence and data integration infrastructure. A performance dashboard is very different from plain dashboards or scorecards. The latter are simply visual display mechanisms to deliver performance information in a user-friendly way whereas performance dashboards knit together the data, applications, and rules that drive what users see on their screens.z

Three Applications

To flesh out this skeletal definition a tad more, I came to realize that a performance dashboard is actually three applications in one, woven together in a seamless fashion: 1) a monitoring application, 2) an analysis application, and 3) a management application.

The *monitoring application* conveys critical information at a glance using timely and relevant data, usually with graphical elements; the *analysis application* lets users analyze and explore performance data across multiple dimensions and at different levels of detail to get at the root cause of problems and issues; the *management application* fosters communication among executives, managers, and staff and gives executives continuous feedback across a range of critical activities, enabling them to "steer" their organizations in the right direction.

Three Layers

When I looked at the data that performance dashboards display, I discovered that they let users navigate through three layers or views of information: 1) a summarized graphical view, 2) a multidimensional view, and 3) a detailed or operational view. Users can access the performance dashboard at any of these layers, but most start at the summarized graphical view and drill down along fairly predefined pathways through the multidimensional and detailed views.

This layered approach meets the information and analysis needs of a majority of individuals in an organization who are not number crunchers by training and only want to use information as a tool to perform their jobs, not as a profession in itself. Performance dashboards conform to the natural sequence in which these users want to interact with information. First, they want to monitor key metrics for exceptions; then, they want to explore and analyze information that sheds light on the exceptions and reveals hidden trends and issues; and finally, they want to examine detailed data and reports to identify root causes of problems and take action to remedy the situation.

The New Face of Business Intelligence

In many respects, performance dashboards are the new face of business intelligence. They transform business intelligence from a set of tools used primarily by

business analysts and power users to a means of delivering actionable information to everyone in an enterprise. Thus, performance dashboards fulfill the promise of business intelligence to help organizations leverage information to increase corporate agility, optimize performance, and achieve strategic objectives.

Three Types

The final thing I discovered about performance dashboards after talking to many companies is that that there are three types—operational, tactical, and strategic—that are distinguished largely by the degree to which they use the three types of applications listed above (i.e. monitoring, analysis, and management.)

Operational dashboards track core operational processes and emphasize monitoring more than analysis or management; *tactical dashboards* track departmental processes and projects and emphasize analysis more than monitoring or management; and *strategic dashboards* monitor the execution of strategic objectives and emphasize management more than monitoring or analysis. An organization can and should have multiple versions of each type of performance dashboard, but they should integrate them using consistent definitions and rules for shared and related metrics.

Success Factors

It is one thing to know what a performance dashboard is and another to implement one successfully. In the course of interviewing people at organizations that have deployed performance dashboards (regardless of what they call them), I discovered many critical success factors. On a macro level, the keys to success are: 1) get proper sponsorship and resources for the project, 2) create the right metrics and standardize their meaning, 3) design a compelling graphical user interface, and 4) plan ahead to ensure end-user adoption and drive organizational change.

Beyond these major success factors, I discovered dozens of tips and techniques that often spell the difference between a successful project and a mediocre one. This book does not pretend to provide a step-by-step methodology for implementing a performance dashboard or a comprehensive list of critical success factors; instead, like a good performance metric, it provides reasonable guidance for the road ahead.

NAVIGATING THIS BOOK

Who Should Read This Book

This book is geared to business and technical managers who oversee performance management projects or who have been recently appointed to create or overhaul an organization's performance management system, including informa-

tion systems and corporate policies and procedures. These managers generally have deep knowledge of their business and suitable experience managing information technology projects. Most are prime candidates to become Chief Performance Officers.

At the same time, business executives can benefit by reading this book. Although it covers the technical underpinnings of performance management and dives into technical detail at points, the book tries to convey technical concepts in plain English. Conversely, technologists will find value in this book because it provides an overview of performance management concepts and a technical framework for implementing them. In addition, Balanced Scorecard professionals will find the book helps them understand how Balanced Scorecards relate to and can be integrated with other types of performance dashboards in their organizations.

Skim, Drill, and Examine

To help you get the most out of the next 250+ pages, let me tell you how I have approached writing the text. First, I know that business people are busy. If you are like me, you rarely get to read an article or report from beginning to end, let alone a book, unless you are on a plane or vacation. You really just want the prescriptions, the key takeaways that you can apply at work tomorrow, next week, or next month.

To accommodate your needs, I have tried to make the book as easy as possible to skim while staying within the publisher's constraints. For example, I have made liberal use of headings, lead-ins, exhibits, captions, and sidebars so they serve as visual guideposts to the content. Glance at these markers as you flip through the pages, and if you spy something that catches your interest, drill down and read the text for a while. (Does this sound like a performance dashboard in book form? I hope so. The concept is universally applicable!)

Sections in the Book

The book is also divided into three sections. Part One, "The Landscape for Performance Dashboards," provides the framework and context for understanding performance dashboards. Chapter 1 defines performance dashboards and describes their primary characteristics. Chapter 2 provides background on BPM, which contributes the conceptual underpinnings for performance dashboards and represents the broader commercial market for related products and services. Chapter 3 explains business intelligence, which contributes the analytical and technical foundation upon which performance dashboards rest. Chapter 4 provides an organizational readiness assessment for organizations preparing to implement a performance dashboard, and Chapter 5 offers a technical readiness assessment based on a BI Maturity Model that I developed in 2004 and has been well received by BI professionals and their business counterparts.

Part Two, entitled "Performance Dashboards in Action," adds flesh to the conceptual framework defined in Part One by profiling each type of dashboard system using an in-depth case study with plenty of screenshots to help you differentiate between types. Chapter 6 provides an overview of each type of dashboard and compares and contrasts the three types at a conceptual level. Chapter 7 examines operational dashboards using Quicken Loans as a case study. Chapter 8 looks at tactical dashboards by profiling a Key Business Indicator (KBI) portal developed by International Truck and Engine Corporation. Chapter 9 examines strategic dashboards by examining a Balanced Scorecard application developed by Hewlett Packard Co.'s Technology Solutions Group.

Part Three is titled "Critical Success Factors: Tips from the Trenches." This section synthesizes recommendations and guidance from dozens of performance dashboard projects that I've researched. Chapter 10 discusses how to launch a performance dashboard project. Chapter 11 discusses how to create effective metrics, which are the backbone of any dashboard system. Chapter 12 switches to the visual design and examines how to create powerful dashboard screens that communicate relevant facts quickly and concisely. Chapter 13 describes several approaches to integrating or linking multiple dashboard systems, whereas Chapter 14 tackles the thorny topic of how to establish an effective partnership between business and the information technology (IT) department, which is required to deliver a long-lasting, high-value dashboard system. Chapter 15 closes with advice on how to ensure end-user adoption and use a performance dashboard as an agent of organizational change.

Feedback Please!

As someone who works for an educational organization, I know that the best learning occurs not in classrooms but in group discussions and individual conversations. Once you finish reading (or skimming) this book, I hope that you take the time to send me your thoughts. Ideas do not stop evolving once they are put on paper. This book is not my final word on the subject; there is always more to learn! Undoubtedly, there are numerous perspectives I did not cover and nuances I overlooked. Please help me write the next edition; send your thoughts to weckerson@tdwi.org. Happy reading!

Acknowledgments

Although this book focuses on an emerging area of interest to the business community, much of the content was shaped over the course of the past ten years, which I have spent as an analyst, consultant, and educator in the field of business intelligence, which provides the analytical and technical foundation for performance dashboards. Much of what I learned during this period was the result of conversations with hundreds of people who generously shared their time, insights, and camaraderie. Although they are too numerous to mention by name, they include faculty members at The Data Warehousing Institute and my fellow BI professionals at Fortune 1000 companies, consultancies, analyst firms, and vendors. I am eternally grateful to them.

I would like to acknowledge a number of people who contributed directly to the creation of this book. I am indebted to Tim Burgard, my editor at John Wiley & Sons, who approached me with the initial idea and guided me through the process. Special recognition goes to the individuals whose projects I profiled in Part Two and whose experiences and insights helped shape the remainder: Martin Summerhayes of Hewlett Packard, Jim Rappé of International Truck and Engine Corporation, and Eric Lofstrom of Quicken Loans. They spent countless hours with me on the phone and in person answering endless questions and dutifully responding to my every request. This book would not have been possible without their cooperation and enduring patience.

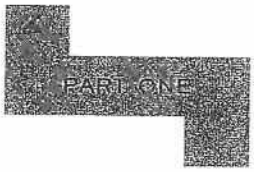
The stories of many other people whom I interviewed were equally compelling, but time, space, or confidentiality prevented me from delving deeper. I would like to thank Viraj Gandhi at Paradigm Management, Doug Smith in the City Administrator's office at the District of Columbia, John Lochrie and Ripley Maddock at Direct Energy Essential Home Services, Kevin Lam at TELUS, Ryan Uda at Cisco Systems, Inc., John Monczewski at Booz Allen Hamilton, Dave Donkin at Absa Bank Ltd., Klaus Detemple at Deutsche Börse, Chris Gentry at

CCC Information Services Inc., Larry Fox, Todd Klessner, Deb Masdea, Alicia Acebo, Mike Grillo, Greg Jones, Christopher Soong, and Preetam Basil, among others.

Next, I would like to commend the many people who reviewed all or portions of the book and kept me from veering too far afield from my task at hand. Their advice provided desperately needed perspective, nuances, and insights. Professors Hugh Watson and Barbara Wixom provided considerable encouragement and gave me constructive feedback on how to approach the assignment and shape the content. Stephen Few generously shared his rich intellectual capital, advising me on visual design principles in general and on techniques for creating effective dashboard screens in particular. Chapter 12 would not have been possible without his input. Bill Balberg, president of Insightformation, Inc., offered many ways to align my ideas with those circulating in the Balanced Scorecard community and was indefatigable in reviewing my text. Neil Raden pointed out numerous areas for improvement; Colin White helped with the framework, taxonomy, and evaluation criteria; Cindi Howson provided input on evaluation criteria; and my good friend Jim Nowicki provided the all-important business user perspective. I would also like to thank Larissa DeCarlo of Hyperion Solutions, Diaz Nesamoney of Celequest, Tracy Shouldice of Cognos, Rebecca Adams of Business Objects, and Doug Cogswell of ADVIZOR Solutions, Inc. for putting me in touch with customers and providing screen shots upon request.

Going back a few years, I would like to pay tribute to my colleagues and friends at *Network World Magazine* who taught me how to think logically and write clearly and succinctly, as well as Patricia Seybold, whose quiet trust gave me the confidence I needed to acquire a strong professional voice in an industry filled with very smart people.

Also, I would like to thank Peter Quinn and Ellen Hobbs, my managers at The Data Warehousing Institute and 101communications, respectively, who for some strange reason encouraged me in this pursuit and made allowances to ensure I could finish on time. I also appreciate the support and patience of my colleagues at The Data Warehousing Institute, including Meighan Berberich, Michelle Edwards, and Eric Kavanagh, who lent their time and expertise to help market the book, and especially Denelle Hanlon, who always provided encouragement at the right moments. Last, but not least, I thank my wife Christina and my children, Harry and Olivia, who gallantly tolerated the long hours I spent in front of the computer at home when I should have been doing things with them.



The Landscape for Performance Dashboards

CHAPTER 1

What Are Performance Dashboards?

THE CONTEXT FOR PERFORMANCE DASHBOARDS

The Power of Focus

Executives in Training

This summer I found my 11-year-old son, Harry, and his best pal, Jake, kneeling side by side in our driveway, peering intensely at the pavement. As I walked over to inspect this curious sight, I saw little puffs of smoke rising from their huddle. Each had a magnifying glass and was using it to set fire to clumps of dry grass as well as a few unfortunate ants who had wandered into their makeshift science experiment.

In this boyhood rite of passage, Harry and Jake learned an important lesson that escapes the attention of many organizations today: the power of focus. Light rays normally radiate harmlessly in all directions, bouncing off objects in the atmosphere and the earth's surface. The boys had discovered, however, that if they focused light rays onto a single point using a magnifying glass, they could generate enough energy to burn just about anything and keep themselves entertained for hours!

By the time Harry and Jake enter the business world (if they do), they will probably have forgotten this simple lesson. They will have become steeped in corporate cultures that excel at losing focus and dissipating energy far and wide. Most organizations have multiple business units, divisions, and departments, each with their own products, strategies, processes, applications, and systems to support

them. A good portion of these activities are redundant at best and conflicting at worst. The organization as a whole spins off in multiple directions at once without a clear strategy. Changes in leadership, mergers, acquisitions, and reorganizations amplify the chaos.

Organizational Magnifying Glass

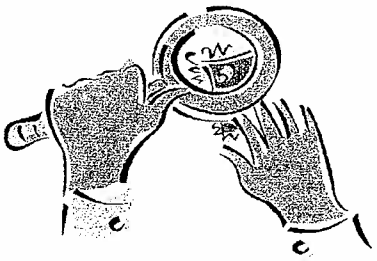
To rectify this problem, companies need an "organizational magnifying glass"—something that focuses the work of employees so everyone is going in the same direction (see Exhibit 1.1). Strong leaders do this. However, even the voice of a charismatic executive is sometimes drowned out by organizational inertia.

Strong leaders need more than just the force of their personality and experience to focus an organization. They need an information system that helps them clearly and concisely communicate key strategies and goals to all employees on a personal basis every day. The system should focus workers on tasks and activities that best advance the organization's strategies and goals. It should measure performance, reward positive contributions, and align efforts so that workers in every group and level of the organization are marching together toward the same destination.

Performance Management System

In short, what organizations really need is a *performance dashboard* that translates the organization's strategy into objectives, metrics, initiatives, and tasks customized to each group and individual in the organization. A performance dashboard is really a performance management system. It communicates strategic

EXHIBIT 1.1 ORGANIZATIONAL MAGNIFYING GLASS



Companies need an "organizational magnifying glass" that focuses the energies and activities of employees on a clear, unambiguous set of goals and objectives laid out in the corporate strategy.

objectives and enables business people to measure, monitor, and manage the key activities and processes needed to achieve their goals.

To work this magic, a performance dashboard provides three main sets of functionality, which I will describe in more detail later. Briefly, a performance dashboard lets business people:

- **Monitor** critical business processes and activities using metrics of business performance that trigger alerts when potential problems arise.
- **Analyze** the root cause of problems by exploring relevant and timely information from multiple perspectives and at various levels of detail.
- **Manage** people and processes to improve decisions, optimize performance, and steer the organization in the right direction.

Agent of Organizational Change

A performance dashboard is a powerful agent of organizational change. When deployed properly, it can transform an under-performing organization into a high flier. Like a magnifying glass, a performance dashboard can focus organizations on the key things it needs to do to succeed. It provides executives, managers, and workers with timely and relevant information so they can measure, monitor, and manage their progress toward achieving key strategic objectives.

One of the more popular types of performance dashboards today is the Balanced Scorecard, which adheres to a specific methodology for aligning organizations with corporate strategy. A Balanced Scorecard is a strategic application, but as we shall soon see, there are other types of performance dashboards that optimize operational and tactical processes that drive organizations on a weekly, daily, or even hourly basis.

Historical Context

Executive Dashboards and Cockpits

Although dashboards have long been a fixture in automobiles and other vehicles, business, government, and non-profit organizations have only recently adopted the concept. The trend started among executives who became enamored with the idea of having an "executive dashboard" or "executive cockpit" with which to drive their companies from their boardroom perches. These executive information systems (EIS) actually date back to the 1980s, but they never gained much traction, because the systems were geared to so few people in each company and were built on mainframes or minicomputers that made them costly to customize and maintain.

In the past 20 years, information technology has advanced at a rapid clip. Mainframes and minicomputers largely gave way to client/server systems, which

in turn were supplanted by the Web as the preeminent platform for running applications and delivering information. Along the way, the economy turned global, squeezing revenues and profits and increasing competition for ever-more demanding customers. Executives responded by reengineering processes, improving quality, and cutting costs, but these efforts have only provided short-term relief, not lasting value.

Convergence

During the 1990s, organizations began experimenting with ways to give business users direct and timely access to critical information, an emerging field known as business intelligence. At the same time, executives started turning to new performance management disciplines, such as Balanced Scorecards, Six Sigma, Economic Value Added, and Activity-Based Costing, to harness the power of information to optimize performance and deliver greater value to the business.

These initiatives convinced many executives that they could gain lasting competitive advantage by empowering employees to work proactively and make better decisions by giving them relevant, actionable information. Essentially, executives recognized that the EIS of the 1980s was a good idea but too narrowly focused; everyone, not just executives, needed an EIS. Fortunately, executives did not have to wait long for a solution. At the dawn of the 21st century, business intelligence converged with performance management to create the performance dashboard.

Market Trends

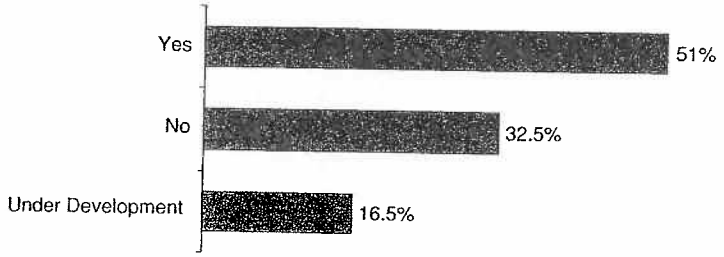
This convergence has created a flood of interest in performance dashboards since the year 2000. A study by The Data Warehousing Institute (TDWI) in 2004 showed that most organizations (51 percent) already use a dashboard or scorecard and that another 17 percent are currently developing one. The same study showed that almost one-third of organizations that already have a dashboard or scorecard use it as their *primary* application for reporting and analysis of data (see Exhibit 1.2).

Benefits

The reason so many organizations are implementing performance dashboards is a practical one: they offer a panoply of benefits to everyone in an organization, from executives to managers to staff. Here is a condensed list of benefits:

- **Communicate Strategy.** Performance dashboards translate corporate strategy into measures, targets, and initiatives that are customized to each

EXHIBIT 1.2 DOES YOUR ORGANIZATION USE A DASHBOARD OR SCORECARD?



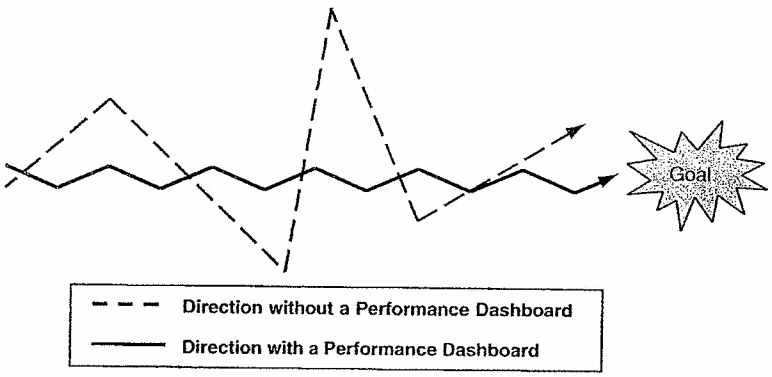
A majority of organizations have already deployed dashboards or scorecards, and many are in the process of building them. Data based on 473 responses to a survey of BI professionals by The Data Warehousing Institute.

Source: Wayne Eckerson, "Strategies for Developing Analytic Applications" (*TDWI Report Series*, The Data Warehousing Institute, 2005).

group in an organization and sometimes to every individual. Each morning when business people log into the performance dashboard, they get a clear picture of the organization's strategic objectives and what they need to do in their areas to achieve these goals.

- **Refine Strategy.** Executives use performance dashboards like a steering wheel to fine-tune corporate strategy as they go along. Instead of veering drastically from one direction to another in response to internal issues or industry events, executives can use performance dashboards to make a series of minor course corrections along the way to their destination (see Exhibit 1.3).
- **Increase Visibility.** Performance dashboards give executives and managers greater visibility into daily operations and future performance by collecting relevant data in a timely fashion and forecasting trends based on past activity. This helps companies close their financial books faster at the end of each month and avoid being surprised by unforeseen problems that might affect bottom-line results.
- **Increase Coordination.** By publishing performance data broadly, performance dashboards encourage members of different departments, such as finance and operations, to begin working more closely together. They also foster a healthy dialogue between managers and staff about performance results and forecasts and make it easier for managers to conduct more frequent and constructive performance reviews.

EXHIBIT 1.3 CHARTING A COURSE WITH A PERFORMANCE DASHBOARD



A performance dashboard enables executives to chart a steady course to their destination by making a series of fine-tuned course corrections instead of veering dramatically from one direction to another in response to internal or industry events.

- **Increase Motivation.** It has been said that "what gets measured, gets done." By publicizing performance measures and results, performance dashboards increase the motivation of business people to excel in the areas being measured. Performance dashboards compel people to work harder out of pride and desire for extra pay when compensation is tied to performance results.
- **Give a Consistent View of the Business.** Performance dashboards consolidate and integrate corporate information using common definitions, rules, and metrics. This creates a single version of business information that everyone in the organization uses, avoiding conflicts among managers and analysts about whose version of the data is "right."
- **Reduce Costs and Redundancy.** By consolidating and standardizing information, performance dashboards eliminate the need for redundant silos of information that undermine a single version of business information. A single performance dashboard can help an organization shut down dozens, if not hundreds, of independent reporting systems, spreadmarts, data marts, and data warehouses.
- **Empower Users.** Performance dashboards empower users by giving them self-service access to information and eliminating their reliance on the IT department to create custom reports. Through layered delivery of informa-

tion, structured navigation paths, and guided analysis, performance dashboards make it easy for average business people to access, analyze, and act on information.

- **Deliver Actionable Information.** Performance dashboards provide actionable information—data delivered in a timely fashion that lets users take action to fix a problem, help a customer, or capitalize on a new opportunity before it is too late. A performance dashboard prevents users from wasting hours or days searching for the right information or report.

In short, performance dashboards deliver the right information to the right users at the right time to optimize decisions, enhance efficiency, and accelerate bottom-line results.

Pretenders to the Throne

Although many organizations have implemented dashboards and scorecards, not all have succeeded. In most cases, organizations have been tantalized by glitzy graphical interfaces and have failed to build a solid foundation by applying sound performance management principles and implementing appropriate business intelligence and data integration technologies and processes. Here are the common symptoms of less than successful solutions:

- **Too Flat.** Many organizations create performance management systems, especially tactical and strategic dashboards, using Microsoft Excel, Microsoft PowerPoint, and advanced charting packages. Although these applications often look fancy, they generally do not provide enough data or analytical capabilities to let users explore the root cause of problems highlighted in the graphical indicators.
- **Too Manual.** In addition, some organizations rely too heavily on manual methods to update performance dashboards that contain sizable amounts of information. Highly skilled business analysts spend several days a week collecting and massaging this information instead of analyzing it. The majority of performance dashboards automate the collection and delivery of information, ensuring a sustainable solution over the long term.
- **Too Isolated.** Some performance dashboards source data from a single system or appeal to a very small audience. As a result, they provide a narrow or parochial view of the business, not an enterprise view. In addition, these dashboards often contain data and metrics that do not align with the rest of the organization, leading to confusion and chaos.

In the end, performance dashboards are only as effective as the organizations they seek to measure. Organizations without central control or coordination will deploy a haphazard jumble of non-integrated performance dashboards. However,

organizations that have a clear strategy, a positive culture, and a strong information infrastructure can deliver performance management systems that make a dramatic impact on performance.

COMPOSITION OF PERFORMANCE DASHBOARDS

Definition

Every performance dashboard looks and functions differently. People use many different terms to describe performance dashboards, including portal, BI tool, and analytical application. Each of these contributes to a performance dashboard but is not a performance dashboard by itself. Here is my definition:

A performance dashboard is a multilayered application built on a business intelligence and data integration infrastructure that enables organizations to measure, monitor, and manage business performance more effectively.

This definition conveys the idea that a performance dashboard is more than just a screen populated with fancy performance graphics: it is a full-fledged business information system designed to help organizations optimize performance and achieve strategic objectives. An equivalent, and perhaps better, term is *performance management system*, which conveys the idea that it is a system designed to manage business performance. However, since the title of this book uses the term performance dashboards, I will stick with that term on most occasions, although I feel that the two are interchangeable.

Build or Buy

A common question is whether it is better to build or buy a performance dashboard. During the past several years, many software vendors have shipped dashboard or scorecard solutions. Many qualify as performance dashboards, and some do not. Until recently, most companies built their own performance dashboards or started with a vendor tool and customized it extensively to meet their needs.

Most of the companies profiled in this book built performance dashboards using a mix of custom code and BI tools running on standard corporate infrastructure components (i.e., databases, servers, storage systems). However, organizations that have deployed performance management systems within the past two years have frequently used commercial, off-the-shelf products, sometimes customizing them extensively and, in other cases, minimally.

Whether you plan to build or buy a performance dashboard, it makes sense to create a list of criteria against which you can evaluate your solution. The appendix at the end of this book provides a comprehensive set of evaluation criteria.

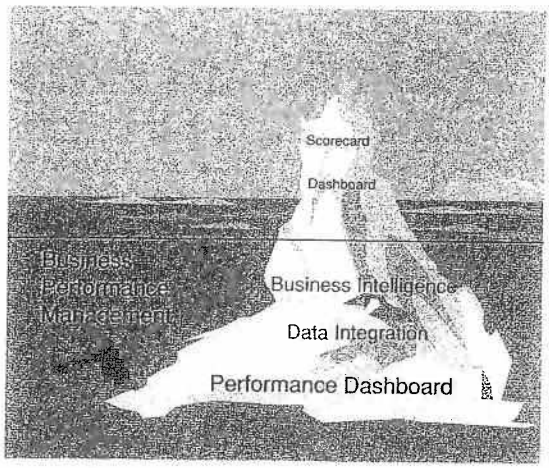
Context

The Big Picture: Business Performance Management

Before we dive into the details, let us step back and examine the context for performance dashboards from a business perspective. A performance dashboard plays a pivotal role in an emerging discipline called business performance management (BPM). As we will see in Chapter 2, BPM consists of a series of processes and applications designed to optimize the execution of business strategy. BPM provides a framework that takes the long-standing task of *measuring performance* to the next level, that of *managing performance*. BPM provides the business context in which performance dashboards operate (see Exhibit 1.4).

BPM uses many different tools to help organizations manage performance better, ranging from financial consolidation and reporting tools to planning, budgeting, and forecasting applications to dashboards and scorecards. However, the most important tool in the BPM portfolio is a performance dashboard, because it enables executives to communicate strategic objectives and then measure and monitor the organization's progress toward achieving those objectives. In essence, a performance dashboard helps organizations execute their strategy.

EXHIBIT 1.4 THE CONTEXT FOR PERFORMANCE DASHBOARDS



Like an ocean surrounding an iceberg, business performance management (BPM) provides the business context for performance dashboards, which are layered applications built on a business intelligence and data integration infrastructure (i.e., the base of the iceberg). The most visible elements of a performance dashboard are the scorecard and dashboard screens, which display performance using leading, lagging, and diagnostic metrics.

Three Applications

Moving from context to composition, the first thing one notices about a performance dashboard is that it contains three applications woven together in a seamless fashion. Each application provides a specific set of functionality delivered through a variety of means. Technically speaking, the applications are not necessarily distinct programs (although sometimes they are), but sets of related functionality built on an information infrastructure designed to fulfill user requirements to monitor, analyze, and manage performance (see Exhibit 1.5).

1. Monitoring

A performance dashboard enables users to monitor performance against metrics aligned to corporate strategy. At an operational level, users monitor core processes that drive the business on a day-to-day basis, such as sales, shipping, or manufacturing. At a tactical or strategic level, users monitor their progress toward achieving short- and long-term goals.

In general, organizations use *dashboards* to monitor operational processes and *scorecards* to monitor tactical and strategic goals. Dashboards and scorecards are visual display mechanisms within a performance management system that convey critical performance information at a glance. They are the lens through which users view and interact with performance data, but they are not the entire system in themselves. Although dashboards and scorecards share many features and people use the terms interchangeably, they have unique characteristics (see Spotlight 1.1).

EXHIBIT 1.5 PERFORMANCE DASHBOARD APPLICATIONS

	Monitoring	Analysis	Management
Purpose	Convey information at a glance	Let users analyze exception conditions	Improve alignment coordination and collaboration
Components	Dashboard Scorecard BI portal Right-time data Alerts Agents	Multidimensional analysis Time-series analysis Reporting Scenario modeling Statistical modeling	Meetings Strategy maps Annotation Workflow Usage monitoring Auditing

A performance dashboard consists of three applications—monitoring, analysis, and management—that deliver related sets of functionality and consist of multiple components.

SPOTLIGHT 1.1 "DASHBOARDS VERSUS SCORECARDS"

Dashboards and scorecards are visual display mechanisms within a performance management system that convey critical performance information at a glance. The primary difference between the two is that dashboards monitor the performance of operational processes whereas scorecards chart the progress of tactical and strategic goals (see Exhibit 1.6).

EXHIBIT 1.6 COMPARING FEATURES

	Dashboard	Scorecard
Purpose	Measures performance	Charts progress
Users	Supervisors, specialists	Executives, managers, staff
Updates	Right-time feeds	Periodic snapshots
Data	Events	Summaries
Display	Visual graphs, raw data	Visual graphs, text comments

Dashboards. Dashboards are more like automobile dashboards. They let operational specialists and their supervisors monitor events generated by key business processes. But unlike automobiles, most business dashboards do not display events in "real time" as they occur; they display them in "right time" as users need to view them. This could be every second, minute, hour, day, week, or month depending on the business process, its volatility, and how critical it is to the business. However, most elements on a dashboard are updated on an intra-day basis, with latency measured in either in minutes or hours.

Dashboards often display performance visually, using charts or simple graphs, such as gauges and meters. However, dashboard graphs are often updated in place, causing the graphs to "flicker" or change dynamically. Ironically, people who monitor operational processes often find the visual glitz distracting and prefer to view the data in its original form, as numbers or text, perhaps accompanied by visual graphs.

Scorecards. Scorecards, on the other hand, look more like performance charts used to track progress toward achieving goals. Scorecards usually display monthly snapshots of summarized data for business executives who track strategic and long-term objectives, or daily and weekly snapshots of data for managers who need to chart the progress of their group or project toward achieving goals. In both cases, the data are fairly summarized so users can view their performance status at a glance.

Like dashboards, scorecards also make use of charts and visual graphs to indicate performance state, trends, and variance against goals. The higher up the users are in the organization, the more they prefer to see performance encoded visually. However, most scorecards also contain (or should contain) a great deal of textual commentary that interprets performance results, describes actions taken, and forecasts future results.

Summary. In the end, it does not really matter whether you use the term dashboard or scorecard as long as the tool helps to focus users and organizations on what really matters. Both dashboards and scorecards need to display critical performance information on a single screen so users can monitor results at a glance.

A monitoring application also delivers information to users in "right time"—usually within minutes or hours depending on the volatility of information and decision making requirements—so they can take steps to fix a problem or exploit an opportunity. We cover "right time" information delivery in Chapter 7. Other key elements of a monitoring application are alerts, which notify users when events exceed predefined thresholds of performance, and agents, which automate the responses to well-known exception conditions, such as ordering new stock when inventory falls below predefined levels.

2. Analysis

The analysis portion of a performance dashboard lets users explore large volumes of historical performance data across many dimensions and down to minute detail. The application enables users to evaluate the origins of exception conditions highlighted by the monitoring application and identify the root cause of a problem or issue. The analysis application leverages a variety of BI technologies, including on-line analytical processing (OLAP), parameterized reporting, query and reporting, and statistical modeling, and relies heavily on a data integration and data warehousing infrastructure to prepare and deliver information in an intuitive, timely, and reliable fashion. Chapter 3 describes the various types of BI and data integration tools in depth.

3. Management

A performance dashboard typically embeds a variety of management and collaboration capabilities into the monitoring and analysis applications. The management features support a variety of business processes, both formal and informal, that guide the way users communicate and share performance information. Their purpose is to help executives steer the organization in the right direction, foster improved coordination among business units and groups, and engender better communication among managers, analysts, and staff.

A key management application is performance review meetings. These can be quarterly strategy sessions, monthly operational meetings, individual performance review sessions, or ad hoc conversations between managers and their direct reports. Performance dashboards facilitate these dialogues using strategy maps at the executive level, workflow applications at the team level, and document-based annotations at the individual level. Usage monitoring features track end-user adoption of the performance dashboard and logs changes made to the system for audit and control purposes.

Three Layers

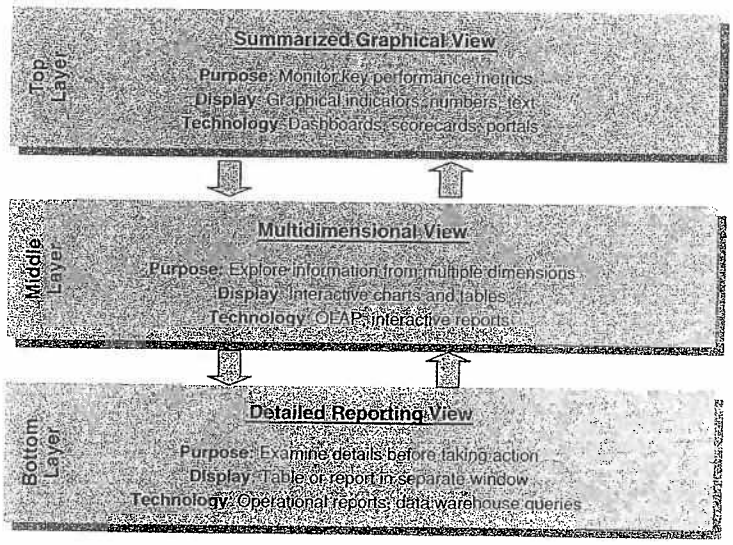
Besides containing three applications, a performance dashboard consists of three views or layers of information. Just as a cook peels layers of an onion, a performance dashboard lets users peel back layers of information to get to the root

cause of a problem. Each successive layer provides additional details, views, and perspectives that enable users to understand a problem better and identify the steps they need to take to address it.

This layered approach gives users self-service access to information and conforms to the natural sequence in which users want to handle that information: 1) monitor, 2) analyze, and 3) examine. That is, most business users first want to monitor key metrics for exceptions; then explore and analyze information that sheds light on those exceptions; and finally, examine detailed reports and data before taking action. By starting at high-level views of information and working down, this layered approach helps users get to the root cause of issues quickly and intuitively (see Exhibit 1.7).

EXHIBIT 1.7 PERFORMANCE DASHBOARD LAYERS

Users



A performance dashboard delivers information to users in layers as they need it. The top layer graphically displays exception conditions; the middle layer lets users explore or "slice and dice" data from multiple dimensions; and the bottom layer lets users examine individual transactions and operational reports.

Here are the three layers:

1. **Summarized Graphical View.** The top layer provides a summarized view, usually graphical, of the status of key performance metrics and exception conditions. When performance exceeds thresholds applied to each metric, the dashboard or scorecard interface alerts users to the exception condition. These exceptions can be in the form of alerts that pop up on users' screens or arrive via e-mail, pager, or another channel. More commonly, the software changes the color or shape of a symbol or graph associated with the metric. In essence, this layer is where users monitor information. The dashboard, scorecard, or portal interface essentially becomes a graphical exception report.
2. **Multidimensional View.** This middle layer provides the data behind the graphical metrics and alerts. Using multidimensional analysis tools, users navigate the data by dimensions (e.g., customer, geography, or time) and hierarchies (e.g., country, region, or city). More colloquially, these point-and-click tools let users "slice and dice," "drill down or up," or "pivot" the data to view exceptions and trends from any perspective they want. The tools let users apply complex calculations to the data, perform "what-if" analyses, and switch between tables and charts. There are many technologies that support multidimensional analysis. Chief among them are online analytical processing (OLAP), parameterized reporting, and advanced visualization tools.
3. **Detailed Reporting View.** The bottom layer lets users view detailed reports and transaction records, such as invoices, shipments, or trades. Users often need such data to understand the root cause of a problem, such as a decline in sales due to missing or incomplete orders or a salesperson who has been sick. This layer either connects users to existing operational reports or dynamically queries a data warehouse or operational system to obtain the appropriate records. The resulting report or query results are then usually displayed in a separate window, which users can view or print.

Navigating the Layers

Users can access the performance dashboard at any of these three layers, but most start at the summarized graphical layer and drill down along fairly predefined pathways as far as they need or want to go. Many BI tools force users to start at the middle or bottom layers, which makes them difficult to use. Most users find the middle multidimensional layer too complex and the bottom reporting layer too detailed. Only business analysts and operational specialists find it easy to navigate these bottom two layers.

This layered approach to delivering performance information meets the needs of most users in an organization. These "casual" users do not crunch numbers and information for a living; they simply want to monitor and manage the key processes for which they are responsible. They only "casually" use information, perhaps checking a performance dashboard or reports once or twice a day or week, depending on their role and responsibilities.

As a result, performance dashboards, with their layers of information, meet the long-standing mantra of these types of casual users: "Give me all the data I want, but only what I really need, and only when I really need it." In other words, casual users do not want to view information except when there is an out-of-bounds condition, and then they want to view all pertinent data but they do not want to spend precious time looking for it. Performance dashboards meet the requirements of casual users perfectly.

Transparent Navigation

The goal for performance dashboards is to make the transition between the three layers transparent to users. This is challenging since most performance dashboards today use different technologies and tools to support each layer. This gives each layer its own distinctive look and feel, making the performance dashboard more challenging to use than it should be.

Fortunately, some vendors are beginning to blend their monitoring, analysis, and reporting tools—which comprise the three layers in effect—to offer a more homogenous navigation experience for users. In addition, home-grown solutions are building the various components in each layer using a standard programming framework (i.e., .NET or Java) to simplify navigation and ease of use. In the future, performance dashboards will be designed as a single application running against a robust BI infrastructure rather than a combination of disparate applications and components cobbled together from various tools and systems.

Three Types of Performance Dashboards

The last thing you need to know about performance dashboards is that there are three major types: operational, tactical, and strategic. Each type of performance dashboard emphasizes the three layers and applications described above to different degrees (see Exhibit 1.8).

1. **Operational dashboards** monitor core operational processes and are used primarily by front-line workers and their supervisors who deal directly with customers or manage the creation or delivery of the organization's products and services. Operational dashboards primarily deliver detailed information that is only lightly summarized. For example, an online Web merchant may track transactions at the product level rather

EXHIBIT 1.8 THREE TYPES OF PERFORMANCE DASHBOARDS

	Operational	Tactical	Strategic
Purpose	Monitor operations	Measure progress	Execute strategy
Users	Supervisors, specialists	Managers, analysts	Executives, managers, staff
Scope	Operational	Departmental	Enterprise
Information	Detailed	Detailed/summary	Detailed/summary
Updates	Intra-day	Daily/weekly	Monthly/quarterly
Emphasis	Monitoring	Analysis	Management

There are three types of performance dashboards. Operational dashboards emphasize monitoring more than analysis or management; tactical dashboards emphasize analysis more than monitoring or management; and strategic dashboards emphasize management more than monitoring or analysis.

than the customer level. In addition, most metrics in an operational dashboard are updated on an intra-day basis, ranging from minutes to hours, depending on the application. As a result, operational dashboards emphasize monitoring more than analysis and management. Chapter 7 profiles an operational dashboard from Quicken Loans that monitors the calling activity and sales performance of hundreds of loan consultants working in a huge call center at corporate headquarters.

2. **Tactical dashboards** track departmental processes and projects that are of interest to a segment of the organization or a limited group of people. Managers and business analysts use tactical dashboards to compare performance of their areas or projects, to budget plans, forecasts, or last period's results. For example, a project to reduce the number of errors in a customer database might use a tactical dashboard to display, monitor, and analyze progress during the previous 12 months toward achieving 99.9 percent defect-free customer data by 2007. Tactical dashboards are usually updated daily or weekly with both detailed and summary data. They tend to emphasis analysis more than monitoring or management. Chapter 8 profiles a tactical dashboard used by the International Truck and Engine Corporation to monitor financial and operational performance across several business units.
3. **Strategic dashboards** monitor the execution of strategic objectives and are frequently implemented using a Balanced Scorecard approach, although Total Quality Management, Six Sigma, and other methodologies are used as well. The goal of a strategic dashboard is to align the organization around

strategic objectives and get every group marching in the same direction. To do this, organizations roll out customized scorecards to every group in the organization and sometimes to every individual as well. These "cascading" scorecards, which are usually updated weekly or monthly, give executives a powerful tool to communicate strategy, gain visibility into operations, and identify the key drivers of performance and business value. Strategic dashboards emphasize management more than monitoring and analysis. Chapter 9 profiles a strategic dashboard created by Hewlett Packard's Technology Solutions Group that uses a Balanced Scorecard approach.

Integrating Performance Dashboards

An organization can have multiple versions of each type of performance dashboard. More than likely, each department will have its own operational, tactical, and strategic dashboard. At a minimum, all performance management systems should be logically integrated using a common set of metrics and rules that are populated with data from a common BI and data integration infrastructure. In reality, however, most performance management systems are built separately using unique metrics and rules and different BI and data integration platforms. Although each performance dashboard provides value, collectively they create information chaos. Chapter 13 discusses how to integrate disparate performance dashboards.

PERFORMANCE MANAGEMENT ARCHITECTURE

A performance management system consists of both a business architecture and a technical architecture. Exhibit 1.9 shows the components of these two architectures and how they relate. The linchpin that ties the two architectures together is the metrics that define leading, lagging, and diagnostic measures of business performance. On the business side, the metrics embody the organization's strategy and tactics. On the technical side, the metrics contain rules that define what data to collect and when and how they should be aggregated, filtered, and calculated. The metrics are the means by which organizations measure, monitor, and manage the effectiveness of their strategy and tactics to satisfy key stakeholders.

No organization needs to implement all the components in both architectures. In fact, organizations tend to pick and choose components at each level that best meet the organization's needs. However, it is imperative that organizations choose at least one component in each layer; otherwise things break down. Without a complete and harmonized business and technical architecture, the business would fail to deliver a coherent strategy, workable plans, and accurate metrics, and the technical team would fail to deliver a viable information system.

EXHIBIT 1.9 PERFORMANCE MANAGEMENT ARCHITECTURE

A performance management system consists of a business architecture, represented by stakeholders, strategy, tactics, and metrics, and a technical architecture represented by a performance dashboard, which consists of several layers of components. To deliver a performance management solution, the business and IT department must partner closely.

Business Architecture

Stakeholders

By drilling down into the business architecture, one sees that each organization serves many different stakeholders—the investors, board of directors, workforce, customers, suppliers, and regulators—each of whom has a different perspective or view of the organization and wants to see different information. For instance, investors want to see the financial valuation of the organization, the staff wants to see a process view, and customers want to see the value of their accounts or the products and services they have purchased, bid on, or returned.

Strategy

Executives then devise a strategy to meet the needs of those stakeholders. The strategy may start with a strengths, weaknesses, opportunities, and threats (SWOT) analysis, a strategy map, or some other strategy formulation technique. Ultimately, executives create a mission statement, strategic objectives, a vision, values, and long-term plans and goals. (We will discuss strategy in more detail in Chapter 4.)

Tactics

Executives then throw the strategy "over the wall" to managers and supervisors who implement the strategy using a variety of resources—knowledge, money, people, processes, and technology. The upshot is that managers create projects, initiatives, and annual plans or budgets that try to nudge the organization toward its strategic objectives.

Metrics

Executives and managers then translate the strategy and plans into metrics. Strategic dashboards measure initiatives and plans that range from one to five years in scope, whereas tactical dashboards measure initiatives and plans that span several weeks to several months or more. Operational dashboards usually measure daily operations.

There are three major types of metrics: leading, lagging, and diagnostic. In the past, most organizations used lagging indicators, mainly financial metrics, to measure performance and outcomes. However, BPM and Balanced Scorecard methodologies encourage companies to use leading indicators to gain greater visibility into future performance and to manage people, processes, and technology more proactively. We will cover metrics in more detail in Chapter 11.

Technical Architecture

A performance dashboard consists of multiple layers of technology that work together to deliver the information business people need to execute strategy and tactics and meet the needs of stakeholders. The technical architecture consists of interlocking components that must work together seamlessly to deliver business value. Designers should choose the components in each layer that work best to meet the needs of target users.

Display Layer

The metrics are displayed in the top-level screen of a performance dashboard, which can be a dashboard, scorecard, or portal interface. As mentioned earlier, a dashboard is used to monitor operational information and display alerts, whereas scorecards are used to chart progress toward strategic or tactical goals. Portals provide one-stop shopping for all kinds of information, including performance metrics.

Application Layer

The three applications described earlier—monitoring, analysis, and management—reside below the display layer. Application functionality is interwoven with the display, which serves as the opening screen or initial page to the performance dashboard.

Data Store Layer

The application layer gives users access to information, which can be stored in a variety of data stores. Low-latency data stores, including operational data stores and in-memory caches, are ideal for delivering near real-time information to users in operational dashboards. Data warehouses, data marts, and multidimensional databases (MDBs) are best for analyzing historical data in tactical or strategic dashboards and can also be used to store a limited amount of text. In some cases, performance dashboards do not require sophisticated data stores because they do not store large volumes of data (see Spotlight 1.2).

In other cases, performance dashboards pull data directly from source systems to populate metrics, bypassing persistent data stores, like data warehouses, data marts, and multidimensional databases. This approach makes it easy to get a performance dashboard up and running but can bog down the performance of systems that run the business. Organizations should use this virtual dashboard technique judiciously, to supplement information in persistent data stores, not replace them.

SPOTLIGHT 1.2 QUALITY NOT QUANTITY COUNTS

Although performance dashboards can store large volumes of data, this is not a prerequisite for success, especially with strategic dashboards. In fact, some successful strategic dashboards contain only a few gigabytes of data, less than you can store on a single CD ROM.

For instance, Brown & Root, a Halliburton subsidiary that provides marine oil rig construction and services, used a strategic dashboard with small volumes of information to execute a new business strategy that helped turn around the company, from losing money to number one in its niche, with a net income increase of 30 percent. The strategy involved offering high-margin solutions that simultaneously lowered customer costs by integrating offerings from six operating companies in the newly merged firm.

To chart the effectiveness of the strategy, the company used several metrics, none of which required substantial amounts of data, according to Bill Barlberg, president of Insightformation, Inc., a business intelligence and knowledge management consultancy, and a Balanced Scorecard specialist. For example, the company tracked the number of contracts it won that contained integrated solutions involving two or more operating companies. Since the company does a limited number of huge projects each year, the data for these metrics were hand calculated and manually added to the strategic dashboard. Other key metrics included percent of revenue from integrated projects, number of integrated solutions created, and survey results of employee awareness and acceptance of new cultural values.

For strategic dashboards, the quality of information is the key, not the quantity. In some cases, they can deliver significant business value with just a few gigabytes of data, although this is not the norm. As long as a strategic dashboard focuses an organization on what is important, the volume of data is irrelevant.

Integration Layers

To deliver information to users, a performance dashboard must extract it from source systems. An operational dashboard often uses custom application programming interfaces (APIs) or enterprise application integration (EAI) middleware to capture events from source systems, move them across a network, and update a low-latency data store within the performance dashboard in near real time. In addition, they may query data sources directly, as mentioned above, using SQL queries or enterprise information integration (EII) middleware. Both techniques enable developers to populate metrics with data from a variety of sources, including analytical systems (i.e., data warehouses, data marts, multidimensional databases, or ODSs), operational systems, and external sources, including XML-based Web pages and Web services.

Tactical and strategic dashboards generally use extraction, transformation, and loading (ETL) tools to populate analytical data stores, although they also can query sources directly to supplement historical data with real-time updates or

external data. Some strategic dashboards are updated manually when they contain small amounts of information or when users need to add commentary. Chapter 3 will discuss data integration technologies in more depth.

Data Sources

Performance dashboard data may come from a wide range of sources. The most voluminous sources of data include legacy systems running on mainframes or minicomputers and newer packaged applications running on relational databases. The most numerous sources, however, include Web pages, Excel files, Access databases, e-mail messages, survey responses, documents, and commentaries, among other things.

Business–IT Partnership

To deliver a successful performance dashboard, the business must work closely with the information technology (IT) department to create metrics that embody strategic objectives and compare performance to plans. Since strategy and plans are constantly changing, these two groups work closely together to create a performance management system that delivers lasting and significant value. Chapter 14 addresses the all-important issue of how to establish a strong partnership between the business and technical teams.

SUMMARY

Definition. Many organizations lack focus. They may devise strategies but not communicate them well to employees, who often work at cross-purposes without clear guidance from above. For organizations to become both efficient and effective, they need to implement a performance management system that translates the organization's strategy into objectives, metrics, initiatives, and tasks customized to each group and individual in the organization. The system can then provide business people with the information they need to measure, monitor, and manage the key activities and processes they need to achieve their goals.

Applications. A performance dashboard consists of applications that *monitor, analyze,* and *manage* performance. The monitoring application is delivered via a dashboard, scorecard, or portal interface. The analysis application is delivered via a business intelligence and data integration infrastructure that provides users with self-service access to the relevant data they need to analyze performance issues in a timely fashion. The management application allows business users to collaborate with other coordinated activities between departments and to optimize performance over the long haul.

Layers. Well-designed performance dashboards let users drill down from graphical views of performance metrics and their status to detailed information, even down to individual transactions in operational systems if required. Performance dashboards are really glorified exception reports that alert users to out-of-bounds conditions and then guide them quickly and effortlessly into an exploration of the root causes of the issue.

Types. There are three types of performance dashboards. Operational dashboards enable front-line workers and supervisors to monitor operational processes that drive the business on a daily basis. Tactical dashboards let managers and business analysts investigate historical trends and issues against large volumes of information from across the enterprise. Strategic dashboards highlight strategic objectives and the activities and tasks users need to accomplish to achieve those objectives. Sometimes strategic dashboards deliver significant value using very little data.

Architecture. A performance dashboard is a multilayered application built on a business intelligence and data integration infrastructure that enables organizations to measure, monitor, and manage business performance more effectively. To accomplish this, business people and technologists must work together. On one hand, business people need to develop coherent strategies and tactics to meet the needs of stakeholders. On the other, they must work with technologists to create effective metrics that measure the status and progress the organization is making with its strategies and tactics. It takes two to tango and build an effective performance dashboard.

CHAPTER 2

The Role of Business Performance Management

THE LANDSCAPE

Understanding Business Performance Management

Setting the Context

Chapter 1 showed that performance dashboards put business performance in context. They provide a visual interface and a set of analytical and management tools to help organizations monitor, analyze, and manage performance better. However, to understand performance dashboards fully, we need to put them in context as well. In this case, the context is an emerging management discipline and technology solution known as business performance management (BPM).

BPM, which was introduced briefly in Chapter 1, is quickly becoming a familiar term in the business world. It is a business strategy that ties together a number of related management disciplines, processes, and tools into a coherent whole. Performance dashboards play a pivotal role in BPM; they represent the most visible face of a BPM initiative.

Confusion Reigns

Unfortunately, there is much confusion about what BPM is—and is not. Much of the confusion stems from the fact that BPM involves multiple processes and applications that organizations have already implemented. These range from strategic planning to financial consolidation and reporting; from planning and budgeting to forecasting and modeling; and from business intelligence and reporting

to dashboards and scorecards. When introduced to the concept of BPM, many managers rightfully exclaim, "We've been doing that for years!"

However, most organizations have not pulled these applications and processes together in a cohesive and concerted way—using a common strategic and technical framework to drive all parts of the organization toward a common set of goals and objectives. Today, organizations implement BPM applications and processes in isolation from each other. Each application provides some local benefit but little global value.

Different Acronyms

Confusion also arises because industry experts cannot agree on what to call BPM, let alone how to define it. Although most experts and users prefer the term "business performance management," others use different names. Gartner Group, a leading technology research firm, favors the term "corporate performance management," whereas some leading software vendors prefer "enterprise performance management."

To add to the confusion, most organizations have a performance management process that they use to measure and evaluate employees on objectives defined by human resources and determine bonus payments and compensation. Although BPM encompasses individual performance plans and reviews, it is much broader than this. Finally, many middleware vendors use the term BPM to stand for business *process* management, a related but distinct discipline (see Spotlight 2.1).

SPOTLIGHT 2.1 BPM VERSUS BPM

Like the old "Spy vs. Spy" cartoons in *Mad Magazine*, business *performance* management and business *process* management are distinct but related disciplines. Both seek to optimize business processes, but one approaches the task from the top down and the other from the bottom up.

Business *performance* management is a top-down discipline that helps executives understand what processes are needed to achieve strategic objectives and then measure the effectiveness of those processes to deliver the desired results. Conversely, business *process* management is a bottom-up approach designed to automate and optimize existing business processes using modeling, workflow, and enterprise application integration tools.

Business Process Management

The Gartner Group defines five key elements of a business *process* management system. Translated into business-friendly language, they are[1]:

1. **Graphical modeling tools** that enable business users to define and optimize the flow of information among business processes and the applications that support them.

SPOTLIGHT 2.1 *(CONTINUED)*

2. **An application engine** that executes and manages the flow of information among applications and notifies business people when they must handle certain tasks in the process.
3. **An adaptive system** that adjusts the flow of information in response to various conditions and automatically updates worklists and tasks accordingly.
4. **Monitoring tools** that monitor and manage process and system performance and highlight out-of-bounds conditions.
5. **Analytical tools** that enable users to analyze historical data about process flows.

Most business *process* management vendors started out selling enterprise application integration (EAI) middleware that links applications together in near real time. They have since added process modeling and management tools as well as business intelligence tools and operational dashboards to deliver a complete system.

In addition, most people use the term BPM informally as shorthand for something else. At a conference I attended in 2003, one speaker equated BPM to budgeting, another to financial consolidation, and a third to compliance with the Sarbanes-Oxley Act. In addition, I found attendees who thought BPM meant either financial reporting, scorecarding, or business intelligence.

BPM Definition

In retrospect, these presenters and attendees were both right *and* wrong. Budgeting, scorecarding, and business intelligence are all components of BPM. You cannot do BPM without them. They are not BPM alone, however. BPM is much broader and bigger than any of these individual components (see Spotlight 2.2).

SPOTLIGHT 2.2 BPM COMPONENTS

Business performance management (BPM) is a management framework that contains the following applications and tools, among others, depending on which vendor or consultant you talk to. It is important to know that BPM is not any of these things individually.

- Performance dashboards
- Budgeting or planning
- Financial consolidation
- Financial reporting
- Business intelligence

SPOTLIGHT 2.2 *(CONTINUED)*

- Portals with embedded key performance indicators
- Strategy maps
- Forecasting software
- Modeling tools for planning

To deliver a true BPM solution, organizations must integrate all the above components in a cohesive and seamless way using a common strategic and technical framework.

After much research and some soul searching, I decided to put a stake in the ground and define BPM. My "big picture" definition is: *a series of organizational processes and applications designed to optimize the execution of business strategy.*

Managing the Business

The concepts behind managing a business are straightforward: Executives set strategy and goals, managers develop plans and budgets to achieve the goals, and the staff executes the plans. Then, everyone continuously monitors their progress toward meeting the goals using reports and analytical tools, and they make course corrections as needed to stay on track. However, defining a good strategy and executing it are two different tasks. BPM processes and tools support good management practices and make it easier for executives at all levels to identify, communicate, and monitor key drivers of business value.

Strategy Gap

Ironically, the prospects for BPM are bright because the state of business management in most companies is so poor. The main problem is that there is a huge gap between strategy and execution. Executives spend days or weeks devising well-crafted strategies and then throw them "over the wall" to the rest of the company, hoping and praying that their vision will bear fruit. Usually, nothing much happens. The organization is deaf to the executives' guidance and direction. Inertia reigns supreme.

Broken Budgets

Another problem is that traditional planning and budgeting cycles—based on centuries-old bookkeeping practices—are no longer fast or flexible enough to meet the accelerated pace of business today. Most plans and budgets are simply

irrelevant and out of date before they are completed. Most employees view the budget as a mindless hoop to jump through, a corporate rain dance, rather than a real aid to planning and management.

Lack of Focus

Most people think that BPM is simply about improving performance in general, but it is not. BPM is about improving performance *in the right direction.* It is possible for organizations to work efficiently but not effectively. Groups and teams may work long hours with great enthusiasm, but if they develop or refine the wrong processes, products, or services, then all their sweat, blood, and tears will not help the company achieve its strategic goals. BPM is designed to help organizations focus on the few things that really drive business value instead of many things that generate activity but do not contribute to the organization's long-term health or viability (see Spotlight 2.3).

SPOTLIGHT 2.3 INTEGRATED BPM: BOOZ ALLEN HAMILTON

Booz Allen Hamilton, one of the world's leading strategy and technology consulting firms, has developed an integrated scorecarding, planning, and reporting solution that helps align the firm to corporate strategy and provide timely, accurate, consistent, and transparent information to the entire organization.

In 2003, the firm's Global Operations team, which provides infrastructure and business support services to the consulting business units, began building individual scorecards for 75 teams across the business. In 2004, it began to align the key performance indicators in these scorecards to the Global Operations team's five strategic themes and seven overarching strategic initiatives and then cascading the scorecards down the organizational hierarchy. Today, the scorecards measure both strategic and operational measures and have become an integrated part of how the company does business (see Exhibit 2.1 for Booz Allen Hamilton's top-level scorecard).

To align the business further, Booz Allen Hamilton also overhauled its planning and financial reporting systems and integrated them with the scorecards. To ensure integration, the company purchased software for planning, scorecarding, and financial reporting from Hyperion Solutions.

The planning system replaces a cumbersome, largely manual, Excel-based process. Today, the planning system automates the creation and delivery of planning, budgeting, and forecasting templates based on previous history. It standardizes the rules and maintains them in a centralized repository. This has greatly accelerated the planning process, reduced errors, and enabled the company to make changes in the model and automatically update all plans everywhere.

Moreover, the company aligns its plans to strategic objectives and then uses plans to drive measures in the scorecards. "We can take information in the plan and arrive at targets and ranges we want to use in the scorecard itself," says John Monczewski, senior manager of firm-wide financial reporting at Booz Allen Hamilton.

SPOTLIGHT 2.3 *(CONTINUED)*

Although Booz Allen Hamilton was best of breed for time to close its financial books, it needed to accelerate the speed with which it distributed financial reports, which several years ago were primarily paper-based reports compiled by almost 100 analysts who used slightly different metric definitions for common terms. Today, the firm generates interactive financial reports online. By centrally generating online reports, the firm has reduced distribution and printing costs, standardized metrics, and reduced the time to distribute end-of-month financial reports by more than 50 percent.

"We've gone from no idea how to measure strategy and a planning process that was pretty broken to one that is consolidated and efficient with one portal for managing plans, strategy, and performance," says Monczewski.

BPM Benefits

BPM bridges the gap between strategy and execution. According to Brenda Moncla, a consultant at ThinkFast Consulting, this results in three major benefits:

1. **Improves Communication.** BPM provides executives with an effective mechanism for communicating strategy and expectations to managers and staff at all levels of the organization via planning models and performance metrics tied to corporate goals and objectives.
2. **Improves Coordination.** BPM also fosters a two-way exchange of ideas and information, both vertically between levels within an organization and horizontally among business units, departments, and workgroups that manage a shared activity.
3. **Improves Control.** BPM enables staff to adjust plans continuously and fix or improve operations in a timely manner by providing them with up-to-date information about market conditions and the status of operational processes.

Interestingly, organizations gain many of these benefits when they implement performance dashboards, especially strategic dashboards. This demonstrates that performance dashboards play a central role in BPM solutions.

Research shows that most organizations implement BPM solutions for a variety of reasons. The primary ones are to gain greater visibility into the business, execute strategy better, improve process efficiency, react faster to business events, improve strategic planning, and deliver a more consistent view of business information (see Exhibit 2.2).

The desire among executives to gain greater visibility into the operations of their business is fueled in part by the U.S. Sarbanes-Oxley Act of 2002, which

EXHIBIT 2.1 STRATEGIC DASHBOARD HOMEPAGE

GO Team Scorecard Report
February-28, 2005 80%

Booz | Allen | Hamilton

GO Team Operational Measures

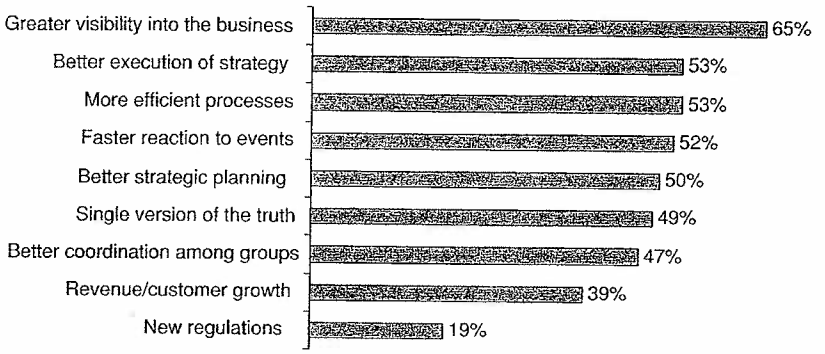
Perspective	Measure	Unit	Target	Score	Status
Value	GT Sales Point Vs. Target	%	28.07	98.56	
	GT Budget vs Actual	%		100	
	GT Cost per Firm Cost	%			
	GT Cost over Firm Headcount	%			
	GT DSO	Days	82	100	
	GT Staff Utilization	Index	12	80.83	
Delivery	GT Client Value Index	Index	4	100	
	GT Model Contractor Rating	Index	5	86	
People Development	GT Diversity Female - Level II and Below	%			
	GT Diversity Female - Level III and IV	%			
	GT Diversity Minority - Level II and Below	%			
	GT Diversity Minority - Level III and IV	%			

GO Team Strategic Measures

Perspective	Measure	Unit	Target	Score	Status
Outreach	GT Develop and roll out an integrated GO Team outreach strategy	%	75	0	
Delivery	GT Roll out approach to effectively close each contract engagement	%	25	100	
New Capabilities	GT Blue print and launch a GO Team Service Center strategy	%	75	80.67	
	GT Build a capacity to plan and fluidly execute a GT bet progra	%	100	83.46	
People Development	GT Develop and roll out the GO Team Way for client service	%	100	85	
	GT Develop and roll out the GO Team Way for people development	%	100	95	
	GT Develop and roll out the GO Team Way for problem solving	%	100	95	

The top-level view of Booz Allen Hamilton's strategic dashboard categorizes and maps strategic objectives and indicates its progress using colored stoplight icons on each objective.

EXHIBIT 2.2 WHY IMPLEMENT BPM?



Based on 2004 survey of 635 respondents who have deployed a BPM solution; conducted by The Data Warehousing Institute, 2004.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, The Data Warehousing Institute, 2004).

established strict new standards for corporate governance and financial disclosure. In particular, section 409 of the Act calls for organizations to provide real-time disclosure of material events that may affect performance. Combined with heightened competition and the accelerating pace of business today, organizations feel a pressing need to know what is happening in their operations at all times.

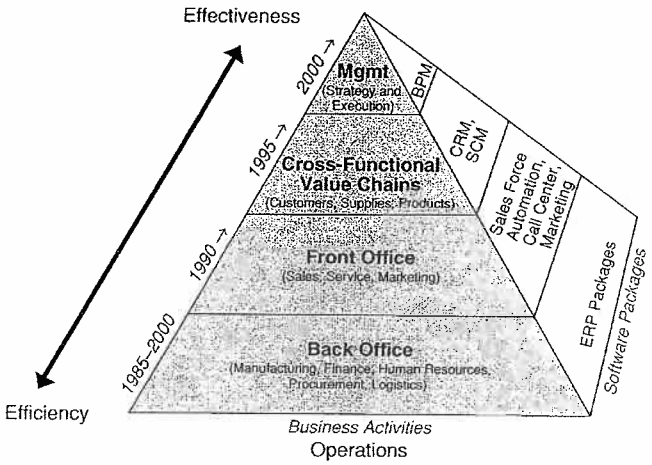
The desire to react to events faster and deliver a single version of the truth is also a primary reason why organizations are implementing business intelligence, which will be covered in Chapter 3. Although the respondents in the survey mentioned above are largely BI professionals, nevertheless this demonstrates the central role that business intelligence plays in BPM and, conversely, performance dashboards.

Evolution of Application Packages

The Last Big Market for Business Software?

From a technology perspective, BPM is merely the latest—and perhaps the last—business function that corporations are "automating" with packaged application software. Starting in the 1980s, organizations deployed software packages to integrate and automate back-office operations, such as manufacturing, finance, and human resources. In the 1990s, organizations deployed software packages to support and enhance front-office activities, such as sales, service, and marketing. In the

EXHIBIT 2.3 THE EVOLUTION OF BUSINESS SOFTWARE PACKAGES



In the past 20 years, companies have employed software packages to integrate and optimize increasingly higher business functions, the latest being business management using BPM solutions.

late 1990s, organizations purchased software packages to optimize cross-functional processes, such as supply chains and customer relationships (see Exhibit 2.3).

Today, one of the last remaining business areas to be automated or fully supported by packaged software is business management. This is the domain of BPM, and it might be the last great untapped market for business software. By virtue of its position at the top of the business pyramid, BPM software holds a commanding view of the rest of the organization, with its processes and activities. Whereas software at lower levels of the business pyramid focuses on increasing the efficiency of business processes, BPM serves as the brains or central nervous system of the entire organization. BPM enables organizations to work more effectively, not just more efficiently, to achieve strategic objectives.

Return on Investment

As a result, BPM has the potential to provide the highest return on investment (ROI) of any business software to date. This is why many vendors are racing to get into the BPM market. Unfortunately, calculating the ROI of BPM is sometimes challenging, because BPM solutions deliver largely intangible benefits, such as better strategies, more alignment, faster access to information, better decisions,

and so on. Enlightened executives intuitively understand the value BPM solutions provide, whereas more "bottom-line"-oriented executives may hold off implementing BPM until they see quantifiable ROI.

A FRAMEWORK FOR BPM

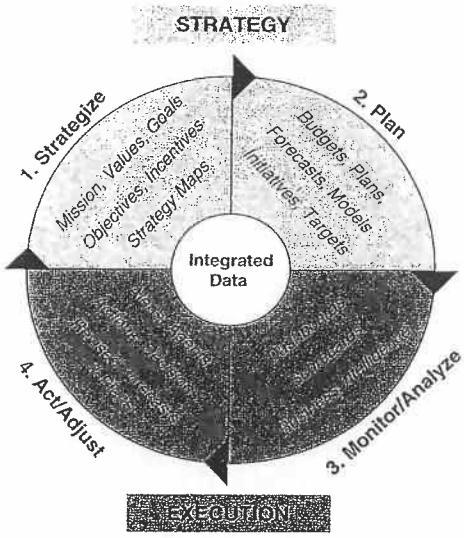
Four-Step Process

If BPM optimizes business management, what is the process by which it works? What are its components? What are the technologies required to support it?

BPM is a four-step, closed-loop discipline that turns business strategy into action. The steps are as follows: 1) Strategize, 2) Plan, 3) Monitor/Analyze, and 4) Act/Adjust (see Exhibit 2.4).

The first two steps in the top half of the circle—Strategize and Plan—constitute the "strategy." The last two steps in the bottom half of the circle—Monitor/Analyze and Act/Adjust—"execute" the strategy. Within each step, organizations

EXHIBIT 2.4 BPM FRAMEWORK



BPM is a four-step process divided equally between strategy and execution. Each step is permitted by the various techniques or technologies shown in the quadrants and supported by a consistent set of integrated data.

use enabling techniques or technologies to support the process. For example, the Plan step uses budgeting, planning, and forecasting software to define initiatives, allocate resources, and establish targets.

When all steps in the BPM process are executed in a concerted manner, they enhance communication, control, and coordination among staff and groups in the organization. In many ways, BPM greases all the parts of the organizational engine to keep it moving in the right direction. The following sections describe the four major steps in the BPM process in more detail.

Step 1: Strategize

Here, executives define key *drivers* of business value and ways to *measure* them. "World class companies focus on value drivers to improve financial performance. They set targets and measures for each driver," says Lawrence Serven, principal at the Buttonwood Group, a management consulting firm in Stamford, CT.

Examples of drivers might be "high customer satisfaction" or "excellent product quality." Measures for these drivers might be "customer satisfaction index" and "number of defects per thousand," respectively. The strategizing process also defines or reaffirms the mission, values, and vision for the organization and sets the goals and objectives to accomplish the mission.

Top executives are not the only ones who can define strategy. Any team of executives or managers in charge of a business unit or department can develop strategies and plans. However, lower level executives must be careful to tie their drivers, measures, and goals to those at the level above them and those of the organization as a whole.

Enablers

Measures of business drivers are called *key performance indicators* (KPIs). KPIs measure how well the organization or individual performs an operational, tactical, or strategic activity that is critical for the current and future success of the organization. KPIs should drive individuals and teams to take action that leads to positive outcomes. As we shall see in Chapter 11, it is not easy to create effective KPIs.

Organizations define drivers, goals, and objectives in strategic planning sessions, which can last several days, weeks, or months. One technique for defining business drivers and KPIs is "strategy mapping," which emanates from a BPM methodology known as Balanced Scorecard. Strategy mapping helps executives define business drivers, objectives, and metrics and map their cause-effect relationships at various levels of an organization. I will discuss strategy maps in more detail in Chapter 9.

Incentives are another key tool that executives use to reinforce value drivers and KPIs. Most companies have systems to evaluate and reward employees for per-

formance, but many of these systems are not tied to strategic objectives and KPIs. Many experts believe that BPM cannot be implemented effectively unless the organization ties performance to compensation.

Step 2: Plan

Next, groups within the organization meet to develop plans to carry out the business strategy and allocate resources. The plans may involve creating new initiatives, projects, and processes, or refining or reaffirming existing ones.

Enablers

The primary planning tool is the *budget or plan*, which allocates resources—people, knowledge, technology, equipment, and money—to carry out the group's goals. The planning process involves breaking down high-level corporate objectives (e.g., "increase market share by 10 percent") into discrete targets and operating models (or scenarios) for every group at each level in the organization. The groups then create projects and processes to meet those targets.

Fixing the Planning Process

Experts agree that planning should be a collaborative process that ties together people across the organization rather than a spreadsheet-driven corporate ritual that imparts little value. Unfortunately, the budgeting process is broken in most organizations. It projects last year's activities onto the coming year and, once approved, is rarely adjusted as circumstances change.

Part of the problem is that most organizations use custom spreadsheets to disseminate and collect data, a process that is cumbersome, error prone, and time consuming. Another pitfall is that many companies do not have a standard planning process or shared definitions for calculating currency conversions or the fully loaded cost of hiring a new worker, for example. If each business unit has a separate planning system, it becomes virtually impossible to align the organization and deliver a consistent view of business activity.

New Web-based planning solutions promise to transform budgeting from a backward-looking, static, and labor-intensive process to one that is dynamic, forward-looking, and tied to strategic drivers and objectives. Leading-edge companies are moving away from grueling, bottom-up budgeting to continuous planning with rolling forecasts based on actual performance.

Step 3: Monitor/Analyze

Ideas are a dime a dozen. It is easy to devise strategies and plans. What is difficult is executing them. This requires good people armed with powerful information

tools and clear direction from the top. Therefore, the most critical elements of a BPM solution are the tools that let users monitor and analyze performance in a timely manner and take action to improve performance—in other words, a performance dashboard.

Chapter 1 showed that a performance dashboard consists of BI tools for reporting and analyzing information, a data integration infrastructure for collecting and integrating data from diverse sources, data storage systems, such as data warehouses and data marts, and monitoring and management tools. Collectively, these tools and components enable business users to access and analyze information and chart their progress toward achieving strategic objectives and optimizing performance.

Step 4: Act and Adjust

The last part of the BPM process is the most critical. It is the action component. To execute strategy, workers must take action to fix broken processes before they spiral out of control or to exploit new opportunities before they disappear.

Performance dashboards play a key part in the Act/Adjust phase because they alert users to potential problems, and provide them with additional detail and guidance to help them make fast, high-quality decisions. "It's not enough to provide just metrics," says one IT professional. "If the metrics show something is wrong, the first thing users want is more information." For well-known processes, organizations are also implementing *intelligent agents,* which automatically recommend or take action in response to predefined events. For example, one online travel site uses an operational dashboard to alert managers to surges in demand that require expansion of their inventory of airline seats and hotel rooms for sale.

Organizations also need to adjust plans and forecasts to reflect changing market conditions. With centralized, Web-based planning systems, staff can more easily adjust forecasts and models they have built into their plans and budgets. Forward-thinking organizations are using these tools to move to a continuous planning environment. For example, one equipment manufacturer now reforecasts sales eight times a quarter and financials once a quarter after implementing a continuous planning solution. The company now closes its plans up to 90 percent faster using half the staff.

BPM TRENDS

Status

Despite the widespread publicity about BPM, few organizations have deployed BPM solutions, and most have only implemented one or two BPM components, typically budgeting software, performance dashboards, or BI tools. Unfortunately,

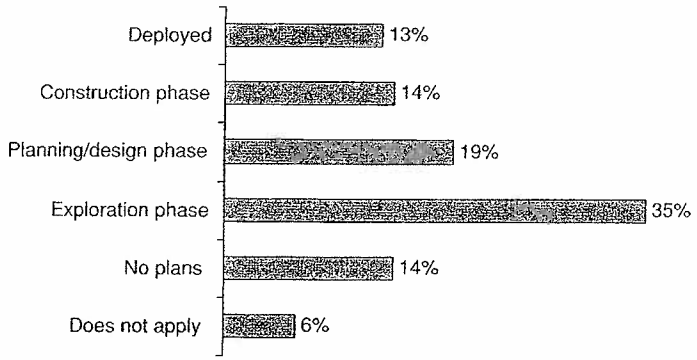
most companies implement these applications in isolation rather than in an integrated fashion. Vendors are helping to move the BPM market along by evangelizing the value and scope of BPM solutions and offering integrated BPM solutions that comply with the framework described above.

According to research from The Data Warehousing Institute (TDWI), only 13 percent of respondents have implemented a BPM solution. However, another third (33 percent) are under construction or in the planning/design phase, and another third are exploring whether to implement a BPM solution. Only 14 percent have no plans (see Exhibit 2.5). Among the 13 percent of organizations that have deployed BPM, less than a third (21 percent) have had a solution in place for more than two years. Thus, BPM is in its early adopter phase in most organizations.

Scope and Growth

Most organizations that deploy BPM do so on an enterprise basis. These are not necessarily CEO-led initiatives that touch every employee in the organization, rather, many BPM solutions—whether they represent a single component of BPM or the entire framework—are initiated by a business unit, a region, or a department (e.g., typically, finance, operations, or sales). If these initiatives are successful, they quickly spread throughout the enterprise.

EXHIBIT 2.5 STATUS OF BPM DEPLOYMENTS



Only 13 percent of organizations have deployed a BPM solution, although one-third (33 percent) are in construction or planning/design phases, according to a survey of 796 respondents by The Data Warehousing Institute, 2004.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, The Data Warehousing Institute, 2004).

For example, Hewlett Packard Co.'s Technology Solutions Group (TSG), which is profiled in Chapter 9, deployed a strategic dashboard in early 2002 to measure customer service in its European region. The initial solution contained nine metrics and was rolled out in seven weeks to 800 users. Within 18 months, the system grew to support more than 120 metrics and 5,500 registered users in Hewlett Packard TSG worldwide.

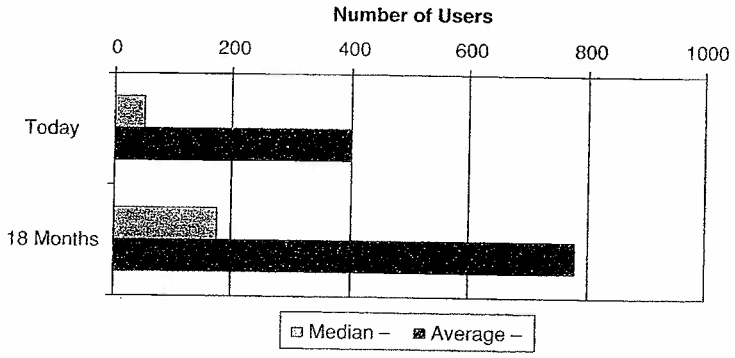
Number of Users

Research shows that organizations implementing BPM solutions will experience the same explosive growth as Hewlett Packard TSG. Organizations estimate that the average number of BPM users will jump almost 100 percent, from 404 users to 777 users in 18 months. The median number of users shows an even greater percentage growth, increasing from 50 to 175 in 18 months. The median numbers are more reflective of reality, because a few very large BPM solutions skewed the average numbers (see Exhibit 2.6).

Type of Users

In addition, most BPM solutions support a balanced mix of users: executives (25 percent), midlevel managers (27 percent), business analysts (27 percent), and

EXHIBIT 2.6 BPM USERS



Most BPM solutions grow exponentially once deployed. Based on a survey of 796 respondents by The Data Warehousing Institute, 2004.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, The Data Warehousing Institute, 2004).

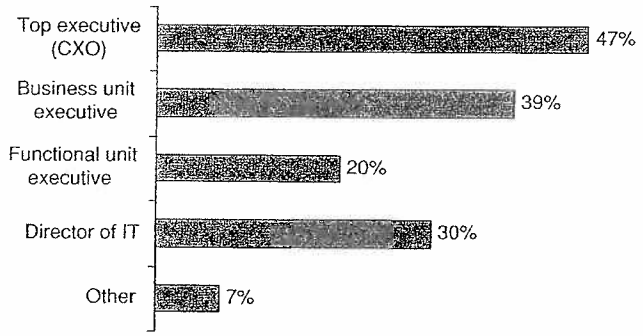
operations personnel (29 percent combined), according to research from TDWI. Only five percent said they allow customers and suppliers to participate in a BPM solution. For example, Hewlett Packard TSG initially geared its strategic dashboard to senior executives who wanted a global view of key metrics, but it quickly modified the application to support managers at all levels in the organization, including field offices with perhaps a dozen or fewer employees.

Business Drivers

Given the strategic nature of BPM and its imperative to improve business management, it is not surprising that top executives are the predominant drivers of BPM solutions. Almost half of all solutions (47 percent) have been spearheaded by C-level executives (CEO, CFO, COO), followed by business unit executives (39 percent). Top technical executives (CIO/director of IT) led the initiative in one-third (30 percent) of the cases (see Exhibit 2.7).

Most projects also have more than one executive driver, especially when top executives are leading the charge. Typically, top executives sponsor the project and evangelize its importance to the company, but divisional executives or heads of IT drive the project, especially if it is initiated in a single division or functional area.

EXHIBIT 2.7 BPM DRIVERS



Top executives initiate more BPM solutions than other managers. Percentages don't equal 100% because users could select more than one answer. Based on 360 respondents in a survey conducted by The Data Warehousing Institute, 2004.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, The Data Warehousing Institute, 2004).

Strategic Value and Satisfaction

When asked how strategic the BPM project is to executives, most respondents to the TDWI survey said either "very strategic" or "fairly strategic" (86 percent total). An almost equal percentage (81 percent) said the executives were either "very satisfied" or "fairly satisfied" with the BPM solution. More than half (57 percent) said their estimated ROI was "high" or "medium."

Although these data show promising early results for BPM, the jury is still out. Because BPM solutions are still in their early adoptive phase, it will take a few years before we know for sure whether BPM can transform the management of organizations to be more efficient and effective in executing strategy and goals.

SUMMARY

Confusion about BPM. Performance dashboards are part of a larger strategic initiative known as business performance management (BPM). Unfortunately, there is considerable confusion about what BPM is and is not. Part of this confusion stems from the fact that BPM is still in its infancy, both as a management discipline and as an integrated software solution. Confusion also exists because experts call it different things, including corporate performance management and enterprise performance management. Also, many people confuse BPM with business *process* management, which is a distinct, but related, discipline.

Business Management Discipline. In its essence, BPM is about improving business management using software tools to improve execution of business strategy. Given this definition, performance dashboards play a critical role in BPM. Executives translate strategy into metrics and goals, which are displayed in performance dashboards. Performance dashboards are the vehicle by which executives communicate strategy to all employees at every level of the organization. Performance dashboards also align activities of all workers and groups to the strategy so everyone is marching in lock step toward the same destination.

Last Great Software Market. BPM is perhaps the last big market for business software. It sits at the top of the business pyramid, serving as a command and control center for the entire organization. It helps optimize the use of other software packages used to increase the efficiency of business processes at lower levels of the organization.

Four-Step Framework. As a management discipline, BPM prescribes a four-step framework: 1) Strategize, 2) Plan, 3) Monitor and Analyze, and 4) Act and Adjust. The first two steps define an organization's strategy; the last two steps execute the strategy. Performance dashboards support the execution of strategy and enable users to monitor and analyze performance, adjust plans and forecasts, and take action to optimize results.

Rapid Growth. BPM as a management discipline and software applications is still in its infancy. Only a fraction of organizations has deployed a BPM solution, although a large percentage is in the planning or design phase. Those organizations that have deployed BPM solutions—particularly strategic dashboards—report that they expand fast, spreading across departments and business units and adding users at a rapid rate. Most BPM solutions are initiated by chief executives, although business unit heads and IT directors also lead the initiatives.

NOTE

1. Excerpted from a Gartner Group Research Note, "A BPM Taxonomy: Creating Clarity in a Confusing Market," T-18-9669, 29 May 2003 in a white paper "A Closer Look at BPM" (Ultimus, Inc., January 2005).

CHAPTER 3

The Role of Business Intelligence

THE VALUE OF BUSINESS INTELLIGENCE

In Chapter 1, we defined performance dashboards and described their salient characteristics. In Chapter 2, we provided a business context for performance dashboards, showing how they are a critical tool in an emerging business discipline known as business performance management. In this chapter, we provide the technical context for performance dashboards by exploring the business value and composition of business intelligence (BI).

It is important to provide a primer on business intelligence because it is such an integral part of a performance dashboard. Most of the companies profiled in this book built their performance dashboard on top of a BI environment. Without business intelligence, organizations cannot exploit the full potential of a performance dashboard to focus and align people and processes with strategic objectives and make smart, timely decisions. In short, business intelligence is the foundation upon which most performance dashboards grow and flourish.

Origins of Business Intelligence

Early Days

Business intelligence emerged as a distinct discipline in the early 1990s as a way to provide end-users with better access to information for decision making. The initial goal was to give users "self-service" access to information so they did not have to rely on the IT department to create custom reports. By the early 1990s, business intelligence consisted of two nascent segments: data warehousing and desktop query and reporting tools.

Companies began building data warehouses as a way to offload queries from operational systems. Data warehouses became "analytical playgrounds" that let

users query all the data they wanted without bogging down the performance of operational systems. At the time, users needed to know SQL, a database query language, to submit queries. So, many prescient vendors began shipping query and reporting tools that hid the SQL language behind a point-and-click Windows interface. Vendors converted these desktop query and reporting tools to the Web in the late 1990s and bundled them with other types of analytical tools to create what are today called "BI suites" or "BI platforms."

The Modern Face of Business Intelligence

Taking a big picture view, business intelligence is an umbrella term that encompasses a raft of data warehousing and data integration technologies as well as query, reporting, and analysis tools (i.e., "BI tools or suites") required to fulfill the promise of giving business users self-service access to information. Performance dashboards represent the latest incarnation of business intelligence; they are built on years of technical and process innovation within the BI field and span both the data management and analytical sides of business intelligence. You could say that performance dashboards are the modern face of business intelligence.

Market Size

Today, business intelligence is big business. Almost every Fortune 2000 company has a data warehouse or some variant. Startup firms that peddled Windows-based query and reporting tools in the early 1990s are now approaching $1 billion in revenues, offer a panoply of products and services, and boast customers around the world. Many software heavyweights, such as Microsoft, Oracle, SAP, and Siebel Systems, have also joined the fray, hoping to take a piece of the BI market's ever expanding pie.

International Data Corporation (IDC), a leading IT market research firm, predicts that the market for BI tools and applications alone will expand from $3.9 billion in 2003 to roughly $5 billion in 2007 with a compound annual growth rate of almost 5 percent, greater than most software market segments in recent years. Adding sales of servers and database management systems used for data warehousing, the BI market exceeds $100 billion annually.

The ROI of Business Intelligence

Case Studies

When done right, business intelligence delivers real value. Organizations in various industries have reaped both tangible and intangible benefits from business intelligence. The Data Warehousing Institute (TDWI) receives more than 100 applications each year to its *Best Practices in Business Intelligence* contest from

organizations that can testify to the power of business intelligence to deliver concrete business value. Here are a few examples:

- A major airline estimates that it generated $40 million in new revenue and saved $31 million in costs last year from just four of 35 analytical applications running in its BI environment.
- A major electronics retailer attributes $1.3 million a year in improved assortments and fewer out-of-stock situations to a BI solution. The same solution also saves $2.3 million a year in inventory, a result of more accurate supplier shipments.
- A state department of finance and revenue has closed its tax compliance gap by $10 million a year while optimizing customer satisfaction, thanks to a new BI solution.

If at First You Don't Succeed...

Although these are just a few of many hundreds of successful BI solutions, it would be misleading to suggest that every BI project generates substantial business value. Not everyone succeeds with business intelligence. It takes a considerable amount of money, time, and leadership to deliver real value. Unfortunately, many executives underestimate the commitment that they and their organizations need to make in order to ensure success.

The good news is that most organizations eventually succeed with business intelligence, even if they fail initially. In a recent survey by TDWI, only 18 percent of "stalled" BI projects were canceled outright. The rest were given another chance after restructuring the project with new sponsors, project managers, consultants, or funding levels. With the benefit of hard-earned experience, most teams eventually deliver substantial value.

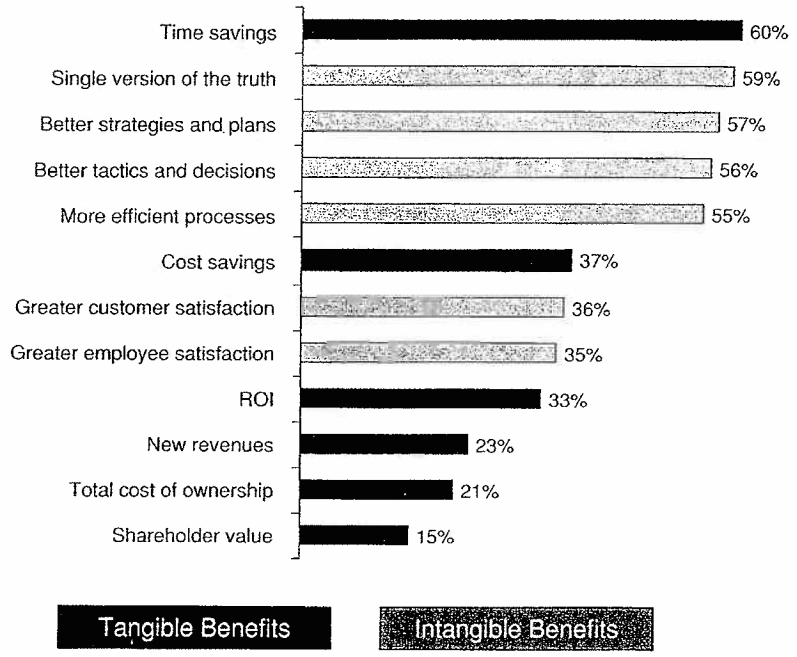
Tangible and Intangible Benefits

Organizations that deploy BI solutions cite many tangible and intangible benefits. Research shows that most benefits from BI solutions are intangible in nature, which makes them difficult to justify in terms of cost, similar to performance dashboards (see Exhibit 3.1).

Many executives report that they did not foresee the biggest benefits that business intelligence would deliver when they initially approved a project. Consequently, many executives do not insist on a rigorous cost justification.

"Our CEO is the champion of our BI project because he wants to understand what each customer means to our firm in revenue and usage," says Ted Carlson, an energy information consultant at Wisconsin Public Service. "It was difficult to pinpoint the ROI for the project—we primarily justified it as a strategic asset. It

EXHIBIT 3.1 BENEFITS OF BUSINESS INTELLIGENCE



Business intelligence delivers mostly intangible benefits, which is why it is difficult to cost justify. Based on a survey of 510 respondents by The Data Warehousing Institute, 2003.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful BI Solutions" (*TDWI Report Series*, The Data Warehousing Institute, 2003).

has played a big role in attracting and retaining customers and keeping our stock price and credit rating at high levels compared to the rest of the industry."

BUSINESS INTELLIGENCE LANDSCAPE

Conceptual Framework

Business intelligence is often used as a synonym for query, reporting, and analysis tools. However, the term *business intelligence* is broader than a set of software tools. A better definition is as follows:

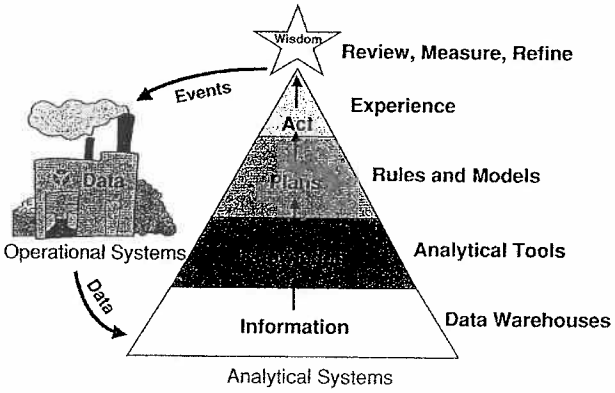
> Business intelligence consists of the processes, tools, and technologies required to turn data into information and information into knowledge and plans that drive effective business activity.

Given this definition, performance dashboards based on a BI infrastructure provide more than just a visual display of performance metrics. They are powerful tools for transforming companies into learning-based organizations that use fact-based decision making to achieve strategic objectives.

One way to think about business intelligence is as a "data refinery." To understand this analogy, think of an oil refinery, which is designed to take a raw material—crude oil—and process it into a multiplicity of products, such as gasoline, jet fuel, kerosene, and lubricants. In the same way, business intelligence takes another raw material—data—and processes it into a multiplicity of information products (see Exhibit 3.2).

The cycle begins when operational systems that "run" the company—such as order entry, shipping, billing, general ledger, and so on—capture business events and turn them into data, the raw material of business intelligence:

EXHIBIT 3.2 THE "DATA REFINERY"



Business intelligence can be thought of as a "data refinery" that processes a raw material—data—into a multiplicity of information products: "Information," which is collected and aggregated by data warehouses; "Knowledge," which is gleaned from query, reporting, and analysis tools; "Plans," which are pieced together from rules, models, and patterns discovered by analytical tools; and "Action," in which business users execute plans that generate events, which starts the cycle over again.

1. **Data to Information.** A data warehouse captures data from one or more operational systems and integrates it at the "atomic" level—the most granular level of data that exists among all systems. For example, a data warehouse might match and merge product data at the SKU level from four operational systems—orders, service, sales, and shipments systems. Integrating data and storing it in a single place transforms data into a new product: *information.*
2. **Information to Knowledge.** Then, users equipped with query, reporting, and analysis tools examine the information and identify trends, patterns, and exceptions in the data. Analytical tools enable users to turn information into a new product: *knowledge.*
3. **Knowledge to Rules.** Armed with these insights, users then create *rules* from the trends and patterns they discover. These rules can be simple—"Order 50 new units whenever inventory falls below 25" or "We expect to sell 1,000 widgets next month based on our past three months of sales and year-to-date comparisons." The rules can also be complex, generated by statistical algorithms or models. For example, statistically generated rules can dynamically configure prices in response to changing market conditions, or optimize freight-hauling schedules in a large carrier network, or determine the best cross-sell opportunities for use in a call center or Web site.
4. **Rules to Action.** Users then create plans that implement the rules. For example, a marketing manager may create a marketing campaign that provides unique offers to customers in six market segments using an optimal combination of marketing collateral and incentives for each customer. The campaign defines what offers to make to each customer segment and the channels (e.g., direct mail or e-mail) through which the offers should be sent. Plans turn rules into *action.*
5. **Feedback Loop.** Once plans are executed, they generate business events that are captured by operational systems, repeating the process. Each time an organization goes through this cycle, it measures, reviews, and refines its plans. This allows users to refine both their mental and statistical models of how the business works and how their decisions affect performance.

This five-step virtuous cycle—in essence, capture, analyze, plan, act, and review—creates a learning organization that can respond flexibly and nimbly to new events in the marketplace.

In many respects, business intelligence is designed to mimic the processes that humans use every day to learn and to make judicious decisions. During our lifetime, we experience millions of events that we assimilate, analyze, and turn into

rules, whether consciously or not. Each time we apply a "rule," we get feedback on its validity, which enables us to refine the rules and adapt to changes in our environment. Our "gut instincts" are no more than the unconscious application of rules refined from millions and millions of life experiences. In the same way, business intelligence uses technology to turn millions of business events into models that an organization can use to adapt quickly to changing market conditions.

Common Misconceptions

Some executives make the huge mistake of thinking that there is no difference between BI systems and operational systems. Many executives do not believe they need to spend hundreds of thousands or millions of dollars to create a BI system when their operational systems already generate reports and when business analysts create custom reports in Excel or Access for them.

Eventually, reality catches up with these organizations. They become extremely inefficient in gathering and analyzing data, wasting hundreds of thousands of dollars in man-hours every year. Even worse, they make bad decisions based on incomplete, inconsistent, or inaccurate data, leading to millions of dollars in lost sales. The sad thing is that most organizations do not realize the extent to which they are bleeding themselves dry because of the lack of business intelligence! This is because no accountant or auditor tracks how much money the company loses each day or week or month by not providing timely, consistent data to all workers who need it.

Business Intelligence Is an Adaptable System

The major difference between the two types of systems is that BI systems adapt to the business whereas operational systems structure it. BI systems need to adapt continually to the changing concerns of the business. The questions that business users ask today are different from the ones they will ask tomorrow or next week. In contrast, operational systems impose structure on the business so that a process, such as order taking, is done the same way every time no matter who takes the order. Once designed, operational systems do not change much. The opposite is true for BI systems: the more they change, the more value they provide. In short, whereas operational systems automate processes to improve efficiency, BI systems support decision making to improve effectiveness (see Exhibit 3.3).

So, the real challenge of business intelligence is how to design and manage a system that always changes. In other words, how do you create an adaptive system? This is not easy, which is why many experts say that building a BI system (or a data warehouse) is a "journey, not a destination."

EXHIBIT 3.3 OPERATIONAL SYSTEMS VERSUS BI SYSTEMS

Operational Systems	Business Intelligence
Automate processes	Support decision making
Designed for efficiency	Designed for effectiveness
Structure the business	Adapt to the business
React to events	Anticipate events
Optimized for transactions	Optimized for queries

Types of Data

The dichotomy between operational and BI systems is also evident in the type of information that each manages (see Exhibit 3.4). Operational systems track current transactions (e.g., debits, credits, and current account balance) and keep little history around (i.e., usually only 60 to 90 days of transactions). In contrast, BI systems maintain *years* of detailed transactions culled from multiple operational systems. Moreover, BI systems create new or derived data by summarizing and calculating transaction data to support the metrics that the business uses to track performance.

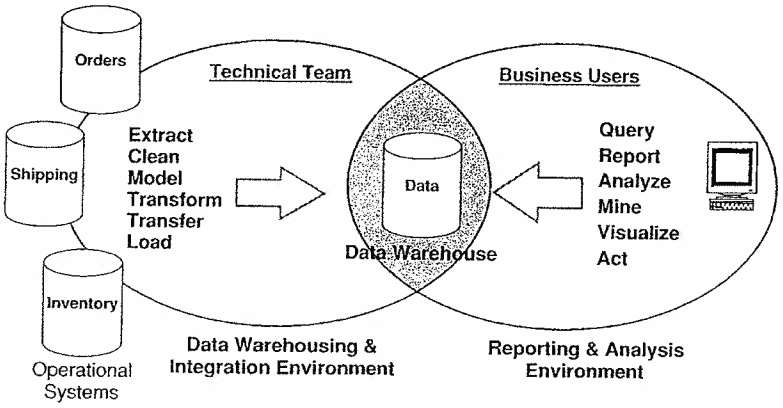
Operationalizing Business Intelligence

Until recently, BI systems captured transactions by taking periodic "snapshots" of data in an operational system at regular intervals. Now, however, companies want to analyze more timely or "fresher" data to make operational or right-time decisions. For example, store managers who can analyze product sales hourly or daily might change product displays twice a day to optimize revenues by analyzing hourly shopping trends. To support this type of decision making, BI systems are

EXHIBIT 3.4 OPERATIONAL DATA VERSUS BI DATA

Operational Data	BI Data
Current	Historical
Continuously updated	Periodic snapshots
Source specific	Integrated
Application oriented	Subject oriented
Detailed only	Detailed, summarized, and derived

EXHIBIT 3.5 BUSINESS INTELLIGENCE TECHNICAL FRAMEWORK



Business intelligence consists of two intersecting environments represented by the ovals above: the data warehousing and integration environment and the reporting and analysis environment.

beginning to adapt the characteristics of operational systems noted in Exhibits 3.4 and 3.5. We will discuss right-time BI in more detail in Chapters 6 and 7.

Technical Framework

Now that we understand the conceptual basis of business intelligence, let us explore the components that comprise a BI environment. The diagram shown in Exhibit 3.5 depicts business intelligence as two intersecting ovals, with operational systems (e.g., orders, shipping, and inventory) off to the left.

Data Warehousing and Data Integration Environment

Data Archaeology

In Exhibit 3.5, the left-hand oval is the data warehousing and integration environment. This is where the technical team spends 60 to 80 percent of its time. Its job is to capture, clean, model, transform, transfer, and load transaction data from one or more operational systems into the data warehouse. These tasks are not easy because operational data is rarely clean, consistent, or easy to integrate. Like archaeologists, the technical team needs to decipher the meaning and validity of thousands of data elements and values in multiple operational systems. It then needs to glue everything back together again into a single coherent "model" of the

business, much like a paleontologist might reconstruct a life-size model of a dinosaur from an assortment of bones.

Needless to say, these tasks take a tremendous amount of time and effort. Just as it takes years for a paleontologist to piece together a dinosaur from its relics, it can take months for a technical team to create an initial data warehouse or data mart. This is why most teams start small and incrementally build an enterprise view one subject area at a time. Also, just as paleontologists need expert knowledge of their subject matter, technical teams need a deep understanding of the business they are trying to model. In fact, technical teams cannot do this work themselves. They need business analysts who are intimately familiar with both the business and the data to guide them step by step through the process of gluing the business back together again.

Data Warehouses

Once the data archaeology is complete, the technical team loads the integrated data into a data warehouse, which is usually a relational database designed to handle large numbers of both simple and complex queries. A *simple query* might ask for the customer record for "John Doe," which was pieced together from multiple systems and stored in one row of the data warehouse database. A *complex query* might ask to see the top 10 customers for the previous 12 months who have outstanding credit but declining orders. Whereas simple queries take seconds to execute, complex queries can take many minutes or hours depending on the complexity of the query and the volume of data in the data warehouse.

Data Marts

To improve query performance and narrow the scope of data warehousing projects, technical teams often create subject-specific data warehouses, called data marts. Data marts became popular once it became clear that early data warehousing projects that tried to model and map large portions of the enterprise took years to build, cost millions of dollars, and, not surprisingly, failed to deliver meaningful results. Data marts scale down projects to a realistic scope, allowing technical teams to deliver results within three to six months. Typical data marts are designed to support individual business areas, such as sales, marketing, or accounting.

Most data warehouses are modeled in a highly normalized format, such as third normal form, which minimizes redundancy in the database by dividing data into tables and specifying relationships between them. Third normal form models are commonly used in transactional systems so applications only have to access a single table to make an update instead of multiple tables, increasing application speed and accuracy.

In contrast, most data marts are designed using a star schema model, which arranges relational data so that it is easy and fast to query and quick to load into online analytical processing (OLAP) cubes. Unlike normalized models, a star schema puts all the fact-based information (e.g., the numbers) in a central table surrounded by multiple dimension tables, such as customer, geography, channel, product, which is why it is called a "star" schema. The dimension tables filter the central fact table in response to a user query, such as "I want to see revenues (i.e., a "fact") for the last 12 months (i.e., time dimension) in the Midwest region (i.e., geography dimension), by our top 10 customers (i.e., customer dimension ranked)."

Multilayered Architecture

Today, most companies use a hub-and-spoke architecture to meet users' information needs. This architecture consists of a central data warehouse that feeds information to multiple downstream data marts. In this environment, users query the data marts, which are designed to meet the specific information requirements of a department or workgroup. Only data-savvy business analysts query the data warehouse, which contains a superset of information in the marts.

The use of data marts frees technical teams to design a data warehouse to handle two major tasks: 1) collect and integrate data from multiple systems at the most granular level possible and 2) prepare and distribute data to data marts. The data warehouse never gets rid of data and serves as a perpetual recycling center and staging area. This multitiered architecture enables technical teams to create new data marts quickly by repurposing data already in the warehouse and perhaps extracting new data from operational systems either periodically in a batch process or in near real-time using enterprise information integration (EII) tools. However, not all data warehousing experts believe that a multi-tier architecture is best (see Spotlight 3.1).

SPOTLIGHT 3.1 DATA WAREHOUSING ARCHITECTURES: THE BATTLE OF THE TITANS

The BI community has experienced its share of religious wars over the years. The biggest battle has been waged over how to construct a data warehousing environment.

The Inmon Model. The Inmon model, named after Bill Inmon, a prolific author and respected figure in data warehousing circles, advocates using a "hub-and-spoke" architecture in which a central data warehouse serves as a staging area to collect data from multiple sources systems and then distribute subsets to downstream data marts. In this multitiered approach, users query data marts instead of the data warehouse, which functions more as a staging area and distribution center. The data warehouse contains detailed data whereas the data marts contain mostly summary data.

SPOTLIGHT 3.1 *(CONTINUED)*

The Kimball Model. Another major camp follows the advice of Ralph Kimball, another prolific author and respected figure in the industry. The Kimball model dismisses the need for a data warehouse. Because most users want detailed data, Kimball argues that it is best to store the detailed data in individual data marts and logically connect them using "conformed" dimensions. In essence, Kimball's data warehouse is the sum of all the data marts. To optimize query performance and improve ease of use of the data marts, Kimball popularized a type of data model known as a *star schema* that is widely used today, even among "Inmonites" when creating data marts.

Centralized Data Warehouse Model. Teradata, a division of NCR, advocates using data warehouses without any data marts. This centralized approach gives users unfettered access to all data in the data warehouse instead of restricting them to individual data marts. It also makes it easier to manage and maintain the system because all the data are kept centrally within a single data management platform. However, central data warehouses can become extremely large in terms of the amount of data and number of users they support. To maintain adequate query performance in large central warehouses, organizations need a high-performance, parallel-processing database (such as the one Teradata provides).

Federated or Virtual Approach. The federated approach creates a virtual data warehouse. Instead of consolidating data into a single repository, this approach pulls data together on the fly from multiple source systems, including data warehouses, data marts, operational systems, Web pages, and external systems, among other things. From the user's perspective, however, the data appear to exist in a single system since the federated approach delivers a virtualized view of remote systems. Users aren't aware of the complexity of the data environment, although some complex queries may not run as fast as in a traditional environment.

Although the federated approach does not always scale well, it is a quick and easy way to get a performance dashboard up and running when an organization either does not have a data warehouse or data mart or does not want to wait for the IT department to upgrade an existing one with the right data. An organization can use the technique to populate metrics in a performance dashboard with data from different systems. For instance, it can pull budget data from a planning system, last month's results from the data warehouse, and yesterday's activity from an operational system. Many organizations now prefer the flexibility of the federated approach, and it is one reason for the explosion of performance dashboards today.

Research from TDWI shows that most organizations prefer Inmon's multilayered, "hub and spoke" approach to either a central data warehouse or a Kimball architecture. Interestingly, these approaches are not mutually exclusive. Most organizations create hybrid architectures that blend elements from each. In reality, there is no one right or wrong way to build a data warehouse as long as it meets an organization's information needs.

Operational Data Stores

To confuse matters, many organizations create a specialized data warehouse, known as an *operational data store* (ODS), to support operational applications that require fast access to integrated data. Unlike traditional data warehouses or data marts that store large volumes of historical data and support complex, long-running queries, ODSs do not store more than a few months of data and support quick look-up queries (e.g., customer records.) In addition, users can update records in the ODS but not the data warehouse, which typically appends new information to existing records but never throws anything out in order to keep a true historical record of events.

A good example of an ODS is a customer database that delivers a customer record to a telephone service representative when the customer calls with a question or an order. The customer record contains a history of customer purchases and past interactions with the company culled from multiple customer-facing systems. It may also contain a "score" that informs the customer service representative what products to cross-sell to the customer based on their buying history. (The scores are usually calculated in the data warehouse and passed to the ODS.) In addition, whereas data warehouses are read-only environments, an ODS lets business users edit or delete records on the fly. For example, a service representative can update a customer's address, marital status, or other information within the ODS while on the phone with the customer.

Data Warehousing Tools

To build a data warehousing environment, technical teams must first analyze source systems to see what data they contain and also examine the condition of the data. Often, source systems contain incomplete, missing, or invalid data, which makes it challenging to build a data warehouse. Most teams now use *data profiling tools* to audit and assess the condition of source data and identify relationships among columns and tables. They use *data cleansing tools* to validate and fix known problems in source data as it is loaded into the data warehouse.

Once the team finishes analyzing the data in source systems, it creates a target *data model* for the data warehouse. The model, in effect, is a logical representation of how the business operates in a specific area, such as sales or service. Most technical teams create conceptual, logical, and physical data models using commercially available *data modeling software*, although some data modelers still work entirely by hand.

Data Integration Tools

With a target model in hand and a good understanding of data in source systems, the team is now ready to map source data to the target data warehousing model.

It does this by using *extraction, transformation, and loading (ETL) tools* or by coding transformation logic by hand. ETL programs are the heart and soul of a data warehousing environment because they contain all the rules for gluing data from multiple source systems into a single data store that provides an integrated picture of the business. ETL tools also contain engines that automate the process of extracting source data, transforming and mapping it to the target model, and moving and loading it into the data warehouse.

To support right-time or even real-time updates, a performance management group may also employ high-speed middleware in conjunction with their ETL tools. For example, organizations that use *enterprise application integration (EAI)* to integrate packaged and legacy applications are now pushing data to ETL engines in real time. This "trickle feed" approach replaces traditional batch-loading processes that limit data warehouses to storing historical data only. The combination of EAI and ETL promises to transform data warehouses from stodgy historical archives into active repositories of on-demand information.

Another way to deliver right-time information is to use *enterprise information integration (EII)* middleware. These tools query multiple, distributed data sources, join the results on the fly, and display them to end-users. EII tools, in effect, create a virtual data warehouse or virtual performance dashboard that is dynamically generated transparently to users. However, many EII tools only work well against small volumes of clean, relatively non-volatile data that have well-defined database keys. Most experts agree that EII tools provide a good way to prototype the contents of a proposed data warehouse or performance dashboard or supplement an existing one with right-time or external data.

Lightweight Infrastructure

Not all performance management systems require organizations to build data warehouses and deploy data integration middleware, which can be expensive. Some strategic dashboards succeed without them. However, just because an organization does not want to spend money creating a BI infrastructure does not mean it can succeed without it (see Spotlight 3.2).

SPOTLIGHT 3.2 DO WE REALLY NEED A BI INFRASTRUCTURE?

Some executives who want to deploy a performance dashboard balk at the cost and complexity of creating a BI infrastructure, including data warehouses, data marts, and data integration tools. They question whether these tools and structures are absolutely critical and wonder if there is a shortcut.

SPOTLIGHT 3.2 *(CONTINUED)*

It is true that not all performance management systems require a BI infrastructure. Chapter 1 described a strategic dashboard built by Brown & Root that did not hold much data and thus didn't require a classic BI infrastructure. However, just because an organization does not want to spend money on a BI infrastructure does not mean it can get away without one.

Most operational and tactical dashboards require a BI infrastructure, but strategic dashboards may not need one right away. However, once a company starts cascading scorecards throughout the enterprise and to lower levels of the organization, its information requirements expand substantially and it will need to invest in a BI infrastructure. Lower level scorecards generally require more detailed data than higher level scorecards.

Organizations that put off building a BI infrastructure create problems for themselves in the long run. They usually hit a brick wall once they try to expand the performance dashboard beyond the initial target group of users. Successful projects are cursed with success and the team must support three to four times more data and users than they anticipated. When this happens, the team often quickly slaps together a BI infrastructure that is not reliable, scalable, or aligned with corporate information standards. These makeshift BI infrastructures are costly to maintain and are prime candidates for consolidation into a more standard infrastructure.

A robust BI infrastructure does not have to cost a fortune, and it does not have to be built all at once. Many companies profiled in this book bootstrapped their performance dashboards with little or no money and without making long-term technical compromises at the infrastructure level. Most built the BI infrastructure incrementally along with new applications and functionality requested by users. Some also leveraged existing data warehouses and data marts, accelerating development and avoiding duplication of resources.

Analytical Environment

The right-hand oval in Exhibit 3.5 refers to the reporting and analysis environment, which is the domain of the business users, who use a variety of tools to query, report, analyze, mine, visualize, and, most importantly, act on the data in the data warehousing environment.

Report Design Tools

Report design tools allow power users or developers to craft custom queries and format the results in a standard report layout, such as master-detail reports or pixel-perfect invoices and account statements. A decade or two ago, most standard business reports were hand-written using a programming language, printed on paper, and distributed via snail mail. However, vendors now offer powerful new report design tools that run on a variety of platforms (e.g., Windows, Web,

mainframe) and pull data from multiple source systems. The tools now generate online reports that users can interact with by linking to subreports (i.e., "linked reports") or selecting parameters from a drop-down list box (i.e., "parameterized reports"). Many report design tools now use a desktop publishing paradigm that makes it easier for report developers and power users to create custom reports quickly and easily.

The earliest report design tools exhibited many characteristics of modern day data warehouses and data integration tools. They extracted, joined, and massaged data from multiple source systems, placed the data into a large report file, and stored it on a central server. Many financial, management, and regulatory reports are still produced this way. Unfortunately, many executives mistake their 15-year-old production reporting systems for a full-fledged business intelligence environment. They believe that because they spend hundreds of thousands of dollars each year producing standard reports they already "do" business intelligence. It is difficult to convince these executives that they are losing money and a competitive edge by not giving users timely access to relevant information, something that most standard and production reports do not deliver.

Whereas early report design tools created static reports, many now create interactive reports that function similarly to end-user query and reporting tools. For example, parameterized re-ports make users think they are performing ad hoc queries when, in reality, they are simply filtering a preexisting report. A single parameterized report with multiple filters can replace hundreds or thousands of custom reports, liberating end-users from having to request custom reports from the IT department (see Exhibit 3.6).

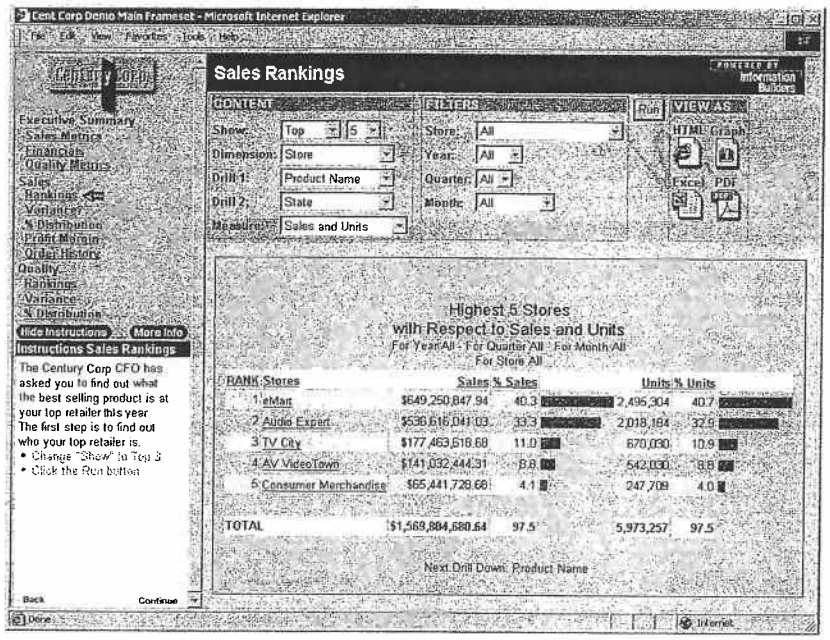
Query and Reporting Tools

End-user versions of report design tools are known as *query and reporting tools*. These tools provide users with predefined query objects that shield users from having to know SQL or master the complexity of navigating back-end databases and networks. With a semantic layer, end-users simply drag and drop data elements and measures onto a "query panel" and hit the submit button. The results come back in rows and columns (i.e., tabular format) that users can then turn into charts or apply other formatting as needed. Business Objects and Cognos were among the first vendors to deliver end-user query and reporting tools.

Online Analytical Processing Tools

OLAP tools are essentially spreadsheets on steroids. Whereas spreadsheets store data in two dimensions in a file, OLAP tools store data in multiple dimensions in a specialized database (see Exhibit 3.7). The beauty of OLAP tools is that they let users query data the way they think about the business—dimensionally. Whereas

EXHIBIT 3.6 PARAMETERIZED REPORTING



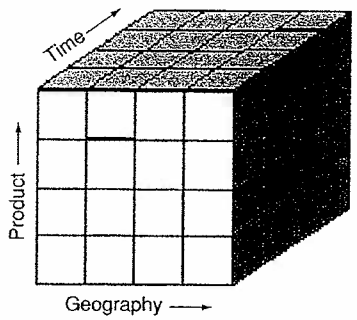
Parameterized reports let users filter an existing report by selecting values from one or more drop-down list boxes, as in the example above. With parameterized reports, users think they are performing "ad hoc queries" when they're really just applying filters to an existing report. Parameterized reports let developers create one report that provides many views or slices of the data.

Source: Courtesy of Information Builders, Inc.

query and reporting tools require users to select tables, rows, and columns—which are the artifacts of databases—OLAP tools let users select measures and dimensions—which are artifacts of the business. A typical OLAP query might be "Let me see net profits by product, by channel, by geography, and by time." Like spreadsheets, OLAP tools let users apply complex calculations to the data and create hierarchies within each dimension. A geography hierarchy might be Region, Country, District, City, or Office. A time hierarchy might be Year, Quarter, Month, Week, or Day.

Unlike spreadsheets, however, OLAP tools hold much more data because they run on a specialized multidimensional database. OLAP tools are fast—they provide split-second response times to most queries, allowing users to "slice and dice"

EXHIBIT 3.7 OLAP CUBE: DIMENSIONAL ANALYSIS



OLAP tools are like spreadsheets on steroids. Whereas spreadsheets store data in two dimensions, OLAP tools store data in multiple dimensions. Users can quickly and easily navigate through dimensions and hierarchies in the cube, hence the term "slice and dice." The diagram above only shows three dimensions, but OLAP cubes can hold dozens of dimensions, each with multiple hierarchies of data.

the data almost at the speed of thought. Interestingly, most users cannot tell the difference between a parameterized report and an OLAP application. Both provide flexible navigation. The major difference is that OLAP users navigate a dimensional database whereas parameterized report users navigate query filters defined by a report designer. Thus parameterized reports are ideal when you want to impose greater structure on user navigation, whereas OLAP is best when you want to give users unfettered access to a predefined set of data.

The traditional downsides of OLAP databases are that they only hold a limited amount of data (but much more than a spreadsheet) and they run on a proprietary database that may not match your company's architecture. Traditionally, OLAP tools take a long time to populate with data because they precalculate results at the intersection of each dimension and each hierarchy. This effectively limits them to storing summary data only. However, in recent years, vendors have made dramatic breakthroughs in OLAP server scalability and calculation performance. Many companies are now considering replacing star schema data marts with OLAP servers because they are equally scalable.

Data Mining Tools

Data mining tools, also known as knowledge discovery in databases (KDD), provide highly specialized tools for statisticians and skilled business analysts. These

tools automatically "mine" or discover patterns in the data and generate statistical models and rules. Unlike query, reporting, and analysis tools that require users to start with a hypothesis of trends in the data, data mining tools do not require business users to make such assumptions.

Using sophisticated statistical analysis and data mining techniques, such as neural networks, decision trees, and linear regression, these tools find patterns in the data that might take days or weeks for users to discover on their own, if at all. Some vendors now sell *text mining tools* that discover patterns in documents or text, such as call center conversations, Web forums, or Web pages. Both data and text mining tools turn the patterns into rules or algorithms (i.e., "models") that can be applied to other data to make predictions, classifications, segmentations, recommendations, and forecasts. For example, companies use data mining models to spot fraudulent credit card transactions, anticipate machinery breakdowns, or recommend products to new or existing customers.

The ROI of predictive mining applications is almost five times greater than that of nonpredictive applications using standard query, reporting, and analysis tools, according to research firm IDC. The downside is that data mining applications require high-priced specialists and software that make them almost twice as expensive to set up and maintain as other analytical applications, according to IDC.

Fitting Users to Tools

One Size Does Not Fit All

The five categories of BI tools described above—report design, end-user query and reporting, OLAP, and data mining—deliver different types of functionality for different types of users. To meet user requirements, organizations must purchase multiple BI tools, something most executives are loath to do. For years, executives have made it abundantly clear that they only want to purchase one tool for all users to minimize upfront license fees and downstream maintenance, support, and training costs. The reality, however, is that one size does not fit all when it comes to BI tools.

To date, companies that have purchased a single BI tool for all users pay in the end. Users get frustrated with BI tools that are over- or underpowered for their needs and stop using them. There is a lot of BI shelfware today, representing hundreds of millions of dollars in wasted investments. The beauty of performance dashboards is that they support a broad range of users by incorporating the functionality of a variety of BI tools in a layered fashion that conforms to the way users want to view and manipulate information. Performance dashboards finally give executives a single tool that meets the needs of most users in their organizations.

Outside of performance dashboards, many BI vendors sell integrated suites of BI tools, which meet most users' requirements and minimize the risks of pur-

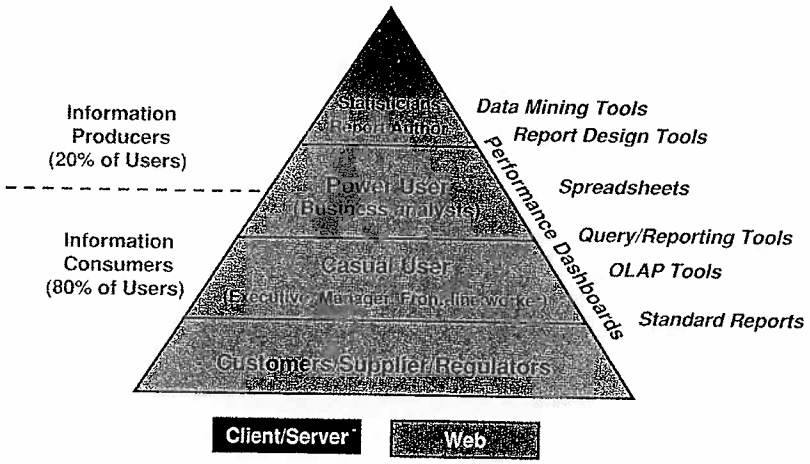
chasing BI tools, although they generally increase upfront license fees. However, even when purchasing a performance dashboard or BI suite, organizations need to assess user requirements to ensure that they display the right functionality in a performance dashboard or outfit users with the right modules in a BI suite. To do this, organizations need to segment users into categories based on their analytical habits and requirements. Most organizations have between four or eight distinct categories of BI users. Once these profiles are known, organizations can then assign the right BI tool to each type of user.

Exhibit 3.8 provides a simple framework for mapping users to BI tools. The framework divides all users into two categories: 1) *information producers*, who create reports and views for others to view and 2) *information consumers*, who consume those reports and views.

Information Producers

Information producers comprise 20 percent of the total user population and generally use desktop tools to create reports or models. Information producers consist of *statisticians*, who use data mining tools, and *report authors*, who use report

EXHIBIT 3.8 FITTING USERS TO BI TOOLS



This diagram provides a simple framework for classifying types of business intelligence users and fitting them with appropriate BI tools. The beauty of performance dashboards is that they support the broadest range of users by incorporating the functionality of a variety of BI tools in a layered fashion that conforms to the way users want to view and manipulate information.

design or programming tools to create custom reports. Report authors can be IT developers or "power" users—business users who taught themselves how to use a report design tool or were trained by the IT department. Because *power users* both create and consume reports, they straddle the line between information producers and information consumers. The most typical type of power user is a *business analyst*, who uses Microsoft Excel and Microsoft Access to analyze data and build custom reports.

Information Consumers

Most information consumers are *casual users* who regularly view reports but do not crunch numbers or perform detailed trend analysis on a daily basis. Casual users include executives, managers, staff, and external users. This is a large group that is well served by a performance dashboard, which encompasses query and reporting tools, OLAP tools, spreadsheet reports, standard reports, and the output of statistical models. Most of these tools now provide a Web interface to promote ease of use and minimize administration and overhead.

Promise and Reality of BI Tools

When BI tools made their debut in the early 1990s on Windows desktops, there were high expectations that the tools would liberate end-users from their dependency on the IT department to create custom reports. The combination of these tools and newly minted data warehouses caused vendors and pundits to proclaim that the era of "self-service" business intelligence had arrived.

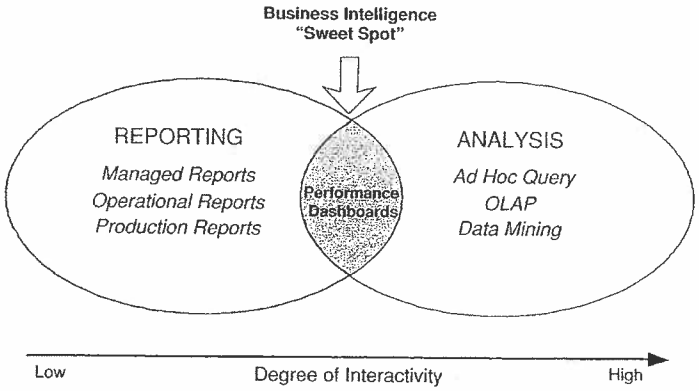
However, reality quickly fell short of promise. It turns out that most users found the tools too difficult to use. Even when the tools migrated from Windows to the Web, simplifying user interfaces and easing installation and maintenance burdens, it was not enough to transform BI tools from specialty software for power users to general-purpose analytical tools for everyone in the organization.

Even power users abused the early generations of BI tools (and still do!). Most use BI software as glorified extraction tools to download huge data sets to their desktops, clogging networks and bogging down query performance for everyone else. These users then dump the data into Microsoft Excel to do their "real" analysis, creating spreadmarts that undermine data consistency and a single view of the business.

New Wave on the Way

However, a new wave of BI tools has arrived: performance dashboards. These next-generation BI tools blend the once distinct worlds of reporting and analysis behind a dashboard or scorecard interface. These tools hit the BI "sweet spot"

EXHIBIT 3.9 BUSINESS INTELLIGENCE "SWEET SPOT"



Performance dashboards blend the attributes of reporting and analysis to create a dynamic or "drillable" exception report that meets the needs of 80 percent of your workforce.

by delivering the information and functionality that most users in an organization want and need to do their jobs effectively (see Exhibit 3.9).

The information needs of these users are best summed up in the mantra: "Give me all the data I want, but only the data I really need, and only when I really need it." In other words, most users don't want to spend unnecessary time analyzing data unless there is an exception condition that demands their attention. When that happens, they want immediate access to all relevant information, but in a systematic and structured way so they don't get lost in the data.

Key Features

Performance dashboards support the "user mantra" by providing only the information users need when they need it. Performance dashboards do not overwhelm users with a dizzying array of reports or analytical options; they keep things simple by highlighting anomalies in a graphical interface and giving users the option to investigate the details if they desire.

In essence, performance dashboards are "prettified" exception reports with built-in analytical tools that make it easy and fast for users to examine information about an exception condition. In short, performance dashboards conform to the way users want to work instead of forcing them to conform to the way the tools work.

SUMMARY

Business intelligence is the foundation upon which performance management systems grow and flourish. Without business intelligence, organizations cannot exploit the full potential of a performance dashboard to focus and align people and processes with strategic objectives and optimize performance. Business intelligence consists of a data warehousing environment and a reporting and analysis environment.

Data Warehousing and Integration. Technical teams use a variety of data integration tools to populate a data warehousing environment, including tools that capture data in real time directly from source systems. Although most organizations use a multitiered architecture, there are numerous ways to build a data warehousing environment. The reporting and analysis environment allows end-users to query, report, analyze, mine, and act on data in a data warehousing environment.

Reporting and Analysis. Although there are many reporting and analysis tools, no one tool will fit all users in an enterprise. Organizations need to purchase different tools for different categories of users according to their analytical requirements and abilities. Although every organization classifies users differently, there are two basic categories of users: information producers, who create reports, and information consumers, who consume them. Within these categories are multiple segments, each of which has slightly different requirements and needs. Organizations need to fit BI tools carefully to users; otherwise users will not use the tools.

The New Face of Business Intelligence. Performance dashboards represent the latest incarnation of business intelligence, building on years of technical and process innovation. Performance dashboards meet the information requirements of most casual users by hitting the business intelligence "sweet spot," which blends reporting and analysis capabilities within an intuitive dashboard interface. Performance dashboards deliver on the promise of self-service data access by providing the right data to the right people at the right time to optimize decisions and accelerate results. In short, performance dashboards are the modern face of business intelligence.

CHAPTER 4

Assessing Your Organizational Readiness

READINESS CRITERIA

Performance dashboards cannot take root in a hostile environment. The organization must be ready to accept and nurture a performance dashboard for it to succeed.

Paul Niven, author of *Balanced Scorecard Step by Step: Maximizing Performance and Maintaining Results,* defines seven criteria for evaluating an organization's readiness to implement a Balanced Scorecard. Although Niven created these criteria specifically for Balanced Scorecards (i.e., strategic dashboards), they are equally valid for any kind of performance dashboard.

I have adapted Niven's list and added three criteria to reflect the importance of having a solid business intelligence (BI) infrastructure to support all types of performance dashboards, not just strategic ones. Although some strategic dashboards do not initially require an investment in BI and data integration software, most eventually do, as explained in Chapter 3. Therefore, the following ten criteria are good ways to evaluate an organization's readiness to deploy and sustain a performance management system for the long haul.

To evaluate readiness, ask whether your organization has:

1. A clearly defined strategy
2. Strong, committed sponsorship
3. A clear and urgent need
4. The support of mid-level managers
5. The appropriate scale and scope

6. A strong team and available resources
7. A culture of measurement
8. Alignment between business and IT
9. Trustworthy and available data
10. A solid technical infrastructure

Let us describe each of these criteria in detail and then use them to create an assessment tool to evaluate organizational readiness.

1. A Clearly Defined Strategy

A performance dashboard is a window into an organization's strategy and planning processes, especially a strategic dashboard. If the strategy and planning processes are unclear, unaligned, or uncoordinated, the performance dashboard will be ineffective and short lasting. For example, Hewlett Packard Co.'s Technology Solutions Group (TSG) asks business sponsors a series of questions to ascertain whether their group or unit has a measurable strategy and a culture of measurement before creating scorecards for them (see Spotlight 4.1).

SPOTLIGHT 4.1 STRATEGIC DASHBOARD READINESS ASSESSMENT

Hewlett Packard Co.'s Technology Solutions Group (TSG) has a program office that creates strategic dashboards for its regional groups and other units. When working with a new group, the program office first meets with the sponsoring executives to explain strategic dashboard concepts and discuss their concerns. To assess the group's readiness to use a strategic dashboard approach to manage performance, the program team asks executives to answer the following six questions:

1. **Is the relationship between your strategy and measures clear and obvious?** This question communicates the need to translate strategy into a small number of carefully defined metrics with corresponding objectives, targets, and initiatives. Most companies have hundreds of metrics, most of which they rarely consult and few of which are truly relevant to their mission.
2. **Do you measure outcomes or causes?** This introduces executives to the concept of "leading" and "lagging" indicators and gets them to start thinking about measuring value drivers instead of historical activity.
3. **Is there consensus about the importance of the measurements and objectives?** Do all executives agree that existing metrics accurately define the strategy? If the strategy and vision are vague, the answer is usually "no." Second, do employees agree that the metrics used to evaluate their performance are valid and produce the desired results? Without employee buy-in, a performance management system cannot work.

SPOTLIGHT 4.1 *(CONTINUED)*

4. **If you select ten managers at random, how many know whether they are helping to achieve the strategy?** Most managers and workers know what tasks they need to do each day, but few know how their work contributes to the company's strategy. This helps executives see that the strategic dashboard is a communications tool that lets employees literally "see" how their work contributes to the strategy and performance of the company.
5. **Is important information easy and readily available for the right people?** It is one thing to measure performance, but it is another thing to empower people with information so they can take action to improve performance. This helps executives assess the state of their information delivery systems and whether they need to be overhauled.
6. **What do you do with the figures you receive?** This can be a gut-wrenching question. A strategic dashboard broadcasts performance results so managers can compare themselves with their peers and no longer hide behind well-scrubbed spreadsheets. Many executives will be threatened by the free flow of performance data required in a successful implementation.

The organization must have a strategy that defines its mission, values, vision, goals, and objectives, as well as metrics for measuring progress toward reaching those objectives. It also needs a planning process that devises new initiatives, refines existing ones, and allocates resources to implement the strategy. The following are the major components of a strategy.

Mission

A mission statement communicates the purpose of a business to people both inside and outside the organization. In about 50 words or less, a mission statement describes what the company does, how it differs from the competition, and its broadest goals. It communicates to employees and the outside world the reason for the organization's existence. To define a mission statement, Niven recommends the "Five Why's" technique developed by Collins and Porras.[1] An individual crafts a short description of what the organization does and then a facilitator asks "Why is this important?" five times. Each answer refines the description until it becomes a powerful and pithy encapsulation of the company's mission.

Goals and Objectives

Goals and objectives define the path a business takes to achieve the mission. They state what the company is committed to doing and, more importantly, what it *will not* do. Goals and objectives are the heart of any strategy statement. They

should be aligned with the mission statement and disseminated widely. Specifically, goals are the major aims of the company or the broad results it wants to achieve, whereas objectives are the steps it takes to reach each goal. Goals are generally stated without much detail. They are ambitious but realistic, motivating employees, not demoralizing them. Objectives, on the other hand, are more narrowly defined. They specify targets, time frames, and measures for each goal. Objectives are revised regularly as the business changes.

Values

Values reflect the principles and beliefs that guide the way the company does business. Values are shared assumptions about how things should get done. Values are very important in a crisis situation when a new and unique situation confronts the company and it must decide how to act. For example, values helped executives at Johnson & Johnson decide to quickly pull every bottle of Tylenol from retail shelves when several were found to be contaminated with cyanide, an act that cost the company more than $100 million. However, its rapid action to safeguard the lives of the public ultimately garnered tremendous goodwill and public respect, which helped to minimize the impact of its financial losses.

Vision

The vision statement describes where your company wants to go or what it wants to become. It is inspiring, a call to action. Whereas goals represent what a company hopes to achieve in the near term, a vision shows where the company plans to be in 5, 10, or 15 years. The vision represents the company's "stretch" goals. Think of John F. Kennedy's speech, when he called for the country to send a man to the moon by the end of the decade. This challenge galvanized the country, which rose to the task and achieved the seemingly impossible.

Metrics and Targets

A critical part of a strategic planning session that most companies overlook is the task of translating strategy (i.e., mission, goals, objectives, values, and vision) into metrics and targets that can be tracked over time. Without such metrics and targets, companies have no idea how well their strategy is being carried out in the field and cannot make course corrections to stay on track. Chapter 11 goes into detail about how to craft metrics and targets for performance dashboards.

Planning

Planning translates strategy into initiatives at the local level and allocates resources to various groups to carry out the initiatives. When plans and budgets are tied to

strategic objectives, the business moves collectively toward the same goals and destination. One way to do this is to reevaluate group and individual plans on a quarterly basis. Such continuous planning gives an organization greater flexibility to adapt to changes and opportunities in the marketplace.

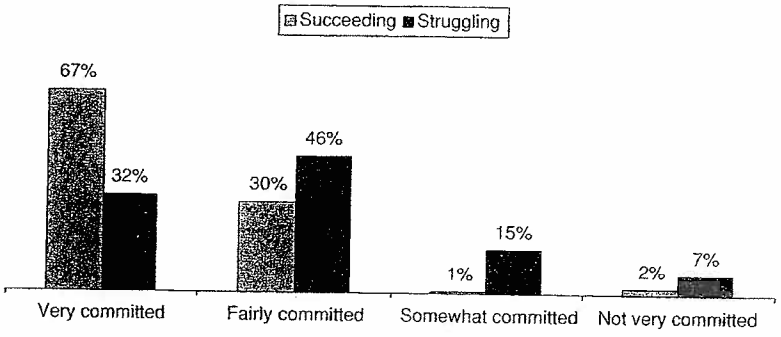
2. Strong, Committed Sponsorship

It is almost an industry cliché to say that strong business leadership is critical to the success of any information management project, including performance dashboards. A committed and involved business sponsor evangelizes the system, secures and sustains funding, navigates political issues, effects cultural change, and helps prioritize projects. Research shows a high correlation between the commitment of a business sponsor and success rates of BI solutions, which include performance dashboards (see Exhibit 4.1).

In fact, what is most interesting is that projects with a "very committed" sponsor are twice as likely to succeed as those with a "fairly committed" sponsor (67 percent versus 30 percent). And almost half (46 percent) of projects with "fairly committed" sponsors—the next level below—are actually struggling. So, sponsors cannot be half-hearted or even three-quarters hearted; they must give it 100 percent if they want a successful project.

The sponsor must also assign a trusted lieutenant to guide the project on a daily basis. These "drivers" or "champions" need to devote at least 50 percent of their time to the project. Like the sponsor, they must be well respected and con-

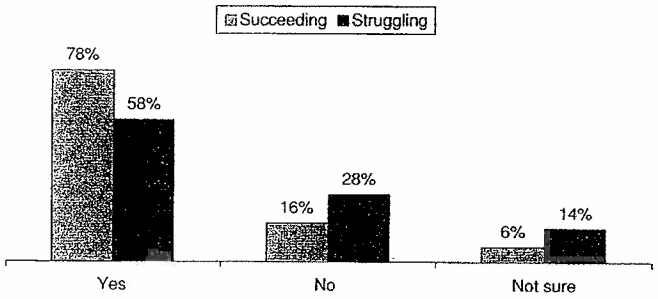
EXHIBIT 4.1 LEVEL OF SPONSOR COMMITMENT



Projects with "very committed" sponsors are more than twice as likely to succeed, whereas projects with "fairly committed" sponsors are more likely to struggle.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

EXHIBIT 4.2 DOES YOUR PROJECT HAVE A BUSINESS DRIVER?



Successful BI projects almost always have a business driver and are more likely to be succeeding than struggling.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

nected in the organization, with a direct line to the executive suite. They need to lead interference for the project when it gets bogged down in politics, vendor negotiations, or budget planning. Often, the driver is the person who initiates the idea for the project and sells it to the sponsor, whose influence and credibility are vital to the success of the project.

Although the presence of a business driver does not correlate with success to the degree that having a committed sponsor does, nevertheless most successful projects have a business driver (see Exhibit 4.2).

3. A Clear and Urgent Need

This aspect is almost too elementary to mention, but it plays a pivotal role in whether a performance dashboard project succeeds or not: the sponsoring group must demonstrate a clear and urgent need for a performance management system. If not, the system will not take root. The best performance dashboards address a critical pain in the business that stems from a lack of information and alignment with strategy. Paradoxically, the more pain, the more likely a performance dashboard will flourish. Unless the business is starving for information and a way to monitor and manage business performance, the project will not survive the strong tides and currents that wash many technology projects out to sea.

There are many legitimate reasons to implement a performance dashboard. Perhaps the biggest is that an existing performance management system is ineffective. It tracks lagging measures and has not improved the company's profitability, revenues, or share price. Or perhaps employees hardly notice when the system is updated. Or maybe few managers conduct personal performance

reviews on a regular basis, which shows that the company's culture does not value performance measurement or individual accountability.

Other events that often drive organizations to implement a performance dashboard include the following:

- **A New Top Executive.** The company hires a new CEO, CFO, or CIO who is used to running an organization using business performance management techniques and performance dashboards.
- **A New Strategy or Initiative.** Executives need a way to educate the organization about a new strategy or strategic initiative, align everyone's actions to the objectives, and monitor progress toward achieving goals.
- **A Merger or Acquisition.** A company must align two incompatible sets of strategies, cultures, values, and goals and get everyone marching in the same direction quickly.
- **A Business Crisis.** There are many events that can put an organization into crisis mode, requiring laser-like focus for the company to survive the calamity: a new competitor or market-transforming technology, an economic downturn, a natural disaster, financial mismanagement, or criminal wrongdoing, and so on.
- **Organizational Restructuring.** Executives who reorganize groups and divisions to improve productivity or competitiveness need to explain their rationale and monitor the effectiveness of the move.
- **Confusion over Data.** Executives can become exasperated by the lack of consistent data, which prevents them from getting a clear picture of the organization at any given moment.
- **Core Systems Overhaul.** An organization that replaces multiple legacy systems with a packaged business application needs to monitor the progress of the project and measure the return on investment.
- **New Regulations.** New regulations, such as the Sarbanes-Oxley Act or the Basel Accord, may force organizations to change their strategy or revamp core processes.

Coaches frequently motivate players with the maxim "There is no gain without pain." However, with performance dashboards, it is better to say, "There is no project without pain." Find a group with strategic or informational pain, and you have found a good place to implement a performance dashboard.

4. The Support of Mid-Level Managers

Successful performance dashboards solutions need the support of mid-level managers to succeed. This group determines the success or failure of a performance dashboard more than any other. These managers translate strategic goals and

objectives into initiatives, metrics, and budgets to govern their areas. Their words and actions signal whether their staff should take executive edicts seriously or not. If they are unwilling partners—or worse, active saboteurs—the project cannot succeed. It is critical to win the support of mid-level managers because they know how the company operates on a day-to-day basis and can provide a healthy "reality check" to senior executives. Mid-level managers often know which metrics will work and which will not, what data are available to populate metrics, and to what level in the organization it makes sense to deploy scorecards.

"They generally know the best sources of information, the biggest issues, and the best workarounds. We also use these mid-level managers as advocates back into the organization, both up and down and across, to help communicate the program, benefits, and what people will be able to use," says Martin Summerhayes, program manager in Hewlett Packard TSG. Unfortunately, mid-level managers can also be the ones most threatened by a performance dashboard. They are used to massaging and spinning numbers to present themselves and their group in the best possible light to executives higher up in the organization. A performance dashboard undercuts their ability to do this, leaving them feeling exposed and vulnerable. A performance dashboard broadcasts their performance to everyone through an unfiltered lens. They may feel they have to scramble and compete for budget dollars, resources, and promotions like never before and aren't happy about it.

It takes considerable effort and political savvy to win the hearts and minds of mid-level managers. Executives have to educate these managers about how the program benefits them personally as well as their group, and they have to quell unfounded fears. Executives identify key individuals who can make or break a project and communicate with them early and often. If appropriate, executives should invite the most pivotal managers to sit on the steering committee that oversees the project. The managers may see this as an honor and view the project more favorably as a result; at the very least, it gives executives a good way to keep an eye on key managers and make sure they have a positive attitude toward the project.

5. The Appropriate Scale and Scope

Most people assume a performance dashboard is always implemented on an enterprise scale starting with the executive suite, but this is not always true. Sometimes, it is better to implement a performance dashboard in a business unit, region, or department that is highly receptive to it. If the initial project succeeds, it will spread quickly throughout the organization. However, if executives try to force-fit a performance management system into an organization or business unit that is not ready for it, the tool will not gain the momentum it needs to expand throughout the enterprise.

When deploying a strategic dashboard (i.e., Balanced Scorecard) in a business unit or group, Niven recommends selecting a unit that conducts business across

an entire value chain of activities. In other words, the business unit should have a "strategy, defined customers, specific processes, operations, and administration." Selecting a unit with a narrow, functional focus will produce a strategic dashboard with narrow, functionally focused metrics that will not be readily transferable elsewhere in the organization.

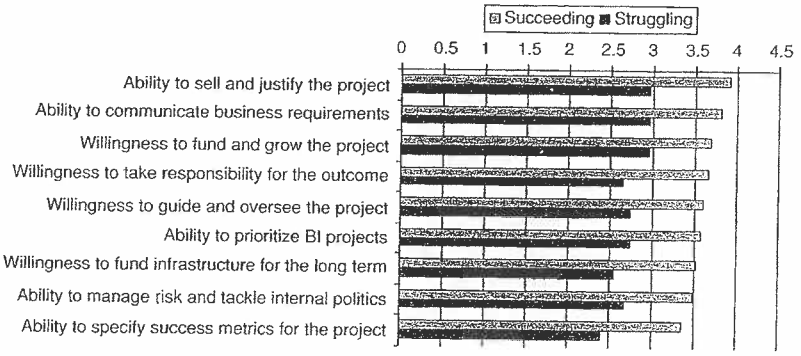
6. A Strong Team and Available Resources

To succeed, an organization needs business and technical people with the right skills who are willing and available to work on the project.

On the business side, the sponsor and driver must allocate enough time and attention to nurture the project through its entire life cycle. They also must stick around for the duration of the project or garner sufficient consensus and momentum so the project can continue without them. Successful projects have business people who are skilled at selling, funding, prioritizing, and completing projects as well as communicating requirements, managing risk, and accepting responsibility for the outcomes (see Exhibit 4.3).

On the technical side, successful projects have technical teams with strong technical and project management skills. Successful technical teams score especially well on the "soft issues," such as the ability to communicate technical issues

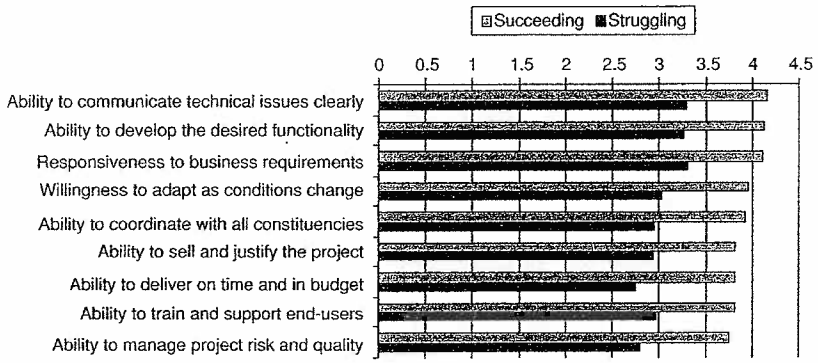
EXHIBIT 4.3 BUSINESS TEAM CAPABILITIES



Business teams that can sell, manage, and develop the project further are more likely to deliver successful solutions. (Chart based on a 5-point rating scale, with 1 being "poor" and 5 being "excellent.")

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

EXHIBIT 4.4 TECHNICAL TEAM CAPABILITIES



Technical teams that work well with the business and exhibit strong technical skills are more likely to deliver successful solutions. (Chart based on a 5-point rating scale, with 1 being "poor" and 5 being "excellent.")

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

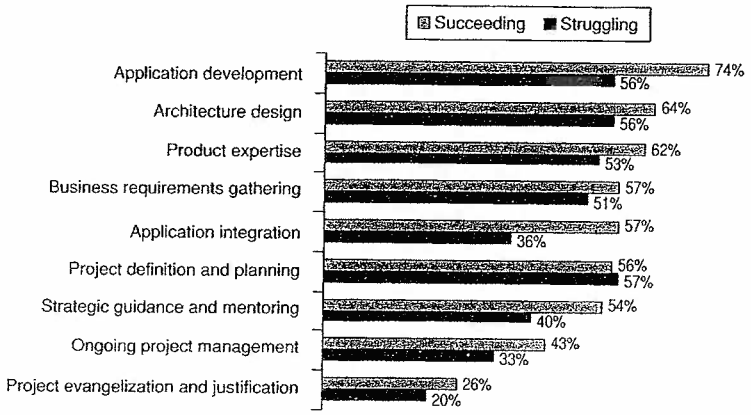
clearly, respond to business requirements, and develop desired functionality (see Exhibit 4.4).

If the needed resources do not exist in-house, the organization must be willing to bring in outside consultants and contractors. However, they need to put in place a plan to transfer consultants' knowledge and skills to in-house workers so the company is not dependent on the consultants. Organizations with successful solutions rely heavily on management consultants to help formulate strategy and metrics, develop project plans, and implement change management programs; they use technical consultants largely to assist with application development, architectural design, product installation, requirements gathering, and application integration (see Exhibit 4.5).

7. A Culture of Measurement

Does the business already have a culture of managing through performance measures? If not, even the strongest desire may not be enough to overcome organizational inertia. At a bare minimum, does it compare performance with plan or forecasts? Does it hold individuals and groups accountable for performance? Does it conduct individual performance reviews using objective data?

EXHIBIT 4.5 CONSULTANT SERVICES USED BY SUCCESSFUL BI PROJECT TEAMS



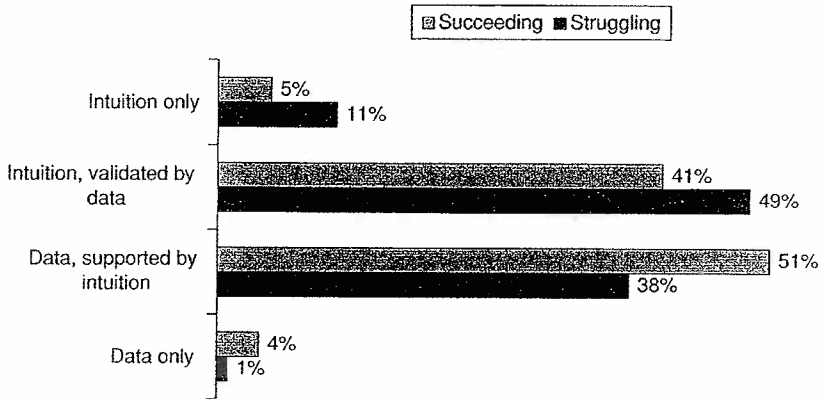
Companies with successful BI solutions rely on consultants more than companies with struggling BI solutions in all areas, but especially application development, application integration, and strategic guidance and monitoring.

Similarly, the organization should have a history of using information and data to make decisions. If the organization relies primarily on intuition, it will struggle to succeed (see Exhibit 4.6).

"Our company used to make decisions on gut feel," says a director of business information and analysis at a major U.S. manufacturer, "but now our executives believe strongly that fact-based decision making gives us a competitive advantage. Executives now ask 'Where are the data to back up this decision?' and they expect sales people to use information to close deals, not just rely on the strength of their client relationships. And it's working!"

Performance dashboards work best in a corporate culture that encourages users to share information. They cannot flourish if executives tightly control information to insulate themselves from the rest of the company; or if managers use information as a political weapon to protect their turf; or if users are penalized for sharing information with colleagues. In contrast, organizations whose employees share information "very openly" are five times more likely to have a successful solution than those whose employees do not (17 percent to 3 percent). Organizations whose employees do not share information openly are five times more likely to struggle (23 percent to 4 percent) (see Exhibit 4.7).

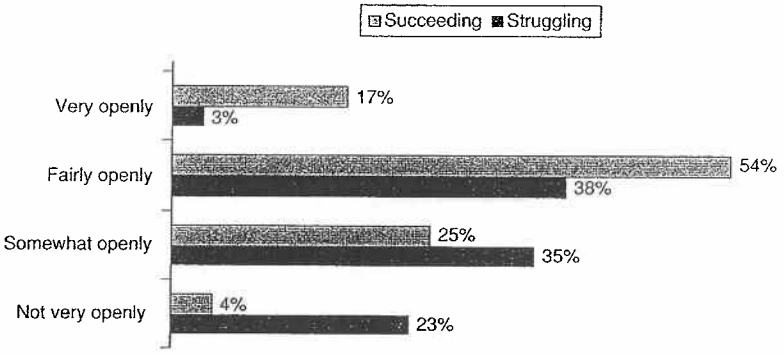
EXHIBIT 4.6 HOW ARE DECISIONS MADE?



Organizations that rely on data to validate intuition and make decisions are more likely to succeed.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

EXHIBIT 4.7 HOW OPENLY DO USERS SHARE DATA?



Organizations in which users share data openly are more likely to succeed with BI projects, such as performance dashboards.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

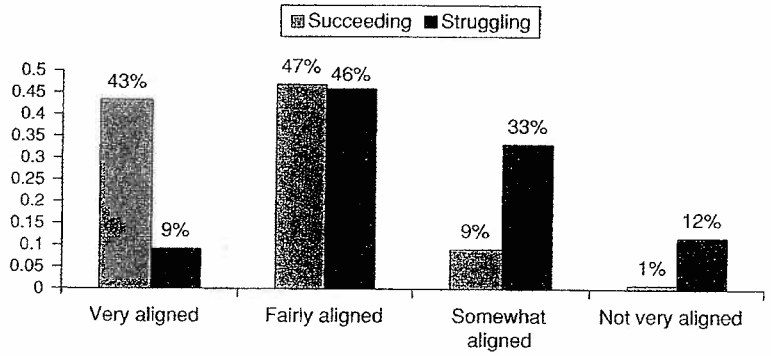
8. Alignment between Business and IT

The degree of alignment between the business and the technical team also determines the readiness of an organization to adopt a performance dashboard. That is because performance dashboards are adaptive systems that continually change as the business changes. Performance dashboards require a great deal of ongoing interaction between the business user and the technical team to define new requirements, metrics, and targets and refine old ones. If the relationship between business and technical groups is tense and both groups eye one another with distrust and sarcasm, then the chances that a performance dashboard will succeed are minimal. We will discuss business-IT relationships in detail in Chapter 14.

Like sponsorship, there is no middle ground with alignment. Teams that are "very aligned" are almost five times more likely to succeed, whereas teams that are only "fairly aligned" struggle a whopping 46 percent of the time. The key to guaranteeing success is to achieve total alignment between the business and technical sides of the team (see Exhibit 4.8).

So what does a "very aligned" team look like? First of all, it has an actively involved business sponsor or driver. Second, it is a team—not two or more disparate groups with different leaders, objectives, and cultures. "We sit side by side with business people and report into the same leadership," says a senior technology manager who helps run the BI team at a telecommunications firm. "The only difference is that we specialize in the data and they specialize in the business processes."

EXHIBIT 4.8 HOW ALIGNED IS THE BUSINESS AND IT?



When business and technical teams are "very" aligned, a project is almost five times more likely to succeed than fail. Teams that are only "fairly" aligned are as likely to fail as succeed.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

9. Trustworthy and Available Data

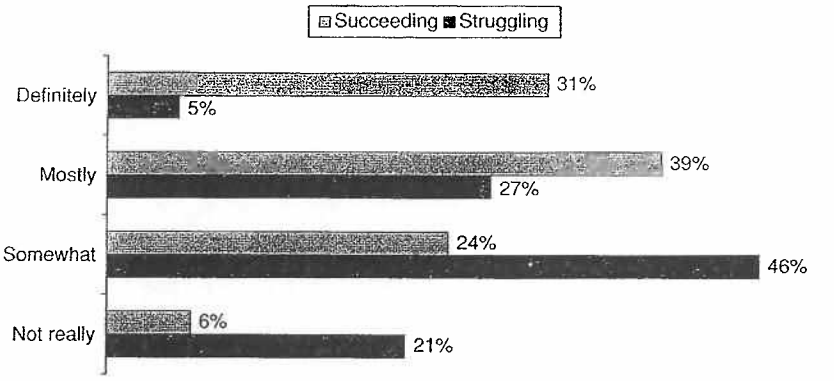
Does the organization have the right data to populate metrics in a performance dashboard? Although it is unlikely that data exist for all measures, a new initiative should supply data for most of the metrics under consideration. It is also critical that someone evaluate the condition of the data. Nothing can damage the credibility of a project faster than launching a performance dashboard with inaccurate and untrustworthy data.

Because data are at the heart of most performance management systems, organizations need to treat data as a vital corporate asset, as important as other assets, such as buildings, people, and cash. Companies whose executives view data as a corporate asset are six times more likely to be successful than those whose executives do not (31 percent versus 5 percent). Companies with executives who do not view data as an asset are between two and three times more likely to struggle with BI projects (see Exhibit 4.9).

10. A Solid Technical Infrastructure

To generate data for performance dashboard metrics, companies often must either overhaul operational systems and processes or establish a BI infrastructure

EXHIBIT 4.9 DO YOU VIEW DATA AS A CORPORATE ASSET?



Companies that perceive data as a corporate asset are more likely to succeed with BI projects like performance dashboards.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

that delivers high-quality data, or both. However, not all performance dashboards require a robust technical infrastructure to initiate a project. Strategic dashboards, in particular, can often start by using manual processes to capture and disseminate key data elements (see Spotlight 4.2).

SPOTLIGHT 4.2 GROWING INTO A BI INFRASTRUCTURE

Balanced Scorecard consultants argue that organizations should not delay a strategic dashboard project because they lack the requisite data or a robust BI infrastructure. Bill Barberg, president of Insightformation, Inc., describes a hypothetical scenario:

Suppose that the executives at a mid-sized manufacturing company that recently acquired several plants, each with its own IT systems, create a strategy to become a low-cost producer. One "causal driver" in this strategy involves driving scrap and rework to levels significantly below the industry average. Unfortunately, the company does not have good data to measure scrap and rework processes, and the data that exist are spread across many operational systems with different database fields and definitions. Few of the systems track why things are scrapped and do not reflect labor costs associated with the process. In addition, there are no industry benchmarks against which they can compare their performance.

The executives quickly realize that it might take several years to overhaul the company's operational systems and processes to capture the information they need and then create a BI solution to analyze, aggregate, and accurately track detailed scrap and rework information across the company. Rather than delay the Balanced Scorecard project until they have a solid technical foundation, the executives decide to forge ahead and make do with less than perfect information.

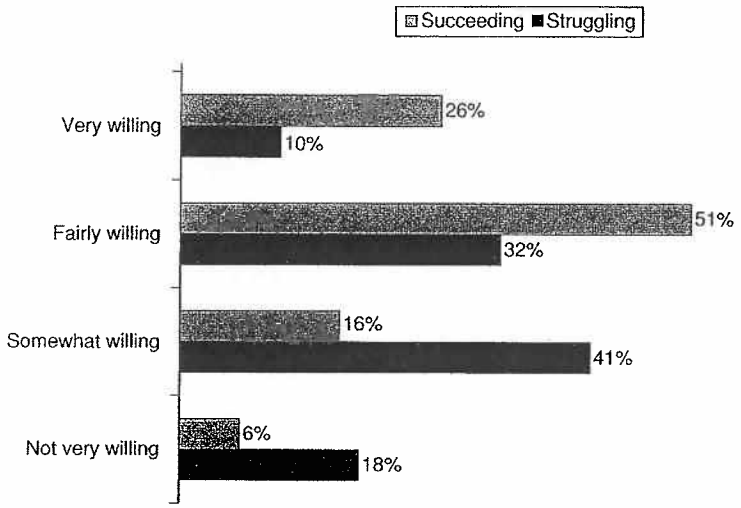
Barberg says the executives made the right choice. Even a set of rough monthly measures for scrap calculated by hand provides direction and, more importantly, communicates a powerful message about what the company needs to focus on to succeed. The scorecard motivates managers and staff to take positive steps to reduce scrap, and these behaviors can be reinforced through additional objectives and monthly scorecard review meetings.

To track progress against its strategic objectives regarding scrap, executives can assign a business analyst to create a spreadsheet report that merges and standardizes data collected by hand at each plant with relevant operational data. At the very least, the analyst can summarize monthly results in the Balanced Scorecard and attach the report. However, if the scorecard software has simple aggregation or roll-up capabilities, it can also show trends for each plant.

Meanwhile, with a clear understanding of the type of information that is needed, the company can work on a parallel track to upgrade its operational systems to capture data required for the Balanced Scorecard and implement an activity-based costing system to allocate labor cost to scrap. The company can also implement reporting and analysis tools that deliver a standardized view of scorecard metrics, Barberg says.

Although the company would have benefited from having integrated operational systems and a robust BI infrastructure to start, it can reap some benefits without them. Eventually, it can upgrade its technical infrastructure to further increase the value the project delivers, says Barberg.

EXHIBIT 4.10 WILLINGNESS TO FUND INFRASTRUCTURE



Organizations that are "very willing" or "fairly willing" to fund a BI infrastructure are more likely to succeed with BI projects than those that don't.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

The BI infrastructure consists of the BI environment (data warehouses, data marts, and analytical tools), the technical platform (servers, storage, networks), and the people to feed and maintain the environment. Organizations that are very willing or fairly willing to fund a BI infrastructure are more likely to succeed than those that are not. We will discuss what a robust BI infrastructure looks like and how to get there in the next chapter (see Exhibit 4.10).

Readiness Worksheet

Using the above criteria, organizations can assess their readiness to implement a performance dashboard as a whole or identify the best business unit or group to start with. Exhibit 4.11 adapts Niven's readiness assessment tool to an evaluation of a performance dashboard project within a business unit of a larger company.

To use the tool, assign a percentage weight to each criterion based on its importance to your organization. The weights should add up 100 percent. Then, score the organization (or a group within it) on its ability to support each crite-

EXHIBIT 4.11 BUSINESS UNIT READINESS ASSESSMENT

Criteria	Score	Weight	Total Points	Rationale
Strategy	10	15%	1.5	This unit has recently completed a new strategic plan for the next five years.
Sponsorship	9	15%	1.35	The new unit president used a strategic dashboard at two other organizations.
Clear need	5	10%	0.5	This group has performed well and may not see the need for this tool to sustain future efforts.
Midmanager support	7	5%	0.35	Young, energetic management group willing to experiment with new approaches.
Appropriate scope	8	5%	0.4	This unit produces, markets, and sells a distinct set of products.
A strong team	4	5%	0.2	The unit has talented staff who are already overextended so the unit will have difficulty finding resources for this project.
Culture of measurement	7	15%	1.05	Despite the unit's success, it has not used performance measurement systems in the past.
Business–IT alignment	5	15%	0.75	The unit has its own IT team, but it has lost staff since corporate IT declared its intentions to subsume the group.
Trustworthy and available data	4	5%	0.2	Many customer metrics (i.e., loyalty) have no data source, and customer data are spread across many systems.
Solid BI infrastructure	5	10%	0.5	The unit primarily runs on spreadsheets maintained by many people, although it wants to purchase a BI tool.
TOTAL	64	100%	7.3	

Overall Assessment: This unit scores a very high 7.3 out of 10 and is a good candidate for the performance management system but poses a few potential risks. The data, resource, and alignment issues, while not insignificant, are mitigated by the strong leadership of the unit president, and the creation of a new strategic plan. Early education initiatives within this unit could focus on the value of the system as a means of sustaining results for the long term. This may reduce skepticism surrounding the implementation based on the past success of the unit.

Source: Adapted from Paul R. Niven, *Balanced Scorecard Step By Step: Maximizing Performance and Maintaining Results* (John Wiley & Sons, Inc.), 2002, page 46.

rion, using a value from one to ten. Then, for each criterion, multiply the score by the weight to obtain points. Add up all the points for each criterion to get a total score. Because the maximum number of points that can be scored is ten, an organization (or group) that scores between seven and ten points is a good candidate for a performance dashboard. An organization (or group) that scores between four and six points poses significant risk, and a group that scores below four points should not attempt the project (see Exhibit 4.11).

Evaluating a business unit or department against the ten criteria above provides a great way to assess the readiness of an organization to implement a performance dashboard.

SUMMARY

Not all companies are ready to implement a performance dashboard. Organizations need strong leadership, a receptive culture, and a robust technical environment.

You can assess your organization's readiness to implement a performance dashboard by asking the following questions:

- Does your organization have a clear, coherent strategy with well-defined goals, objectives, and measures?
- Is there a high-level executive who strongly believes in the project and is willing to spend time evangelizing and nurturing the project?
- Does the organization have a demonstrated need for the system? How much is it suffering from an inability to track and measure performance?
- How willing are mid-level managers to support the project? Will the open sharing of performance results threaten their positions and their hold on power?
- Does the group have sufficient scope so that the implementation can be adapted by other groups in the organization?
- Does the group have business and technical people with proper skills and experience to deliver a successful project?
- Does the group already have a culture of measurement and make decisions by fact instead of intuition?
- How aligned are the business and technical teams? Do they have a good working relationship and trust one another?
- Do data exist to populate the measures? How clean, valid, and complete are the data?
- Does the group have a solid technical infrastructure that generates the required data and delivers it to users in a format that is easy to monitor and analyze?

These ten questions can help executives determine the best place to implement a performance dashboard as well as understand better the risks the project poses and the obstacles they will need to overcome.

NOTE

1. James C. Collins and Jerry I. Porras, "Building Your Company's Vision," *Harvard Business Review*, September-October 65–77 (1996), as referenced in Paul Niven, *Balanced Scorecard Step by Step: Maximizing Performance and Maintaining Results* (Hoboken, NJ: John Wiley & Sons, Inc., 2002), p. 74.

CHAPTER 5

Assessing Your Technical Readiness

BUSINESS INTELLIGENCE MATURITY MODEL

The Big Picture

In the previous chapter, we discussed ten criteria for evaluating the readiness of an organization to implement a performance dashboard. This chapter focuses more specifically on evaluating an organization's technical readiness. Without a strong technical foundation—especially in business intelligence (BI)—most performance dashboards will not survive long. They will be crushed by the weight of cumbersome and costly data-gathering processes, inaccurate and untrustworthy data, poor performance, and antiquated functionality.

Like organizational readiness, technical readiness does not happen overnight. It takes years to build a robust BI infrastructure and develop the internal skills and talent necessary to support an effective performance management system. During the past several years, many organizations that initiated performance dashboards became disillusioned when they could not automate the solution or populate its metrics with valid, accurate data.

I've created a BI Maturity Model to help organizations understand the maturity of their BI infrastructures and, by extension, their readiness to build and sustain a performance management system. The six-stage BI Maturity Model shows the trajectory that most organizations follow when evolving their BI environments from low-value, cost-center operations to high-value, strategic utilities that drive market share. The model provides organizations with a

"big picture" view of where their BI environment is today, where it needs to go, and how to get it there.

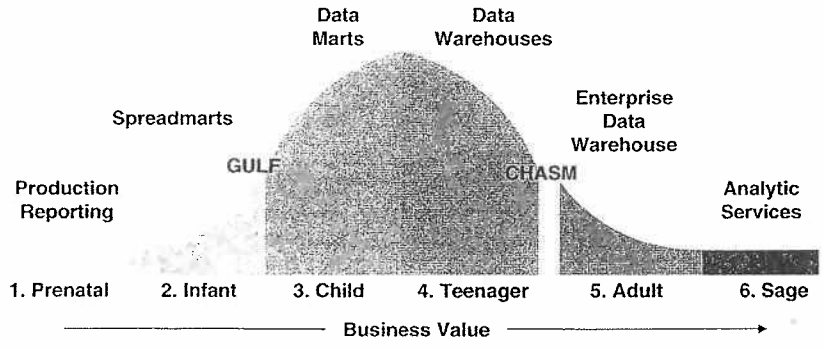
The model shows that performance dashboards are best deployed once organizations reach Stage 4 or later. At this level of maturity, organizations can quickly deploy performance dashboards without having to make significant investments to create or rearchitect a BI environment. In Stage 5, organizations are ready to cascade strategic dashboards throughout the enterprise and link them (logically at least) to operational and tactical dashboards. In short, it takes a reasonable amount of BI maturity for organizations to deploy a performance dashboard successfully.

Six Stages

Exhibit 5.1 shows that the BI Maturity Model consists of six stages: Prenatal, Infant, Child, Teenager, Adult, and Sage. As an organization moves through successive stages, business value increases as data become more consolidated and logically integrated within fewer analytic structures.

The BI Maturity Model is shaped in a bell curve to indicate that most organizations today have reached Stages 3 and 4. Only a few are still stuck in the first two stages or have advanced to highly mature implementations in Stages 5 and 6. Because business intelligence originated as a distinct discipline in the early 1990s, it is no surprise that after a decade or so most organizations have reached "BI adolescence" and are suffering all the requisite growing pains (see Spotlight 5.1).

EXHIBIT 5.1 BI MATURITY MODEL



The BI Maturity Model consists of six stages, which correspond to different types of BI structures.

SPOTLIGHT 5.1 SYMPTOMS OF BI ADOLESCENCE

Most organizations today are in the adolescent phase of business intelligence. If you remember correctly from your youth, adolescence is both an exciting and a painful time, full of change, transition, and surprises. The same is true for companies that reach adolescence in business intelligence. Every step forward is tentative, and more setbacks are experienced than victories. The key to getting through this stressful period is to stay focused on the future and the value that awaits those who persevere while taking one step at a time in the present. Here are a few symptoms that signify that your organization is square in the middle of BI adolescence.

- The BI team moves perpetually from one crisis to the next.
- The BI program manager has to explain continually why the BI budget should not be cut.
- Usage of the BI environment peaked several months after deployment and continues to decline.
- The BI manager has to evangelize continuously the value of the BI environment to executives and business users.
- The number of spreadmarts, independent data marts, and other data warehouses with redundant data keeps increasing instead of decreasing.
- Users keep asking the IT department to create custom reports even though the organization recently purchased a "self-service" BI tool.
- Executives still believe BI is a tool, not a strategic information resource to drive the organization in the right direction.

Managing a BI environment in its adolescence is painful. Perhaps the only comforting thought is that most companies are also experiencing the same growing pains. Like your organization, they spend more time reacting to problems than proactively solving them and put more effort into putting out fires than delivering lasting business value. In short, most organizations are stuck in the Chasm, halfway between adolescence and adulthood.

The BI Maturity Model defines each stage using a number of characteristics, such as scope, analytic structure, executive perceptions, types of analytics, stewardship, funding, technology platform, change management, and administration (for which we borrow concepts from the Software Engineering Institute's Capability Maturity Model). This book will focus only on a few of these characteristics.

Organizations evolve at different rates through these six stages and may exhibit characteristics of multiple stages at a given time. Thus organizations should not expect to move cleanly and precisely from one stage to the next.

Although it is possible to skip stages, it is unlikely. Organizations must learn critical lessons at each stage before they can move to the next. Organizations that feel compelled to "catch up" and skip stages will encounter problems that

eventually bog down the project. Organizations that successfully skip stages must have strong senior leadership, considerable funding, and experts with considerable BI experience to guide the project to a successful completion.

More likely, an organization will regress and slip backward in the evolutionary cycle. Often, the cause is beyond the project team's control: a merger, acquisition, new executive leadership, changing economic or competitive circumstances, or new regulations. Here, the plans are put aside to address the new issues. This makes many BI professionals feel like "Sisyphus," the ancient Greek condemned to roll a huge stone perpetually up a hill in Hades only to have it roll down again upon nearing the top.

Sticking Points

Although a few companies skip stages, and more regress, almost every organization gets stuck at two points in the life cycle. These are represented in the model as the "Gulf" and the "Chasm." Most BI initiatives stall here. They have one foot stuck in the previous stage while the other is reaching out to the next, and they are unable to make a clean leap beyond. As a result, many never fully reach the other side and reap the benefits therein.

The Gulf

The primary way to cross the Gulf is to change executive perceptions. Executives must recognize that they need more than a production reporting system to make timely, effective decisions and that the dozens of spreadsheets and desktop databases (i.e., spreadmarts) that run the business undermine productivity and effectiveness. Once they recognize this, they need to mandate and fund a BI initiative to move the organization off the old systems and onto the new ones that empower users to access, analyze, and act on information.

The Chasm

The Chasm is deeper and wider than the Gulf and harder to cross. There are several reasons:

- **Perceptions.** Executives fail to transform their view of BI from a tool for power users to an enterprise resource for all users and that is critical to the mission of the company.
- **Ownership.** Divisional or departmental managers resist turning over their successful BI initiatives, including performance dashboards, to a corporate group so the systems can be scaled up and out and disseminated to the rest of the organization.

- **Consolidation.** Organizations fail to stem the proliferation of analytical silos by consolidating them into a standard BI environment that delivers a consistent view of the business.
- **Self-Service.** Organizations fail to shift their emphasis from building data warehouses to empowering users with BI tools, such as performance dashboards, that foster self-service access to information.
- **Mental Silos.** The organization fails to break down end-users' mental silos for accessing information in a BI environment and show them how to perform cross-departmental analyses that lead to deep insights about how to optimize performance.

The following is a brief description of each stage and its major characteristics.

Prenatal Stage: Production Reporting

Most established organizations have production reporting systems generating standard reports that are usually printed and distributed to large numbers of employees on a regular basis, usually weekly, monthly, or quarterly. Because programmers hand-code the reports, it can take several days or weeks to produce a new or custom report. This creates a backlog of requests that the IT department can never get ahead of, as well as many frustrated users who cannot obtain timely information to do their jobs.

Consequently, many users take matters into their own hands, especially business analysts who know their way around corporate information systems and whose job is to crunch numbers on behalf of executives and managers. These individuals circumvent the IT department by extracting data directly from source systems and loading the information into spreadsheets or desktop databases. This gives rise to an abundance of spreadmarts, which is the hallmark of Stage 2.

Infant Stage: Spreadmarts

Spreadmarts are spreadsheets or desktop databases that function like data marts. Each spreadmart contains a unique set of data, metrics, and rules that do not align with other analytical systems in the organization. An organization afflicted with spreadmarts has no consistent view of the business and no single version of truth from which every employee can work.

Spreadmarts ultimately wreak havoc on organizations. They bleed organizations dry, often without the organizations knowing it. Users spend inordinate amounts of time collecting and integrating data, becoming, in effect, "human data warehouses." Executive meetings dissolve into chaos as managers argue about whose data are right rather than making effective decisions. This phenomenon is known as "dueling spreadmarts."

Spreadmarts are difficult to eradicate—because they are ubiquitous, cheap, and easy to use. Many users, especially business analysts and financial managers, cannot function without spreadsheets. Spreadsheets give them a high degree of local control at extremely low cost, which undermines departmental, divisional, or enterprise standards. As a result, spreadmarts proliferate like weeds—organizations have dozens, if not hundreds or thousands of these pernicious analytical structures.

Research shows that organizations on average have 28.5 spreadmarts. However, the reality is that most organizations have no idea how many spreadmarts they have, and many have given up trying to control their proliferation. Although spreadmarts are difficult to eradicate, there are remedies for curing this "disease" before it poisons the entire organization (see Spotlight 5.2).

SPOTLIGHT 5.2 STRATEGIES FOR ERADICATING SPREADMARTS

Spreadmarts are renegade spreadsheets and desktop databases that contain vital pieces of corporate data needed to run the business. However, because they are created by individuals at different times using different data sources and rules for defining metrics, they create a fractured view of the enterprise. Without centrally defined metrics and a single version of corporate information, organizations cannot compete effectively.

Today, spreadmarts are the bane of workers in IT departments, who cannot control their proliferation, and the nemesis of CEOs, who cannot gain an accurate view of the enterprise because of them. Here are five strategies—the five "Cs"—for eradicating spreadmarts:

1. **Coercion.** Have the CEO mandate the proper use of spreadsheets and desktop databases. By itself, this strategy rarely works because it is difficult to enforce. In fact, coercion usually makes the problem worse. Users go underground, managing their divisions and departments with clandestine spreadmarts that run parallel to "official" systems. The old adage "What you resist, persists" applies to spreadmarts. However, without a strong executive mandate, users are often reluctant to change their analytical habits. So, it's best to use this tactic in conjunction with one or more of the approaches below.
2. **Conversion.** This strategy involves selling the benefits of the organization's standard BI environment. The key is to make sure the BI environment provides at least 150 percent the value of spreadmarts (which is sometimes difficult!). The key selling points are:
   - **Saves Time.** The BI tool collects and integrates the data (via a data warehouse) so you no longer have to perform these functions.
   - **Improves Data Quality.** The BI tool provides cleaner and more accurate data than any spreadmart (thanks to the data warehouse).

SPOTLIGHT 5.2 *(CONTINUED)*

- **Provides Deeper Insights.** The BI tool lets you analyze data across more systems and subject areas, leading to deeper, career-enhancing insights.
- **Offers Comparable Functionality.** The BI tool provides the same analytical functions and features as the spreadmart, such as briefing books, charting, report manipulation, "what-if" modeling, and offline usage.
- **Offers Additional Functionality.** The BI tool supports additional functions, such as the ability to schedule, share, or annotate reports, collaborate with colleagues, and easily publish reports to a portal.
- **Offers Support.** The BI tool and data warehouse are supported by the IT department so you do not have to worry when something breaks.

3. **Co-existence.** This strategy turns Excel into a full-fledged client to a BI server. Rather than force users to switch tools, let them use Excel to access data and reports on the BI server. This gives them all the spreadsheet features they know and love and lets the organization manage critical data and reports in the standard way. This is perhaps the best option when used in conjunction with number two above. Ironically, this option will expand the use of Excel for BI while minimizing or eliminating the use of Excel as a spreadmart.

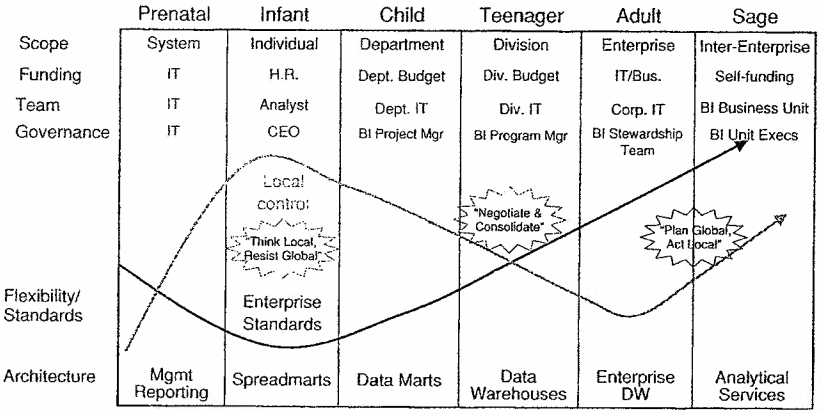
   There are two ways to make Excel a BI client. In a tightly controlled environment, Excel users access predefined reports that are rendered in Excel on the server. In a more open environment, Excel users query back-end systems using a semantic layer—a set of predefined query objects defined by the IT department that govern access to data in source systems. Most leading BI vendors now support both methods of integrating with Excel.

4. **Co-option.** The fourth strategy takes the approach: "If you can't beat them, join them." This strategy automates spreadmarts by running them on a central server maintained and managed by IT. IT does not change the data access methods, processes, or rules set up by spreadmart users, it just maintains them on their behalf, freeing up users to spend more time analyzing data and less time collecting and massaging it. Gradually, over time, the IT department can transfer the spreadmarts to a more standard environment. Several BI vendors, such as Compassoft and Meta5, now offer co-option tools.

5. **Cower.** The last strategy is a variation of the first. Sarbanes-Oxley regulations in the United States provide the IT department with a huge stick to enforce data management standards across the organization. Because most top executives would prefer to stay out of jail, it often does not take much to convince them to support an enterprise architecture that standardizes the use of tools and data to deliver key financial reports, among other things.

Whatever strategy you use to deliver a single version of the truth, the key is to be patient. Analytical habits do not change overnight. With a heavy dose of patience, strong communications skills, and a robust BI environment, you should be able to control the proliferation of spreadmarts.

EXHIBIT 5.2 CROSSING THE GULF: THE SPREADMART DILEMMA



Like invasive weeds, spreadmarts are difficult to eradicate. They provide a high degree of local control at low cost, which undermines departmental, divisional, or enterprise standards. This is why many organizations have a difficult time crossing the gulf and reaping the full benefits of the Child and Teenager stages. Enterprise standards start to gain the upper hand (as they should) in the Teenager stage and then grow in parallel with local control in the final two stages, as the BI environment becomes extremely flexible and responsive to new and changing user requirements.

Although organizations afflicted with spreadmarts may build data marts and data warehouses and appear to enter Stages Three and Four, they do not get very far. Spreadmarts sap the vitality of those structures and prevent organizations from reaping their benefits. To cross the Gulf from the Infant to Child stage, spreadmart users must sacrifice their autonomy and individual views of the business and adopt departmental or divisional standards for design, delivery, and definition of data and information. Most users do not relinquish local control and their spreadmarts without a fight, which is why the Gulf is so difficult to cross! (See Exhibit 5.2.)

Child Stage: Data Marts

In the Child stage, departments recognize the need to empower all knowledge workers with timely information and insight, not just business analysts and executives, who are the primary beneficiaries of spreadmarts. Departmental leaders fund the development of data marts, assign project managers to oversee the initiatives, and purchase BI tools so users can access and analyze data in the marts.

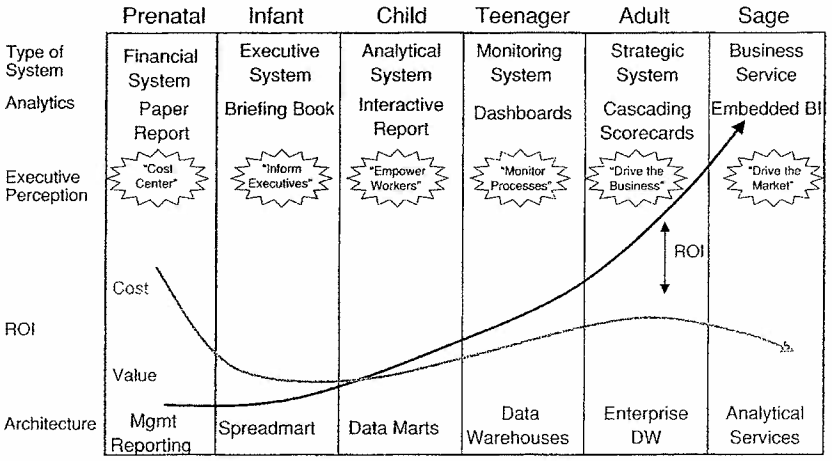
A data mart is a shared, analytic structure that generally supports a single business process or department, such as sales, marketing, or finance. The departmen-

tal team gathers information requirements and tailors the data mart to meet the needs of the members in its group. A data mart requires members of a department to consolidate or replace multiple spreadmarts and negotiate data definitions and rules to ensure data consistency throughout the department.

Unfortunately, data marts often fall prey to the same problems that afflict spreadmarts. Each data mart supports unique definitions and rules and extracts data directly from source systems. Although these so-called "independent" data marts do a great job of supporting local needs, their data cannot be aggregated to support cross-departmental analysis. What is needed is a mechanism to integrate data marts without jeopardizing local autonomy. This is the hallmark of the Teenager stage.

Also, most companies purchase more BI licenses than they need. They do not realize that many BI tools are geared to "power" users who are technically literate and conversant with the company's databases and access methods. These power users comprise less than 20 percent of all knowledge workers. Thus, the payoff from BI in this stage is low, with minimal to nonexistent return on investment (ROI) although the company may reap significant intangible benefits (see Exhibit 5.3).

EXHIBIT 5.3 THE ROI OF BUSINESS INTELLIGENCE



The ROI of business intelligence starts to increase dramatically in the Teenager stage as the organization provides users with timely, consistent data delivered in an intuitive fashion using all types of performance dashboards. ROI further escalates in the final two stages as the organization uses the BI environment to rapidly create large numbers of highly valuable analytical applications and insights that drive the business and the market.

Teenager Stage: Data Warehouses

The Teenager Stage begins when a business unit executive recognizes that the proliferation of non-integrated data marts is costing the group considerable sums of money and undermining a single view of operations. The executive calls a halt to the creation of new data marts and consolidates existing marts onto a single data warehousing platform. This consolidation usually happens in concert with something else, such as a strategic initiative to improve customer loyalty or an acquisition, merger, or reorganization.

Value Chain Analysis

Unlike single-subject data marts, a data warehouse encourages deeper levels of analysis. This is because users can now submit queries across functional boundaries, such as finance and operations, and gain new insights not possible when data were confined to departmental subjects. Unfortunately, most users fail to recognize the value of information in the data warehouse and never move beyond their mental silos to conduct cross-departmental analyses and discover highly profitable correlations in the data. BI managers must spend a great deal of time educating users about the full potential the data warehouse offers.

Performance Dashboards

This stage also empowers "casual" users with self-service BI tools, namely operational and tactical dashboards, that enable them to monitor and manage business processes quickly and easily. The performance dashboards provide actionable information to large numbers of individuals with minimal maintenance and administration. Executives value the performance dashboards as a way to improve process efficiency, empower users, and foster fact-based decision making.

Unfortunately, many organizations never advance further than here. They fall headfirst into the Chasm. They do not capitalize on their momentum. They fail to consolidate analytical silos throughout the enterprise, show users the benefit of cross-departmental analyses, or deliver self-service BI tools. Executives continue to view BI as a tactical tool instead of a strategic lever that drives the business and differentiates them from the competition. Departmental executives refuse to work cooperatively with corporate IT to expand successful solutions into enterprise resources.

It takes a lot of energy, vision, and willpower to cross the Chasm and enter into the final two stages of business intelligence.

Adult Stage: Enterprise Data Warehouse

Although a data warehouse delivers many new benefits, it does not solve the problem of analytical silos. Most organizations today have acquired multiple data warehouses through internal development, mergers, or acquisitions. Like spreadmarts and independent data marts, divisional data warehouses contain overlapping and inconsistent data, creating barriers to the free flow of information within and between business groups and the value chains they manage.

Integration Machine

In the Adult stage, organizations make a firm commitment to deliver a consistent view of the business. Executives view data as a corporate asset that is as valuable as people, equipment, and cash. They anoint one data warehousing environment as the system of record or build a new one from scratch to service the entire organization. This enterprise data warehouse (EDW) serves as an "integration machine" that the BI team uses to continuously consolidate all other reporting systems, data marts, and data warehouses unto itself. For example, some organizations use an EDW to assimilate acquired companies after a merger or acquisition.

An EDW does not have to be a single centralized data warehouse running on a single database management system. An EDW is a standardized BI environment that can be constructed in many different ways, ranging from a centralized or hub-and-spoke data warehouse to a set of conformed data marts or a federated environment glued together on the fly with EII and other tools and techniques (see Chapter 3 for more information on BI architectures).

In the Adult stage, the EDW serves as a strategic enterprise resource for integrating data and supporting mission-critical applications that drive the business. To manage this resource, executives establish a strong stewardship program. Executives assign business people to "own" critical data elements and appoint committees at all levels to guide the development and expansion of the EDW resource. On the analytical side, the organization starts to cascade strategic dashboards and integrate them with other performance dashboards in the organization. The cascading scorecards align every worker and business process to corporate strategy.

ROI

During the Adult phase, investments in business intelligence really begin to pay off. The ROI comes from delivering actionable information in a consistent fashion to large numbers of users who make better and more timely decisions that increase profits and revenues. The EDW also benefits from economies of scale and a fast-track development process that churns out new applications rapidly,

meeting user requirements quickly and efficiently. In addition, users begin to perform profitable cross-departmental analyses and find new and unexpected uses for data in the EDW that developers had not anticipated, leading to a proliferation of profitable analytical applications. This "serendipity of scale" further accelerates ROI. Meanwhile, costs actually decline as the organization eliminates analytical silos and reduces overhead (see Exhibit 5.3).

Sage Stage: BI Services

Once business intelligence becomes a strategic enterprise resource that drives the business with an ever growing panoply of mission-critical applications, you may think the job is done. It may well be! However, there are additional opportunities to increase the strategic value of a BI environment by driving the resource outward and downward.

Interactive Extranets

Many companies today are already opening their data warehouses to customers and suppliers—extending and integrating value chains across organizational boundaries and driving new market opportunities. Next-generation extranet applications will provide customers and suppliers with simple, yet powerful interactive reporting tools to benchmark their activity and performance and compare them with those of other groups across a variety of dimensions. Some companies have already created new business units to sell data warehousing and information analysis services, creating a competitive advantage for themselves and altering the competitive landscape of their industries.

Web Services

At the same time, BI teams are encapsulating data and reporting and analysis functions into Web services that developers—both internal and external to the organization—can use (with proper authorization, of course) to build a raft of new analytical applications. The advent of Web services turns BI into a market-wide utility that can be embedded into any application. With BI services, workers will no longer have to shift contexts to analyze data. The data, information, and insights they need to do their jobs are embedded in the operational applications they use on a daily basis.

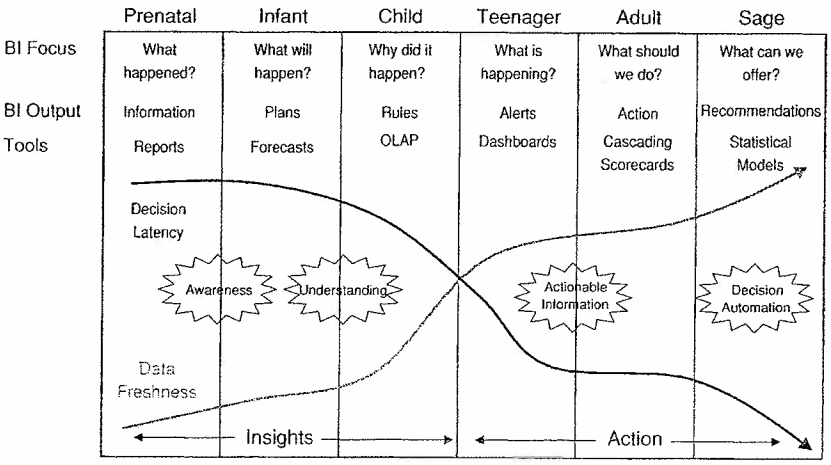
Decision Engines

These BI services also make it possible for companies to capitalize fully on their investments in statistical analysis and modeling. They turn statistical models

into "decision engines" embedded in internal and external applications. Workers or applications feed information into these engines and receive recommendations instantaneously. For instance, a fraud detection system reviews your credit card transactions and compares them to a statistical model of your past purchasing behavior and spits out a score that indicates the degree to which a given purchase may be fraudulent. Other examples of decision engines are Web recommendation engines and automated loan approval applications (see Exhibit 5.4).

Once an organization enters the Sage stage, its value increases exponentially as its visibility and costs decline. As a Web service, BI becomes a utility that no one thinks about until it stops working. Our economy has commoditized innumerable services in the past: electricity, sewage, water, transportation, and so on. Insights delivered via BI are simply the next in line.

EXHIBIT 5.4 EVOLUTION OF REPORTING AND ANALYSIS



The first three stages of business intelligence deliver "Insights" using historical data to analyze what happened, why it happened, and to build forecasts. The second three stages deliver "Action" using right-time data to populate performance dashboards and statistical models that automate decision making.

SUMMARY

The BI Maturity Model described in this chapter is a good way to assess an organization's technical readiness to deploy a performance management system. The model shows that performance dashboards are best deployed once organizations reach Stage 4 or later. At this level of maturity, organizations can quickly deploy operational and tactical dashboards without having to make significant upfront investments. In Stage 5, organizations are ready to cascade strategic dashboards throughout the enterprise and link them (logically at least) to operational and tactical dashboards.

Many people who have heard presentations about the BI Maturity Model say it is "therapeutic." They find comfort in knowing that others have encountered the same growing pains they have. Many view the BI Maturity Model as a tool to help them envision the future and the steps needed to get there. They also view it as a perfect way to explain the potential of BI to their business counterparts as well as the investments and persistence required to deliver real value.

PART TWO

Performance Dashboards in Action

CHAPTER 11

How to Create Effective Metrics

TOOLS OF CHANGE

One of the most common questions people ask about performance dashboards is "How do we define effective metrics?"

The answer is important because the metrics govern how employees do their jobs. The adage "What gets measured, gets done" is true. Metrics focus employees' attention on the tasks and processes that executives deem most critical to the success of the business. Metrics are like levers that executives can pull to move the organization in new and different directions. In fact, among all the tools available to executives to change the organization and move it in a new direction, performance measures are perhaps the most powerful.

Subsequently, executives need to treat metrics with respect. As powerful agents of change, metrics can drive unparalleled improvements or plunge the organization into chaos and confusion. If the metrics do not accurately translate the company's strategy and goals into concrete actions on a daily basis, the organization will flounder. Employees will work at cross-purposes, impeding each other's progress and leaving everyone tired and frustrated with little to show for their efforts. In short, the company will be efficient but ineffective.

Suboptimized Processes

A trucking company, for example, that measures performance by the percentage of on-time shipments may drive hauling costs skyward because the metric does nothing to discourage dispatchers from sending out half-empty trucks to meet their schedules. To keep costs in line, the company needs to add a second metric that measures the percentage of unused cargo capacity in outgoing trucks, and it needs to revise the first metric so it emphasizes meeting customer expectations for fast, reliable shipments rather than just on-time deliveries. This combination

of metrics gives dispatchers leeway to contact customers and renegotiate shipping schedules if they know the customer may be flexible.

Another classic example is a call center that pays bonuses to customer service representatives based on how many customers they talk to per hour versus how many customer problems they solve. Representatives paid by the number of clients they talk to per hour are not likely to take the time to understand a customer's problem or provide a satisfactory response, especially when complex problems are involved. To address this problem, some call centers create a special team to handle complex calls; such calls are then measured by how effective the representatives are at problem solving, not how many calls they handle per hour.

Many organizations take a close look at the performance metrics when designing strategic dashboards. This is because the Balanced Scorecard methodology encourages organizations to create metrics that are leading indicators of performance rather than lagging indicators (i.e., financial metrics). However, the two examples given above demonstrate the importance of creating effective metrics in operational and tactical environments as well. Creating effective metrics is critical to the success of any performance dashboard.

The Art of Creating Metrics

Crafting sound metrics is more an art than a science. Although a metrics or KPI team may spend months collecting requirements, standardizing definitions and rules, prioritizing metrics, and soliciting feedback—in short, following all the rules for solid metric development—it still may not succeed. In fact, there is a danger that metrics teams will shoot for perfection and fall prey to "analysis paralysis." In reality, KPI teams can only get 80 percent of the way to an effective set of metrics; the last 20 percent comes from deploying the metrics, seeing how they impact behavior and performance, and then adjusting them accordingly.

"Only when you put the metrics out there, do you really understand what behaviors you are driving," says John Lochrie, senior vice president of Direct Energy Essential Home Services.

UNDERSTANDING METRICS

Types of Metrics

Key Performance Indicators

Metrics used in performance dashboards are typically called key performance indicators (KPIs) because they measure how well the organization or individual performs an operational, tactical, or strategic activity that is critical for the current and future success of the organization. There are two major types of KPIs: leading and lagging indicators. Leading indicators measure activities that have a

significant effect on future performance, whereas lagging indicators, such as most financial metrics, measure the output of past activity.

Leading Indicators

Leading indicators are powerful measures to include in a performance dashboard, but are sometimes difficult to define. They measure key drivers of business value and are harbingers of future outcomes. To do this, leading indicators either measure activity either in its current state (i.e., number of sales meetings today) or in a future state (i.e., number of sales meetings scheduled for the next two weeks), the latter being more powerful because it gives individuals and their managers more time to influence the outcome (see Spotlight 11.1).

SPOTLIGHT 11.1 SAMPLE LEADING INDICATORS

It is easy to define lagging indicators, but it takes imagination and persistence to identify leading indicators. One must follow the trail backward from results measured by a lagging indicator to a first-mover driver. Because each lagging indicator or outcome has numerous drivers, the key to defining effective leading indicators is to find the one or two drivers that have the greatest effect on the results desired by executives. Here are a few examples of leading indicators and the outcomes (or lagging metrics) they influence.

Leading Indicators or Value Drivers		Lagging Indicators or Outcomes
Number of clients that sales people meet face to face each week	→	Sales revenue
Complex repairs completed successfully during the first call or visit	→	Customer satisfaction
Number of signed, positive employee suggestions each week; ratio of positive to negative comments	→	Employee satisfaction
Number of parts for which orders exceed forecasts within 30 days of scheduled delivery	→	Per unit manufacturing costs
Number of days with lowest prices for comparable products	→	Market share
Number of customers who are delinquent paying their first bill	→	Customer churn
Number of loyalty rewards cashed in each month	→	Customer loyalty

For example, Quicken Loans identified two KPIs that correlate with the ability of mortgage consultants to meet daily sales quotas: the amount of time they spend on the phone with customers and the number of clients they speak with each day. Quicken Loans now displays these two "current-state" KPIs prominently on its operational dashboards. More importantly, however, it created a third KPI based on the previous two that projects every 15 minutes whether mortgage consultants are on track to meet their daily quotas. This "future-state" metric, which is based on a simple statistical regression algorithm using data from the current state metrics, enables sales managers to identify which mortgage consultants they should assist during the next hour or so.

Brainstorming Leading Indicators

Most people are so well trained at measuring outcomes instead of drivers that it takes them a while to shift their mental focus and become adept at creating effective KPIs. Consultant Paul Niven suggests using facilitated brainstorming sessions to break mental logjams. Whenever a user suggests a metric, the meeting facilitator should say, "Good, what drives the performance of that measure?" The individual or group then brainstorms new metrics, and the facilitator repeats the question. Before long the group has performed a root-cause analysis of the initial metric and generated one or more effective leading indicators.[1]

Diagnostic Measures

Some measures do not necessarily fit neatly into a leading or lagging indicator category, but they are still important to capture. In most cases, these metrics signal the health of various operational initiatives or processes and are good candidates for a departmental or workgroup dashboard. Niven calls these types of KPIs "diagnostic" metrics. Some examples might be net margins on key product lines, profitability of the top 10 percent of channels, or days of sales outstanding.

KPI CHARACTERISTICS

Actionable KPIs

Besides predicting future performance, KPIs have numerous other characteristics (see Spotlight 11.2). Perhaps the most important attribute of a KPI is that it is actionable. That is, if a metric trends downward, users should know what corrective actions to take to improve performance. There is no purpose in measuring activity if users cannot change the outcome.

SPOTLIGHT 11.2 TWELVE CHARACTERISTICS OF EFFECTIVE KPIS

1. **Aligned.** KPIs are always aligned with corporate strategy and objectives.
2. **Owned.** Every KPI is "owned" by an individual or group on the business side who is accountable for its outcome.
3. **Predictive.** KPIs measure drivers of business value. Thus, they are "leading" indicators of performance desired by the organization.
4. **Actionable.** KPIs are populated with timely, actionable data so users can intervene to improve performance before it is too late.
5. **Few in number.** KPIs should focus users on a few high-value tasks, not scatter their attention and energy on too many things.
6. **Easy to understand.** KPIs should be straightforward and easy to understand, not based on complex indexes that users do not know how to influence directly.
7. **Balanced and linked.** KPIs should balance and reinforce each other, not undermine each other and suboptimize processes.
8. **Trigger changes.** The act of measuring a KPI should trigger a chain reaction of positive changes in the organization, especially when it is monitored by the CEO.
9. **Standardized.** KPIs are based on standard definitions, rules, and calculations so they can be integrated across dashboards throughout the organization.
10. **Context driven.** KPIs put performance in context by applying targets and thresholds to performance so users can gauge their progress over time.
11. **Reinforced with incentives.** Organizations can magnify the impact of KPIs by attaching compensation or incentives to them. However, they should do this cautiously, applying incentives only to well-understood and stable KPIs.
12. **Relevant.** KPIs gradually lose their impact over time, so they must be periodically reviewed and refreshed.

Accountability

An actionable KPI implies that an individual or group exists that "owns" the KPI, is held accountable for its results, and knows what to do when performance declines. Without accountability, measures are meaningless. Thus, it is critical to assign a single business owner to each KPI and make it part of his or her job description and performance review. It is also important to train users to interpret the KPIs and how to respond. Often, this training is best done "on the job" by having veterans transfer their knowledge to newcomers.

Some companies attach incentives to metrics, which always underscores the importance of the metric in the minds of individuals. However, just publishing performance scores among peer groups is enough to get most people's competitive juices flowing. It is best to assign accountability to an individual or small group rather than a large group, in which the sense of ownership and accountability for the metric become diffused.

Empowered

Companies also need to empower individuals to act on the information in a performance dashboard. This seems obvious, but many organizations that deploy performance dashboards hamstring workers by circumscribing the actions they can take to meet goals. Companies with hierarchical cultures often have difficulty here, especially when dealing with front-line workers whose actions they have historically scripted. Performance dashboards require companies to replace scripts with guidelines that give users more leeway to make the right decisions.

Timely

Actionable KPIs require right-time data. The KPI must be updated frequently enough so the responsible individual or group can intervene to improve performance before it is too late. Operational dashboards usually do this by default, but many tactical and strategic dashboards do not. Many of these latter systems contain only lagging indicators of performance and are only updated weekly or monthly. These types of performance management systems are merely electronic versions of monthly operational review meetings, not powerful tools of organizational change.

Some people argue that executives do not need actionable information because they primarily make strategic decisions for which monthly updates are good enough. However, the most powerful change agent in an organization is a top executive armed with an actionable KPI.

David Parmenter, the CEO of Waymark Solutions, a performance management consultancy in New Zealand, recounts the story of Lord King, chairman of British Airways, who reportedly turned around the ailing airline in the 1980s using a single KPI: the timely arrival and departure of airplanes.[2]

"[Lord King] was notified, wherever he was in the world, when a British Airways plane was delayed over a certain time, say two hours. The British Airways airport manager at the relevant airport knew that if a plane was delayed beyond this threshold, he or she would receive a personal call from the Chairman. It was not long before British Airways planes had a reputation for leaving on time," says Parmenter.

Trigger Points

The British Airways story illustrates another characteristic of KPIs. They trigger a chain reaction of process improvements throughout the organization. Effective KPIs sit at the nexus of multiple interrelated processes that drive the organization. When activated, these KPIs create a ripple effect throughout the organization and produce stunning gains in performance.

For instance, late planes affect many core metrics and processes at airlines. Costs increase because airlines have to accommodate passengers who miss connecting flights; customer satisfaction declines because customers dislike missing flights; worker morale slips because they have to deal with unruly customers; and supplier relationships are strained because missed flights disrupt service schedules and lowers quality.

When an executive focuses on a single, powerful KPI, it creates a ripple effect throughout the organization and substantially changes the way an organization carries out its core operations. Managers and staff figure out ways to change business processes and behaviors so they do not receive a career-limiting memo from the CEO.

Easy to Understand

In addition, KPIs must be understandable. Employees must know what is being measured, how it is being calculated, and, more importantly, what they should do (and should not do) to affect the KPI positively. Complex KPIs that consist of indexes, ratios, or multiple calculations are difficult to understand and, more importantly, not clearly actionable.

However, even with straightforward KPIs, many users struggle to understand what the KPIs really mean and how to respond appropriately. It is critical to train individuals whose performance is being tracked and follow up with regular reviews to ensure they understand what the KPIs mean and know the appropriate actions to take. This level of supervision also helps spot individuals who may be cheating the system by exploiting unforeseen loopholes.

"We hold forums where we show field technicians how our repeat call metric works and how it might impact them. We then have the best technicians meet with others to discuss strategy and techniques that they use to positively influence the metric," says Ripley Maddock, director of customer management at Direct Energy Essential Home Services.

It is also important to train people on the targets applied to metrics. For instance, is a high score good or bad? If the metric is customer loyalty, a high score is good, but if the metric is customer churn, a high score is bad. Sometimes a metric can have dual polarity, that is, a high score is good until a certain point and then it turns bad. For instance, a telemarketer who makes 20 calls per hour may be doing excep-

tionally well, but one who makes 30 calls per hour is cycling through clients too rapidly and possibly failing to establish good rapport with callers.

Accurate

It is difficult to create KPIs that accurately measure an activity. Sometimes, unforeseen variables influence measures. For example, a company may see a jump in worker productivity, but the increase is due more to an uptick in inflation than internal performance improvements. This is because the company calculates worker productivity by dividing revenues by the total number of workers it employs. Thus, a rise in the inflation rate artificially boosts revenues—the numerator in the metric—and increases the worker productivity score even though workers did not become more efficient during this period.

Also, it is easy to create metrics that do not accurately measure the intended objective. For example, many organizations struggle to find a metric to measure employee satisfaction or dissatisfaction. Some use surveys, but some employees do not answer the questions honestly. Others use absenteeism as a sign of dissatisfaction but these numbers are skewed significantly by employees who miss work to attend a funeral, care for a sick family member, or stay home when daycare is unavailable. Some experts suggest that a better metric, although not a perfect one, might be the number of sick days since unhappy employees often take more sick days than satisfied employees.

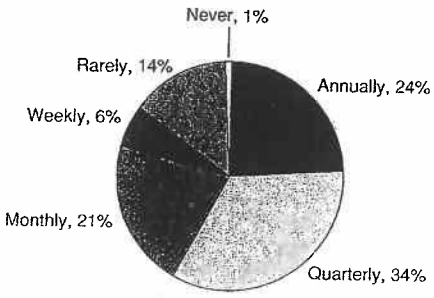
Relevant

A KPI has a natural life cycle. When first introduced, the KPI energizes the workforce and performance improves. Over time, the KPI loses its impact and must be refreshed, revised, or discarded. Thus, it is imperative that organizations continually review KPI usage.

"We usually see a tremendous upswing in performance when we first implement a scorecard application," says Martin Summerhayes, a program manager at Hewlett Packard Technology Solutions Group (TSG), "but after a while, we often see performance trail off again. In the end you can't control people, so you have to continually reeducate them on the importance of the processes that the metrics are measuring or you have to change the processes."

Performance dashboard teams should track KPI usage automatically, using system logs that capture the number of users and queries for each metric in the system. The team should then present this information to the performance dashboard steering committee, which needs to decide what to do about underused metrics. For example, Hewlett Packard TSG holds quarterly meetings to review KPI usage, which it tracks at a detailed level. "If a metric isn't being accessed, we go back to the owners and see whether they still want it. If not, we remove the metric," Summerhayes says.

EXHIBIT 11.1 HOW OFTEN DO YOU MODIFY KPIS?

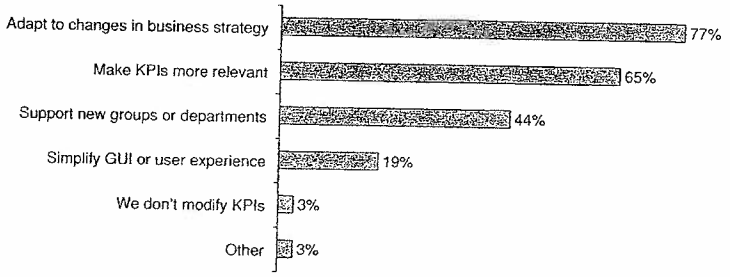


Most companies modify KPIs annually or quarterly. Based on 360 respondents.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, 2003).

Research from The Data Warehousing Institute (TDWI) shows that most organizations modify KPIs on a quarterly or annual basis. Only 15 percent of organizations "rarely" or "never" modify KPIs. The most common reason for modifying KPIs is to adapt to changes in business strategy (77 percent) followed by the need to make KPIs "more relevant" (see Exhibits 11.1 and 11.2).

EXHIBIT 11.2 WHY DO YOU MODIFY KPIS?



Most companies modify KPIs to adapt to changes in business strategy or make KPIs more relevant. Based on 360 respondents who could select more than one choice.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, 2003).

CREATING METRICS

Gathering Requirements

Most performance dashboard teams use interviews and surveys to gather requirements as a way to determine the right KPIs to create. Interviews are usually done by business analysts who ask open-ended questions to top executives about the business strategy, objectives, goals, and expectations for the project, among other things. The analysts then gather additional detail by interviewing mid-level managers and subject matter experts who can fill in the details of specific processes, identify data sources, and discuss the metrics used in current reports, what those metrics mean, and how they are calculated.

Requirements Forms

To guide business analysts during interviews, most project teams create a template or requirements form to capture requirements in a standardized way. This ensures that analysts ask a consistent set of questions and gather a comprehensive set of information that is easily synthesized and standardized.

Hewlett Packard TSG, for example, uses two forms to define new metrics for its strategic dashboard, one to gather business requirements and one to define technical specifications. The business requirements form or template asks for a general description of the metric, how it aligns with corporate strategy, the name of the metric, its owner, its target and stretch goals, and how the metric is calculated, among other things (see Exhibit 11.3).

The technical specification document provides technical details for each proposed metric. For example, it asks for data sources and formats, extraction logic, scorecard layouts, target specifications, analytical layouts (including columns, rows, data types, formats, and formulas), chart views, and security requirements. Most importantly, the form asks for the business and technical owners of the metrics so project team members can follow up with additional questions, if needed.

Understand Metric Usage

Although the above data about proposed metrics is important, most project teams find it is critical to understand the context within which the business plans to use the metrics. This usually involves follow-up interviews or creating use-case scenarios that document the processes and ways in which people use the metrics.

For example, International Truck and Engine Corporation conducted follow-up interviews with several managers, who shared that they usually ask a business

EXHIBIT 11.3 BUSINESS REQUIREMENTS FORM

	PMMS LIBRA Metric Request Form **Submitted By:** _____ **Date:** _____
Business or Function	*What business or function do you request a metric for:*
Region/Country Scope	*What is the geographical scope of the metric:*
Metric Perspective	*What balance scorecard perspective does the metric fit in? Customer, Financial, Internal, Learning:*
Metric Title	*Give a brief name to the metric (less than 20 characters)*
Metric Description	*Describe the metric in business terms*
Business Justification & Strategic Importance	*Define if the metric is a strategic metric or an operational excellence measure and justify it. How does the metric measure progress towards strategy execution?*
Metric Business Owner, Subject Matter Expert, Business IM Owner	*Define the owners of the metric either from the business or the function that will be measured on the results (can be name or job title). Also, who collects, reviews, approves and reports the data?*
Metric Goals	*Specify both the target and stretch goals for the metric (indicate over what time period) Also, how is the goal selected and who approves the goal?* **Target :** **Stretch:** **Goals setting process and approval from:**
Definition, Calculation, and Criteria	*How is the metric calculated? What criteria is used? Identify any differences between WW or Sub-Region definitions.*
Data Source and Availability	*What is the data source for the actual results and how is it collected? When is the data available? (i.e., which workday, every six months, annually, etc.)*
Supporting Reports	*What detailed reports are available to support the metric results?*
Related Metrics	*List of upstream metrics (influenced by this metric)? List of downstream metrics (have influence on this metric)?*
Additional Information	*Input additional information related to the metric.*
Status	*Status of the metric request from the PMMS WW Program Office team (approved, pending additional info), targeted implementation date, etc.*

Sample form used by Hewlett Packard TSG to capture requirements for a strategic dashboard.

analyst to create a detailed report for them when they notice a downward trend in a metric. The team quickly realized it could provide significant value to the managers and free up analysts' time if it provided detailed data and reports alongside the metrics.

Validating Metrics

Elusive Nuances

The problem with many metrics is that they are difficult to understand or implement. Sometimes the metric does not accurately capture the nuances of a business process, making it difficult for the project team to figure out what data to capture and how to calculate it.

For example, executives at Direct Energy requested a "repeat call" metric to track the efficiency of field service technicians, but it took the project team considerable time to clarify the meaning of the metric. For example, field service technicians primarily repair home energy equipment, but they can also sell it. So, is a repeat call a bad thing if the technician also brings literature about replacement systems or makes a sale? Or, what if a homeowner only lets a technician make minor repairs to an aging system to save money, but then calls shortly afterwards because the home's furnace broke down again?

Most business processes contain innumerable nuances that must be understood and built into the metric if it is to have any validity, especially if the metric is used as a basis for compensation. The worst-case scenario is when employees discover these nuances after the metrics have been deployed, which stirs up a hornet's nest of trouble and wreaks havoc on both the performance management system and compensation policies.

Missing or Corrupted Data

Sometimes, the data to support a metric simply do not exist, or they are in poor condition and difficult to integrate. The most well-defined KPIs are irrelevant if there are no data to support them. Executives who want to create a strategic dashboard frequently assume the data warehouse or some other system contains all the data necessary to support their metrics. To get a handle on data issues early in the process, executives need to appoint a systems analyst to scout data sources for potential KPIs so executives can decide whether to revise a proposed KPI or create a new system or process to capture the data they want.

Data that are in poor condition and chock full of missing or invalid values, duplicate records, or inconsistent data types might take weeks or months to clean up, if at all. Here, executives need to decide whether the metric is important enough to warrant a major data reconditioning project or should be dropped or replaced by another. Another common problem is that the data required to pop-

ulate a metric are spread across multiple systems that capture and format data differently. Even if the distributed data are in good condition, which they usually are not, the project team must expend significant effort to integrate the data in a consistent fashion.

"Data integration is critically important but it is often overlooked, especially by the business side of the house," says Patrick Morrissey, manager of performance management at Business Objects. "Business people often don't know there is a problem until the technical team reports back that it can't deliver all the relevant KPIs. The larger the organization, the bigger the data integration challenge."

Establish a New Process

In some cases, it is fairly simple to create a new process to capture high-quality data for a KPI. For example, executives who want to track the number of clients that each salesperson meets face to face each week can have the sales department fill out a time sheet of appointments and submit it to the performance dashboard team each week. Similarly, executives who want to track customer satisfaction can commission market research firms to conduct blind surveys and submit the results for inclusion in the strategic dashboard.

However, not all KPIs can be populated with manual data. Sometimes executives may need to commission the creation of a new operational system. For example, executives who want to track daily grocery sales at the SKU level might need to build a multimillion dollar transaction system to obtain the data. Executives need to weigh the value of the KPI and the processes it measures against the cost of building the new system.

Project Delays

Experts say that most strategic dashboards are missing 20 to 30 percent of the data they need when starting out but that this should not delay or postpone the project. The organization can still benefit from the other metrics while it builds systems to capture the remaining data. However, these problems underscore the importance of having technical people on the project team to ascertain the true costs of delivering the required data to populate KPIs.

Standardizing Metrics

Standardizing Terms Is Key to Integration

A big challenge in creating KPIs is getting people to agree on the definitions of terms, such as sales, profits, or customer. As mentioned earlier in this book, standardizing terms is critical if organizations are going to distribute performance dashboards to different groups at multiple levels of the organization and roll up

the results. Without standards, the organization risks spinning off multiple, inconsistent performance dashboards whose information cannot be easily reconciled.

Scope Increases the Challenge

The challenge in standardizing terms increases with the scope of the project and the number of distinct groups the performance dashboard supports. The more groups and people, the more divergence there will be in the definitions of terms, rules, and calculation that compose a metric. Sometimes the only way to resolve these differences is for top executives to get together and hash out a standard with which they all can live.

"We have two distinct businesses, commercial and government, and the measurements each uses are very different, which makes it very challenging to develop corporate-wide standards," says John Monczewski, senior manager of reporting at Booz Allen Hamilton. "We've had strong backing from our CEO to make this work and we've made a lot of progress. But even with that, it takes a lot of time. Our partners have decided to postpone trying to resolve some issues until a later time."

Hewlett Packard TSG faced a similar situation. "We wanted a worldwide metric for cost reduction and we discovered that the operation and finance people had 32 ways to measure cost reduction. Some of these were duplicates, others measured different facets of costs. The project team arranged a meeting between two top financial executives and they agreed to standardize on six metrics for cost reduction," says Summerhayes.

Prioritizing Metrics

Less Is More

One thing many people ask about KPIs is: "How many should we have?" The short answer is: "As few as reasonably possible." There is a natural tendency among organizations to keep adding metrics and never delete any. As a result, they lose their power to grab the attention of employees and focus their behavior on key value-added activities. "There is always a temptation to add more metrics as time goes on," says Direct Energy Essential Home Services' Maddock. "When people have too many metrics to track, the message gets blurred."

Guidelines for Metrics per User

Some experts say that organizations should limit the number of KPIs to between three and seven metrics per user, because most people have difficulty concentrating on more than seven things at a time. However, the optimal number of metrics depends more on a person's role and level in the company than on an arbitrary number.

As a rule of thumb, workers managing operational processes should track fewer metrics, probably less than a handful because they have less time to respond to issues, whereas executives responsible for setting strategic direction should view many more metrics, perhaps a dozen or more. To reduce the visual confusion of displaying a lot of metrics on the screen at once, designers should group metrics in folders or tabs or nest related metrics under a lead metric.

Guidelines for Metrics per Dashboard

From an organizational perspective, a performance dashboard may have dozens of metrics or more. The total number of metrics depends on the size of the organization, the scope of the project, and the complexity of the organization's business model. Large organizations with complex processes may require hundreds of metrics to measure performance accurately.

Hewlett Packard TSG's Summerhayes, for example, says that it often takes multiple metrics to measure key processes from end to end. For example, a repair call resolution metric might require five sub-metrics to capture performance accurately at each stage in the repair process, from taking an order and scheduling the repair to validating the repair and receiving customer payment. One metric may not shed enough insight to help managers know what part of an end-to-end process is experiencing problems.

If in doubt about how many KPIs to create, err on the high side. What does not get measured, does not get done, and what does not get done can hurt the organization. The key to selecting metrics judiciously is to validate that they are aligned with strategic objectives and distribute them to performance dashboards at the appropriate level in the organization. Not all metrics need to appear on the top-level scorecard; most, in fact, should be delegated to lower-level ones.

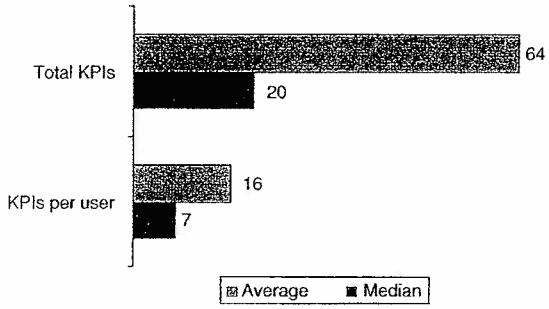
According to research from TDWI, most organizations adhere to the "less is more" rule regarding KPIs. Organizations deploy a median of 20 KPIs in the entire Performance Dashboard and a median of seven KPIs per user (see Exhibit 11.4).

Another common question that people ask is how often they should refresh metrics with new data. The primary factor is the role of the user of the metric and the frequency with which they need to make decisions. If the person is an executive with primarily strategic decision-making responsibilities, then monthly or quarterly updates are probably fine. Of course, if the executive wants to monitor critical operational processes, as many do, then the updates should happen in right time.

Balancing Metrics

The most important characteristic of a KPI is that it leads to positive outcomes. This is easier said than done. A KPI alone will not change behavior or improve

EXHIBIT 11.4 AVERAGE AND MEDIAN KPIS



Organizations that have deployed Performance Dashboards average 64 total KPIs (16 median) and 20 per user (7 median). The median numbers reflect the larger number of organizations. Based on 360 respondents.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, 2003).

performance. It is merely a tool to communicate what workers need to do to help the company achieve its strategic objectives and, in the process, improve their position in the company.

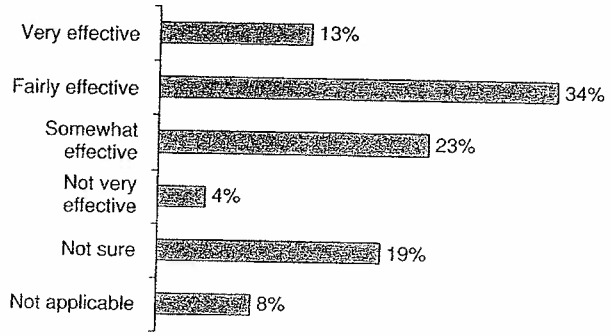
"Measures without meetings are useless," says Maddock. "Unless managers hold regular sit-down meetings with their staff to review performance, nothing will change. Managers need to ask, 'What are you doing about this number? How will we avoid this happening next time?'"

Organizations as a whole appear to be struggling to find KPIs that impact employee performance, according to research from TDWI. Only 13 percent said their KPIs are "very effective" at changing employee performance; 34 percent said they were "fairly effective." Meanwhile, 23 percent said their KPIs were only "somewhat effective," and 19 percent were not sure (see Exhibit 11.5).

Finding Loopholes

One problem is that users often try to circumvent established KPIs out of laziness or personal gain. "Users always look for loopholes in your metrics," says Direct Energy's Maddock. At Hewlett Packard's TSG, to prevent users from "fudging" customer satisfaction numbers, the company hires a market research firm to audit customer surveys.

EXHIBIT 11.5 HOW EFFECTIVELY DO KPIS CHANGE EMPLOYEE PERFORMANCE?



A third of respondents say that KPIs are "fairly effective" at changing employee performance. Based on 360 respondents.

Source: Wayne Eckerson, "Best Practices in Business Performance Management: Business and Technical Strategies" (*TDWI Report Series*, 2003).

Sub-Optimization

In other cases, KPIs may unintentionally undermine each other. For instance, a logistics group that is trying to streamline inventory costs may decide to reduce inventory, which makes it difficult for a retail store to prevent stockouts of fast-moving items—a key performance measure for them. "We've seen our staff take unexpected action to boost a metric that turned out to undermine other measures," Maddock says.

Strategy Maps

One way to avoid having metrics undermine each other and sub-optimize processes is to create strategy maps that show cause-and-effect linkages among objectives and the metrics that represent them. Strategy maps can help executives clarify their assumptions about what drives the business and debug the objectives and metrics that comprise the strategy. If a positive improvement in one metric doesn't lead to an expected bump in a related one, then this is a sign that executives need to examine their assumptions behind the linkages. It may cause the team to revise the metrics or create a new one that sits between the previous two and links to both.

Putting Performance in Context

By definition, KPIs provide context. They show users or groups what is an acceptable level of performance. KPIs embed organizational expectations in the form of targets and thresholds.

Targets and Thresholds

Targets define a desired state at a particular point in time. For example, a target might be a 10 percent growth in net profits by year end. Ideally, targets are set by executives and managers with input from subordinates. Targets can come from many sources: annual budgets, strategic plans, forecasts, industry benchmarks, competitors, or comparisons with a previous point in time, such as last year, last month, or last week. Thresholds, on the other hand, provide an upper and lower range of acceptable performance for each target in a given time period. Thresholds generally operate on a graduated rolling basis; that is, the thresholds gradually increase each period, usually monthly, until the desired end-state or target is reached.

Target Scope

Organizations may want to establish several types of targets for various KPIs. Most KPIs will have an *annual target* that is decomposed into weekly or monthly targets and thresholds. In addition, some KPIs may have a three- to five-year goal that serves as a *stretch target*. This type of target may be applied to operational processes that are critical to the strategy or that need substantial improvement. Executives set stretch targets either by getting input from workers and managers in the trenches, hiring consultants to assess the efficiency and potential of existing processes, or referring to industry benchmarks that define "best in class" performance.

The final type of target is a *visionary target*. This target reinforces a company's vision statement of where it wants to be in five to ten years. The visionary target should galvanize employees and create a sense of unity and purpose that causes the organization to perform at a much higher level. Executives usually set visionary targets in response to competitive threats. For example, President John F. Kennedy's 1961 call to "land a man on the moon and return him safely to Earth" before the end of the 1960s was a response to the Soviet Union's success in putting the first man into orbit.

Creating Realistic Targets

Setting realistic targets is not easy. Targets should not be so challenging that they discourage workers, nor should they be too easy, which creates complacency.

Also, managers should be aware of ways that workers may try to circumvent targets or "game the system." Often setting targets is a matter of trial and error. However, it is best to get as close to realistic targets as possible at the outset to avoid problems.

The best way to create targets is to interview executives and managers in an attempt to understand their goals and objectives for the areas they manage. They may often use last year's targets or goals as a basis for creating targets for the upcoming year. Other sources of targets may be industry benchmarks or customers and suppliers, which may already have standards by which they measure your organization. For instance, a manufacturing company may expect a supplier to deliver 95 percent of shipments on time and in full with proper bar codes or RFID labels.

It is important not to set targets in a vacuum. Although it is tempting for executives and managers to set targets based on their own knowledge of the business, such unilateral goal setting does not engender goodwill among the people who are responsible for achieving the goals. It is critical that executives gather input from employees to understand what targets are reasonable and gain their buy-in to the project. Ultimately, employees are doing the work and should feel that the goals are reasonable.

Technical Considerations

Technically, it is not easy to apply targets and thresholds to metrics. Developers need to create a rules engine that lets users define targets and thresholds for each KPI using a simple Boolean engine (i.e., "if, then, else" rules). The rules need to be applied on a periodic basis to data stored by a repository managed directly by the performance dashboard or a related data mart or data warehouse. This can happen on an event-driven basis (e.g., when the database is updated) or at regular intervals (e.g., every ten seconds, ten minutes, or ten days).

Alerts

The system should also let developers and end-users define rules about when and how users should be notified if parameters are exceeded for a given metric (i.e., alerts) as well as when and how to initiate automated actions based on those alerts (i.e., agents). Visual alerts should be accompanied by text that explains the problem, a report that users can click to see actual data, and a URL to initiate additional action, such as to refresh a report or display contact information for someone to call. The rules engine should accept events from third-party systems as well.

SUMMARY

Agents of Change. KPIs are powerful agents of organizational change. Creating effective KPIs is challenging; it is more of an art than a science. It is easy to create poor metrics that cause performance to decline, business processes to be suboptimal, and users and executives to be frustrated. To avoid these problems, organizations should understand the characteristics exhibited by effective metrics.

Leading versus Lagging. The two primary types of KPIs are leading and lagging indicators. Lagging indicators measure past activity, whereas leading indicators measure drivers of future performance. Performance dashboards should contain a healthy dose of leading indicators to optimize future outcomes.

KPI Characteristics. Effective KPIs exhibit many other characteristics. They are actionable, empowering users to intervene in a process. Actionable KPIs, by definition, must be updated frequently enough so that empowered users can take action in a timely manner. Also, KPIs must be few in number, easy to understand, and have an owner who is accountable for the outcomes. KPIs also put performance in context by applying targets and thresholds to performance. The targets may be based on the annual budget or plan, three- to five-year strategic plans, or a top executive's long-term vision for the company. Targets are typically applied using thresholds that define low and high levels of acceptable performance.

Far-Reaching Impact. Effective KPIs trigger positive change. They sit at the nexis of many core processes. When the organization focuses on a KPI, it creates a ripple effect of positive changes throughout the organization, especially when the CEO actively monitors and manages that KPI. Effective KPIs are also based on corporate standards so they can be integrated across performance dashboards, if needed. Standard definitions and rules for calculating metrics enable companies to aggregate data from lower to higher level views in the performance dashboard.

Reality Check. It is important to select KPIs that can be populated with data that do not undermine each other or create a loophole that lets users cheat the system. One way to vet KPIs is to create a strategy map that defines cause-and-effect linkages among objectives in the performance dashboard. Because KPIs lose their impact over time, organizations must continually reevaluate and refresh them. This involves monitoring system usage and getting feedback from members of the performance dashboard steering committee.

NOTES

1. Paul Niven, *Balanced Scorecard Step by Step: Maximizing Performance and Maintaining Results* (John Wiley & Sons, 2002), p. 116.
2. David Parmenter, "The New Thinking on KPIs: Why You May Be Working with the Wrong Measures," BetterManagement.com.

CHAPTER 12

How to Design Effective Dashboard Screens

This chapter focuses on how to design the "look and feel" of a performance dashboard so that it is easy to use and visually appealing. The visual interface—what users can see and do on the screens—can make or break a performance dashboard.

Workers do not have to use a performance dashboard; it is not a requirement for doing their jobs. They will use it if it makes them more productive and effective, but they will shun it if it is not intuitive and consumes too much time and effort for the value it delivers. They will go elsewhere to obtain the information they need or get by on intuition and gut feel.

Creating dashboard screens is challenging, and few people have the background in visual design techniques required to do a good job. Most rely on their own visual instincts, get feedback from users, and go from there. Unfortunately, this usually produces a visual interface that is cluttered and complex, forcing users to work too hard to discern the pertinent facts they need to know. Surprisingly, few organizations hire visual design experts to lend advice, and few have usability labs that observe workers using a piece of software and recommend enhancements to the visual design.

Nevertheless, designing dashboard screens and functionality is rewarding. It is the fun part of building performance dashboards, the grand finale when users finally see the fruits of the initiative and get excited about using the new system.

GENERAL GUIDELINES FOR MANAGING THE DESIGN PROCESS

Focus on Data and Process First

It is a fact that the quickest way for a magazine to boost sales is to put a picture of a pretty woman on the cover. In the same way, it's no exaggeration to say that a pretty "face" sells a performance dashboard. A surefire way to get executives excited about a dashboard project is to show them a mockup of a dashboard screen with their metrics wrapped in fancy graphics. However, selling a dashboard screen and delivering a performance management system are two different things. A project team should be wary of raising users' expectations too early in the process.

"It's often too easy to create a fancy-looking dashboard and get executive support. But if you don't have real data to put into it, it's really just smoke and mirrors. It's important that you do the necessary work to get to the point where the glitz is functioning properly. That includes defining metrics and targets as well as getting systems data. If we had gone in with glitz and glamour before building the infrastructure, we would have set unrealistic expectations and wouldn't be as far along as we are now," says Kevin Lam, performance manager at TELUS (see Spotlight 12.1 and Exhibit 12.1).

SPOTLIGHT 12.1 USING STRATEGIC DASHBOARDS AT THE DEPARTMENTAL LEVEL

In 2001, TELUS, a leading Canadian telecommunications company, implemented a strategic dashboard in its operations group that has enabled the company to increase the productivity of workers significantly, including field technicians, engineers, customer service representatives, dispatchers, and their supervisors and managers. Specifically, the Web-based scorecard helped increase workers' productive hours by 9 percent and reduce the time to complete a job by 16 percent, saving approximately $1 million to $2 million a month.

"The scorecard was one of the primary catalysts driving these productivity gains," says Kevin Lam, manager of business performance at TELUS. "It's given us line-of-sight visibility into our daily performance from our vice presidents all the way to individual technicians. Without the measurements and structure in place, we would have limited visibility on where we stand or how or what to improve."

TELUS kicked off the dashboard project in 2001 in response to a company-wide initiative to cut costs and improve operational efficiencies. The initiative was designed to reduce overhead and make the firm more competitive after a series of mergers, followed by the economic downturn in 2000 that hit the telecommunications industry particularly hard.

TELUS's goal was to reduce operating costs without long-term negative impact to government-regulated customer service levels. "We had tinkered with Balanced Scorecards as a way to measure and manage worker productivity, but now we had no choice. We had to be more efficient or lose market share," says Lam.

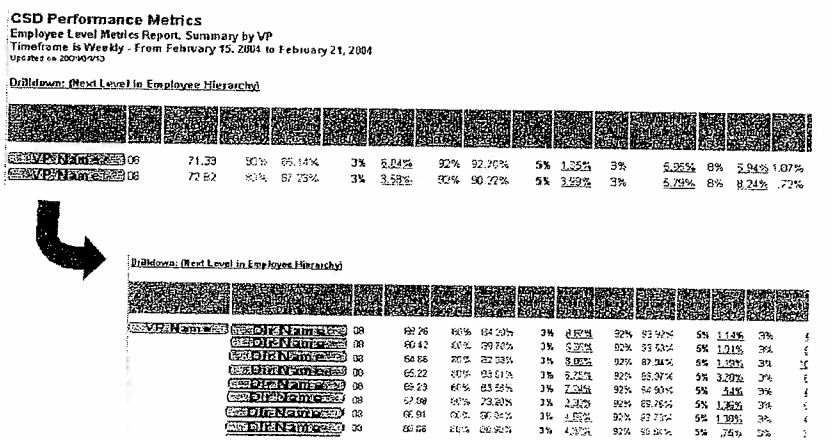
SPOTLIGHT 12.1 *(CONTINUED)*

Today, the firm provides "actionable scorecards" to 300 managers with visibility to over 2,000 front-line team members. Every scorecard displays the same metrics and targets, but the values differ based on a user's position in the firm. The information rolls up several levels from technician all the way to the executive vice president. This way users can see how their performance contributes to the overall productivity of the business unit, says Lam.

The system also lets users drill into and slice the information any way they want. They can view the information by level, metric, time period, or interval (i.e., daily, weekly, monthly). If required, they can even drill into transaction data, such as a trouble ticket, to find specific information about an incident. The information values are color coded so users can see how their performance compares with predefined targets.

The system replaced a hodgepodge of manually crafted Excel reports that never delivered consistent information in a timely or detailed fashion. "We could never have achieved significant productivity gains without changing the way we deliver and use information," says Lam.

EXHIBIT 12.1 A STRATEGIC DASHBOARD FOR THE OPERATIONS GROUP AT TELUS



The Performance Dashboard at TELUS Corp. is geared to an operations department. Everyone in the department, from vice presidents down to field technicians, receives the same display with the same metrics, but each view contains different values based on the person's role and level in the company. The system aggregates data from the lowest levels of the organization to the top levels. The view above is designed for vice presidents. By clicking on their name, vice presidents can drill down to see results for the directors that report to them, and so on down the line. (Data do not reflect actual results.)

Source: Courtesy of TELUS Corp.

When gathering requirements for a performance dashboard project, it is critical to focus on what information users need and how they plan to use it rather than how they want to view it. Focusing on screen layouts too early in the process restricts your ability to design an optimal visual interface; it is best to show a screen mockup at the end of the process once developers have a solid understanding of the information that users need to manage the business processes and projects for which they are responsible.

Know Your Users

It is one thing to build a robust performance dashboard with all the bells and whistles, and it is another to expect your workers to use it. As we discussed in Chapter 3, it is important to segment users by their technical and analytical capabilities and preferences. Just because one segment of users finds the screens easy to use does not mean that all segments will.

Executive Requirements

For example, to ensure that senior executives at Hewlett Packard Technology Solutions Group (TSG) would adopt its strategic dashboard, the project team trained executive administrators to use the tool and investigated how executives prefer to receive quantitative information. They discovered that some executives prefer to receive reports via e-mail, while others like to print out the views, and others prefer offline electronic versions that they can examine while traveling. "We tell executives, don't worry about accessing the tool, we'll train your assistants to get you the information," says Martin Summerhayes of Hewlett Packard TSG.

Power User Requirements

Although executives may need extra hand holding, power users need additional leeway. Power users are usually not satisfied with functionality geared to average users, who primarily want to monitor data, not analyze it. Although well-designed dashboards let users drill from high-level views to detailed transactions, the pathways are fairly structured and circumscribed. To satisfy power users who want unlimited freedom to explore, it is often necessary to let them access data and information directly using whatever tools they want. For example, power users at Quicken Loans use desktop OLAP tools to access the data warehouse and multidimensional cubes, whereas power users at Hewlett Packard TSG prefer query and reporting tools.

Make It Simple

Ironically, although fancy graphics and charts help sell performance dashboards, the "glitz" gets in the way once workers begin using the system. Designers even-

tually strip out items from screens to reduce their "busyness" and complexity. What is left may not look overly appealing, but it is quick and easy to use.

"Simple is best. We did a project we thought was spectacular, but users thought it was too complex. We created stoplights, up and down arrows, but it was too fancy. Some guys are new to this stuff so we had to make it foolproof," says TELUS's Lam.

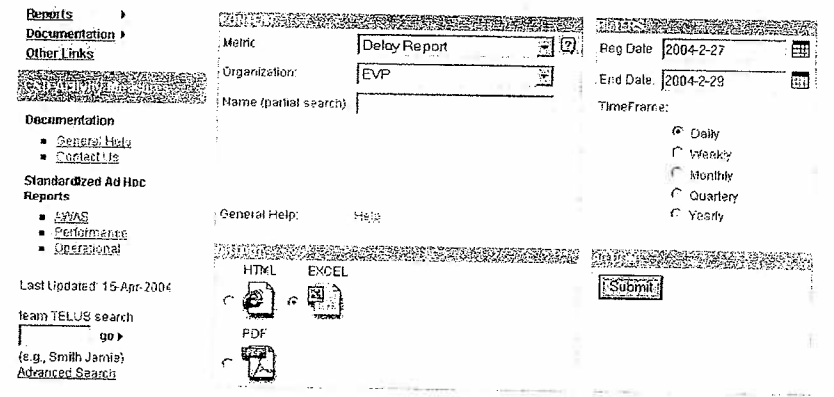
Because TELUS's dashboard was designed for the company's operations department, Lam's team took out all graphics and charts and displayed only numbers, which were color coded, to make the performance dashboard look more like an operational report. Also, to prevent workers from getting lost in drill-down paths, every screen has the same layout and column names, and information never disappears, it is only added. Lam calls this "line of sight drill through." For example, when executives drill from a VP level to a Director level, they see rows of director-level performance data nested underneath the rows of VP-level data. This way, they always know where they are in the organizational hierarchy.

Lam's team also simplified the way users request ad hoc reports. They created an uncluttered screen that steps users through four prompts: 1) users select the metric and organization using drop-down list boxes or a keyword search, 2) users type in a date range or use a calendar function, 3) users select the output format (i.e., Excel, HTML, or PDF), and 4) users click on the "submit" button (see Exhibit 12.2).

Optimize Each Application

As described in Chapter 1, a performance dashboard is three applications in one: a monitoring application that conveys critical information quickly, an analytical

EXHIBIT 12.2 SIMPLIFIED REQUEST SCREENS



Source: Courtesy of TELUS Corp.

application that allows users to navigate and analyze large volumes of information, and a management tool that improves communication among executives, managers, and staff. When designing dashboard screens, it is important to know which of these three applications you are working on. Each application uses a different visual paradigm and requires different functionality.

Here are some guidelines for designing the "look" (i.e., screens) and "feel" (i.e., functionality) for each application in a performance dashboard. This book has addressed many of these items already, but here is a condensed and consolidated version.

Monitoring Application

- **Keep it selective.** Display only critical metrics that users need to achieve their objectives. Do not overwhelm users with too many things to monitor at one time.
- **Keep score.** The metrics should visually express *performance state* (e.g., superior, good, or bad), *performance direction* (e.g., trending up, down, or steady), and/or *performance progress* (e.g., gap between performance and targets). Operational dashboards will also display actual data or text.
- **Keep it sparse.** Do not clutter the screen with unnecessary or overly fancy graphics. Graphics should convey only the relevant information with a minimum amount of ink.
- **Highlight exceptions.** Use colors or symbols only to express out-of-bounds conditions or performance states.
- **Alert users.** Proactively notify users of out-of-bounds conditions via the Web, e-mail, or other high-impact channels.
- **Customize it.** Dynamically generate screens that are generically geared to every individual's role and responsibilities.
- **Personalize it.** Allow users to personalize the customized screens by selecting the objects they want to view from a predefined list.
- **View properties with one click.** Let users click on a metric to view its properties, such as how it was derived, who owns it, when it was last updated, and so on.
- **View information with one click.** Let users click on a metric name or symbol to view the information underneath in table or chart format.
- **Provide "right-time" information.** Although this is more of an infrastructure issue, it is critical to a monitoring application. Design elements must be populated with "right-time" information so users can proactively manage and optimize processes.

Analysis Application

- **Make it interactive.** Make sure users can switch views and contexts, access reports, and drill from high to low levels of detail using simple point-and-click techniques.
- **Make it structured.** Do not allow users to get lost in the information or have to drill up and back down when switching dimensions or formats (i.e., table to chart). Create easy-to-use prompts and predefined drill paths that structure how users navigate the information.
- **Make it guided.** Guide novice users through the process of analyzing and acting on performance information or finding relevant reports using wizards, context-sensitive recommendations, or online help.
- **Make it detailed.** Provide seamless and dynamic access to transaction data stored in a data warehouse or operational system.
- **Support multiple channels of delivery.** Allow users to access the dashboard system via alternative interfaces, including e-mail, wireless devices, or desktop applications.
- **Support disconnected usage.** Allow users to disconnect from the network and take the dashboard system and data with them for further analysis.
- **Support advanced analytics.** Let users perform "what-if" analyses, create and test scenarios, build forecasts, or create simple statistical models in the system or via third-party applications (e.g., Excel, data mining tools, or advanced visualization techniques).

Management Application

- **Publish it broadly.** Provide open access to the results throughout the company, especially among peers so they can compare their performances.
- **Exchange it widely.** Exchange performance information with other groups that have other dashboard systems to improve coordination and cross-pollination of ideas.
- **Compare to plan.** Use targets and goals from the budget, strategic plan, forecasts, or benchmarks so workers can gauge their progress and improve the accuracy of their forecasts.
- **Attach commentary.** Allow users to attach comments to dashboard views and respond to those comments. These threaded discussions provide an audit trail of ideas, decisions, and actions, which is useful for regulatory purposes as well as for new managers who want to learn how to manage specific processes.
- **Make it collaborative.** Let users set up a workflow that sends published dashboard views to a list of users for review and approval.

- **Make it timely.** Update the information frequently enough so users can take action to fix problems or capitalize on opportunities before it is too late.
- **Build in recommendations.** Build in recommendations for actions users should take based on the context of the information in the dashboard system.

Hire or Train Visual Designers

To optimize the design of the performance dashboard, it is important to get somebody on the team who has visual design expertise. Although few teams can afford to hire someone full or part time, they may be able to hire a consultant to provide assistance. Ideally, the consultant can educate the team about basic design principles and provide feedback on initial designs. It is also helpful for someone on the team to read articles and books on the topic or take a course on visual design before starting the process.

Usability Labs

In the best of all worlds, your company has a usability lab that can observe workers using the dashboard system in a laboratory setting. These labs use cameras to record hand and eye movements and interviews to determine the intuitiveness of an application and where users most get hung up in the visual interface. Usability labs usually provide good suggestions to improve even the most sound designs.

"We used [our company's] usability lab twice. We went initially to get advice about how to design the interface and get the dashboard up and running. Then, we went a few months ago after our dashboard went live to have it tested with real users. Some of the advice we got involved making small cosmetic changes, for instance that we should move some icons around and clean up the layout. But other advice gave us a better understanding of how the system behaves from the perspective of business users and where they find it confusing. We learned that people had difficulty drilling down into our data using parameterized drop-down lists. So now we're trying to address these issues in subsequent upgrades," says an IT director at a financial services company.

Use Prototypes

Once you have gathered all the information requirements and defined the metrics and targets, you are ready to design the look and feel of the dashboard system. The best way to get the process going is to deliver users a strawman proposal based on solid design principles. Then, let users tweak the layout and design as required but do not let them overhaul your design completely (unless it is really poor!). Also, do not start with a blank screen or let users create the strawman on their own. They have fixed ways of viewing information, usually limited by what they've grown accustomed to seeing and doing over the years.

However, sometimes, there is no way around user biases. In one company, executives insisted that the opening scorecard screen look exactly like the paper scorecard they had created during the strategy mapping process. Although this made sense in many ways—the company had published posters of the initial scorecard and hung them in the hallways throughout the organization—it forced the team to create a custom solution, which both the business users and technical team did not want to do.

SPECIFIC GUIDELINES FOR CREATING THE VISUAL INTERFACE

The first section of this chapter provided general guidelines for approaching the design process. The following section provides specific recommendations on how to create an effective visual interface for the performance dashboard.

First Impressions

First impressions make a big difference, today more than ever. In our busy, fast-paced lives, if something does not catch our eye immediately and draw us inward, we ignore it and move to something else. For this reason, it is imperative to spend considerable time and effort designing the initial screen of a performance dashboard. This initial view conveys the breadth, depth, and usability of the entire performance dashboard. If it does not resonate with users or portray the right information, they may not use it, or only use it begrudgingly.

Painterly Touches

A good dashboard designer is like an expert painter who conveys an image or evokes an emotion with a single stroke of the brush. The art of visual design is working sparsely, making sure that every element and figure on the screen is there for a purpose. Visual designers are ruthless in stripping out colors, shapes, images, or decorations that distract users or do not convey vital information.

Although few of us have training as artists or visual designers, there are a number of things we can do to enhance the visual appeal and usability of the dashboard and scorecard screens we create. The following are guidelines and techniques for creating screens that jump out and grab users, not require them to squint at and study the screen to discern relevant facts.

Much of the advice in this section comes from Stephen Few, principal of Perceptual Edge, a consulting firm that specializes in information analysis and presentation, and a faculty member of The Data Warehousing Institute. Few has written an excellent book entitled *Show Me the Numbers* (Analytics Press, 2004) and several articles in *Intelligent Enterprise, DM Review,* and the *Business Intelligence Journal* that are worth reading. He is also currently working on a book

titled *Information Dashboard Design: Beyond Gauges, Meters, and Traffic Lights* scheduled for publication by the end of 2005. Few says he is a dedicated follower of Edward Tufte, whose 1983 book, *The Visual Display of Quantitative Information*, laid the conceptual foundation for how to display information clearly and cogently.

1. Display Information on a Single Screen

The first and toughest goal of a dashboard designer is to squeeze the information onto a single screen. Users should not have to scroll down or open another screen to view critical information. All relevant information should be instantaneously viewable.

> The fundamental challenge of dashboard design is to display all the required information on a single screen, clearly and without distraction, in a manner that can be assimilated quickly. If this objective is hard to meet in practice, it is because dashboards often require a dense display of information. You must pack a lot of information into a very limited space, and the entire display must fit on a single screen, without clutter. This is a tall order that requires a specific set of design principles.[1]

2. Minimize the Number of Metrics and Objects on the Screen

To put all vital performance information on a single screen, the designer must have a clear understanding of the information users need to monitor, its importance to them, and the order in which they want to see it. This helps designers determine the priority of information and its placement on the screen.

How Many Is Too Many?

Some experts say that dashboard screens should only have between three and seven metrics to have the greatest visual impact. However, few people want to restrict the number of metrics arbitrarily and risk excluding those that meet bona fide business requirements. To accommodate both principles, many designers nest lower priority metrics under higher priority ones.

Portal-Based Dashboards

Another way to prioritize metrics is to let users do it themselves using a dashboard's personalization capabilities. This lets users pick metrics that they want to see from a pre-approved list.

Some organizations also let users add other objects, such as documents, alerts, and Web links, turning the dashboard screen into a makeshift portal. Conversely, many organizations let users create personalized views of the corporate portal. One of the most popular elements to customize a corporate portal with is a KPI

chart. So, here the difference between dashboard and a portal begins to blur. In any case, a personalized dashboard motivates workers to visit the application more frequently because it contains information and objects they deem important. The downside is that users always add too many objects to the screen, creating clutter and minimizing its visual impact.

3. Keep Graphical Icons Sparse

Graphical Elements

The only way to pack a lot of information onto a single screen is to abbreviate or summarize it. This is usually done by representing metrics as graphical elements. This keeps designers from having to put actual data onto the dashboard screen, which takes up valuable real estate and crowds the view.

However, most organizations get carried away when using graphical elements, spurred on by vendors who populate their dashboard solutions with eye-popping graphics that do a good job of catching attention but a poor job of communicating pertinent information quickly. Part of the problem is that most vendors try to simulate an automobile dashboard on a computer screen instead of focusing on the fundamental principles governing the visual display of information.

"Caught up in the race to out-gizmo one another, few vendors have taken the time to gain more than a superficial understanding of effective dashboard design. Without this knowledge as a foundation, these dashboards are destined for the trash heap," says Few.

Few has very specific recommendations for using graphical elements, or graphs, for short. As a general rule of thumb, every designer should ask: "Do the graphs provide the clearest, most meaningful presentation of the data in the least amount of space?" He adds that graphs should:

- Fit any size space
- Be appropriate for the task
- Display measurement, context, and state

Gauges, Thermometers, and Stoplights

Few dislikes radial gauges because they waste a lot of space due to their circular shape. "You can't put a lot of radial gauges side by side," he says. In this regard, Few prefers thermometers, which are linear and fit in a compact space. However, he says that most thermometers are overly decorative. "They are generally designed to look so much like the real thing that space is wasted on meaningless realism."

Less is More

He objects to stoplights for much the same reason, saying there is no reason to display three lights when one will suffice. "Don't waste visual content with an entire stoplight, just show a single icon (for example, a circle) next to a metric," he says. Going one step further, Few recommends not showing a symbol or icon at all unless it is important to do so, such as when performance falls below target. Users subconsciously recognize that the absence of an object carries meaning, like "no news is good news." In this example, users understand that a metric without a circle next to it reflects acceptable performance and there is no need to examine the data or take further action.

4. Display Context in Abbreviated Form

The main purpose of dashboard graphics is to display performance in context so users can quickly ascertain what is going on.

There are three aspects to context: 1) the *performance state*, which indicates whether performance is good or bad according to predefined thresholds; 2) the *performance trend*, which indicates whether performance has improved, declined, or held steady during the prior period; and 3) the *performance variance*, which shows how performance compares with the target for that period (see Exhibit 12.3 for a dashboard screen that displays all three contexts).

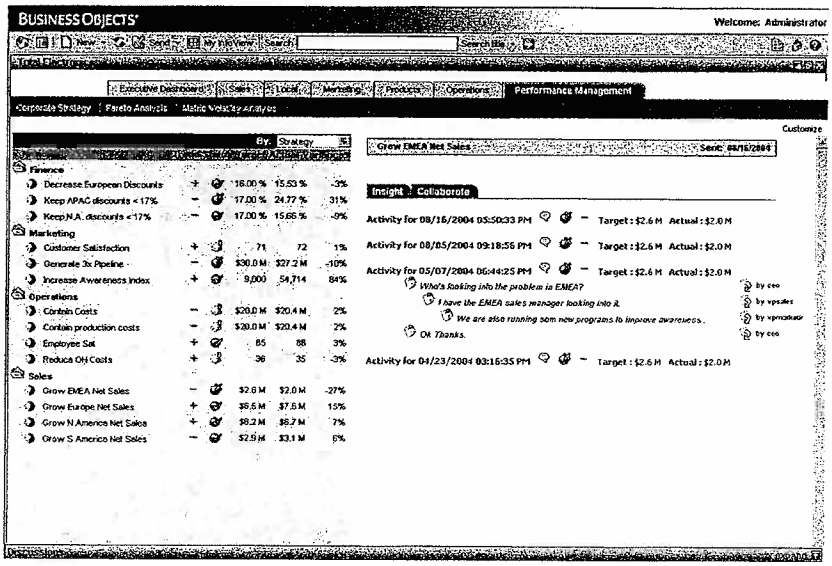
Performance State

The depiction of performance state is usually done by applying colors to a graph, symbol, or the metric itself (i.e., the text label). Performance states correspond to thresholds set by managers to identify ranges of performance. For example, a sales organization might have four performance states based on four ranges or thresholds of performance against a single target and associate colors or symbols with each state:

1. "Urgent" indicates that sales fell 10 percent or more below target (red)
2. "Caution indicates that sales were 10 percent or less below target (yellow)
3. "Normal" indicates that sales were up to 10 percent above target (green)
4. "Superior" indicates that sales were 10 percent or higher above target (blue)

An initial dashboard screen for an executive might display performance state by putting a color-coded circle next to the name of each metric, and that is it. A second-level screen might display performance state using color-coded numbers in a table or by showing a trend line in a chart whose background is painted according to threshold ranges.

EXHIBIT 12.3 DISPLAYING PERFORMANCE STATES



This Balanced Scorecard screen displays metric name, performance trends, status, target, actual, and variance from target from left to right in the left-hand column. The dashboard uses a colored symbol to indicate trend and both a colored circle and an icon to represent status to accommodate color-blind people. The right-hand panel embeds a threaded discussion on metrics where performance is below target.

Source: Courtesy of Business Objects S.A.

When using more than three performance states, it's wise to embed a key in the dashboard screen that translates the encoding. However, a key also forces users to work harder than they want. They have to study the screen to decipher its contents instead of being able to glance at it quickly and ascertain performance.

Performance Trend

A performance trend indicates the direction of performance data for a prior period. The trend indicates whether performance is moving up, down, or holding steady. Each "trend state" also needs to be calibrated with a threshold or rule that defines what is "up," "down," or "steady." The best way to show performance trends visually is with a symbol, such as an arrow or plus (+) and minus (–) signs.

An arrow supports a wide range of trends because it can be pointed in any direction. Plus and minus signs support only two trends, up and down. However, the absence of a plus/minus sign could also indicate "steady."

Hewlett Packard TSG displays both performance state and trend on its scorecard. It encodes block arrows with four different colors (i.e., red, green, blue, and white) to indicate performance status and points them in three different directions (i.e., up, down, and sideways) to convey performance trends (see Exhibit 9.2 in Chapter 9). This use of color-coded arrows is effective because it shows both state and trend using one symbol. However, since this does not work for color-blind people, users can configure the system to display data values instead of arrows or display data values only when they hover their cursor over the arrows.

Performance Variance

Performance variance compares actual performance with a target and calculates a variance. The target and variance can be displayed textually as numbers in columns or graphically on a line chart using two lines (i.e., one for targets or thresholds and one for data values) or a bar chart by plotting a target line across the bars. Performance variance can also be displayed using a simple graph, such as a thermometer or bullet graph (see below.)

Many companies like to apply multiple targets to a single metric. For instance, an organization may want to compare this month's net sales against the annual budget and results from the same period last year. Few recommends applying no more than two targets per metric to avoid creating overly complex graphical elements.

5. Use Color Intensities not Hues

Color has four characteristics that are helpful to know when one is designing dashboards:

- **Hue.** The color, such as red, white, or blue.
- **Lightness.** The shade of the hue, ranging from light to dark.
- **Saturation.** The amount of hue applied to a given area, ranging from little (pale) to total saturation.
- **Intensity.** Refers to both lightness and saturation, because each can be manipulated to increase or decrease the perceived intensity of a hue.

Few believes it is more effective to use a single hue with multiple intensities rather than multiple hues to depict performance states. It does not matter which hue is used—red, black, or blue—as long as it does not change. One reason to

use different intensities instead of different hues or colors is to give the dashboard screen a consistent look and feel. Another reason is to increase the contrast between things that really need highlighting, such as an urgent, out-of-bounds condition, and those that do not. For example, an alert encoded as a red circle immediately catches a viewer's attention when the rest of the screen and graphs are cast in shades of gray.

A third reason to use intensities instead of hues is to accommodate color-blind workers, most of whom cannot differentiate between red and green. Ten percent of men and one percent of women are color blind to some degree, which makes using hues alone to depict performance states problematic. However, color-blind people can distinguish between intensities of the same hue. So one way to communicate state without adding an extra symbol is to use different intensities of the same hue. For instance, deep red can signify an urgent problem and dimmer red a less urgent one. Some dashboard designers add symbols or simple graphs to accommodate color-blind workers, but this is overkill and leads to cluttered screens.

6. Pay Attention to Position and Placement

The way designers position or sequence information on the screen reinforces its meaning. Position and placement become another way to communicate meaning and enhance the value of the dashboard.

Top Left to Bottom Right

According to Few, elements in the top left quadrant and the center get the most attention when set apart visually from what surrounds them. Next is the upper right and lower left quadrants, followed by the bottom right. Therefore, designers place elements that deserve more prominence in the upper left or in the center of a screen and leave plenty of white space around the objects. Designers also use arrows to step people from one section of the screen to another if there is a logical sequence or flow to the data. They also sometimes number elements to indicate a visual flow.

Groupings and Flows

It also helps to group like elements together on the screen to show that they are related. The same goes for items that need to be compared. Placing them too far apart makes the user's eyes work too hard to see and compare the items. When designers cannot place items together, they use hues, shapes, or fonts to show which elements are related to each other.

SAMPLE TECHNIQUES

Two Effective Graphical Elements

Few advocates two techniques that circumvent many of the problems with graphical elements today: sparklines and bullet graphs.

Sparklines

Sparklines are the brainchild of Edward Tufte and are ideally suited for performance dashboards because they give a basic sense of trends over time, skipping superfluous detail. Sparklines are designed for time-series data (i.e., measurements that occur in regular intervals over time), but they do not contain a quantitative scale. Sparklines are good when users require a quick, high-level perspective of historical performance in a highly condensed display.

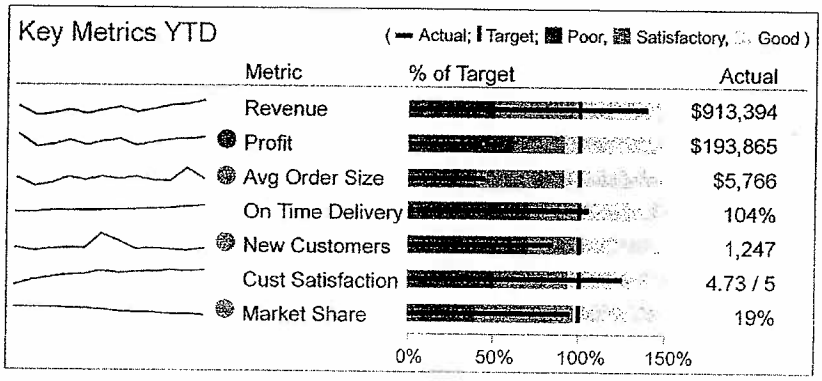
Bullet Graph

A bullet graph is a linear widget, invented by Few, that uses the following: a single bar or data point to show actual performance, color intensities to show performance levels or thresholds, and one or more short lines to show comparative measures, such as a target. Bullet graphs let users quickly evaluate performance in context (i.e., comparisons and thresholds). They also take up less space than most simple graphs (e.g., gauges, meters, and dials) and can shrink to fit into a compact space without losing their legibility. However, because they are new, users may need some training to interpret them and become comfortable using them.

Sample Dashboard

Exhibit 12.4 shows a portion of a dashboard created by Few that applies the visual design principles and display techniques described above. Few's compact dashboard contains seven metrics for maximum impact. Each metric has an associated sparkline, a bullet graph, and actual data. (The only thing missing is the actual date or time interval being measured, although monthly is implied.) The sparklines show performance trends for the past 12 months. The bullet graphs show actual performance compared with year-to-date targets and thresholds. A red circle (which is the darkest circle in the exhibit) appears next to the names of metrics in which performance is below the target for the period, but circles do not appear next to metrics that meet or exceed monthly goals. The intensity of a circle's hue indicates the degree to which the metric is below target. For example, the "profit" metric has a circle with the most intense hue because it is below the bottom threshold, as indicated on the bullet graph. The other circles

EXHIBIT 12.4 STEPHEN FEW'S SAMPLE DASHBOARD



are colored with a less intense hue because their metrics are only slightly below target.

Few also sequences these elements from left to right in a way that tells a story. Users can view 12-month trends, followed by an alert, which prompts them to read the bullet graph to compare performance with targets and actual data. I would have preferred to see the metric names on the far left side, kind of as a row header, but Few placed the metric names between the sparkline and performance bar to simplify the screen. Because the metric names sit in the middle of these two graphical elements, there is no need to add a separate label for each element, which reduces clutter. It also removes the temptation to add row or column lines between the graphical elements as a visual divider, another design faux pas.

Although it may take a few minutes to become oriented to Few's dashboard, the value is obvious. It conveys much more information in a compact space than most dashboards. In a glance, users can view 12-month performance trends for each metric, month-end data values, and comparisons with targets and thresholds. Few's alerts jump out at users because they are colored with a different hue (red) than the rest of the elements, which are shades of gray. (Note: since the book is printed in black and white, these different hues are not distinguishable in Exhibit 12.4.) Also, the alerts (i.e., an abbreviated stoplight) only appear when an out-of-bounds condition exists. Less is more.

Although you may not be inclined to use the widgets or style in Few's dashboard, it clearly demonstrates basic principles of visual design and offers alternative ways of displaying information that most people have not considered.

NAVIGATION TECHNIQUES

Drill Paths

From the scorecard screen, which represents information graphically, users should be able to drill down effortlessly to see actual data. Unfortunately, software vendors have yet to devise a standard way to perform drill-downs, and many techniques employed today are not intuitive.

One-Click Drills

The ideal way for users to drill down is by left clicking on the metric name, indicator, or alert or whatever on the screen demands their attention. They click once and the information appears in the form of a table or chart that plots performance over time.

Unfortunately, few performance dashboards make it this easy. Some require users to right click, which is an awkward movement for many users. This causes a dialogue box to pop up that usually contains too many options and drill paths for users to absorb or remember. Other performance dashboards require users to click on one or more drop-down list boxes to specify the parameters of their drill and then click a "go" button. Although power users like having multiple drill paths and parameters, casual users do not.

Customizing Drill Paths

Rather than provide users with unlimited navigation, it is wise to discover all the possible drill paths users need in advance and bake them into the system. The technical team can then select the drill paths that each department or role requires and associate them with individual users' security profiles. This way users only see the drill paths that they need and aren't overwhelmed with too many options. Administrators can always expand the number of drill paths it makes available to departments or individuals, even providing unlimited navigation. This approach eases users into the system, delivering new functionality and navigational paths only when they are ready to use them.

Getting Lost

Another problem with dashboard navigation is that users often drill to a certain point and forget where they are. For instance, I watched one user drill down on a series of charts, but when he wanted to switch to a table view he had to drill back up the hierarchy and drill back down in the table view mode. (Actually, he could have switched formats in one click but did not know how; it was not

intuitive.) This also happens when users switch subject areas or departments, say from viewing customer profitability by region to viewing product sales by channel. It also occurs when users drill through to data stored in another system, such as a data warehouse or transaction system and land in a separate window with different navigational techniques (if any at all) without a clear way to get back to their starting point.

To avoid having users get lost in the system, designers should dynamically map a user's navigational path through the information so they always know where they are, where they have been, and how to get back. These maps can be similar to computer pathnames or spider webs, for instance. Users should be able to click on any part of the map to return to a previous view.

Think Like a 12-Year-Old

To deliver high-quality performance dashboard interface, designers should think like a 12-year-old (or younger perhaps). Designers who spend every working hour building an application forget how alien the system is to someone using it for the first time. Designers need to build the system not for someone like themselves, but for a 12-year-old son or daughter who uses computers but not regularly or intensely (except perhaps to play computer games!). Ultimately, the key is to prevent users from getting "lost" in the data and overwhelmed by system functionality.

SUMMARY

Dashboard design is like putting icing on a cake. It is the fun part of building a performance dashboard. It is how you really connect to users. However, the design—no matter how well executed and visually attractive—is worthless if the team has not first done the hard work of creating effective metrics and targets and populating them with clean, valid data. The most important principle to remember when designing dashboard screens is "Get the data right first!"

With a solid foundation, dashboard designers can then begin the process of creating layouts and screens. The most common mistake is to make things too complex. K.I.S.S., or "Keep It Simple, Stupid!," should be the motto of every dashboard designer. Although many vendors sell glitzy dashboard displays that tantalize users with fancy graphics, most users prefer less glitz and more content once they begin using the system. Operational dashboard users take this a step further: they usually prefer text or numbers rather than graphics, which they find get in the way.

A good dashboard design conveys a lot of information with as few elements as possible. Users should be able to glance at the dashboard to view the infor-

mation they need to achieve their objectives. If they have to scroll down or switch screens to assess their progress, they get frustrated. The screen should display a minimal number of elements in a compact way. This means representing metrics and context using simple graphs, hues, intensities, symbols, and charts. These graphical elements should be streamlined, not decorative, so they convey vital information quickly. They should also be placed on the screen or grouped together in a way that conveys meaning.

Colors or hues should be used sparingly, only to highlight out-of-bounds conditions. Graphical elements should use different intensities to display performance states, different symbols (e.g., arrows, icons) to convey performance trends, and different graphs to display performance variances.

Finally, the dashboard screen should provide intuitive navigation that lets users click once to drill down on graphical elements to view actual data. Drill paths should be structured so users cannot easily get lost in the information. The dashboard should dynamically map the user's path through the data so they always know where they are, where they have been, and how to get back.

NOTE

1. Stephen Few, "Dashboard Design: Beyond Meters, Gauges, and Traffic Lights" (*Business Intelligence Journal, 2005*).

CHAPTER 13

How to Link and Integrate Performance Dashboards

APPROACHES TO INTEGRATION

A common question that people ask about performance dashboards is how to integrate and link them. The question usually has one of two sources. Either they have read about the Balanced Scorecard methodology and want to know how to "cascade" scorecards throughout the organization, or they want to integrate two or more existing performance dashboards that were designed and developed independently.

In either case, the task is the same: align multiple performance management systems so everyone is working off a consistent set of information. When this happens, an organization starts to use information strategically. It can roll up or aggregate performance results from lower levels of the organization to higher levels and give executives an accurate and comprehensive understanding of overall organizational performance at any given moment. It also lets managers and staff compare their performance to internal peer groups, increasing motivation and performance.

Centralized versus Federated

Organizations can align and link performance dashboards using either a centralized or a federated approach. The centralized approach creates a single performance management system that spawns multiple, dependent dashboards and scorecards. The federated approach, on the other hand, dynamically integrates existing performance dashboards that run on different BI platforms and are administered by different technical teams.

The centralized approach works best in companies with centralized or hierarchical cultures in which a CEO or business unit head can get everyone to standardize on a common set of metrics and BI platform. In contrast, the federated approach works best in companies with more decentralized cultures where business units, departments, and workgroups enjoy considerable autonomy and frequently build their own IT systems. In reality, most companies neither have an entirely centralized or decentralized organizational structure, but something in between. As a result, the majority of organizations use a blend of both centralized and federated approaches to deliver a consistent set of performance management metrics.

CENTRALIZED APPROACH

The centralized approach builds integration into the design and project plan so all performance applications, whenever and wherever deployed, run on a common business and technical foundation, sharing common metrics, data, and functionality, and work together harmoniously.

In a centralized approach, performance dashboards are not physically distinct systems or applications; they are simply customized views of performance information generated by a single performance management system. The system dynamically generates custom views of metrics and information based on each user's role or security profile. The centralized approach makes it easy for technical teams to rapidly create multiple, customized performance dashboards for every individual and group in the organization.

Top-Down Deployment

The best way to deploy performance dashboards using a centralized approach is to work from the top down, starting at the executive level and then working down the organizational hierarchy in a systematic fashion.

Cascade Development

The first performance dashboard—or executive dashboard or scorecard—translates the organization's strategy into key performance indicators (KPIs) that measure performance at an enterprise level. The corporate view then serves as a template for all subsequent performance dashboards. Each business unit or group reuses KPIs from the corporate scorecard or creates new ones that directly influence executive-level objectives and metrics or that measure unique processes at the business unit or group level. Once the business unit scorecards are completed, the process repeats itself at the regional or district level, and so on down to the lowest level in the organization, which could be an office, a workgroup, or an individual.

Asking each business unit to figure out how to influence metrics in higher level performance dashboards unleashes considerable creativity. Paul Niven, in *Balanced Scorecard Step by Step*, writes: "One of the benefits of the cascading process is watching creativity bloom. . .as groups begin to contemplate how they might contribute to an organizational goal once considered well outside their sphere of influence."

Program Offices

The key to the top-down approach is to make sure each group adheres to the standard definitions and rules for metrics contained in the executive dashboard or scorecard and faithfully aligns their versions to the ones directly above them in the organizational hierarchy. This usually requires the organization to create a program office that oversees and coordinates development activities. The program office, which serves as an intermediary between the business and project teams, ensures that all development efforts adhere to standards for defining and linking metrics as well as predefined technical specifications.

Serial versus Parallel Development

Ideally, every performance dashboard is built on the same infrastructure and guided by the same project team, which ensures that every group adheres to corporate standards and processes for defining objectives and metrics. This ensures consistency, saves money, and reduces risk. The project team creates each performance dashboard in a serial fashion, one after the other and one level at a time.

However, the downside of a serial approach is that it can take considerable time to roll out performance dashboards to every group in the organization. Executives can accelerate the process by funding parallel development teams or allowing each business unit or group to create its own version of the performance dashboard on the same infrastructure. However, the organization needs to ensure that the program office has significant clout and resources to enforce standards among various development groups and ensure the consistent usage of metrics and information among all performance dashboards.

Bottom-Up Deployment

The opposite of top-down deployment is bottom-up deployment, whereby an initiative does not start in the executive office but in a business unit, region, or other group and spreads upward and outward from there. For example, a regional group at Hewlett Packard TSG initiated a strategic dashboard project to serve its own needs, but it was so successful that it quickly spread to every region and unit in the group (see Chapter 9). The problem with the bottom-up approach is that

other business units and groups are usually developing similar systems. Invariably, these groups use different metrics, sources, staffs, and methods, making their systems incompatible.

A large number of operational and tactical dashboards start in a business unit or department and use a bottom-up approach to expand outward to the enterprise. In contrast, many strategic dashboards—because they align and focus the organization on strategic objectives—use a top-down approach.

Technical Requirements of a Centralized Approach

The centralized approach—whether working top down or bottom up—requires the technical team to create and manage all dashboards and scorecards on a standard BI platform. This approach offers greater flexibility at lower cost than developing individual performance dashboards from scratch. Technical teams quickly create new "views" (i.e., dashboards or scorecards) for individuals or groups without having to build a system or application or buy new servers and software. When users log on, the system checks their credentials and dynamically displays a unique dashboard or scorecard view. In this way, a single performance dashboard can support dozens or hundreds of distinct applications, which most users refer to as their "dashboard" or "scorecard."

The centralized approach also makes it easier for companies to maintain the consistency and uniformity of metric definitions and rules because they are stored and maintained in one place by one team. (Companies call a repository of metric definitions a "data dictionary," a "data library," or a "data glossary." Technical teams call it a "metadata repository.") Another benefit of the centralized approach is that organizations can support other analytical applications on the BI infrastructure other than performance dashboards. For instance, Quicken Loans built its BI architecture primarily to drive its operational dashboards but now uses it to support other analytical applications as well.

Systems Standards

A development team needs to define architectural standards for the performance management system. For instance, it needs to specify what technologies and products it will use for its Web servers, application servers, storage systems, databases, online analytical processing tools, programming languages, and reporting tools.

Although business managers often object to adhering to architectural standards because they can slow down or sidetrack a thriving project, standards ensure the long-term sustainability of a project. Standards ultimately reduce development, maintenance, and training costs for both business and technical staff and speed delivery of applications and solutions. The business and technical teams need to work together to optimize the business value of information technology,

which often means making tradeoffs between adhering to technical standards and delivering immediate business value (see Chapter 14 for how to align business and technical requirements).

Application Standards

The team also needs to establish development standards to ensure reliable delivery, accurate data, and consistent application performance. Development teams that establish conventions for displaying, manipulating, and navigating data can work more efficiently and rapidly. They can reuse components, such as layouts, grids, graphs, and charts, instead of creating them from scratch each time. They can also optimize these components to deliver fast response times when users navigate the performance dashboard, submit queries, or download reports.

Unfortunately, many development teams are whipsawed by user demands and are unable to establish technical standards that would enable them to serve customer needs better in the long run. Instead, they spend significant time recreating the same components over and over again to meet the preferences of different groups whose needs are actually more similar than different.

For instance, a technical team in a telecommunications company that is developing a corporate scorecard complains that each department wants the same information displayed in different ways: the marketing department wants charts with a green background and special graphics; the engineering department wants the chart to display a map of the United States; and the finance group wants charts with two "y" axes that displays multiple metrics simultaneously. Each request requires the technical team to build or buy a new charting component. Even off-the-shelf components still take them considerable time to configure and test.

The senior IT manager of the technical team says, "The program office needs to go to the business and say, 'You must use these formats,' but they are reluctant to do so because they fear that business users will create their own charts and reports and not use the corporate scorecard."

The example above illustrates the pitfalls of developing performance dashboards that span multiple business units and departments. Project teams that build performance dashboards for a single business unit or department tend to avoid many of these issues. They can adhere to standards because there is greater homogeneity in the way people want to view and manipulate applications and data in the group.

Data Standards

Besides standardizing application components, the technical team needs to standardize data. This is accomplished in three ways: 1) by creating a data model that drives the performance dashboard; 2) by sourcing the appropriate data operational systems, file systems, and other places, both inside and outside the organi-

zation; and 3) by cleaning and validating data to ensure it meets user expectations for quality and accuracy.

Data Models. Every application, including a performance dashboard, needs a data model. A data model represents a business process within the structure of a database. It is the brains of the application. Without it, the application cannot work.

Logically, the data model defines "things" (e.g., employee, position, manager, and so on), attributes of those things (e.g., employee can be full-time, part-time, current, former, and so on), and relationships among things (e.g., an employee is hired by a manager). Physically, the model stores all this information in tables and columns within a relational database (or in other types of structures in specialized databases). Once deployed, the database captures events and adds rows to various tables (e.g., John Doe was hired as a part-time receptionist on January 17 by manager Jane Ray). Metrics apply calculations to the rows and columns and generate scores or values, also usually stored in tables.

Technical teams spend considerable time interviewing business users before creating data models. Their goal is to create models that accurately reflect the way the business works and deliver fast application performance when mapped into a database. The bigger the scope of the project and the more complex the processes, the longer it takes to create effective data models.

One advantage of commercial performance dashboard solutions is that they contain a generic data model that is tailored to managing performance in a large organization. Most vendors cull the experiences of numerous customers when creating generic data models and analytic applications. While the models usually need to be tweaked for individual companies, they can accelerate project development compared to starting from scratch.

"We purchased a [vendor product] for its data model, which jumpstarted the project for us. It helped us understand how to roll this stuff out. The vendor product now represents only 20 percent of our entire solution but it was worth having something to start from," says a senior manager of IT at a wireless telecommunications firm.

Data Sourcing. IT managers responsible for populating metrics with data must identify the most reliable sources for that data. This is not always straightforward. There may be 20 places to get customer data. Which is the right source given what the metric is designed to measure? Which sources contain valid, reliable data?

The technical team may decide to pull several fields from one source and a few from another source to populate the dashboard data model. This analysis and triage "takes weeks and months to work out with the business units," says one IT manager, "but now we have high-quality detailed data that people trust." The key is to recruit business analysts who combine a strong knowledge of the business with an acute understanding of the underlying data and systems. These individuals can make or break the data sourcing process.

Data Quality

Data Defects

The third aspect of standardizing data is the hardest: delivering high-quality data to a performance dashboard. Operational systems are often riddled with data errors—missing data, invalid values, incorrect data types and formats, invalid dependencies—that do not show up until a performance dashboard team tries to integrate data among multiple systems.

"Our [performance] dashboard constantly highlights issues with the quality of data coming from source systems," says one IT manager who asked not to be named. "We're at the end of the line and often have to deal with the garbage that others send down the pipe. We point out problems to source system administrators and ask the business owners to pressure the administrators to fix the problems, but that's all we can do. There is an institutionalized lack of rigor around maintaining high-quality information in source systems. They keep band-aiding the system, but we need to get it right at the source the first time."

Fixing at the Source

The cost of fixing data errors increases the further down the line they are identified. The worst-case scenario is when a data error slips into an application and can be detected by end-users. When this happens, end-users stop trusting and using the system, leading to the application's demise.

Obviously, the best way to achieve high-quality data is to prevent errors from occurring in the first place. This usually requires source system owners to apply validation routines to check the accuracy of data entered into applications and to inform downstream application owners whenever they add or change a field in the source system. It may also require developers to rewrite outdated applications and managers to reengineer business processes so workers are rewarded for delivering high-quality data.

Most technical teams let "bad" data pass through into the performance dashboards and do not try to clean it up. The theory, which is sometimes debated, says that the business will not be motivated to fix bad data at the source unless they know that problems exist. Since bad quality data can cause users to reject a new performance management system, many project teams schedule a "beta" or trial period where users can experiment with the system and identify bugs before they officially declare it a production system. After that point, many teams rigorously analyze incoming data and don't allow users onto the system until a business owner declares that the data is valid and ok to use.

Business Ownership

To obtain high-quality data, the business must view data as a critical asset, as valuable as equipment, people, or cash. To preserve this asset, companies need to create

data stewardship teams that identify critical data elements and assign individuals responsibility for ensuring the integrity of each data element. These data "owners" are usually business analysts—individuals who understand the business and the data and can assess whether data values are in or out of range. Their expertise makes them uniquely qualified to identify data quality issues and develop data validation and cleansing programs.

Sometimes these analysts also have responsibility for checking the data in a performance dashboard after new data is added and officially validating its quality before users are allowed to access the system. For example, every day, a business analyst at a Boston-based financial services firm "certifies" that data in the company's financial dashboard is clean and accurate. The analyst runs tests on the data, and when everything looks okay, the analyst pushes a button that changes the dashboard's status from "preliminary" to "final" and adds to the bottom of each screen the time and date that it was officially certified.

FEDERATED APPROACH

The centralized approach works well when an organization builds a performance dashboard from scratch and rolls it out across the enterprise. Unfortunately, most organizations do not start with a clean slate. They may already have multiple performance dashboards, some of which overlap and compete for resources and endorsements from top executives. Given such an environment, project teams need to consider whether it makes sense to add another performance dashboard to the mix or leverage and extend what already exists.

The federated approach attempts to link existing performance dashboards into a seamless whole. This can be accomplished in a variety of ways. It can be as easy as transferring data from one performance dashboard to another or as challenging as standardizing metric definitions in multiple dashboards so they report performance consistently. A federated approach might also involve merging two performance dashboards or consolidating multiple dashboards into a single system. Sometimes organizations pursue multiple tactics at the same time.

Inventory

To bring order to the chaos, project teams should first create an inventory of performance dashboards that already exist in the organization. The inventory should document a number of characteristics, such as performance dashboard type (i.e., operational, tactical, or strategic), business domain, sample metrics, active users, platform used, and business owner, among other things (see Exhibit 13.1).

Project leaders can use this information to determine whether it makes sense to create a new performance dashboard from scratch or piggyback on top of an

EXHIBIT 13.1 SAMPLE INVENTORY

	Dashboard A	Dashboard B
Business Domain	Finance	Sales
Business Owner	John Doe	Jane Ray
Dashboard Type	Tactical	Operational
Usage Metrics	120 active users; 140 queries a day	200 active users; 400 queries a day
Platform/Tools	Excel, Essbase	Custom .NET
Data Sources	Mainframe, Excel	Sales tracking, pipeline
Updates	Monthly	Daily
Primary Metrics	AP/AR, DSOs	Orders, forecasts
Comments	Most data exist in the data warehouse	Heavily used custom application with active sponsor
Evaluation	Good candidate for consolidation	Keep as is

The first place to start in a federated environment is to identify existing performance management systems and collect information about their key characteristics, such as business owner, metrics, platforms, and so on. This side-by-side inventory helps executives triage existing systems, deciding which should stay, which should be merged or consolidated, and which should be eliminated.

existing one. The project leader can also use the inventory as evidence to convince a top executive that the organization has a burgeoning information management problem. The inventory can then serve as a guide to help an executive determine which performance dashboards should remain and which should be eliminated or merged and consolidated into others.

Horizontal Integration

There are two ways to integrate existing performance dashboards: horizontally and vertically. Horizontal integration is when two or more performance dashboards exchange information, creating a peer relationship among them.

Data Exchange

Horizontal integration works best when there are no inconsistencies or overlap among the metrics and data in the performance dashboards. Here, business

groups simply agree to exchange performance data. For instance, the finance group might want its scorecard to display charts from a human resources (HR) scorecard and an operations dashboard maintained by those departments. This is a relatively straightforward process; the only question is whether the exchange is done dynamically or in batch. For instance, the finance group could have the HR department send it data via e-mail or file transfer protocol (FTP). If it wants a more automated exchange, the two groups could connect their performance dashboards via a custom interface or a middleware backbone and send updates in real time.

If the HR department does not want to export its data, then the finance group might create a link from its dashboard to the HR dashboard, allowing finance users to log in and view the appropriate information in the HR dashboard (see Spotlight 13.1).

SPOTLIGHT 13.1 HUMAN RESOURCES DASHBOARD

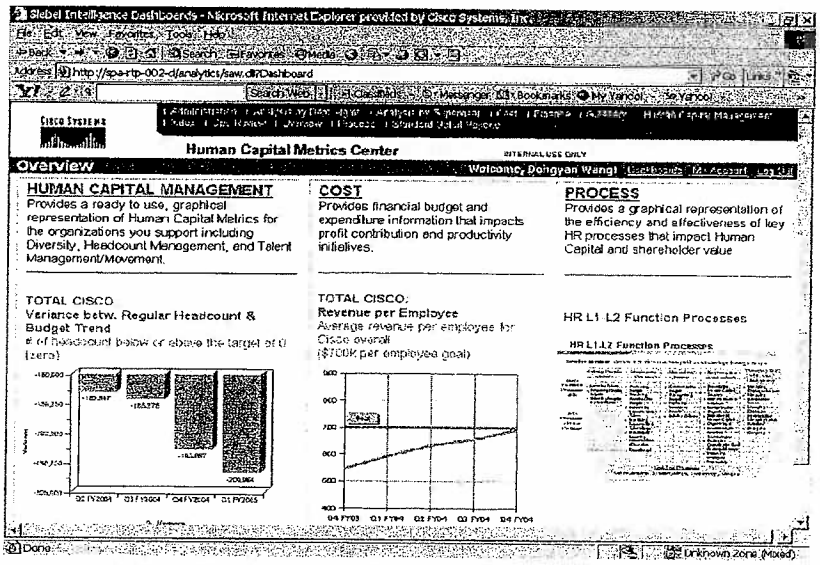
High-flying Cisco Systems, Inc., a maker of networking equipment and software that fueled the Internet boom, was the darling of high-tech investors. In 2000, Cisco Systems was affected by the downturn in the economy along with other high-tech companies. The surprise was not that the economy was slowing but the rate at which it fell. Reporting systems at the time were built around "stovepipe" applications and were incapable of providing visibility into rapid changes in the business.

Cisco Systems has taken a number of steps to improve the visibility of its sales pipeline and supply chain, including consolidating data into a corporate data warehouse and delivering tactical dashboards that make it easier and quicker for users to spot critical trends and issues that need to be addressed immediately. Users access data from an operational data store (ODS) that is updated every 15 minutes to deliver the most up-to-date bookings and inventory data. "Dashboards are the way people want to view reports and information. They provide an easy, intuitive way for workers to access relevant information for decision-making purposes," says Ryan Uda, program manager at Cisco Systems. "But dashboards are the icing on the cake compared to the task of getting accurate, timely data. At one point, Cisco had 30 plus systems managing bookings and backlog information; significant time and resources were committed to developing a single source of truth."

Since the downturn, Cisco Systems has delivered tactical dashboards to more than 2,000 users in sales, marketing, and HR departments (see Exhibit 13.2). The dashboards provide both historical data from the data warehouse or a data mart and "real-time" data culled directly from source systems or an operational data store. Collectively, the dashboards enabled the company to close down hundreds of operational reports and systems and increase worker productivity significantly.

"The data were always there, but locked away in databases most users couldn't access quickly or efficiently," says Uda.

EXHIBIT 13.2 CISCO SYSTEMS' HUMAN RESOURCE DASHBOARD



Cisco Systems uses a Web portal home page for its tactical dashboard that shows major categories of exploration and key high-level metrics divided into three columns. Users click on the text-based hyperlinks to see additional metrics for each area. (All numbers have been scrambled.)

Source: Courtesy of Cisco Systems, Inc.

Data Melding

Horizontal integration becomes challenging when performance dashboards track the same activity but calculate the metrics differently. For instance, an organization might have a metric called "total customer sales," but the marketing department calculates sales by tallying order commitments; the sales department by signed orders; and the finance department by payments received.

Most groups do not want to change the way they calculate metrics because the calculations represent the fundamental way they perceive the business. Unfortunately, this creates a problem when the CEO or CFO wants to know "total customer sales" for the entire company and can't get a valid answer. Just like the dueling spreadsheet phenomenon, the owners of each dashboard argue about whose data and metrics are right, leaving the CEO or CFO bewildered and frustrated.

Vertical Integration

Vertical alignment involves the integration of different types of performance dashboards into a virtual dashboard. Here, an organization with disparate operational, tactical, and strategic dashboards weaves them together so that users can navigate seamlessly from one to the other. This type of integration is tricky but not impossible.

For example, an operations group may have a strategic dashboard that tracks overall performance, a tactical dashboard for reporting and analysis, and an operational dashboard that monitors manufacturing processes. By integrating these dashboards, a user could view their performance in the scorecard view (i.e., strategic dashboard), then drill down into a report (i.e., tactical dashboard) and then view transaction details (i.e., operational dashboard) without knowing they are switching applications or systems.

To make this work, it is important that the three applications work off a common set of metrics. Then, developers need to create dynamic interfaces between each application so users can drill from one application to another without having to log in or reestablish their context. Typically, users can tell that they've moved from one application to the next because the data pops up in a new window and the screen and controls are different.

Another option is to use distributed query technology, or enterprise information integration (EII) tools to integrate data from different performance dashboards (see Chapter 3 for a description of EII). This approach creates a virtual view of data in other dashboards, queries them in response to user requests, and integrates the results on the fly and presents them to users. To improve performance in a distributed environment, administrators configure the systems to cache the results of commonly used queries and reports. Distributed queries work well when data volumes are small, data are relatively clean, and views do not require complex data joins or calculations.

CONSOLIDATION APPROACHES

Rather than trying to integrate disparate performance dashboards, sometimes it is best to consolidate them into a single system with consistent metrics and a common BI platform. Organizations have done this for years with independent data marts and data warehouses. Here are a few of the more common consolidation strategies.

1. Rehost

Organizations focused exclusively on reducing costs may simply opt to rehost existing performance dashboards onto a single operating platform. This "forklift"

option enables firms to eliminate multiple servers and the staffs required to maintain them. However, rehosting does not change the dashboards in any way and does nothing to integrate data or deliver a single version of the truth. Its data model, metrics, and reports stay the same.

Sometimes, organizations rehost to replace proprietary technology or when a vendor withdraws support for a product, such as a database management system. Others rehost as a first step in a broader consolidation strategy.

2. Create from Scratch

Any homebuilder will tell you it is easier to build a new home than renovate an existing one. The same concept holds true for performance dashboards. Organizations that have multiple, redundant performance dashboards often decide that the easiest and most cost-effective option is to start anew.

In most cases, the architects of the new environment borrow heavily from the existing performance dashboards, but they also re-interview users and gather new requirements to build the most comprehensive and up-to-date dashboard possible.

One problem when starting from scratch is trying to figure out what to do with the existing performance dashboards. In some cases, the decision is easy. If end-users are not actively using the dashboards because they are unhappy with the performance, functionality, timeliness, or relevance, then it is a no-brainer to pull the plug. If it would cost too much to swap out tools, then it is best to leave the performance dashboard. For instance, one company determined that it would cost $16 million to convert its existing BI tool licenses to those of another vendor and decided not to make a change.

However, if a performance dashboard has a powerful business sponsor who wants to keep the application or if it has an active user base, then sometimes the best option is to "grandfather" the application and wait until the group is ready to migrate to the new environment. Sometimes, a CIO can accelerate that decision by withdrawing IT support for the grandfathered application. This makes it more costly for the group to continue using a nonstandard system.

3. Designate and Evolve

The "designate and evolve" approach involves designating one of the existing performance dashboards as the "corporate standard." The company then consolidates all other dashboards into the designated environment.

This frequently occurs when a larger company acquires a smaller one. The performance dashboard of the larger company becomes the corporate standard and the newly acquired performance dashboard is folded into it. This approach also makes sense when a company makes a strategic commitment to implement products from a specific vendor, whose performance dashboard product then is designated as the corporate "standard."

4. Backfill

When local groups hold considerable power, a politically acceptable approach is to backfill a data warehouse behind the existing performance dashboards. Here, the data warehouse serves as a staging area for the data contained in downstream performance dashboards. It consolidates all extracts and data feeds from source systems and logically integrates these data via keys and shared dimensions. Although this approach does not reduce the number of performance dashboards, it does reduce the number of source system extract programs that feed the dashboards.

5. "Conformed" Dashboards

One way to consolidate performance dashboards without physically integrating them is to restructure the dimensions and metrics in each mart so they "conform" with each other. Rather than start from scratch, an organization redesigns the data models and metrics used in existing dashboards so that they conform. They also standardize source system extracts so all dashboards are populated with the same data. This has the added benefit of reducing costs and complexity by consolidating multiple, redundant data feeds.

This approach is not without its challenges. Redesigning data models and changing extract feeds can wreak havoc on dashboard screens and reports. The redesign process can get unwieldy if there are a half-dozen or more performance dashboards that need to be conformed.

6. Dashboard of Dashboards

If your organization is highly decentralized and only the corporate group requires consolidated information, one option is to create a performance dashboard that pulls from all the existing dashboards, creating, in effect, a dashboard of dashboards. One benefit of this approach is that it does not change the existing dashboards at all, which is attractive politically. It also does not take much effort or money, but it does require the groups managing the existing dashboards to coordinate closely with the managers of the new downstream dashboard since any changes they make in the fields or metrics will affect the new dashboard.

SUMMARY

Centralized Approach. The best way to link performance dashboards is to use a centralized approach that enables a single project team to automatically generate custom dashboards designed to meet the information requirements of each group or individual in the organization. The centralized approach, however, requires a standardized architecture that specifies hardware and software compo-

nents, programming conventions, a common data model, and a rigorous approach to ensuring high-quality data, among other things.

Top-Down Roll-Out. The best way to integrate performance dashboards using a centralized approach is to work from the top down. Here, the organization builds the corporate scorecard and uses it as a template to build lower-level scorecards. Each successive scorecard either reuses metrics from the previous scorecard or devises new ones to influence the higher-level metrics. This process enables organizations to "cascade" scorecards throughout the organization. To ensure consistency among cascaded scorecards, it is best if a single project team works with the business groups to build each scorecard on a common platform with consistent definitions of metrics.

Bottom-Up Roll-Out. In a bottom-up deployment, a business unit or department initiates a performance dashboard project. Through word of mouth, the project spreads throughout to the rest of the organization as various groups seek to reap the same benefits. Working bottom-up, however, can jeopardize data consistency if business units or departments create their own performance dashboards instead of building off an existing system.

Federated Approach. A federated approach tries to link existing, incompatible performance dashboards using a variety of techniques, including exchanging data via email or FTP or dynamically transferring files via middleware. Integrating non-overlapping performance dashboards is relatively straightforward, but integrating dashboards that define metrics differently and use different data models is challenging and sometimes more effort than it is worth.

Consolidation Techniques. Often, the simplest approach to integrating performance dashboards is simply to consolidate them into a single system. There is a range of consolidation techniques that mirror the way companies consolidate independent data marts and data warehouses. The most commonly used approach is "start from scratch," in which organizations build a new performance dashboard and either shut down or "grandfather" the legacy dashboards.

CHAPTER 14

How to Align Business and IT

PITCHED BATTLES

Tension Abounds

There has always been distrust between the business and the technical sides of an organization, but performance dashboard projects seem to heighten the tension to extreme levels. I have been in the technology industry for 17 years, and frankly, I've been shocked by the intensity of the distrust that I have witnessed between these two groups while researching this book.

Although there is much talk about the need to align business and information technology (IT) departments, little progress has been made. Part of the problem is systemic to IT departments and technical people, but another part involves the willingness of business executives and managers to engage with IT constructively on a long-term basis.

A performance dashboard project exacerbates the tension between business and IT because the two groups need to work closely together to deliver an effective solution. Unlike operational systems that are designed once and run for long periods of time without major modification, performance dashboards must continually adapt to the changing needs of the business. Consider this comment from a business manager who spearheads a performance dashboard project.

"We're supposed to submit a project plan that spells out what we are going to do every month and quarter and budget it out accordingly. But we can't operate that way. We know there will be a reorganization at least once a year, new processes, and potentially a major acquisition that forces the company to change strategy and move in a different direction. We have a project roadmap and cross check with the IT department, but we have to remain flexible to adapt to the business."

Battle over Control

In many cases, the pitched battle between the business and IT occurs because a business group has developed a performance dashboard outside of IT's purview but, due to its own success, can no longer keep up with demand. It needs IT's support and expertise to scale up the application and expand it to the rest of the company.

IT Ineptitude

The business is terrified about ceding control over the design, architecture, and budget of its pet project to a central IT group, which it views as slow, incompetent, and uncompromising. The business cites numerous examples of IT ineptitude to reinforce their notions that the IT department will suck the life blood out of the project and cause it to die a slow, inexorable death.

Here are a few comments from a business manager who used a small team of developers and rapid development techniques to build a performance dashboard in three months for an operations department.

"We need things today, not tomorrow, or else we go out of business. That's not how the IT world sees things; their business acumen is not the same and a sense of urgency is lacking. For instance, we asked IT for a data extract and they said it would take four months. We couldn't wait that long so we leveraged GUI-based technology ourselves and in one weekend created a temporary fix that worked well. But when IT finally delivered the extract, it had errors and required rework. After we launched the dashboard, it was so successful that it began consuming more disk space than they anticipated. Rather than working with us to come up with a satisfactory solution, they threatened to randomly delete our data unless we offloaded the data ourselves."

Spoiled Rotten

Of course, the IT group sees the business as a spoiled child who is too impatient and short-sighted to wait for IT to lay the necessary foundation to ensure the long-term success of their own system. IT is also bitter that the business expects them to deliver an ever-increasing number of "high-priority" projects in shorter and shorter time frames while dealing with reduced costs, shrinking staff, and the constant threat of outsourcing and offshoring. One IT director recently lamented, "We work hard to meet the needs of our business customers but they are constantly adding and changing requirements, and they do not have the discipline to adhere to their own priorities. This makes it difficult for us to plan and impossible to succeed. It's a no-win situation."

The result is a tense standoff in which each group fulfills the other's worst predictions of each other. If the business has the upper hand, it will maintain control of the technical aspects of the project, creating another non-integrated

system that will be costly to maintain in the long run. If IT gains control, it will halt development of new end-user functionality until it brings the infrastructure into conformance with its architectural standards and nothing of value will get accomplished.

So what can be done to slice through this Gordian knot? What will it take for both sides to enter into a relationship of mutual respect? Like a marriage on the rocks, business and IT need some serious counseling before they can work together effectively. Part of the counseling involves taking a number of baby steps that improve communication and overcome mutual distrust by helping each side better understand the other's challenges and dilemmas.

GENERAL COUNSELING

Counseling for IT

During the past ten years, IT has come to recognize that its job is not to deliver technology for technology's sake but to provide exquisite service to its customer—the business. Like an alcoholic who publicly admits the problem, this is a step in the right direction. However, this is only the first step. Verbal acknowledgment alone does not translate into remedial action.

To take the next step, IT must translate goodwill into action. The following questions can help an IT team determine whether it is paying lip service to meeting business needs or actually doing it. If the IT department can respond positively to most of the questions below, they are on the right path.

Does the IT team:

- Sit side by side with the business people it serves?
- Read the same trade magazines as its business counterparts?
- Attend the same conferences?
- Go to lunch regularly with business clients?
- Read the company's annual report?
- Read and understand the short- and long-term strategic plans for the company?
- Know the entire business process that drives the application it is developing or maintaining?
- Have an average ten years of experience in the company's industry?
- Have degrees in database administration and business administration?

What better way to align with the business than to eat, sleep, and breathe like a business person? Unfortunately, the IT department—by virtue of its being a separate organization within the company—often functions as a subculture that operates by its own rules. IT groups have their own jargon, incentives, reporting

structure, and career paths, which are different from those of the business that it serves.

In contrast, technical teams embedded in departments or lines of business often enjoy a much healthier relationship with their business counterparts than corporate IT. Why? Rather than existing in a technical subculture, these "embedded" IT staff members sit side by side with the business people and function as a single team, with the same goals, bosses, and incentives.

Counseling for Business

Although IT groups generally get the lion's share of the blame for misalignment between business and IT, it takes two to tango, as they say. The business shares equal blame for the frustration that it feels towards IT—perhaps more so, because it does not always recognize how its actions and behavior contribute to the problem.

The business needs to understand that it changes too fast for IT to keep up. It harbors a short-term bias toward action and rarely takes a long-term view toward building sustainable value. This is especially true in U.S. companies, whose Wild West heritage makes them notorious for acting first and asking questions later. The business needs to slow down sometimes and ask whether change is really needed or if they are reacting in knee-jerk fashion to the latest event or issue of the day.

Decentralized organizations magnify this behavior, parceling out authority to divisions and departments to make decisions faster and in the context of local markets. Although there are advantages to decentralization, there are considerable downsides that contribute to the perpetual misalignment of the business and IT on an enterprise basis. The scores of analytical and operational silos, including the hundreds and thousands of pernicious spreadmarts that hamstring corporate productivity, testify to the business' fixation with speed and decentralized decision making.

Finally, the business has the upper hand in its relationship with IT and it often rules in a high-handed and capricious manner. In many organizations, executives threaten to outsource or offshore IT when it does not deliver sufficient value, rejecting the possibility that their own actions and decisions may have crippled IT's ability to function effectively. The business often lacks a reasonable degree of restraint and self-discipline when it comes to IT projects. One IT manager I talked with recently said his company's annual technology planning process is a sham because the business cannot discipline itself to live within its limits.

"Prior to the beginning of every calendar year, the business prioritizes IT projects for the next 12 months. Out of 90 projects, they identify 60 of them as 'high priority' and we create a schedule to deliver them," says the beleaguered IT manager. "But even before January 1st arrives, the business adds 20 more 'high-

priority' projects to our list and adds another 20 projects before April. And then they tell us in March that we are already two months behind schedule!"

The IT manager said that he had negotiated a new project prioritization process with the business that required the business to operate in a "zero sum" environment. If they added projects after the budget was finalized, they needed to cut others. Although the IT manager was hopeful the new policy would succeed, he also half-jokingly commented that if he has to tell the business to abide by its new guidelines, he may stir up ill-will that might cost him his job.

ALIGNMENT TACTICS

Although it is not the sole source of the stalemate, the IT department needs to take the first step toward reconciliation. It needs to show that it wants to be an equal partner in the business, not an auxiliary that is more interested in technology than the bottom line. It can do this by becoming more responsive to business needs by improving the way it gathers business requirements, by adopting rapid development techniques, and by creating and selling a portfolio of analytical applications. To do these things, some organizations are creating an information management group that sits between the IT department and the business and is responsible for the timely delivery of information, reports, and analytics to users.

Business Requirements

According to Jill Dyche, partner at Baseline Consulting in Sherman Oaks, California, business requirements are the most "elegant bridge between IT and the business because each organization shares accountability for communicating and representing an understanding of what the business needs." However, many requirements-gathering sessions lead to less than stellar results. Part of the problem is that business users do not know what they want in a report or dashboard screen until they see it. Just asking what data users want to see invariably leads to the answer, "All of it," which helps neither side bridge the gulf.

Some organizations recruit business requirements analysts to interview users and translate their requirements into technical specifications for developers. Other organizations start with open-ended survey questions and then follow up with one-on-one interviews. Other techniques to gather requirements include joint-application design sessions, use case modeling, process modeling, and application storyboarding, among others.

Incremental Delivery

Once requirements are gathered, the technical team needs to step up and deliver value to the business much faster than it does today. Most IT managers under-

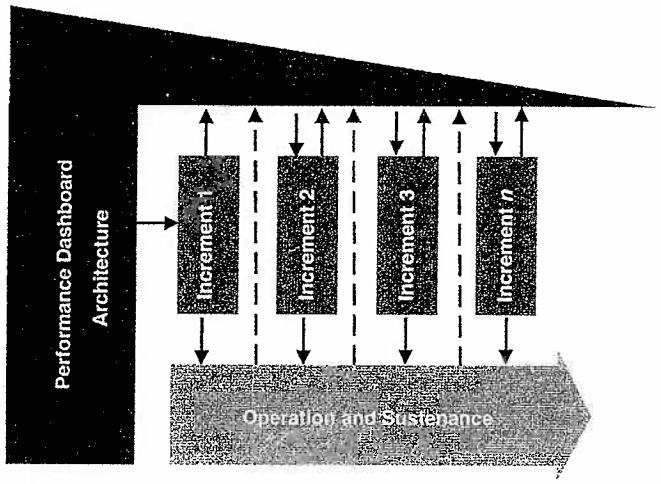
stand that the days of five-year multi-million dollar projects are over; they know they need to deliver projects much faster with fewer dollars and guaranteed return on investment. The business no longer trusts IT to deliver the goods.

Speed without Compromise

However, most IT managers have not yet figured out how to deliver value fast without compromising architectural standards that are in the best interests of the company in the long run. Fortunately, there are solutions, and many come from the business intelligence (BI) arena. Because of the adaptive nature of BI systems, project managers have learned how to develop the architecture and infrastructure incrementally as they go along (see Exhibit 14.1).

Any IT manager will tell you that the hard part of building applications is not what you see on the screen but what lies underneath. Behind each application is an architecture that guides developers as they build a system that meets business requirements. At the heart of the architecture is an enterprise data model that

EXHIBIT 14.1 INCREMENTAL DEVELOPMENT TECHNIQUES



An incremental development methodology enables companies to create an enterprise architecture and infrastructure incrementally instead of all at once at the beginning of a project. The team delivers new infrastructure components and applications in three-month increments. Each increment extends and modifies the architecture in an iterative fashion.

represents how the organization works and how data elements relate to each other. Instead of spending months or even years creating this architecture, BI project managers now create it as they go along, one subject area at a time, usually in three-month increments.

During this three-month period, the technical team does the following: 1) gathers requirements for the new subject area (i.e., customer profitability); 2) extends the data model to support the subject area; 3) identifies what data to use among operational systems and elsewhere; 4) analyzes and maps the data to the target model; 5) documents these mappings or transformations; 6) develops reports and application screens; 7) tests and debugs the application; 8) pilot tests the application with users; 9) launches the application; 10) trains users.

"We roll out our KBI portal in incremental releases, and we treat each release as a production application. It doesn't launch until users sign off on it and we've gone through all the design and testing. This makes sure you have the numbers right," says Jim Rappé, an IT manager at International Truck and Engine Corporation.

Not Good Enough?

However, three months is still too long for most business managers to wait for applications or enhancements. Many business users want instant turnaround. The good news is that technical teams can meet these requirements if the data exist in a usable form. "If users ask for a new metric and the data are already in the data warehouse or an OLAP cube, we can do it in a few days," says Rappé.

Virtual Dashboards

If the data isn't already in a data warehousing repository and users don't want to wait, then a technical team in certain situations can populate dashboard metrics by querying source systems directly using enterprise information integration (EII) tools. Many commercial dashboard products use this technique to deliver dashboards quickly. The set-up is fairly straightforward and primarily involves mapping data in source systems to dashboard metrics. While this approach works well in a pinch, it inherits the liabilities of EII tools and distributed query techniques. The connections can be brittle and slow and often don't scale well to support large volumes of data or users, although this is improving. In general, this approach is appropriate as a way to prototype a performance dashboard or supplement it with limited amounts of external or real-time data stored outside of a BI repository.

Analytic Development Environments

On the front-end, newer BI tools, including many performance dashboard products, enable developers and power users to deliver minor enhancements in a few

hours. Called analytical development environments (ADEs), these tools promise to accelerate development because they largely eliminate the need to write code. They are especially effective when deployed to a network of power users who can write reports on behalf of colleagues in their department. ADEs finally get the IT department out of the business of creating custom reports and applications for users (see Spotlight 14.1).

SPOTLIGHT 14.1 ANALYTICAL DEVELOPMENT ENVIRONMENTS: THE WAVE OF THE FUTURE

An analytical development environment (ADE) is a new generation of BI development tool that lets technically savvy business users create analytical applications rapidly, including performance dashboards. With an ADE, power users drag and drop visual components onto a graphical workbench where they can be connected and configured to create an analytical application without writing code.

ADEs, which are the technical complement to IDEs (integrated development environments), used to create transaction applications, promise to accelerate the development of performance dashboards and other analytical applications. Today, organizations spend way too much time customizing and extending BI tools and application packages to meet user requirements. On average, organizations customize about 33 percent of every packaged application and spend 7.5 months to deliver a final product—way too much time to meet fast-changing user needs.

The drag-and-drop nature of ADEs will shift development responsibilities away from IT staff and application developers. With an ADE, a power user can easily modify a packaged analytical application, flesh out a report definition, or create a new application or report from scratch once IT has established data connections and query objects. Thus, ADEs will once and for all get the IT staff out of the business of creating reports so they can focus on what they are best at: building robust data architectures and abstraction layers for end users.

Rapid Prototyping. ADE tools will also accelerate the trend toward rapid prototyping. Developers and power users can use an ADE tool in a joint application design session to get immediate feedback from users on data, application screens, metrics, and report designs. This iterative process results in better designed applications that are delivered more rapidly. Many vendors are shipping ADEs for specific applications to facilitate rapid prototyping. For example, many dashboard and scorecard solutions are ADEs.

Service-Oriented Architecture. The power behind ADEs comes from the fact that vendors have componentized the functionality of their BI tools. In the past, vendors hard-wired presentation, logic, and data functionality together. However, the advent of object-oriented programming and service-oriented architectures has enabled vendors to open up their products, componentizing functionality within a service-oriented architecture. The upshot is that ADEs enable developers to create multiple instances of components, store them centrally, and reuse them in other applications.

For more information on ADEs, you can download a 40-page report entitled "Development Techniques for Creating Analytic Applications" at www.tdwi.org.

A potential problem with ADEs is that whereas most accelerate development of the front end of the application, few address the back end. That is, most ADEs assume that the data are already loaded into a data warehouse or data mart or that the data are in good condition and can be accessed dynamically and integrated on the fly. Vendors that promise to build a dashboard in a day or week fall into this camp. Although they may have a slick-looking Web-based ADE, they assume that you have already done the hard work of cleaning up and integrating your data.

If the data do not exist for an analytical application, it usually takes technical teams three months at a minimum to source, clean, integrate, design, and test the data set and application before it can be rolled out. However, if the data exist, a developer or power user armed with an ADE should be able to create new views in several hours or days, depending on the complexity of the screens.

Portfolio Planning

One problem with the incremental development approach is that business users do not want their application delivered "piecemeal." They want it all at once or not at all. They do not see the usefulness of having a portion of the functionality they want or need and then waiting months or years for the rest. To curb the restless appetite of the business, it is helpful to unveil the bigger picture of where the project is going and how it will get there. You can do this by developing a BI portfolio that shows how IT can deliver a series of related applications built on a common infrastructure over a period of time, such as 18 to 24 months.

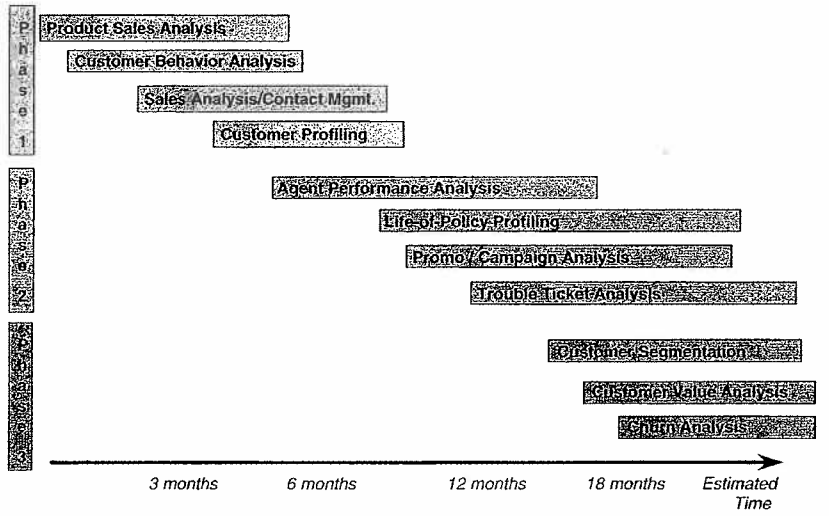
Jill Dyche, partner at Baseline Consulting in Sherman Oaks, California, created the chart shown in Exhibit 14.2 to help business executives understand the iterative process of building analytical applications and how they can accelerate the process if they want to pay the cost of creating parallel development teams.

The chart shows executives that they can get everything they want by building on a common infrastructure instead of adopting the "go-it-alone" approach. If they want their applications faster, they can pay for parallel development teams. This shields IT from accusations that it works too slowly, leaving decisions about speed and cost to the business.

Exhibit 14.3 shows the infrastructure that supports the portfolio of applications in Exhibit 14.2. The data model, which consists of multiple subject areas populated with data from multiple operational systems, is developed one subject area at a time. Each subject area, once added, multiplies the number of new applications that the environment supports.

In other words, there is not a one-to-one correlation between applications and subject areas. In fact, the value of the infrastructure expands exponentially as more subject areas are added. Each new subject area enables the organization to build many new applications on top of the integrated data. A data warehouse

EXHIBIT 14.2 BI DELIVERY PORTFOLIO



A BI portfolio makes it easier for executives to see that their needs will be met over the long term by building on a standard infrastructure. They can accelerate development using parallel teams but they will have to pay extra in the short run.

Source: Copyright © 2005, Baseline Consulting. Reprinted with permission.

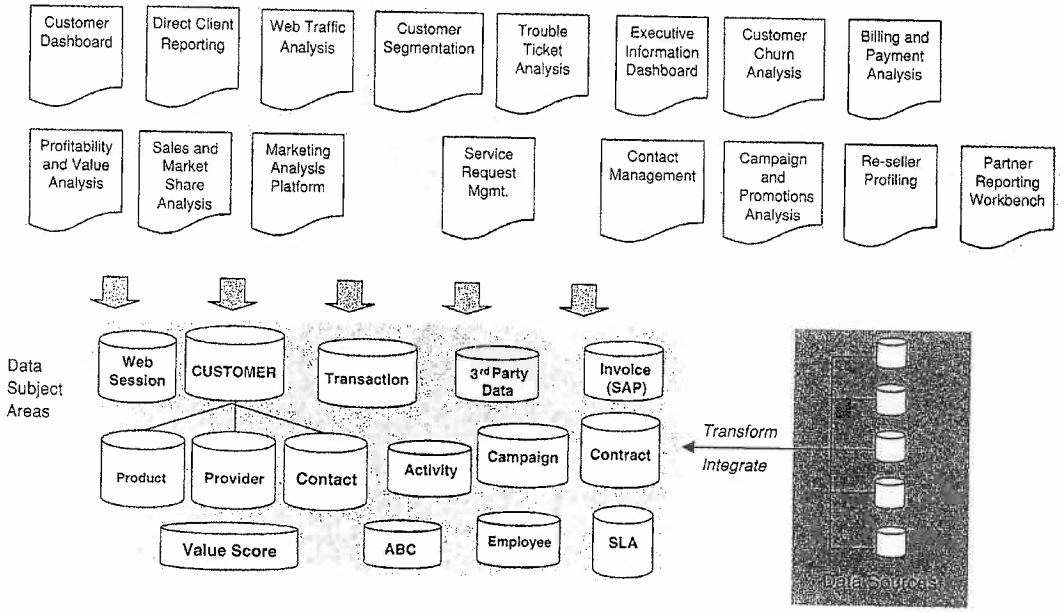
with dozens of integrated subject areas can support an almost limitless number of applications, providing substantial business value. Once the data are stored in the data warehouse, applications can be delivered rapidly, in days or weeks (see Exhibit 14.4).

Debate over Standardization

One of the biggest stumbling blocks between the business and IT is the IT group's insistence on adhering to technical standards, which then become more important than delivering value to the business. As we discussed in Chapter 12, standardization enables the IT group to respond more quickly to user needs because the group can reuse skills, code, and products rather than start from scratch each time. However, IT's nearly zealous adherence to standards drives business people crazy.

"The head of information systems and architecture wants to restructure existing applications to run on a single set of ETL [extraction, transformation, and

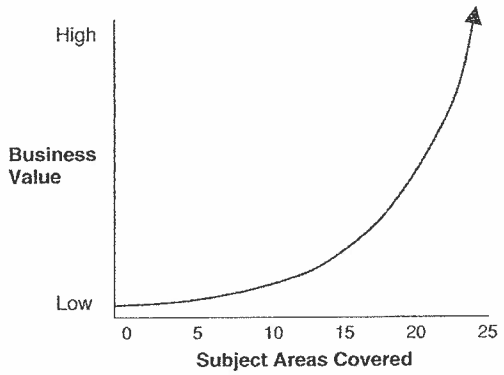
EXHIBIT 14.3 INFRASTRUCTURE FOR A BI PORTFOLIO



With a BI infrastructure, there is no longer a 1:1 ratio between applications and data structures. Each new subject area, which is populated with data from various data sources, multiplies the number of new applications that BI infrastructure can support.

Source: Copyright © 2005, Baseline Consulting. Reprinted with permission.

EXHIBIT 14.4 A BI INFRASTRUCTURE DELIVERS EXPONENTIAL VALUE



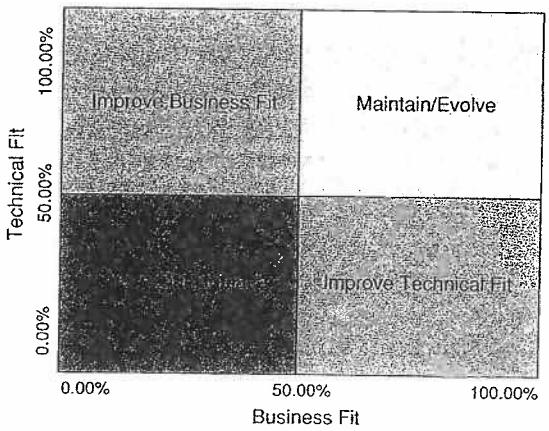
The value of a BI infrastructure increases exponentially as more subject areas are added. Each new subject area enables the organization to build many new applications on top of the integrated data.

loading] and BI tools. But one size doesn't fit all and what's it going to cost to harmonize everything into the new architecture? We spent a half million dollars on our scorecard—it's served hundreds of people for two years and it's stable—but it will cost $2 to $3 million to rebuild the application using the new standards. Meanwhile new work is backed up in the queue so where's the business value?" says one performance manager.

I recently attended a presentation by an IT manager at a health insurance company who had developed a strategic plan to foster a more collaborative partnership between corporate IT and the business. One of the more innovative elements in the plan was a way to create a standard application architecture that had buy-in from both the business and IT. The process of creating the standard architecture required both business and IT to evaluate current and proposed business applications, including performance dashboards. The plan calls for the business to evaluate the "business fit" of the applications and the IT department to evaluate the "architectural fit." The results of the evaluations are depicted on a quadrant chart that plots business fit on the y-axis and architectural fit on the x-axis (see Exhibit 14.5).

Applications in the lower left quadrant are candidates for elimination or consolidation—they are the low-hanging fruit that can help drive momentum behind the new architecture and standards. Applications in the upper right-hand quadrant represent an optimal fit from both a business and technical perspective and should be preserved.

EXHIBIT 14.5 APPLICATION SCORECARD FRAMEWORK



The quadrant chart above can be used to evaluate existing or potential applications in a company's portfolio. It is an excellent tool to help business and IT begin to communicate their needs and requirements in a more proactive, positive manner.

Applications in the remaining two quadrants—lower right and upper left—need modification before they meet both business and IT requirements. Business and IT leaders need to sit down and develop a strategy to bring each into compliance. The process of evaluating applications in this manner is one way for the business and IT to communicate their requirements to each other and overcome the mutual distrust that has darkened relations for years.

Structural Reorganization

Business Requirements Analysts

Another way to minimize the inherent conflict between business and IT is to use an intermediary to communicate between them. For example, many companies hire business requirements analysts to interview users and translate their requirements into technical specifications for developers.

However, these types of intermediaries have had mixed success. A business sponsor at a large insurance company said his firm hired specialists to "bridge the chasm" between the worlds of business and IT. "The results have been poor," he said. An IT manager was even more vocal: "Business requirements analysts are a big mistake because users never really know what they want when you ask them.

You need to show them something, and work iteratively, because your interpretation is never exactly what they had in mind. Plus, they'll come up with new things as they see the application."

Departmental IT

Other companies have experimented with embedding IT into departments and business units. We have seen that this can generate some extraordinarily successful applications, including some profiled in this book. However, this approach creates integration problems down the road. The business sponsor at the insurance company quoted above also tried this approach but said, "That method worked OK when we were constructing technology 'silos' that weren't integrated, but now integration is our chairman's top priority."

Steering Committees

Most companies use steering committees to align business and IT and provide guidance and governance for enterprise IT initiatives, including performance dashboards. Most companies have both a steering committee and a working committee.

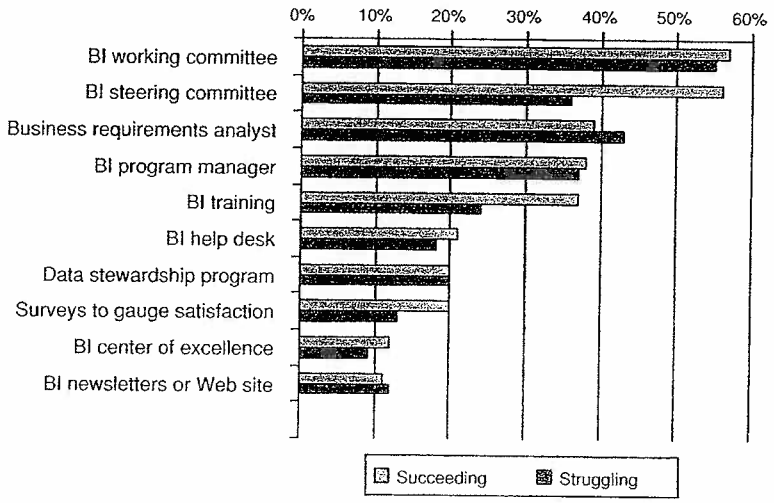
The steering committee is comprised of high-level business representatives from various departments; it sets strategy, prioritizes projects, and allocates funds. The working committee, which is comprised of end-users and members of the technical team, gathers requirements, discusses enhancements, resolves data definitions, and addresses technical issues.

Some companies have even more layers of committees to guide an enterprise-scale project. A major insurance company, for example, has the following committees guide its enterprise data warehousing and BI effort:

- **Data Warehousing Advocacy Team.** Represents the executive steering committee, which sets the strategic direction for the data warehouse. Serves as a liaison to the Business Advisory Team.
- **Business Advisory Team.** Owns the data warehousing strategy and prioritizes projects. Is comprised of business representatives from all functional areas and meets every three weeks.
- **Data Governance Team.** Defines definitions and rules for data elements and enforces policies about data ownership, changes to data, and user training. Is comprised of 20 end-users representing every functional area.
- **BI Solutions Team.** The technical team that translates the decisions of the Business Advisory and Data Governance team into the system. Trains users.

Research from The Data Warehousing Institute (TDWI) shows that companies with successful BI solutions are more likely to employ BI steering committees,

EXHIBIT 14.6 ALIGNMENT STRATEGIES



Companies use a variety of strategies to align business and IT and keep BI projects on track. Steering committees, training, and surveys show the most correlation with successful projects.

Source: Wayne Eckerson, "Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions" (*TDWI Report Series*, 2003).

provide adequate training, and use surveys to gauge user satisfaction (see Exhibit 14.6).

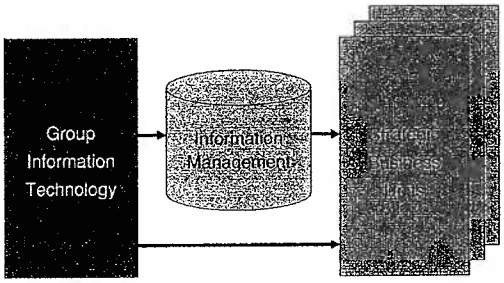
Information Management Groups

One of the best ways to align business and IT is to create a separate business unit that sits between the two groups and is charged with meeting business requirements in a timely fashion. These groups go by many names—Information Center, Information Management, or Business Intelligence Competency Center—and are a relatively new phenomenon. Those who run these organizations feel they are delivering significant value.

Absa Bank

For example, Absa Bank Ltd. in South Africa established its Information Management (IM) group in 2001, originally spinning components out of IT and marketing (i.e. customer information management) so it could focus on managing customer information, which corporate executives deemed was "essential to

EXHIBIT 14.7 INFORMATION MANAGEMENT GROUP AT ABSA BANK



Absa Bank in South Africa created an Information Management (IM) group in 2001 to improve information delivery to business units. Spun off from corporate IT and marketing, the group is responsible for developing and managing the bank's overall information architecture as well as its data warehouse, BI tools and applications, data mining programs, and geographic information systems. It works closely with corporate IT, which manages the bank's operational systems, hardware, servers, and databases.

Source: Courtesy of Absa Bank.

the future success of the organization," according to Dave Donkin, group executive of Information Management at the bank. Today, the IM group's charter is to: 1) allow information- and knowledge-based strategy formulation and decision making, and 2) leverage information to improve business performance.

Absa's IM group is a shared service that is positioned between corporate IT and the strategic business units (see Exhibit 14.7). Corporate IT is responsible for managing the bank's 400+ operational applications, hardware, servers, databases, and the technology and applications architecture. On the other hand, the IM group is responsible for the data warehouse, BI tools and applications, data mining, and geographic information systems. IM also develops the bank's information strategy and architecture that defines how the bank stores and manipulates information in a cost-efficient and effective manner. IM oversees information governance activities, development methodologies, and end-user tools, among other things.

Close Cooperation

Although this division of responsibility seems clear-cut—corporate IT handles operational systems and IM manages analytical systems—there are many areas in which the two groups need to work closely together, such as defining the overall enterprise architecture for the bank. Also, whereas IM designs the data ware-

house and analytical systems, corporate IT manages data warehousing operations (including extracting data from source systems) and builds and maintains the systems that run IM's analytical applications.

When the IM group was formed four years ago, Absa's data warehouse was "sub-optimized: not customer centric, operationally unstable, and not business directed," according to Donkin. Today, Absa's 20+ terabyte data warehouse is more stable (99 percent uptime) and more responsive to changing business needs. Also, it offers a slew of relevant business applications, such as scorecards, fraud detection, risk management, and customer analytics, which drive cross-sell, up-sell, retention, customer segmentation, and lifetime value scores.

One way that the IM group stays in touch with the information requirements of the business units is to assign a "business development manager" to each unit. The business development managers, who are business managers with substantial information and technology experience, meet regularly with their counterparts in the business units to discuss ways the units can better leverage information to meet their strategic objectives and address business problems.

The business development managers have been so effective in delivering value back to the business units that the IM group has added eight business development representatives in the past two years. "The best part is that the business units are so eager to get business development managers that some of them have transferred staff over to the IM division to enable establishment of the role," says Donkin.

Deutsche Börse

Similarly, Deutsche Börse, one of the leading international exchange organizations, several years ago established the Information Center, a technical group that is charged with turning data into information products requested by the business. To make this happen, the Information Center is responsible for data warehousing, ETL, data marts, reporting and analysis tools, data quality, job scheduling, and metadata management. The group is supported by corporate IT, which provides server support, database administration, and custom programming using Java, C, and other languages for components not available as commercial tools. This division of responsibility enables IT to focus solely on managing technology instead of trying to empower the business with information, which is not its strong suit, according to Dr. Klaus Detemple, director of information operations at the stock exchange.

A key to the success of IM groups is having individuals who combine a knowledge of the business and IT and are equally comfortable operating in either environment. Although rare today, these types of individuals are the future of IT. They know how to communicate with the business because they come from the business but they also have a strong technical background or experience managing IT projects.

IM groups take the pressure off the IT department from having to play a role it is not comfortable playing. The IM group enables technologists to focus on technology instead of the business. It gives them a separate career track and an organizational structure designed to maximize their capabilities. It is a win-win situation for both the business and IT.

SUMMARY

For years, business and IT have been locked in a cycle of mistrust. The business does not trust the IT department to place its interests above technical requirements. The IT department does not trust the business to stick to its priorities and provide adequate resources to meet technical requirements.

This cold war can begin to thaw if both sides take steps to understand each other's predicament and find new ways of working together. The IT department must learn the business, and think and talk in business terms. It also needs to develop infrastructure incrementally and create a BI portfolio that shows the business how it will generate valuable analytical applications over an extended period. It needs to establish an IM group that sits between IT and the business and mediates information requirements using individuals who combine a knowledge of both business and technology issues.

At the same time, the business needs to understand that Rome was not built in a day. They need to give IT time to develop a standard infrastructure that, once built, can accelerate development while reducing costs. And, while business units may be tempted to build their own applications, they need to work with the IT or IM group to transfer these early successes into valuable enterprise resources built on a common technology platform.

The good news is that during the past decade both sides have acknowledged the problem and seem earnest to address the issues that divide them. While this is a good first step, there is still much work to do to align business and IT.

CHAPTER 15

How to Ensure Adoption and Manage Performance

You have spent a lot of time and effort creating a performance dashboard. You have sold the idea, secured funding, and created a team. You have worked diligently with the business to define metrics and targets, standardize rules, and locate data, and you have worked with the technical team to create an appropriate business intelligence (BI) infrastructure. Now you are ready to launch and watch the performance dashboard do its magic.

But will it?

If you have done a good job selling the performance dashboard, expectations are high. Executives see it as a powerful tool to communicate strategy and change the behaviors of individuals and groups. They want employees to work more proactively, using timely information to fix problems, streamline processes, and make more effective decisions and plans. They want the performance dashboard to foster better collaboration between managers and staff and improve coordination among departments. They view the system as a way to manage performance, not just measure it. To them, the performance dashboard is like a steering wheel that they can turn right and left to keep the organization headed in the right direction.

TWO TASKS

1. Ensure Adoption

To meet these expectations, you still have two tasks to accomplish; the first is obvious: make sure people use the system! If people do not log in and view the data, the performance dashboard will not have any impact on the organization.

Nothing will change except your career prospects, which will plummet along with next year's performance dashboard budget.

2. Change the Culture

The second task is more formidable: use the performance dashboard to change the culture and optimize performance. A performance dashboard is an instrument of organizational change with a hairline trigger. Aim it in the right direction and performance will skyrocket; aim it in wrong direction and results will plummet along with worker morale (see Spotlight 15.1). Before rolling out a performance dashboard, executives and managers need to learn how to use it correctly to get the results they want.

SPOTLIGHT 15.1 EIGHT WAYS TO UNDERMINE A PERFORMANCE DASHBOARD

Performance dashboards are powerful agents of organizational change, but they can easily backfire and cause performance to decline or stall instead of climb. Below are eight cardinal sins that can turn a Performance Dashboard into a performance quagmire.

1. **Display too many metrics.** This scatters people's energy and attention and makes them less efficient and effective than before.
2. **Fail to get user buy-in.** Users resent when performance dashboards are imposed on them without their approval or input, and their productivity declines.
3. **Do not assign accountability.** People will not change their habits unless they are held accountable for the results.
4. **Create metrics that are too abstract.** Users cannot improve results if they do not understand what a metric means or what steps they can take to influence the outcome.
5. **Create metrics that undermine each another.** Employees work hard, but their efforts cancel each other out, sub-optimizing processes and demoralizing the staff.
6. **Use metrics to punish, not empower.** Managers who view metrics as a way to control rather than coach their staff cause morale and productivity to plummet.
7. **Attach compensation to metrics too soon.** This causes workers to spend too much time debating the reliability of a metric rather than doing their jobs.
8. **Fixating on measures, not management.** Managers who fixate on measures reward short-term spikes in performance, change plans too quickly, and fail to see larger trends driving performance.

STRATEGIES TO ENSURE ADOPTION

There is truth to the adage, "You can bring a horse to water, but you can't make it drink." Once you build a performance dashboard, will workers use it? Asking that question at the end of the development process is not a good sign! To ensure rapid uptake of the system, you need to develop a strategy to ensure end-user adoption at the very start of the project. Below are several techniques to guarantee end-user adoption and make the project a success.

1. Make the Business Drive It

The performance dashboard is a technical solution to a business imperative—the need to measure, monitor, and manage performance. To succeed, however, the technical solution must be driven by the business, not a technical team or the IT department. The head of a business unit or department must initiate the project, secure its funding, oversee its direction, sell it to mid-level managers, evangelize its use, and assume responsibility for its outcome. Chapter 4 showed that there is a strong correlation between an actively involved and committed business sponsor and a successful project with strong end-user adoption.

Too often the project team takes too much responsibility for driving a project, allowing the business to become a dispassionate observer instead of an actively involved leader. Or the IT department tries to meet the requirements of too many groups at once, which dilutes sponsorship. Without a clearly identifiable business sponsor driving the solution, the project gets mired down in bureaucracy, political infighting, and conflicting motivations. In both cases, the project gets a tepid response from target users, if it is deployed at all.

2. Make the Business Own It

This is a corollary to "make the business drive it" above. It is one thing for business sponsors to drive a project and quite another for them to put their reputations and careers on the line and assume responsibility for its outcome. When this happens, they will make time to attend meetings, provide guidance, and evangelize its importance to ensure that the project succeeds. Once a sponsor is committed to the project, the person has vested interest in getting users to adopt the system.

Business ownership also trickles down to lower levels of the organization, where the project gains traction as a resource that end-users find valuable. Here, representatives from various groups sit on governance committees that guide the project and oversee the information infrastructure. Also, subject matter experts from the business "own" the metrics in the performance dashboard and certify the accuracy of data on a daily basis, among other things.

Having the business involved at all levels in the design and administration of a performance dashboard creates considerable momentum for the system. The business has a vested interest in making sure the project succeeds. Business "owners" will identify problems and bring them to the attention of the governance committees or technical teams rather than let the problems fester into major impediments to system usage.

3. Make the Business Evangelize It

Active sponsors and drivers evangelize the performance dashboard every chance they get. They discuss the system at company and departmental meetings, and they write about it in company newsletters and on the corporate intranet. This communication continually emphasizes the importance of the project to the group's strategy and plans.

Sponsors also work with the project team to establish a marketing plan to promote the performance dashboard. The plan targets the various constituencies that either will use the system or whose support is required to build it. It defines the appropriate message for each constituency and the appropriate channels and frequency with which to deliver the information. The sponsor and project team work especially hard to sell the system to mid-level managers, who can make or break end-user adoption.

To promote the system, many organizations link articles to the performance dashboard that outline recent enhancements, answer frequently asked questions, and highlight testimonials of individuals who have had a major success with the system. They also provide links that enable users to provide feedback on the system, contact the help desk, request training, and search for help documents. Some organizations place this information on a corporate portal that users must go through to access the performance dashboard so it's hard to miss.

4. Make the Business Use It

Actions speak louder than words. Business sponsors and drivers may spend considerable time evangelizing the system, but if they do not use it, neither will anyone else. Workers pay close attention to verbal and visual cues from their managers about how much time and energy they should invest in learning a new system. When sponsors continue to rely on analysts to create reports or managers continue to use their spreadmarts, workers get the message loud and clear: do not go out on a limb when your boss is not. However, when executives and managers start using the output of a performance dashboard (whether directly or indirectly), the trickle-down effect is powerful.

"The tip of the iceberg that got this thing going was when executives had our reports all over the boardroom table and began asking 'Where's the data to back

up this decision?'" says Deb Masdea, former director of business information and analysis at The Scotts Miracle-Gro Company.

To build awareness among top executives about the power of the information now available to them, Masdea met one-on-one with many of them to demonstrate the system and get them comfortable with the output, even if they would never directly use the system. To ensure penetration at lower levels of the organization, Masdea established a network of "super users" who create custom reports for colleagues in their department. "To get people to use [the system], we created super users, not because IT couldn't create reports, but because we needed people in the business who know how to get data and get others feeling comfortable with the system," says Masdea.

5. Prove the Validity of the Data

No matter how good the system looks, if users do not trust the data, they will not use it. Validating that data in a new performance dashboard is accurate is painstaking. Users tend to distrust data that they have not seen before. Even though data in the performance dashboard may be more accurate than in the reports or spreadmarts that employees currently use, they will reject the data unless you prove to them beyond a shadow of doubt that the new data can be reconciled with their own.

For example, Masdea's team also worked hard to convince executives, managers, and analysts that the data was accurate and trustworthy. "Once you automate [the delivery of information], they don't trust it. Their secretary didn't give it to them so they're suspicious. Once you get them to the point where they have looked at data in enough different ways that they are comfortable with it, they quickly get dependent on it. Now, our users can't live without logging on [to the system] in the morning!" says Masdea.

6. Add Personal Data to the Dashboard

There is nothing that gets users to use a performance dashboard faster than displaying information that lets them calculate what their bonus or commissions will be. This helped drive initial usage of the dashboards at Quicken Loans and Hewlett Packard TSG. Once users access the performance dashboard, they quickly realize that there is other content there that can help them perform their jobs more effectively and they're hooked. In addition, allowing users to personalize the dashboard gives them added motivation to visit the site. The ability to change colors, add Web links, and select which metrics, reports, and other documents they want on the home page, gives users a feeling of ownership that prompts them to return on a regular basis.

7. Train Users

Training is critical to the successful roll-out of a performance dashboard. Chapter 14 showed a correlation between training and BI success (see Exhibit 14.6). Ironically, however, most users do not want to attend training classes. This requires project teams to get creative in the way they deliver training. Organizations need to provide a mix of training options to cater to everyone's preferences and needs. Here are some of the more common methods to train workers and increase their proficiency using the performance dashboard:

- **One-on-One Training.** Reserved primarily for top executives and their administrative assistants. Also, "super users" (described previously in no. 4) can provide one-on-one training to colleagues in their departments.
- **Classroom Training.** Usually offered to employees that have not had any experience with the system. To encourage attendance, some organizations provide continuing education credits, keep class sizes small, and offer the course on a regular basis in a professional training center. Most courses run two to three hours in length.
- **Virtual Classrooms.** Because it is expensive and time consuming for people to travel to a training facility, many organizations provide virtual training using Web conferencing or online courseware. Web conferencing sessions are live events scheduled periodically in which users can see a demo of the system and ask questions. Most sessions can be archived for later viewing. Online learning software steps users through a series of learning objectives and uses quizzes to reinforce concepts and track users' progress. Online courseware can be delivered via the Web or CD-ROM.
- **Online Help.** Most companies provide various forms of "right-time" training through which users can learn about different metrics, features, and functions as they go along. Online help may consist of documents and user manuals housed on the corporate intranet or dynamic links embedded in the software that present users with context-sensitive help. Some organizations let users request one-on-one help via Web conferencing or NetMeeting utilities.
- **Release Updates.** Many companies are getting creative in the way they inform and train employees about the functionality contained in new releases of software. Some offer classroom training, but most inform users about the enhancements through e-mail, newsletters, online help, or intranet updates. Some build mini-online courses or animations that pop up when users log into the system, providing users with a painless way to stay current with the system if they desire.

- **Rotating Tips.** Many companies publish "Did You Know?" tips in e-newsletters and when users log in to the performance dashboard. These tips highlight high-value features, provide answers to commonly asked questions, and alert users to new content in the system. Some companies use these tips or show interesting facts other users have gleaned from the system. "These tidbits of facts and figures pique users' interest," says Dave Donkin, group leader of Information Management at Absa Bank Ltd. in South Africa.
- **Help Desk.** Most companies also let users call the company's help desk to get answers to questions, instead of just report problems. Help desk personnel keep a record of the most frequently asked questions and create a link to them from the corporate intranet and the performance dashboard.

8. Track Usage

The best way to judge the effectiveness of a new release and training programs is to monitor its usage. Some companies closely monitor usage statistics, using them as an early warning signal of problems with the software or its training. For example, International Truck and Engine Corporation tracks usage even during the pilot phase of a new release. "If only three people out of ten are using the system, we meet with the other seven to find out the problems they have with it and make changes before we roll out the release," says Jim Rappé.

Rappé's group has tracked usage statistics so closely that it now knows what the uptake rate should be after issuing a new release of the software. If adoption rates are lower than normal, the team jumps into action. "If usage is below the norm, we book a 30-minute presentation during a departmental meeting to provide additional education and answer questions. We try to be proactive," says Rappé.

9. Review Satisfaction

It is important to ask users periodically what they think of the system and to get their feedback. This helps in evaluating the overall effectiveness of the system and how it can improve in future releases. Hewlett Packard TSG conducts a customer satisfaction survey every six months. International Truck and Engine issues a survey once a year that lets users express requirements for future upgrades.

PERFORMANCE MANAGEMENT STRATEGIES

Once user adoption is ensured, the next task is more challenging: using the performance dashboard to change organizational culture and improve performance. Dr. Bob Frost, principal of Measurements International Inc., describes the impact that measuring performance has on individuals:

> There's something about performance charts. When most of us see a chart depicting our efforts, we immediately feel something—positive or negative. This feeling may be about the past or the future, but it's almost always motivational and emotional....If your employees know that you value metrics and track the entire organization's performance, an amazing thing happens: the culture changes. Whether mentally or on paper, employees begin to track how their own performance contributes to enterprise performance. And a 'results-tracking culture' is one of the most powerful competitive advantages your enterprise can have.[1]

The trick with a performance dashboard is to harness this emotional reaction to drive behavior in the direction that delivers the most value to the organization. This is not easy. Workers can react negatively to metrics that are improperly designed or circumvent them for personal gain. Or performance metrics and targets can push and pull individuals and the organization in potentially different directions. The following are recommendations about how to use metrics and performance dashboards to drive performance in the right direction.

Test Assumptions

This book earlier discussed the importance of strategy maps to define linkages among objectives and metrics. However, strategy maps are not just a design tool; executives should used them continuously to test assumptions about what drives performance and make adjustments. By fine-tuning strategy, metrics, targets, and initiatives, executives can use a performance dashboard to literally "steer" the organization in the right direction.

Ideally, each linkage correlates objectives and metrics using a mathematical relationship. For example, executives believe that if customer loyalty increases by 5 percent, revenues go up by 1 percent. A performance dashboard then enables executives to evaluate the validity of their assumptions about these linkages. Perhaps customer loyalty does not affect revenue growth as much as they thought, but product quality—which they did not specify as a revenue driver—correlates very strongly. They then add this new metric to the strategy map and recalibrate the linkages to create a more accurate model.

In the past, executives kept these assumptions and models of how the business operates in their heads. Often, they never formally expressed or tested these assumptions, sometimes with disastrous consequences. Many executives have launched multi-million-dollar initiatives based on false assumptions about what drives profits, revenues, or shareholder growth.

Focus on Management not Measurement

The temptation with performance dashboards is to focus too much on measures and results and not enough on process and strategy. When this happens, execu-

tives fail to see the "forest for the trees." They are so focused on measures that they fail to see the bigger picture of what is going on and what they need to do to move the organization in the right direction.

Whipsawing

One symptom of this problem is when executives reward or punish managers for short-term spikes in performance. When performance is evaluated every day or week, there is a tendency to overemphasize short-term fluctuations and miss emerging trends.

"Just like the temperature, metrics swing significantly. You need a process to balance that. You can't throw your planning away if you don't make your numbers one week. It is very counterproductive to overfocus and overdrive on specific elements. You may drive one metric up but the means you use to get there may not overall satisfy the needs of the business," says John Lochrie, senior vice president at Direct Energy Essential Home Services.

Achieving Balance

Lochrie recommends creating a set of metrics that balance the key drivers of the business, which for Direct Energy are operational efficiency, customer satisfaction, and employee satisfaction. "You should evaluate each metric by how good it is for employees, customers, and the business. If a customer likes it, but you kill your employees in the process, then you're ultimately going to fail," says Lochrie.

Examine the Business Context

It is also important to understand what is really driving the measures and continually reevaluate your assumptions. For instance, a performance decline may not mean employees are slacking off—even though this was the case in the past—something else may be going on that you have not anticipated. For instance, staff may be saddled with additional work or requirements that did not exist before. In many instances, the current metrics may no longer be a valid way to assess performance in a changing or more complex environment.

"What I've learned is don't just tend to the numbers. Think more about what is driving the numbers. Are people making the effort but just not getting there, or are people not making the effort any more because they can't overcome the challenges out there? You have to continually pause to take a breath, every 6 to 12 months, and assess the overall climate in which you are operating and ask whether the current metrics are still relevant," says Lochrie.

The important thing, he adds, is to make sure employees have the resources and training they need to be successful. This includes training their managers to

provide them with assistance and guidance in the field. Ultimately, the goal is to make employees and, by extension, the organization successful.

Law of Diminishing Returns

Also, it is important to know when you become a victim of the law of diminishing returns. This is when the effort and cost to increase performance outweigh the returns. When a company first introduces a metric, performance usually increases rapidly but then it gradually tapers off. For instance, a company that starts tracking customer satisfaction sees scores increase from 50 percent to 70 percent in one year, but then can barely get the scores to nudge above 72 percent for the next three years no matter how much effort it expends. When you have reached the point of diminishing returns, it is better to expend the company's energies elsewhere.

Get User Buy-In

Avoid "Us versus Them"

Performance management is not something you impose on workers or do to them. Such heavy-handedness always backfires. When workers see performance metrics as a stick rather than a carrot, their enthusiasm and motivation will wane. To avoid an "us versus them" mentality, it is important to get users' feedback on the validity and reasonableness of metrics and targets before applying them. This can be done in group meetings, surveys, or comment forms.

Respond to All Input

However, do not make the mistake of taking feedback and not responding to it. Every comment should be recorded and a response delivered in person or in writing. This takes time but it demonstrates to workers that you have received their input, acknowledged their ideas, and taken them under consideration. It would also be helpful to schedule "open door" sessions in which workers can call, e-mail, or visit to discuss their concerns.

Expect Pushback

Workers often get nervous about the impact performance metrics will have on their jobs and compensation. So, expect users to push back, but do not be alarmed; this is part of the process. "The first thing that happens when you hold people accountable for metrics is that they say it isn't tracking them right. That's a healthy feedback loop. If you are not getting that pushback, you are probably not challenging the staff enough," says Ripley Maddock of Direct Energy Essential Home Services.

Explain the Data

If a worker has a serious issue with a metric or a performance result, the first thing to do is explain how the data were collected and calculated so the person understands the mechanics. Then work backward from individual events—a sale, a repair, a work order—to the aggregated data to see whether the system tracked the event correctly. "Too many times people will say, 'I don't think that metric is right.' We try to get them down to factual examples. Let's look at this sales order and see how it was measured. If they don't think the business should measure it this way, we'll bring that back up to management for review," says Direct Energy's Maddock (see Spotlight 15.2).

SPOTLIGHT 15.2 A TACTICAL DASHBOARD IN RETAIL SERVICES

In 1999, Direct Energy Essential Home Services, North America's largest competitive energy and home services retailer, was founded as a result of deregulation of the natural gas industry in Canada. To compete effectively in the open market, Direct Energy developed a tactical dashboard to monitor the execution of its new business strategy (see Exhibit 15.1).

"We knew we couldn't do business like we had previously," said Ripley Maddock, director of customer management at the company. "We now had to be driven by ROI, shareholder value, and customer needs. To make this transition, we needed a way to measure our performance against these new metrics and hold everyone in the organization—from executives to field technicians—accountable for the results."

Today, more than 400 personnel, including 300 field technicians, view their performance against budget contained in an easy-to-use Web-based dashboard that costs less than $100,000 a year to maintain. District managers use the dashboard to compare their district's and staff's performance against other districts. They review the results with field technicians on a regular basis and showcase individuals who have exceeded targets.

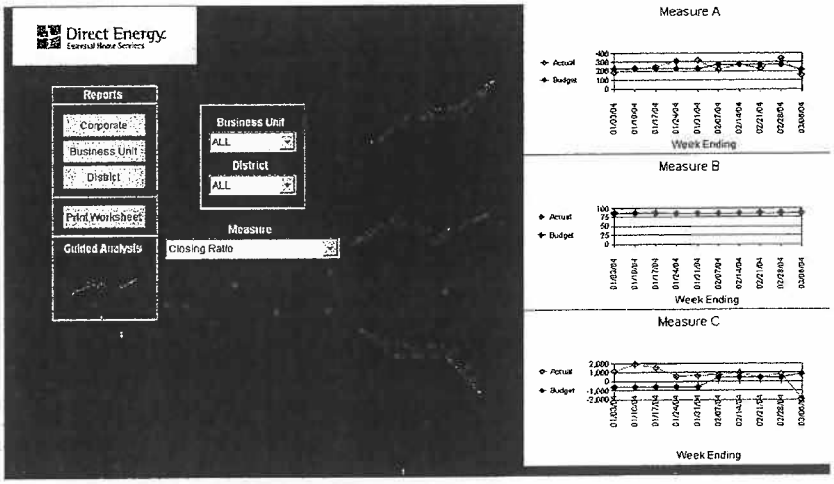
In the two years after Direct Energy implemented the dashboard, the firm reduced the number of repair calls by 2.82%, saving the company $1.3 million while improving customer service. Most of this reduction was driven by a *repeat call* metric on the dashboard, which tracks how many times a technician visits a household to fix a problem. Direct Energy believes this metric offers a good indicator of customer satisfaction and service efficiency, among other things.

Perhaps the most important benefit of the dashboard is that it has changed the entire tenor of discussions about performance at the company. According to Larry Ryan, the group's former general manager, the dashboard is a communications vehicle designed to bring managers and staff together to discuss how to meet or exceed performance expectations and fix outstanding problems, not to dwell on excuses for underachievement.

EXHIBIT 15.1 A SIMPLE TACTICAL DASHBOARD

STEM CORPORATE	28-Feb	6-Mar	Last Week Budget	Last Week Variance	March 2003 Actual	March 2003 Budget	March 2003 Variance	December 2003 Actual	December 2003 Variance	2004 Year to Date Actual	2004 Year to Date Budget	2004 Year to Date Variance
Sales Management												
Measure A	337	354	217		354	217	63	0	0	2,605	2,432	73
Measure B	29.35%	26.07%	30.00%	-0.03%	26.07%	30.00%	-0.03%	0.00%	0.00%	29.31%	30.00%	-0.01%
Measure C	22.58%	15.93%	30.00%		15.93%	30.00%	-14.07%	0.00%	0.00%	28.29%	30.00%	
Measure D	$4,193.67	$3,779.22	$3,350.00	$429.22	$3,779.22	$3,350.00	$429.22	$0.00	$0.00	$3,753.10	$3,350.00	$403.10
Measure E	56.86%	56.70%	48.00%	8.70%	56.70%	48.00%	8.70%	0.00%	0.00%	68.08%	48.00%	10.08%
Measure F	248	-223	0	223	223	0	223	0	0	2924	0	2924
Product Holdings												
Measure A	808	-1,079	807		-1,079	807	-2,705	0	0	6,405	-30	
Measure B	057	-488	0		-488	0	-488	0	0	0,500	0	0,500
Customer Satisfaction												
Measure A	89.35%	89.86%	90.00%	-0.14%	89.86%	90.00%	-0.14%	0.00%	0.00%	86.20%	90.00%	-3.80%
Measure B	0.00%	0.00%	75.00%	0.00%	0.00%	75.00%	0.00%	0.00%	0.00%	57.45%	75.00%	-17.54%
Technician Efficiency												
Measure A	80.41%	87.70%	85.00%	2.70%	87.70%	85.00%	2.70%	0.00%	0.00%	85.90%	85.00%	0.90%
Measure B	6.3	5.2	5.7		5.2	5.7	-0.5	0	0	5.8	5.7	0.2
Measure C	11.33%	9.87%	9.60%	0.27%	9.87%	9.50%	0.37%	0.00%	0.00%	11.72%	9.50%	
Workload												
Measure A	10,390	7,229	6,857	372	7,229	6,857	372	0	0	95,944	83,320	13,624
Measure B	2,809	1,906	3,008		1,906	3,008	-1,102	0	0	21,207	27,542	

Legend for M10 and M7 Measures
Actual/Budget >= 98
Actual/Budget >= 9493 & < 98
Actual/Budget < 9489
NA



This tactical dashboard from Direct Energy Essential Home Services keeps things simple, which is often best. The dashboard (top image) lets users define three key metrics to view by selecting from a list of measures, such as closing ratio, that appear in a drop-down box. Users then choose the business unit and district they want to see data for using the drop-down boxes above the measures drop-down box. If users want more detailed data, they cannot yet drill down into the charts or select other dimensions or filters. However, the dashboard does provides a button to view a list of color-coded corporate, business unit, or district reports, which they can display on the screen or print as Excel spreadsheets (bottom image). If they are not sure which report to view, they can click on the "guided analysis" button, which steps them through a series of "yes/no" questions to narrow down their choices.

Source: Copyright © 2005 Direct Energy–Essential Home Services. Reprinted with Permission.

Let Users Focus

A performance dashboard uses metrics to focus workers on high-value tasks that drive performance in the right direction. The fewer the metrics, the more focused workers can be. Thus, a critical factor in using dashboards to optimize performance is to select the right number of metrics to display on the screen for each user. Unfortunately, no one agrees on a single number. However, most believe it is counterproductive to overwhelm workers with too many metrics.

As a rule of thumb, workers managing operational processes should track fewer metrics, probably less than a handful, whereas executives responsible for setting strategic direction should view many more metrics, perhaps a dozen or more, each with multiple levels of drill-down to lower level metrics. The more areas and activities someone manages and oversees, the more metrics that person will need to monitor.

Hold Users Accountable

It is important that there is an individual or group accountable for the outcome of each metric. This puts teeth into the measures and galvanizes the organization. It lets everyone know in a very personal way that executives are serious about using the dashboard to improve performance and change the culture.

It is best to hold individuals accountable for results. This is true even when performance is a shared responsibility among many people and groups, such as customer loyalty. However, the accountable individual must be given certain authority to allocate resources, make decisions, delegate responsibility, and reward performance to achieve the objectives.

Another way to galvanize the organization around performance metrics and reinforce accountabilities is to publicize the results broadly. Allow people to see how their performance compares with that of their peers. This fosters a competitive environment in which few people want to be seen as laggards or slackers in the organization.

Empower Users

If you are going to hold people accountable, you have to empower them to act. You need to give them more leeway to make decisions and not force them to adhere to prescribed processes or procedures. You also need to make it clear how they can affect the measures. This means creating measures that are easy to understand and appropriate to each level in the organization. For example, you cannot expect assembly floor managers to know how to improve net profits, but they probably have a good idea about how to reduce scrap and quality problems.

"For metrics to be motivational, people must be able to see what to do. There must be a *line of sight* between the actions employees can take and the changes that occur in the measure," writes Frost.[2]

Train Managers to Coach

The problem with individual performance reviews is that they rarely happen. Often, the reason is because managers are too busy to compile the relevant information and write up the results. However, a performance dashboard collects a lot of the information for managers. It becomes an effective tool to help managers conduct performance reviews on a regular, or even continuous basis as needed.

The key to using a performance dashboard for performance reviews is not to punish workers for poor performance, but help them see how they can improve. Managers need to know how to provide workers with the resources, tools, and knowledge to help their staff succeed. This requires training, not just education, says Lochrie. "You can educate managers by going through the process and telling them what's good and bad, and then they go out and do their own thing. By training, you physically witness what the managers do and make sure they do the right things and behave in the right way. Then you coach and re-coach them."

Reinforce with Monetary Incentives

A major way to focus workers' attention on the metrics is to pay for performance. It has been said that "What gets measured, gets done." However, it is also true that "What gets done is what you pay people to do."

None of the companies mentioned in this book use performance dashboard as the exclusive vehicle for calculating bonus payments or total compensation. However, most have a few metrics in the dashboard that affect compensation, and some are slowly moving to adopt the performance dashboard as the primary tool for determining bonus payouts.

It is important not to attach compensation to metrics and targets until they become stable. It is not easy to change metrics once people's compensation is based on them. Even the smallest change can cause people's income to rise or fall dramatically, and they will protest vehemently. If a change or restatement of results is required, it is best if it works in favor of the staff, to avoid dissension.

Another reason to postpone attaching pay to metrics is that it takes time to close all the loopholes that might allow staff to jury-rig the results or take unwarranted shortcuts to boost their performance scores. In a similar vein, you should not let executives design metrics that are used to calculate their bonus payments. They will surely shape the metrics to ensure that they can meet their numbers and earn a sizable bonus.

SUMMARY

End-User Adoption. A performance dashboard is a powerful agent of organizational change. However, if employees do not use the system, the dashboard will

not have any impact at all. Thus, the first task of any business performance manager is to ensure that employees use the system and see it as an integral part of how they do their jobs.

Ensuring end-user adoption starts at the beginning of the project when business sponsors and drivers are being recruited. Business sponsors must provide the organization with the right visual and verbal cues that the system is worth the time and effort to learn and use. Sponsors need to sell and evangelize the project, accept responsibility for its outcome, and, most importantly, use the system. Sponsors must also ensure that lower levels of the organization step into "ownership" roles, such as serving on stewardship committees and taking responsibility for defining, updating, and certifying key metrics and data elements.

Another key element to ensuring end-user adoption is to get users to trust the data in the new system. This requires the project team to reconcile data in the new system with data in the old systems. Other techniques to ensure a fast uptake of the performance dashboard include flexible training, usage tracking, and regular surveys of end-user satisfaction.

Performance Management. A performance dashboard is a tool to help the organization achieve its strategic objectives. To do that, the performance dashboard needs to motivate individuals and groups to work on the right tasks that move the organization in the right direction. However, it is not easy to ensure that every metric has its intended effect on its target audience. This requires executives to constantly fine-tune their assumptions about what is really driving performance.

A strategy map is a good way for executives to document and test their assumptions about the relationships between metrics. They also need to beware of fixating on short-term results without considering larger trends driving performance, which may require new or revised metrics to track accurately. Most importantly, executives need to ensure that managers and staff have the appropriate knowledge and resources to succeed. Managers, in particular, need to be trained how to use the performance dashboard to empower staff, not punish them.

Metrics and performance dashboards naturally get users' competitive juices flowing. To sustain motivation, organizations can publicize performance results so workers can compare their performance against that of their peers. They can also attach bonus payments to performance results, which really ups the ante. However, before mixing pay with performance, executives need to make sure the metrics are stable, reliable, and tamperproof.

NOTES

1. Dr. Bob Frost, "Measuring Performance" (Ogdensburg, NY: Measurements International Inc., 2000), p. 43.
2. Ibid.

Criteria for Evaluating Performance Dashboards

Whether you plan to build or buy a performance dashboard, you can use these criteria to evaluate potential products or solutions and determine whether it is a good fit for your organization.

DESIGN

- **Web-Based.** Simplifies user access and centralizes data management and administration, making it easier to support thousands of users. Also avoids downloading large volumes of data to user desktops across potentially low-speed networks.
- **End-User Design.** Lets authorized end-users define objectives, metrics, targets, thresholds, initiatives, and alerts quickly without coding.
- **Associations.** Lets authorized end-users associate objectives, metrics, targets, and initiatives with each other.
- **Multiple Targets.** Lets users apply two or more targets and associated thresholds to each metric, including forecasts, budgets, prior actuals, and external benchmarks, among others.
- **Groupings.** Lets authorized end-users categorize objectives, metrics, and initiatives by different perspectives.
- **Layouts.** Provides various ways to group related metrics, scorecards, and other objects on the screen, such as tabs, folders, tables, columns, and custom designs.
- **Strategy Maps.** Lets executives visually map linkages between metrics and estimate and test the degree of correlation.

- **Personalizable.** Lets end-users select metrics, alerts, and other objects from authorized lists and arrange them on the screen to suit their preferences without coding.
- **Flexible Graphs.** Provides various types of graphs, symbols, and color-coding that let users quickly evaluate performance state, trends, and variance for critical metrics.
- **Multiple Disciplines.** Supports multiple methodologies for measuring and managing performance: Balanced Scorecards, Six Sigma, Total Quality Management, Economic Value Add, European Foundation of Quality Management, and ISO 9000.

ANALYSIS

- **Layered.** Arranges information in layers, with each successive layer providing additional detail and perspectives about a metric, process, or event.
- **Tables and Charts.** Plots data using tables and a wide selection of chart types. Lets users toggle between a table and a chart or different chart types or lets them view both a table and chart on a single page.
- **Comparisons.** Tables and charts compare data with targets and thresholds by applying rules against a repository of performance data to ensure fast response times.
- **Drill Down/Up.** Lets users drill down from summary level views of metrics to detailed views with a single click of the mouse on the object they want to view in more detail.
- **Drill Across.** Lets users switch views of a metric by changing dimensions (i.e., customer, geography, channel) using a drop-down list box or some other graphical control.
- **Drill Through.** Lets users drill through to transaction details stored in a remote system (e.g., a data warehouse, operational system, or external database) or online reports created in other applications.
- **Interactive Reports.** Lets users sort, rank, filter, regroup, or format the data, and insert or delete columns, modify calculations, and drill to more detail if available.
- **Landmarks.** Visually shows users where they are in the data using a path metaphor or decision tree. Lets them return to any previous location with a single click.
- **Guided.** Uses steps to guide less experienced users through the data or analysis by limiting the drill down/across paths and providing context-

sensitive recommendations for next steps (i.e., reports to see or actions to take).

- **Dynamic Views.** Lets users define and subscribe to new views of "right-time" data coming from one or more operational systems.
- **Advanced Analysis.** Lets users perform "what if" analysis to model scenarios and perform regressions to improve the accuracy of forecasts, among other things.

DELIVERY

- **Access.** Lets managers access different scorecards at various levels of the organization.
- **Publishing.** Lets users publish custom views of the data to the Web for their own use or for others to view. The views are automatically updated with the latest data when users next access them.
- **Custom Output.** Lets users schedule and publish views in a variety of formats (i.e., Web, Excel, PDF, and so on) to a variety of channels (e.g., Web, e-mail, printer, wireless device).
- **Custom Access.** Lets users view and interact with the dashboard via wireless devices and access published views via Excel and PowerPoint.
- **Portable.** Lets users disconnect from the network and take the dashboard with them on the road. This can be done by exporting to Excel or creating a replica of the original view or report.
- **Printable.** Lets users print one or more views in the dashboard with proper page breaks and headings, in any order they prefer, such as from most to least below target.
- **Annotations.** Lets users attach comments to individual metrics and respond to comments made by others.
- **Workflow.** Lets users set up a workflow that routes their published view of data to designated people for review and/or approval.
- **Data Entry.** Provides forms that let users enter performance data manually and automatically reminds them to fill out the forms.
- **Properties.** Lets end-users right-click on any object to examine its properties, such as its owner, when it was last refreshed, how it was derived, and so on.
- **Multi-Source Queries.** Dynamically populates different elements on a dashboard screen with data from different sources, or merges data from multiple sources into a single element on the fly.

ADMINISTRATION

- **Metadata.** Stores definitions and rules about metrics, dimensions, hierarchies, user roles, preferences, and system configuration, among other things, for static lookup, auditing, and dynamic runtime invocation.
- **Customizable.** Lets administrators customize the screens by roles and users, displaying only the tabs, metrics, reports, and data that users are authorized to see.
- **Role-Based Security.** Dynamically displays only the objectives, metrics, initiatives, and other objects that users are authorized to see based on their role in the organization.
- **Row-and-Column Security.** An extra level of security provided at the database level that prevents users from seeing specific rows or columns based on their security profile.
- **Audit Trails.** The software records every change made to the system and by whom and when for control and auditing purposes.
- **Lock-Outs.** Keeps users from changing manually entered data and comments after a certain date to prevent tampering.
- **Usage Statistics.** Tracks usage by users and objects. Used to monitor uptake of the software by target users and for chargebacks.
- **Configuration.** Lets administrators configure the software to run against various data sources, design multidimensional models for analysis, set up drill paths and prompts, customize layouts, manage security, and tune the software for performance, among other things.
- **Responsive.** Lets developers deliver new capabilities within days or weeks, not months or years.
- **Intelligent Agents.** Lets administrators create rules that trigger a series of context-sensitive actions in response to an exception condition, such as sending different types of alerts (i.e., Web, pager, e-mail) based on the nature of the exception; lets administrators issue queries to locate the right person to call or perform other functions.

INFRASTRUCTURE

- **Compatibility.** Works with existing hardware, software, database, network, and storage systems.
- **Alignment.** Works within your organization's existing information architecture that specifies how data flow from operational systems to end-users for reporting and analysis purposes.

- **Standards.** Supports industry standard interfaces, technologies, and frameworks, such as Web Services, XML, LDAP, services-oriented architectures, and so on.
- **Data Management.** Stores historical performance data in a data mart or data warehouse; stores "right-time" data in an operational data store or online cache; and accesses "real-time" data via middleware (i.e., EAI) or dynamic queries against operational systems (i.e., EII).
- **Application Integration.** Integrates with third-party applications, such as portals, budgeting, planning, forecast, project management, and operational applications. Integration can be done via an import/export mechanism, exchanging data and metadata via a synchronization mechanism, or programmatically using application programming interfaces and middleware.
- **Data Integration.** Reads any data type (e.g., Excel files, Web pages, text, XML, relational data) from any system (e.g., mainframe, minicomputer, file server) and stores it to an intermediary server where the data can be scrubbed, transformed, and joined as needed and loaded into the performance dashboard.
- **Multidimensional Views.** Supports multidimensional views of data, usually delivered via an OLAP tool that either stores data in a specialized multidimensional database or maps relational data into a multidimensional view on the fly.
- **Security.** Integrates with an organization's existing security system and supports security standards, such as LDAP.
- **Software Customization.** Lets developers customize the look and feel or functionality of the software using application programming interfaces and custom code, preferably in an industry standard language, such as XML or Java.
- **Fast.** Provides fast response times to user clicks and requests for data, measured in seconds not minutes.
- **Scalable.** Performance doesn't degrade no matter how many users are on the system at any given time or how much data are stored or requested at a given time.
- **Reliable.** The system is continuously available, even when new data are being loaded into the system or updated, and suffers few, if any, outages.

VENDORS

- **Type.** Does the vendor offer a best of breed or integrated solution? If the former, does it focus solely on delivering Balanced Scorecards or some other

type of dashboard (i.e., operational or tactical)? Does it sell dashboards exclusively or broader BI solutions? If it sells an integrated solution, does the vendor focus solely on business performance management (i.e., budgeting, planning, dashboarding, reporting, and analysis software) or does it sell an enterprise suite of applications including BPM? Best of breed solutions offer greater functionality but don't integrate as well as packaged solutions or enterprise suites.

- **Viability.** Is the vendor a startup or established player? If your organization is a leading-edge adopter of technology, a startup might be better, to gain a competitive advantage. If not, selecting an established player is the better route.
- **Partnering.** How much is the vendor willing to partner with your organization to ensure its success? Does it leave consulting to a third party or provide such services itself? How high do you have to escalate a problem within the vendor organization before you get a satisfactory response? Observing vendors during scripted demos, proofs of concept, and negotiations provides clues to their commitment to your success later on.
- **Service and Support.** Check references to find out the quality of the vendor's service and support. The vendor help desk can bail you out of tight situations, so they had better be good.
- **Pricing.** How flexible is the vendor pricing? Does it offer named user, concurrent user, role-based, or server-based pricing or variants of all three? Does it charge by server, CPU, or CPU clockspeed? The latter can be expensive if you upgrade your hardware. Are maintenance charges based on list price or net price? Does maintenance include all new releases and versions or just point upgrades?
- **Technology.** Does the established vendor need to upgrade its architecture to keep pace with advances in technology? If the industry spawns more than one startup with modern architectures and substantially lower prices, the vendor may soon get squeezed by its legacy technology.

Glossary

Active data warehousing. A hybrid data warehousing platform espoused by Teradata, a division of NCR, that supports both analytical and operational queries.

Agents. A rule-based engine that triggers a flexible set of actions in response to an event or exception condition, such as sending different types of alerts, querying data, or creating a workflow process to resolve a situation.

Alerts. Notifications sent by users or administrators that let users know when a metric exceeds predefined thresholds.

Balanced Scorecard. A strategic dashboard methodology defined by Professor Robert S. Kaplan and consultant David P. Norton using a balanced set of metrics across all facets of an organization that focus employees on the activities and tasks that will achieve strategic objectives and deliver lasting business value.

Business performance management. A series of organizational processes and applications designed to optimize the execution of business strategy. Includes Performance Dashboards as well as financial consolidation and reporting, forecasting, planning, and budgeting, among other things.

Business process management. Technology designed to automate and optimize business processes using modelling, work flow and middleware tools.

Corporate portal. A personalized Web interface to business content that people need to do their jobs. (Courtesy of Colin White.)

Dashboard. A visual display mechanism used in an operationally oriented performance management system that measures performance against targets and thresholds using right-time data.

Data. The output of source systems and applications, i.e., transaction data or text data.

Data mining. Also known as knowledge discovery in databases (KDD), data mining lets statisticians and skilled business analysts create models that automatically "mine" or discover patterns in the data and generate statistical models and rules.

Data mart. A data warehouse that focuses on a single subject area and is targeted to a specific homogeneous group of users.

Data model. The logical representation of how the business operates and its physical instantiation within a database management system.

Data warehouse. A repository of clean, integrated information culled from multiple systems that delivers information to end-users or downstream data marts.

Enterprise application integration (EAI). Middleware that integrates applications by transmitting events among applications in near real time.

Enterprise information integration (EII). Tools that query multiple, distributed data sources and join the results on the fly for display to end-users.

Extraction, transformation, and loading (ETL). Tools that extract, transform, and load data from source systems into a data warehouse or data mart.

Graph. A visual display of quantitative data that includes a scale, visible or suggested, along an axis of some sort. Examples of graphs are charts (e.g., bar, pie, line, scatterplots, and so on), histograms, sparklines, empire graphs, meters, gauges, and dials. (Courtesy of Stephen Few.)

Information. Transactional data that have been integrated or aggregated for analysis.

Key Performance Indicator (KPI). A metric measuring how well the organization or individual performs an operational, tactical, or strategic activity that is critical for the current and future success of the organization.

Lagging indicator. A KPI that measures the output of past activities, such as most financial metrics.

Leading indicator. A KPI that measures activities that have a significant effect on future performance.

Measurement. The result or output of measuring an object or activity.

Metric. The standard measurement of a known object or activity. For example, a company has a metric to calculate customer profitability and another that calculates customer loyalty.

Online analytical processing (OLAP). Gives users the ability to slice and dice information dimensionally. OLAP databases (also called multidimensional databases) store information dimensionally, whereas OLAP tools let users access and analyze those data.

Operational dashboard. A performance management system that delivers right-time information about core operational processes and emphasizes monitoring more than analysis or management capabilities in a performance dashboard framework.

Operational data store (ODS). A slimmed-down data warehouse designed to deliver rapid responses to short, operational queries, such as a request by a telemarketer for a profile of a customer who just called in.

Parameterized report. A report offering users pick lists or prompts that let users filter a report dynamically. Mimics OLAP and ad hoc querying to a certain degree.

Performance dashboard. A multilayered application built on a business intelligence and data integration infrastructure that lets users monitor, analyze, and manage performance using a dashboard or scorecard interface. Also called a performance management system.

Performance management system. An information system built on a business intelligence and data integration infrastructure that lets users monitor, analyze, and manage performance using a dashboard or scorecard interface. Also, a performance dashboard.

Query and reporting tools. Tools used by end-users to create their own reports.

Real time. The delivery of information about events as soon as they occur versus right time, which delivers information to users when they need it to make proactive decisions.

Report design tools. Tools used by professional developers or business authors to create custom reports.

Right time. The delivery of information to users when they need it to make proactive decisions. Right-time data delivery ranges from seconds to days or weeks, depending on user requirements.

Scorecard. A visual display mechanism used in a strategically oriented performance management system that charts progress towards achieving strategic objectives by comparing performance against targets and thresholds.

Spreadmart. A spreadsheet or desktop database created by a business user that functions like a surrogate data mart, containing unique terms, definitions, and rules that are not consistent with those used in other systems throughout the enterprise.

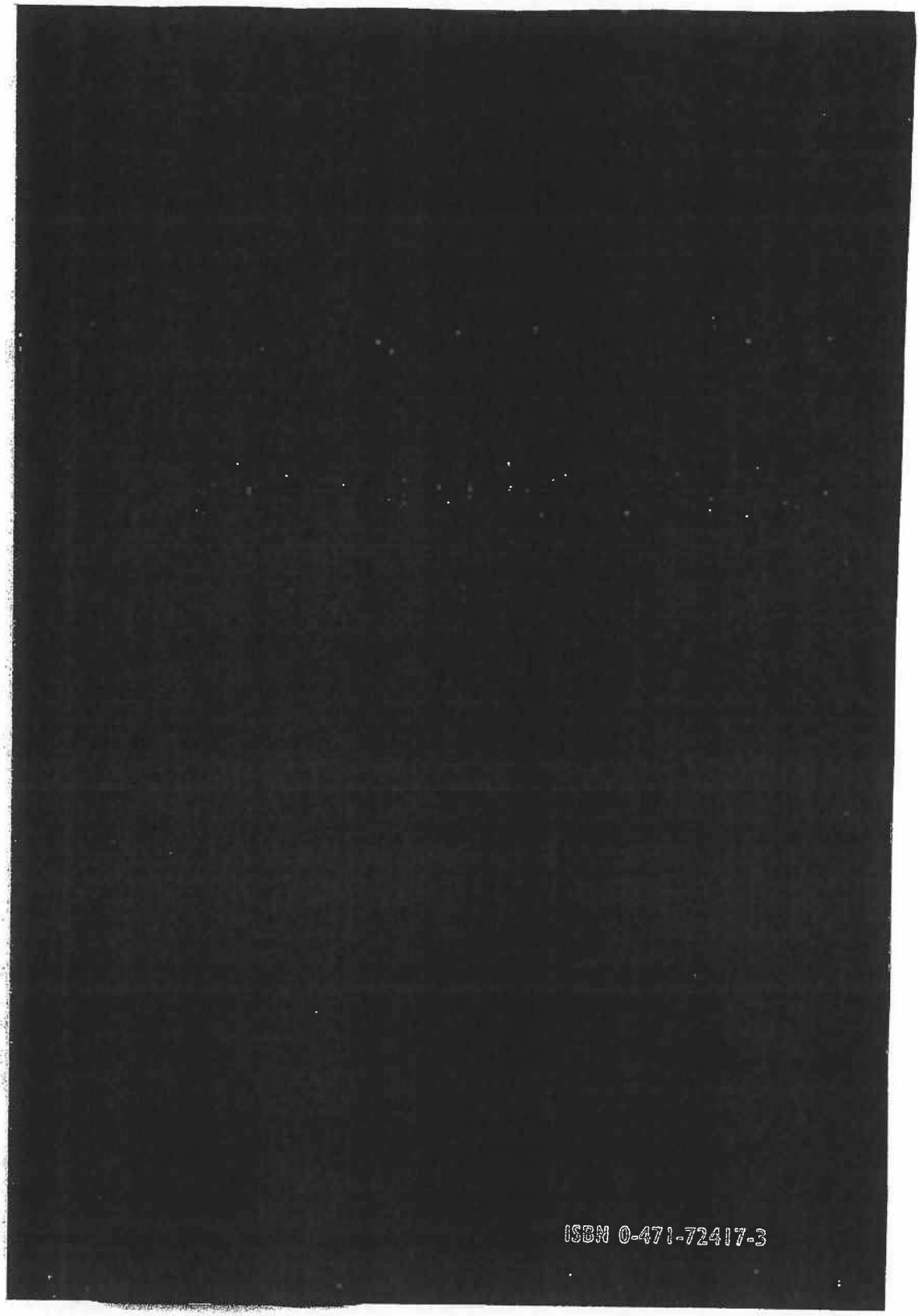
Strategic dashboard. A performance management system that focuses employees on the activities and tasks that will achieve strategic objectives and deliver lasting business value. It emphasizes management more than analysis or monitoring capabilities in a performance dashboard framework.

Strategy map. A tool used in a strategic dashboard or Balanced Scorecard to define linkages between strategic objectives and the measures that represent them. Used to both create and refine the organizational strategy and help executives test their assumptions about causal linkages between objectives and metrics.

Symbol. An image or shape that refers to something else. Common dashboard examples are colored circles, arrows, icons, and traffic lights.

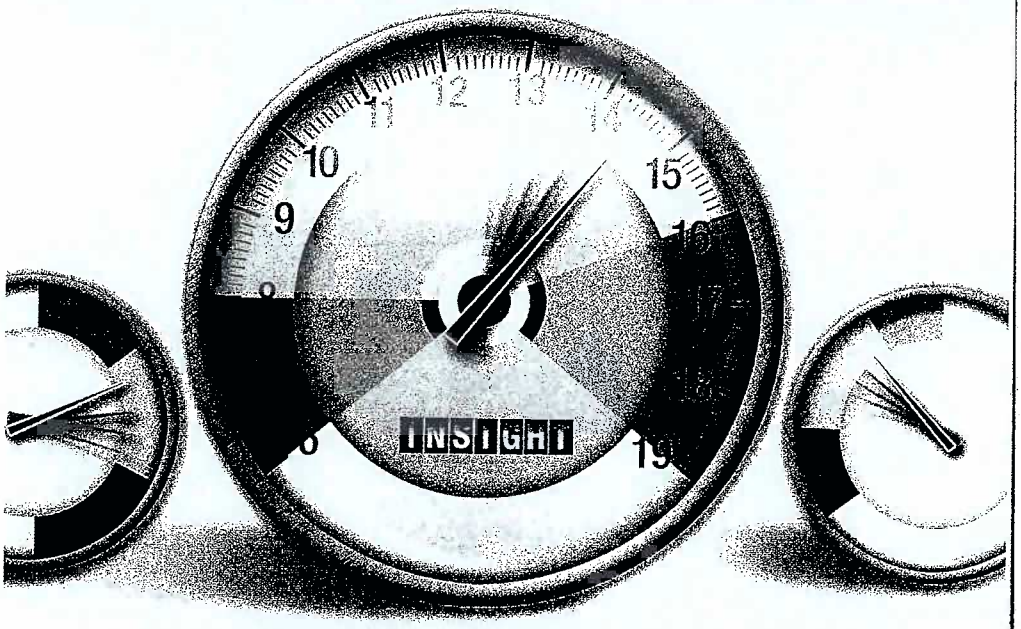
Tactical dashboard. A performance management system that lets managers and analysts track the progress of departmental initiatives and projects and analyze trends and issues. It emphasizes analysis more than monitoring or management capabilities in a performance dashboard framework.

Index



Marketing by the Dashboard Light

How to Get More Insight, Foresight, and Accountability from Your Marketing Investments



Marketing Effectiveness

By Patrick LaPointe

MARKETINGNPV®

www.MarketingNPV.com

A marketing dashboard can be your catalyst for success and credibility. But where do you start? What do you include? And how will you ensure that your marketing dashboard will add to marketing's accountability?

Marketing by the Dashboard Light: How to Get More Insight, Foresight, and Accountability from Your Marketing Investments gives you insight into planning, design, construction, and implementation of an effective marketing dashboard. And for those who already have one, *Marketing by the Dashboard Light* gives you the information you need to help retool and focus your dashboard for maximum effect.

More Praise for *Marketing by the Dashboard Light*

"This is the best practical guide to the dashboard and the marketing metrics that should appear on it. Every business person concerned with their sources of cash flow should read it several times."

Tim Ambler, Senior Fellow, London Business School, and author of *Marketing and the Bottom Line*

"Accountability is finally here. Tracking and measuring marketing and communication is finally possible and Pat tells you how."

Don E. Schultz, Professor Emeritus, Northwestern University, and author of *IMC: The Next Generation*

"I really enjoyed reading *Marketing by the Dashboard Light*. Its content is very useful and will certainly enable me to better assist our clients. Thank you for such a wonderful tool."

Greg Timpany, Director of Research, Wilkin Guge Marketing

Marketing by the Dashboard Light

How to Get More Insight, Foresight, and Accountability from Your Marketing Investments

By Patrick LaPointe

ISBN 0-9787211-2-8

www.MarketingNPV.com

Published in cooperation with the Association of National Advertisers.

To all the hundreds of people from whom I've stolen ideas and drawn inspiration over the years. I only hope you find this a valuable means of getting even with me.

Table of Contents

Part II

What Do We Measure? Choosing the Right Metrics for Your Dashboard

Acknowledgments

The first thing I need to acknowledge is that this book is a work in progress. It will never be finished.

Much like our broader exploration of measuring marketing effectiveness, the real learning is just beginning. True, we've been helped along (as the concepts here were) by some of the most brilliant minds in marketing today, including Don Schultz of Northwestern, Tim Ambler of the London Business School, Gary Lilien of Penn State, and Dave Reibstein of Wharton. Each has patiently shared his invaluable perspective and tools and tolerated the endless stream of "but if that's true then why ..." questions. More than 15 years out of grad school and I'm getting a second chance to work with this incredible faculty. It doesn't get any better than this.

We were also very fortunate to have had the opportunity to interview dozens of CMOs to help us understand what is working (and not working) in marketing measurement today. A few who generously offered their insights and experiences include John Costello (formerly CMO of The Home Depot), Becky Saeger of Charles Schwab, Jim Garrity of Wachovia, Joe Tripodi of Allstate, Larry Light of McDonald's, Anne MacDonald of Citigroup, Mike Winkler (formerly CMO of HP), Scott Deaver of Avis, Scott Fuson of Dow Corning, Arun Sinha of Pitney Bowes, and many others who shared their thoughts informally but contributed to our framework significantly. Thank you all.

And there were more than a few subject-area experts whose impact can easily be seen in the final product. First among equals in this category is Jonathan Knowles, brand strategist extraordinaire (and a

U.S. government-certified "alien of exceptional ability") whose creative and articulate views on brand measurement helped form the pillars of our brand scorecard strategy. Thanks to David Haigh for his thoughtful insight on brand valuation. Jim Lenskold gets credit for not only pushing the thinking behind marketing ROI techniques and process, but also for coming up with the title of this book. Jim Donius also deserves a note of thanks for testing our views on the integration of research and analytics, as Rick Watrall does for continually updating our understanding of integrated modeling in marketing decision processes. And finally, thanks to Beth Weesner of Marketing Transformations for help in refining our thinking about MRM technologies and their role in dashboard development.

I say "we" because I've had a tremendous amount of help in writing this book from friends and co-workers. Tina Anagnostis worked tirelessly to edit and re-edit both text and graphics. Lisa Holton contributed hundreds of hours as a valuable Contributing Editor. Nicole Shillingford kept the other wolves at bay so I could steal precious hours to think and write. Ruth Stevens tightened our thinking and writing. Noushin Nourizadeh made it all look great. And Jennifer Zipf meticulously managed the final editing, layout, and production to perfection despite my many failures to remain on schedule.

I would also like to thank the ANA, especially Barbara Bacci Mirque, for believing that the end product would be good despite long periods of silence on our progress.

And finally, I owe a tremendous debt of gratitude to my family for all the days and nights they allowed me to hide away in my office and write. Please don't ever let me do it again.

Introduction

"*I feel pretty good about all the measurement activity we have going on around here. We've got some incredibly bright people doing some very sophisticated things to determine the effect of our marketing investments. But I still don't feel we have developed any synthesis across those various ad-hoc efforts. We've got some great models, but they're not linked well to our equally great research. We're getting better — but we're not getting to a bigger picture, just getting better at drilling down into the smaller ones.*"

In the course of interviewing dozens of *Fortune* 100 chief marketing officers (CMOs) for this book, we heard that comment (or a close approximation of it) time and again. So often, in fact, that it would be unfair for us to attribute it to any single CMO, but rather to a majority of the group.

The early stages of marketing effectiveness measurement (and let's face it, we are still in the early days) have been characterized by great progress in quantifying the quantifiable. As an industry, we have made some terrific strides in measuring those things for which data is available. We've learned to build mix models to optimize media expenditures. We've reallocated resources across channels and products. And we've gone a long way in many industries to understanding customer-specific profitability and the ROI of individual marketing initiatives.

Yet as the quote above shows, there is still a hunger for answers to the BIG questions about marketing. Not the one that asks, "What is our ROI on that campaign?" (although that's important), but the one that answers the CEO question of, "Should I double my marketing investment or cut it in half?" Without the ability to view effectiveness

horizontally — across programs, initiatives, campaigns, segments, geographies — we are relegated to optimizing the current world view instead of creating new ones.

The reason we seem to be stuck in ad-hoc "measuredom" is that most of us have heretofore approached marketing measurement from a tools-and-data perspective instead of an organizational business-process view. The process of designing and implementing a *marketing dashboard* as described herein is intended to address exactly that error in perspective.

The creation of a marketing dashboard forces alignment between company goals and marketing objectives. Executed properly, it is a big step in giving your executive committee the financial and strategic transparency they've been demanding. Better measurement and better communication will give your department the freedom — and hopefully, the funding — to do more of what you do best.

The best marketing dashboards hone our instincts and intuition. They move talented people away from their dependence on past-performance data and change the orientation to look ahead to the horizon. They can be leading indicators to tell you when marketing initiatives are working, and quick-correction systems when they're not. In short, the dashboard delivers better marketing accountability, which translates into higher credibility.

It's all in how you build it.

A well-executed dashboard can make marketing effectiveness transparent to the CEO and the entire executive committee of your firm so they never again need to ask the question, "We gave you $5 million for XYZ project. What exactly did we get for that money?"

The process of designing and deploying a dashboard provides the discipline of what to measure and then conveys the performance on those metrics. In fact, done correctly, the focus of an effective marketing dashboard is more on where the next $5 million should go, not where the last $5 million went.

There is no "industry standard" marketing dashboard. There shouldn't be. Dashboarding is an evolving practice, especially in

marketing. In a few years, the best of the best will emerge to tell their stories at conferences around the world. But until then (and likely even after), the best dashboard in the industry is the one that best serves *your* organization.

A marketing dashboard needs to be a customized, relevant, context-specific tool that fits the learning style and unique business dynamics of your organization — from financial reporting requirements to data availability to channel structures to sales funnel processes.

A well-executed dashboard takes a thorough look at your marketing team — the strength of your staff, the data and metrics you depend on now, your alliances with other departments, and an honest assessment of how you communicate. As you'll see, the dashboard is merely the visual display of the machine's inner workings. You and your people are the machine.

This book is about building feedback mechanisms to gain more control of your marketing impact. It's about forming a solid foundation for learning that over time will enlighten the CMO and his or her team to get better at predicting and anticipating the potential impact of marketing programs, initiatives, strategies, or changes to the marketing portfolio.

Analytical methodologies will always be important to this process, and sound science can help to focus and magnify the effect of marketing creativity and instinct. But you create real value for shareholders and improve your influence among other constituencies when the analytics are implemented in the context of good organizational practices — structure, process, skills, and tools.

The right marketing dashboard puts the most insightful dials and digits in front of you in a package that's simple, informative, and illuminating — all at a single glance. It needs to be dynamic, and it needs to reflect how your marketing organization is working at any point in time, not six months ago or even two weeks ago.

That's why there really is no "one size fits all" available for this purpose. You design a dashboard to fit your need for understanding and insight — period. And while many software companies offer all sorts of prepackaged solutions, the best solution is *always* the one

that communicates most effectively the things that are most important to you. And that particular solution may come in the most modest, homegrown package.

Start Your Engines

Here's where your thinking should start. A marketing dashboard is an evolutionary journey. It starts best with a small set of key metrics and a limited number of drill-down page views. Initially, it may appear as a single page view that gets updated weekly and passed around in hard copy. Eventually, it can grow to become a real-time window into dozens of key metrics that update every second on your intranet. But right from the very start, it must be inviting, easy to use, and a solid fit with your learning culture.

Last but not least, your dashboard must tell you the most valuable information *right now*, not what you needed to know last week, last month, or last year.

And that's going to require some innovation.

But once you've finished with this book, you'll be armed with the necessary framework to design, build, and implement your marketing dashboard — resulting in more insight, foresight, and accountability for *and* from your marketing investments.

The most common question we get about the marketing dashboard is, "What do we measure?"

Read on. We're going to help you figure that out.

PART I

Planning the Marketing Dashboard: Setting Up for Success

CHAPTER 1

What Is a Marketing Dashboard? The New Way to Capture, Shape, and Improve Marketing Effectiveness and Efficiency

The dashboard of a car, a plane, even a video game gives you a lot of crucial information. How fast are you going? How far have you traveled? How much fuel do you have left? How hot is the engine?

A marketing dashboard provides you with the same up-to-the-minute information necessary to run your operation — sales vs. forecast, distribution channel effectiveness, brand equity evolution, human capital development — whatever is relevant to the role of marketing in your organization. An effective dashboard might focus on only three critical metrics or show the top 20. It could appear in your inbox monthly in the form of a nice color printout or be beamed over the company intranet first thing each morning.

The most useful marketing dashboard allows you to measure and manage your marketing effectiveness in ways you probably haven't tried. It will verify all the things that are working well. It will also shine a bright light on systems, projects, staff, and processes with the opportunity to improve. It will change the way you gather information while helping you to simplify the complex world of moving measurement targets. Most of all, an effective dashboard will focus your thinking and significantly improve the way you communicate it to others.

And yes, it just might reveal for all to see where the marketing investments are paying off and where they aren't. That's the tough part.

From what we see in many organizations, marketing — unlike IT, sales, or manufacturing — isn't always given the same credit by top

management for having a direct impact on the organization's bottom line. Certainly, marketing creates ideas and initiatives that drive growth. Though most CEOs would agree that marketing plays a role in the company's success, they just don't know how to quantify that role. This is what makes it so difficult to get incremental funding for marketing programs or even to defend existing funding when dollars get tight.

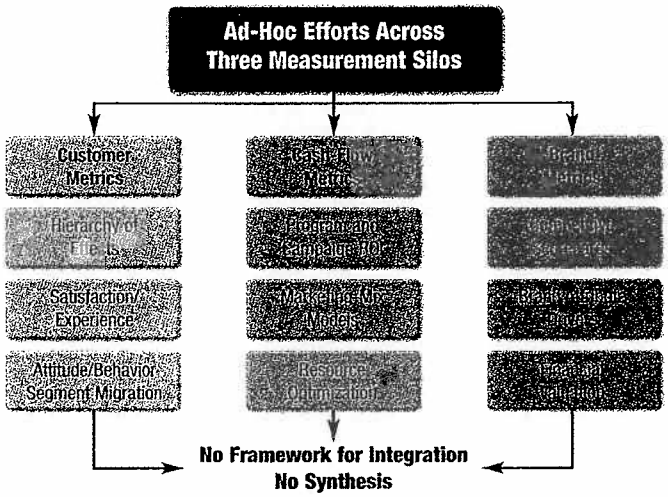
This is something a marketing dashboard can help change.

Many of today's marketing organizations have made significant strides in the development of sophisticated analytical approaches to improve marketing measurement. Ph.D. statisticians are now common in most large marketing departments, as are research departments, media-mix models, and models for assessing the return from a proposed initiative.

But what are they really measuring?

Figure 1.1 shows the three most common measurement "pathways" marketers are pursuing today.

FIGURE 1.1 — COMMON MEASUREMENT PATHWAYS



Source: Adapted from a model by Don E. Schultz, Ph.D. Reprinted with permission. Copyright © 2005 Agora, Inc.

The customer metrics pathway looks at how prospects become customers. From awareness to preference to trial to repeat purchase, many companies track progression through a "hierarchy of effects" model to track evolution of broad market potential to specific revenue opportunities. This customer pathway also tends to include robust attitudinal data on customer segments — why they want what they want or buy what they buy — which is often correlated with actual customer transactional data to create a robust segmentation model. The segments are then monitored for "mobility" — the directional progression of prospects/customers from one segment to a presumably more valuable one. In many B2B organizations, this customer pathway can go all the way to developing a customer-specific P&L.

The cash-flow metrics pathway focuses on efficiency of marketing expenditures in achieving short-term returns. Program and campaign ROI models measure the immediate impact or net present value of profits expected to be derived from a given investment initiative. Media-mix models use statistical regression techniques to identify which combinations of media placements, integrated media elements, and even copy executions generate the most profitable response from customers. And all of those inputs feed a focus on optimizing resource allocation in the context of generating near-term results.

The brand metrics pathway seeks to track the development of the longer-term impact of marketing through brand health. Survey-based tracking studies gauge customer and prospective customer perspectives on the brand — its functionality, personality, accessibility, and value propositions. Brand scorecards track the evolution of these perspectives over time within market segments and across multiple constituencies like employees, regulators, and community influencers. And many have taken the successful leap to develop financial models for estimating the financial value of the brand as a means of determining the aggregation of assets on the balance sheet as an outcome of marketing investments.

While most larger marketing departments have managed to build effective measurement systems within one or more of the three pathways, few have been able to synthesize across pathways in a manner that helps one pathway explain another or clarifies the predictive drivers of the business on a broader level.

For most companies, it's actually not possible to do this scientifically because it's not an econometric modeling problem solvable by equations and computers. Each pathway measures very different components of marketing effectiveness in very different ways. Some are shorter term and some longer term. Linking them algorithmically forces you to make some very large assumptions that may be unreliable in the face of actual marketplace dynamics. And even if you *can* solve it algorithmically, you will likely have to employ statistical techniques of such sophistication that no one in either marketing or finance will understand sufficiently to embrace and defend the method.

A marketing dashboard helps present the insights from all three of the pathways in a graphically related view that facilitates the human brain's incredible power to find subtle contextual links. This is the point where the "art" and "science" of marketing need to blend.

Most CMOs still struggle to close the gap and embrace the scientific measurement practices and the remaining "art" components that seemingly defy measurement in any reasonable fashion yet are highly correlated with success. As with most other aspects of business, the science enables greatness, but the application of imagination and innovation is what delivers it.

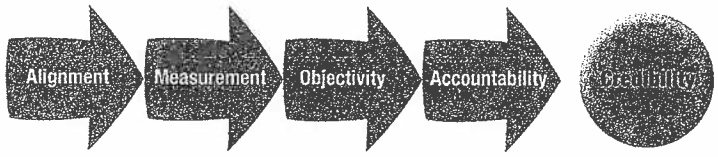
It is this very "art" component of marketing that requires the CMO to have the full confidence and trust of his or her CEO and the executive committee. To win this credibility, today's CMO needs to find ways of measuring risk that are transparent and understandable to all. If you want top management to accept the art you bring to the process, you have to do a better job of quantifying the chances for success. Only in the rarest organizations will marketing chiefs get by with the words "trust me." These days, leaps of faith come with pretty heavy price tags.

But credibility is a hard-won attribute that comes at the end of a long history of earned respect. As shown in figure 1.2, credibility:

- starts with demonstrated alignment with the rest of the organization on goals and objectives;
- builds with the implementation of an overall measurement framework based on as much scientific rigor as appropriate;

- expands through demonstrated objectivity and transparency of reporting results; and
- cements itself in a high degree of personal accountability.

FIGURE 1.2 — THE PATH TO CREDIBILITY



A marketing dashboard is an easy-to-understand way to illustrate to the rest of the organization your alignment, measurement orientation, objectivity, transparency, and ultimate accountability. In short, it puts credibility into a tangible, visible form.

How "Marketing" Has Outgrown the Marketing Department

> *A marketing plan is a clever device intended to arrest the intelligence of the chief financial officer just long enough to get the budget approved.*
>
> — Tim Ambler misquoting humorist Stephen Leacock[1]

In early 2004, the Association of National Advertisers (ANA) and consulting firm Booz Allen Hamilton undertook a study to examine the relevance of marketing, marketing departments, and CMOs (whether they operate under that title or another) in today's business climate.[2] Among the findings:

- More than 75% of marketers and non-marketers said that marketing has become more important to their companies during the past five years. But at more than half of all companies, marketing and the CEO agenda were reported to be misaligned.
- Higher expectations for marketing have driven nearly 70% of all companies to reorganize their marketing departments during the 12 months prior to the survey. Yet a major component of many

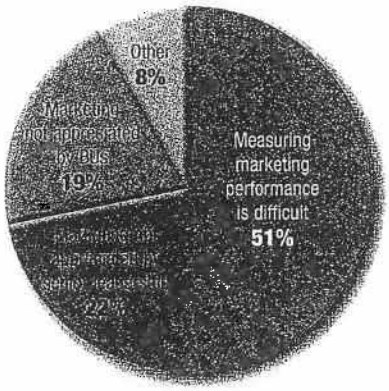
such reorganizations — the position of chief marketing officer — remains ill-defined.

- Measurable outcomes are now expected for marketing programs — 66% of executives say true ROI analytics are marketing's greatest need. But most companies are still using "intermediary" metrics — such as awareness — instead of working toward strong links to financial value.

The pressure on companies to find new sources of topline growth has placed a renewed emphasis on "marketing." Such traditional marketing-centric activities as creating new products or services, finding new markets, and maintaining and growing existing customer relationships are increasingly being shared across the organization in customer service, operations, manufacturing, and elsewhere. It's arguable that the company's marketing needs have outgrown the marketing department.

At the same time, the general business climate is demanding robust measurement and financial controls in all areas of the organization. In most organizations, this has shifted considerable decision-influencing power to finance. For marketing executives, this has been quite a wake-up call.

FIGURE 1.3 — REASONS FOR PRESSURE ON MARKETING



Source: ANA & Booz Allen Hamilton Study of Marketing Organizations 2004, ANA/Booz Allen Analysis. Reprinted with permission.

The problem is compounded by the fact that freshly trained marketing recruits from business schools get little if any preparation for the challenges they're most likely to face today.

> *One of the biggest problems with marketing today is found in the business schools, where finance majors spend the vast majority of their time in courses dealing primarily with manufacturing organizations — i.e., management of tangible assets. Few get exposed to the intangible value created in services or B2B, which is where you see the greatest need for alignment between marketing and finance today. Thus, MBAs can manage a factory but not a group of customers or a set of intellectual properties. And, they have no clue about how to deal with critical issues where finance and marketing come face to face.*
>
> — Don E. Schultz, founder of the Integrated Marketing Communications graduate program at Northwestern University and author of *IMC: The Next Generation*[3]

As competing divisions within the firm get more proficient in measuring their own initiatives and performance, they're seeking greater accountability and support from marketing. In many cases, division heads think, perhaps rightly, that they know the marketing function better than the marketers do.

That front-office conflict may be the smoldering fire sending you one or more of the following smoke signals:

- Nobody credits marketing with any specific impact on the bottom line.
- The budget cycle is a tension-filled fight to keep last year's spending levels intact and protect programs and headcount.
- Your CFO isn't buying your marketing-mix model or any efforts to link brand equities to profits.

Data-driven measurement of marketing is nothing new. Since the evolution of the marketing function in the 1940s and '50s, companies have always attempted to gauge the effectiveness of their marketing expenditures. In those days, the modest technology of the times

and the near absence of rapid media cost escalation or academic involvement led marketing executives to focus mostly on "intermediary" measures like awareness, preference, and other "researchable" variables.

Today, the Internet and the 24-hour information cycle have transformed the way buyers get information. Yet marketing measurement methods haven't adapted to accommodate these realities that have utterly changed the ways we do business.

Today, for better or worse, we face three driving forces:

- fast-changing technology that allows us to capture, warehouse, and analyze previously unimaginable amounts of data in near real time;
- rapid cost escalation in media and message distribution that requires us to re-educate ourselves and sharpen our expenditure patterns ruthlessly; and
- the broadening number of brilliant academics who are now focusing exclusively on the marketing discipline — even if they are driven by their own competitive need to get published, they are advancing mathematical science in marketing in some extremely innovative ways.

Do you feel you're in the loop with all of these developments? If not, you're not alone.

Marketing is dancing as fast as it can, but it's clearly not fast enough. Opportunities to gather data may be improving through technology and information-sharing, but the underlying skills and business processes of your people are probably not keeping pace.

How do you know if you're in trouble? Consider the following:

- Factions within your own marketing department are fighting for budget dollars and attention in a battle of politics and power. Note that these are people you *thought* should be working together.
- You have dozens or possibly hundreds of projects going, but no idea which ones are making the greatest financial contribution to your company's bottom line.

- No one can say for sure — least of all you — what the impact would be if certain key initiatives were dropped completely.

These are big challenges we're talking about. But by working to build alignment, instill measurement discipline, demonstrate objectivity and transparency, and promote accountability, the marketing dashboard might help you put these problems in turnaround. It is most certainly *not* a panacea to all (or even most) marketing ills. But in today's increasingly complex organizations, a return to focus, simple process discipline, and attention to only the most important goals should be paramount.

Today, we find ourselves at an inflection point in marketing measurement. For the first time, we really are in a position to measure what we should, not just what we can. That leaves us with a lot of choices. To make the right ones, marketers need a structure that allows them to learn and evolve quickly and efficiently.

What a Marketing Dashboard Does

There are five key benefits to employing a marketing dashboard:

1. A marketing dashboard aligns marketing objectives to the company's financial objectives and corporate strategy through the selection of critical metrics and sharing of results.
2. The marketing dashboard not only creates organizational alignment *within* marketing by linking all expenditures back to a smaller set of focused objectives, it clarifies the relationships *between* marketing and other corporate functional areas. It crystallizes roles and responsibilities to ensure everyone understands the interdependencies between departments or functions. The result of all this alignment makes it easy to see, if not directly measure, greater job satisfaction in a culture of performance and success.
3. The marketing dashboard establishes direct links between spending and profits. It uses graphical representations of crucial metrics in ways that begin to show, often for the first time, the causal relationships between marketing initiatives and financial results. It portrays historical data in a fashion that makes it easier for any corporate brain to grasp and understand the implications. The result? A better ability to make smart resource

allocations and increase both the efficiency and effectiveness of marketing spending.

4. It creates a learning organization that makes decisions on hard facts supplemented with experiential intuition, rather than battles of intuition punctuated by a few dangerous facts. The real benefit of this evolution is a dramatic reduction in time spent in highly politicized arguments. That speeds decision making.
5. It creates transparency in marketing's goals, operations, and performance, creating stronger alliances outside the department. This elevates marketing's perceived accountability to earn the trust and confidence of the CEO, the CFO, the board, and other key decision makers throughout the company.

Regardless of how sophisticated you are at measuring your current marketing efforts, the dashboard can make you better. It's a very accommodating tool. It benefits from, but does not require, a high degree of sophistication of analytics. It doesn't require that there be a robust IT infrastructure. It doesn't require any special skill set at all — other than the ability to determine what's important to measure.

The Basic Construction

Like all things worthwhile, creating a marketing dashboard is a fairly detailed undertaking with the potential for lots of moving parts. It will take three to six months to define the dashboard, identify its stages of evolution, map and secure the necessary data flows, test its design on the user community for feedback, and instill a sense of ownership.

Of course, you can always implement something fast and cheap quite quickly, but the purpose of the dashboard is to inform the key decision makers on the current and potential state of the business and help them make better choices. So as the old IT saying goes, "Garbage in, garbage out."

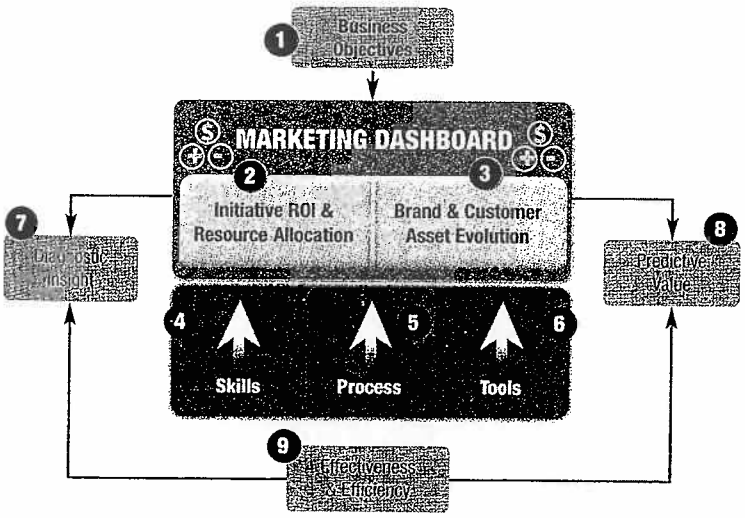
Every dashboard should be as unique as the organization it serves. Whatever physical form it takes, the dashboard's objective is to report succinctly and clearly on the progress marketing is making toward its defined business objectives. For a retailing chain, for instance, a dashboard might track how marketing is helping an

aggressive store expansion plan meet the company's profitability target while monitoring how well brand and reputation assets are laying the groundwork for new private label products. For a chemical manufacturer, the dashboard might focus on customer profitability segments and the velocity of movement through the sales funnel.

An effective dashboard is alive. It adapts and changes with the organization as objectives are clarified and redefined, as causal relationships are established between metrics, and as confidence in predictive measures grows. In short, about the only thing you know for certain about your first version of a marketing dashboard is that it will likely look very different a year or two down the road. And that is as it should be.

There are two primary goals of any dashboard: diagnostic insight and predictive foresight — with a special emphasis on the latter. Some dashboard metrics are diagnostic, looking at what has happened and trying to discern why. The most important ones you'll come to rely on are predictive, using the diagnostic experience to forecast future results under various assumptions of circumstances and resource allocations.

FIGURE 1.4 — THE MARKETING DASHBOARD



The marketing dashboard — in virtually any form — builds a way for you and all the people above and below you on the organizational chart to see what's working, as quickly as possible, forming a solid foundation for learning. Figure 1.4 shows the path to developing the dashboard.

A marketing dashboard is made up of the following parts:

1. **Business objectives:** Your starting point. These are the goals of the company, translated into a set of marketing objectives. All ideas and initiatives should be filtered through this prism.
2. **Initiative ROI and resource allocation:** An important part of the dashboard is measuring the incremental cash flows generated by marketing programs and initiatives in the near term. In addition, the dashboard is an excellent tool to measure the efficiency of resource allocation in dollars, headcount, or both.
3. **Brand and customer asset evolution:** At least equal in importance to the short-term results is the longer-term evolution of the corporate assets entrusted to marketing — most often including the brand and the customer perceptions/relationships. The dashboard can provide a read of how the assets have been growing and how they are likely to progress.
4. **Skills:** A well-rounded dashboard tracks the skills and competencies of the marketing team against a clear set of proficiency goals.
5. **Process:** The dashboard also provides insight into the execution of critical business processes required to deliver on the desired customer value propositions.
6. **Tools:** Less a metric than an enabler, successful dashboarding employs and continuously refines tools to increase insight and reduce effort in both producing and distributing it.
7. **Diagnostic insight:** The dashboard must push beyond portrayal of *what* is happening to *why* it is happening, providing insight into where prior expectations were inaccurate to help hone the process of setting expectations and forecasts for the future.
8. **Predictive value:** The difference between a helpful dashboard and a truly effective one is the degree to which it uses the diagnostic insight and predicts what is *likely* to happen on critical performance dimensions absent intervention.
9. **Effectiveness and efficiency:** The end goal — enhancing both the efficiency and the effectiveness of marketing investments,

thereby improving the ROI and the NPV (net present value) for the firm.

A Few Important Considerations

One of the key traps for dashboard builders is a tendency to overlook the dynamic nature of their macro environment and focus too much on the "within the walls" corporate issues. That's like building a measuring device for what you already know. Dashboards that reflect the "outside-in" perspective are much more likely to be insightful than those limited to the "inside-out" perspective. Identifying and closely monitoring external factors likely to cause significant changes to the business is what makes a dashboard dynamic. Building an addiction to this type of information in your organization is critical.

Another trap is the tendency to fill the dashboard with too many "intermediary metrics" — those that tell marketers something about program effectiveness, but stop short of linking that effect to financial or strategic results. The easy choices often involve brand awareness, trial, and customer or prospect preferences and intentions. Absent some mechanism to translate these intermediaries into financial or strategic value, they are best left to the drill-down pages of the dashboard, which we'll discuss in greater detail later. If you lead with what you can most easily measure, you're just going to reinforce for top management that your nifty little device is nothing more than a more graphical way of "spinning" the same old marketing mumbo jumbo.

Finally, dashboard effectiveness should be defined in terms of the degree to which it is embraced throughout the organization and adopted into the decision making of the key influencers of company strategy and resource allocation. In other words, you want the percentage of senior executives who both believe and understand what the dashboard is presenting to be very, very high.

While you can be successful with a dashboard solely targeted to the marketing staff, its real value lies in your ability to share it with all the marketing stakeholders that exist outside your department. You definitely want to sell it to your CEO and CFO, but there are probably other executives in the company who may think they know your job better than you. Include them in the mix and impress them with your ability to lead the discussion.

CMO VIEW: STARTING THE PROCESS

Rebecca Saeger
EXECUTIVE VICE PRESIDENT, CHIEF MARKETING OFFICER
The Charles Schwab Corporation

I've been here through a period of great change. We've changed CEOs — Charles Schwab has come back to run our company — and we've all gone through a real cost-leadership exercise. So, the microscope has definitely been on marketing.

I do think that there has been a strong belief here that marketing, particularly direct marketing, drives the business. But at the same time I found that we have more data than we could possibly use. So, if someone were to ask a question like, "How is such-and-such working?" five people would come out of the woodwork, each with a different answer from a different perspective.

We had programs that were measured based on response rates based on advertising. We had programs that would be measured based on a predetermined ROI goal. We had programs that weren't being measured at all. It was really kind of all over the place. I think that part of it is that we are in an industry that's been evolving at the speed of light over the last few years. My focus has been on trying to get some sense of alignment from business objectives down through marketing execution, really getting people to understand the thread that ties those things together.

And we have developed some tools — not a dashboard per se, but a marketing planning tool that accounts for every marketing program we have. We plug in objectives, costs, NPV projections and what spits out the back end is how we are doing based on where we are in the life of that project. This way, we can say what worked, what didn't, what paid out, and what is on schedule to pay out. Our system is evolving, but it's grounded in analysis of where we will make the most money. If the profitability proposition isn't there, it doesn't get marketing dollars. We have a corporate target for marketing spend and juggle it through the planning process to see who gets what based on corporate objectives. It's portfolio management, really.

We are in the process of developing a dashboard right now, with an emphasis on using it as a management tool and not just an ad hoc reporting structure. Our first objective is to make it a diagnostic tool

that gets everyone looking at the same numbers at the same time. We're not going to build some multimillion-dollar online dashboard; we're just trying to wrestle the data into manageable sets of metrics.

Part of our process is involving our business-leader partners in helping identify the right things to measure. We have a retail marketing and sales council that meets biweekly. It consists of the executive who runs the retail business, the one who runs the sales channel, the one who runs the customer segment business units, myself, and our CEO. We are in the process of developing the dashboards that we need to look at every couple of weeks so we can tell if we really got our money's worth on what we spent on marketing.

To a large degree, it's a question of accountability and trust building, not just at the CEO level, but with my peers across the organization. Once you have established that accountability where people know that you're clearly focused on the same things as they are and you're making every effort to measure the effectiveness of your allocation of the resources, they're a lot more open to how you can contribute to help their part of the business.

I've known several senior marketers who were not as willing to be open with the rest of the business and not very trusting people. But when I look around the table with the management team, nobody there wants to see anyone fail because we are all in this together. Once they trust that you are listening to them and aligned with what they're trying to do, they are more open to hearing your point of view about your own area of responsibility. So, when I say to them, "Guys, this is what we need to do with the advertising" or "This is what we need to do with this customer segment," they are more likely to take our recommendation. That's not to say that I can just walk in and ask for $20 million because I want it. But if I have a good case, it gets consideration at a level where they're not doubting that the $20 million would do what I say that it would, but only deciding whether that's the place where the company really needs to spend $20 million right now.

Where will we be in a year? I think we are going to have a really aligned management team within the firm and within our marketing organization too. Top management will be consistently looking at the same metrics around the business and I am excited because I think we are going to be looking at the brand as a business tool much more aggressively.[4]

Conclusion

Creating a marketing dashboard is neither fast nor easy. It requires taking a hard look at your organization, your processes, and the often-harsh perceptions others in your organization have of what you're doing. The payoff comes when you create a predictive system of measurement that's easy to understand, revolutionizes your operation, and creates credibility with senior staff.

The marketing dashboard is also a way to refresh or blow up the measurement systems you've been using for years. The drive to create a simple, at-a-glance picture of how your marketing initiatives are creating value for your organization will shine a light on all your processes and results. It's a risky move, but one worth taking.

Sources

1. Ambler, Tim, Senior Fellow, London Business School.

2. ANA (Association of National Advertisers) and Booz Allen Hamilton, "Are CMOs Irrelevant? Organization, Value, Accountability, and the New Marketing Agenda," 2004.

3. Schultz, Don E., Professor Emeritus, Northwestern University; President, Agora, Inc.

4. Saeger, Rebecca, The Charles Schwab Corporation.

CHAPTER 2

See the Road Ahead ... Where Are You on the Ladder of Insight?

One of the best things about a marketing dashboard is that the very process of building one can help establish greater financial and measurement discipline in your organization. It can give a marketing department with little or no infrastructure a way to start and a moderately sophisticated one a path to evolve with a way to pinpoint problems and hidden successes as never before.

Think of it this way: In training to become a pilot, you first learn to fly a single-engine propeller plane in clear skies so you can see everything around you. Eventually, you graduate to multiple engines and flying "by instrument," which allows you to fly at night and in low visibility.

The instruments are intended to keep you oriented and level when your instincts might otherwise mislead. Any pilot will tell you that learning to trust the instruments is a difficult thing to do at first, but once you do, you find yourself free to enjoy the flexibility and feedback they offer. You stay on course more often and get where you're going faster and more efficiently.

Running a marketing department these days is increasingly like learning to fly on instruments. There are so many data points to consider, so many potential obstacles, so many other marketing messages crowding the airwaves and mailboxes, and, of course, so many "false horizons." By necessity, most marketing professionals have had to evolve toward the use of carefully designed instruments to keep on course when the sheer speed of business begins to outpace their instincts.

So what are these instruments and just how are marketers using them to their advantage? The answer depends on the nature of your industry, your company goals, and the level of sophistication you're starting from. While a single book isn't a great place to dive deep into specifics relative to any single industry or company culture, it can be helpful in describing the spectrum of sophistication that exists across companies.

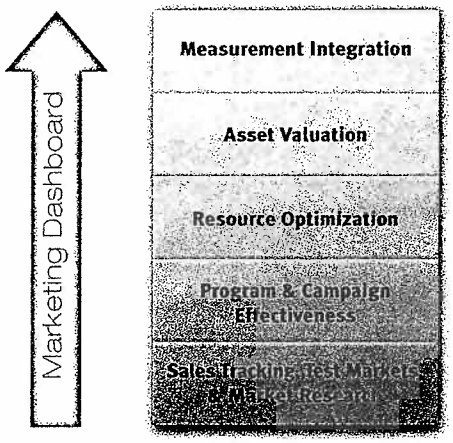
In this chapter, we're going to examine the evolutionary process of marketing departments in their quest for knowledge about the return on every marketing dollar spent. To do so, we use a framework called the "Ladder of Insight," sort of a Darwinian evolutionary chart of where marketing organizations often find themselves on the road to better measurement. Understanding where your company is on the ladder helps you see the starting point for your dashboard, as well as the road ahead. In other words, it gives you a clearer context for the direction you want your dashboard to take you in.

Climbing the Ladder of Insight

We use a ladder as a metaphor to suggest that as you climb higher, you get better visibility and perspective. It also seems appropriate to think that people in the organization will increasingly look up to you and welcome your leadership as you climb higher.

There are five distinct levels on this ladder:

FIGURE 2.1 — THE LADDER OF INSIGHT



Level 1 — Sales Tracking, Test Markets, and Market Research

This is the baseline level. Marketing results are tabulated by product/market/region/channel and reported at least monthly.[1] More often, they might be reported weekly or daily and occasionally in real time. The only correlations between marketing activities and business results are measured by the incremental reported sales in selected test markets vs. matched control markets. In fact, many are still not using matched control markets, but relying on the dangerous practice of looking at pre-/post-measures in the same geography, which are risky due to the inability to accurately read the effect of the marketing stimulus from the rest of the potential variables.

At this first level, market research is used to regularly measure customer and prospect awareness, brand perceptions, purchase intentions, and maybe even share of market.

Level 2 — Program and Campaign Effectiveness

At this level, the CMO requires that select new programs and initiatives are presented with an expected return based upon their anticipated incremental profit contribution (after accounting for fully loaded costs).

This forecast return is compared to alternative opportunities the company has at the time, and the decision to commit or abandon is made based upon allocating budget dollars to achieve the best outcome. While in progress, these initiatives are regularly reassessed at each point that another round of discretionary expenditures are required. When they have run their course, the programs are subjected to a final measurement and studied post-mortem for learnings and insights into future opportunities for improvement. Note that at this level and the next, programs and initiatives intended solely to enhance the customer and prospect perception of the company or brand (e.g., brand advertising, sponsorships, community relations) are often excluded from the analysis. Why? Because their impact is difficult to quantify in terms of dollars, and their contributions generally accrue over an extended period of time.

Going from Level 1 to Level 2

If you got these basics down, you can reach further by taking the following steps:

- Begin to assemble sales and margin data in an accessible format with frequent refreshment. You might want to ask IT to help assemble a "data mart" that you can access directly and use to export data into desktop applications like Excel.
- Set up job-cost accounting so expenditures can be tracked back to specific initiatives.
- Work with finance to adopt a flexible modeling approach to measure the effectiveness and efficiency of campaigns and initiatives built on agreed definitions of gross margin, contribution margin, pre-tax profit, and net income. Also agree on rates for cost of capital and target ROI hurdles. Secure their help in developing these analyses — finance should see these metrics and agree on the methodology long before it's time to pass judgment on them.
- Begin requiring that all new programs, campaigns, or initiatives with expected completion timeframes of six months or less submit an ROI analysis to get funding approvals. Then match each initiative's forecast with a post-analysis reflecting actual results. Use gaps and differentials as the basis for model refinement and calibration, and continue training of individuals and the team as a whole.
- After the first six-month cycle, institute quarterly assessments of projects midstream and introduce interim assessment methods to re-examine the project commitment against possible changes in the investment opportunity horizon.
- Resist the temptation to reward highest ROI initiatives in favor of rewarding managers visibly for support of and adherence to the forecasting system. That way you keep the emphasis on applying the process correctly, not just on getting the highest ROI score — a pursuit that could encourage managers to win by not spending as opposed to spending wisely.
- You might consider installing campaign management software to help standardize tracking and reporting. This is

particularly helpful if you are running dozens of concurrent marketing campaign initiatives or customer promotions.

- Begin correlating market research data on awareness, brand equities, purchase intentions, etc., to financial results like sales and gross margins. Chart the factors together on the same graph and look for patterns over a period of time. Manually overlay significant events you're aware of, such as competitive activity, regulatory activity, macroeconomic and geopolitical events, etc., on the same chart to help discover any possible relationships between the events and the results.

Level 3 — Optimizing Resource Allocation

Once the discipline of financial assessment is adopted across most individual marketing initiatives, the entire "portfolio" of possible initiatives competes for scarce budget dollars on the basis of forecast returns. This comparison may be performed monthly or quarterly to allow resources to be reallocated as market opportunities and threats change. Optimization techniques are used to solve for the highest possible return in terms of media mix, segment emphasis, and channel management.

At this level, highly evolved marketing leaders will take the additional step of requiring that all initiatives be presented with a risk-adjusted forecast so their true potential can be better assessed. Inflating or "padding" the expected risk-adjusted return of any given initiative becomes difficult, perhaps impossible, since flawed assumptions are likely to be uncovered in the very first progress review, if they aren't during the initial risk assessment.

GOING FROM LEVEL 2 TO LEVEL 3

If you're already confidently operating at Level 2, here are a few steps to help you progress further:

- Continue to invest in your data mart, making it more comprehensive and accessible. Consider adding an analytics package to help standardize access to data and ensure that comparisons between programs and initiatives are done on an apples-to-apples basis.
- As you increase the percentage of total marketing spending subject to the financial analysis process, work with accounting to devise a reasonable method of overhead allocation to each project or initiative. Involve team leaders in defining overhead and establish rules for which projects get an allocation and which don't.
- Introduce and train the team on the use of risk assessment tools to become part of each project-funding request. Require that all forecast returns be risk-adjusted and make larger projects subject to peer review to accelerate standardization of the risk assessment process.
- Apply optimization techniques to allocate limited funds between programs, customer segments, channels, acquisition vs. retention, media mix, or other areas where "necessities" or "opportunities" exceed available resources in the near term.
- Begin to measure and monitor correlations of interdependence between various marketing activities to ascertain which programs are complementary and which elements of multifaceted initiatives are most directly related to the results.
- Refine and test correlations among branding initiatives, strategic factors from earlier stages, and financial results to improve predictive/explanatory relationships.

Level 4 — Asset Valuation

At Level 4, the department is comfortable with its ability to measure short-term incremental cash flows generated by marketing initiatives. Now it turns its attention to the more challenging questions of measuring the financial return on expenditures principally designed to enhance brand assets (company/brand awareness, appeal, and

preference) or customer assets (customer value, customer lifetime value, or customer franchise value). This is where the relationship between CMOs and CEOs could get dicey.

The challenge here is that many such efforts in this category are only intended to increase the *likelihood* that a customer or prospect will purchase or repurchase from the company again, not to specifically "ask for an order." Also, most corporate or branding initiatives are part of integrated programs that stimulate particular purchase activity, so it's tough to come up with an overall success measurement for a branding program.

Marketers at Level 4 are making the effort to identify the measurable outcomes of such activities over time (i.e., awareness, brand preference, pricing power, etc.) and correlate those intermediary measures with expected financial benefits in both the near and long term. Most continuously track these key metrics and use statistical techniques to monitor their correlation with sales, gross margins, profits, and "goodwill" that contributes to the company's value as a whole.

It's important to recognize that companies operating at Level 4 didn't develop these skills overnight. They achieved this level of success through a consistent approach that led to reliable correlations between market metrics and financial value. Further, the exact formula used is less relevant than the fact that one was agreed to by marketing, the CEO, and the CFO, and that any evolution of it has been done with careful attention to maintaining historic reliability.

Key Questions That Inevitably Arise at Level 4

Q: What good is a consistent measurement methodology in an increasingly discontinuous world where competitors enter and exit the market freely, and technology reinvents communication and distribution channels annually?

A: The benefit is not so much the measurement algorithms themselves, but having a methodology to use as the basis for comparing and a process to guide the consideration of applying, adapting, or replacing it. This will minimize the risks of reacting on instinct to changes that might appear to be more or less threatening than they really are. A

dashboard serves much the same purpose, by encouraging the long view and putting specific market-altering events in context. It helps improve the quality of perspective when decisions need to be made.

Q: Is it fruitless to try to prove with financial analysis the benefit of long-term brand-building activities?
A. No, it's fruitless to resist. If you can't do it, the company will eventually bring in someone who can. Besides, the question is rarely a referendum on brand building. More often, it is raised in contemplation of cutting or increasing the budget for it. Without a sound measurement methodology to help forecast the implications of those scenarios, the answer will usually be to cut.

Q: Is the question of long-term brand-building effectiveness related to the quality of creative advertising?
A. Clearly. But how many times can we blame a lack of results on "bad creative" before we either admit that brand advertising has too high a risk factor or *change the way we go about developing advertising?*

GOING FROM LEVEL 3 TO LEVEL 4

Having laid the groundwork in Levels 1 through 3, correlations must be made at this point between pure branding or "corporate marketing" initiatives and financial results:

- Engage research, planning, and finance teams to work together to explore the correlations between branding expenditures to increases in profitability, even though they might be on a time-delayed basis.
- Charter — or shadow — the same teams to evaluate changes in the market value of the company relative to comparable benchmarks to see if there is a correlation to branding activities.
- Absent any clear determinations in either case above, your CMO, CEO, and CFO must discuss the strategic benefits of continuing branding or corporate activities and decide if they should be held to a stand-alone measurement standard, allocated against other marketing activities, or continued

for "qualitative" reasons. Regardless, the agreed methodology ultimately forms the basis for the brand scorecard section of your marketing dashboard (see Chapter 6).

But be forewarned. An agreement to a "qualitative" rationale for continued branding activities almost always leads to subsequent budget battles over intuition-driven assessments of ad copy. Informal agreements within the executive team can be quickly forgotten with the first market tightening or change at the executive level.

Level 5 — Measurement Integration

Here, at the top of the ladder, all marketing activities are planned and measured in an integrated framework that takes into account both short- and long-term return.

To accomplish this, companies take an approach that weighs financial efficiency and productivity measures like ROI and NPV against strategic effectiveness metrics like market share, customer retention, satisfaction, employee satisfaction, and others.

Others adopt a more financially driven model such as Economic Value Added (EVA®), in which the cumulative effect of marketing for the period in question is measured by determining after-tax incremental profits from marketing expenditures (aggregated from Level 2, 3, and 4 activities and modifying certain assumptions about expenses vs. depreciable assets). The result is then found by subtracting the benchmark rate of return on the capital deployed.

A few major multinationals like Diageo and Unilever have gone so far as to integrate their far-flung operations into a common measurement structure that allows corporate resource allocation not only by product category, but also by market.

Regardless of the differences in measurement methodologies, the common traits of companies who have reached this highest level include:

- goals and objectives are set (and periodically revisited) using very specific, quantifiable metrics;

- measurement has been integrated into the planning process upfront and is employed through each activity's lifecycle, not just at the end;
- all expenditures are evaluated in the context of maximizing the overall outcome since management compensation (at the VP level and above) is tied to delivery at or above goals;
- the measurement is done at all levels by all marketing managers and integrated into their daily responsibilities, not assigned to a dedicated analysis group of "measurement police"; and
- measurement is structured with the business focus to meet the needs of the CEO, the CFO, and possibly the entire executive committee.

GOING FROM LEVEL 4 TO LEVEL 5

The path beyond Level 4 is largely dependent upon the degree to which a company can confidently measure the benefit of its branding and corporate activities in financial terms. Companies that cannot make that link, yet choose to continue the branding, can consider more of a "balanced scorecard" approach to building a dashboard that integrates hard (e.g., financial) and soft (e.g., awareness and perceptual) measures. Other important considerations include:

- Focusing on just a few top-level objectives, making sure that all are quantified in terms of what is to be achieved, the magnitude of achievement desired, and deadlines (e.g., increase brand preference scores by 15% within 12 months).
- Align all marketing activities with one of these few scorecard elements so relationships can be clearly defined and measured.
- Design compensation and recognition programs for marketing team leaders to reinforce their relationships to specific scorecard elements and also the balance of team goals.

Companies that *can* quantify the financial benefit of branding or corporate marketing activities can apply the same assessment methodology or metric for all marketing expenditures:

- Translate the expected return from brand or corporate marketing initiatives into these common metrics.

- Allocate and reallocate resources regularly, optimizing the desired balance of short- and long-term results.
- Link management compensation directly to incremental improvements in the selected metric(s).
- Integrate marketing expenditure requests back into the corporate resource allocation process using the same metrics as IT, HR, or manufacturing.

Questions You Should Ask

So now that you have a sense of where your organization stands on the Ladder of Insight and how to climb higher, ask yourself a few final questions to guide the ascent.

1. **What are your true objectives?** How will the marketing department and the company as a whole benefit from this evolution? Can you quantify this benefit to help gauge the potential return on the investment you will make in achieving it? If even a broad-based cost/return effort evades you, you might need some outside help to avoid false steps that have big costs in terms of credibility.
2. **How broad is the commitment to improvement?** Is this an effort championed by marketing with active support of its CEO and CFO? Or is it another challenge thrust upon you by top management that you'll try to respond to so you can get back to your real work? Unless the CMO, CFO, and CEO are enthusiastically supportive of an agreed set of objectives along with a process and timeline, there will be disputes over methodology, parochial resource defense, and mixed messages sent to the troops. And the troops have to do the heavy lifting.
3. **Speaking of the troops ... how are their skills?** Do you have the change-leaders within your current marketing organization to help you succeed? Can they drive toward higher levels of achievement?

The answers will help you frame a more realistic plan for improvement and set clearer expectations both within and beyond the marketing department.

CASE STUDY

HILTON HOTELS — USING THE BALANCED SCORECARD AS A FOUNDATION FOR THE MARKETING DASHBOARD

Hilton Hotels Corp. adopted the balanced scorecard in 1997 and made it the foundation for translating its corporate strategic vision to marketing, brand management, and operations. That framework has allowed the hotelier to reach out to its hotel guests, company shareholders, and employees as never before.

It has also served as the starting point for a simple yet effective scorecard that tracks both hard and soft metrics to provide as complete a picture as possible.

Hilton has an annual business-planning process that links its business strategy with critical tactical actions. Each key performance indicator (KPI) on the scorecard is derived from and aligns with one of four value drivers. There are eight KPIs. Some are diagnostic lagging indicators that show the outcomes of a strategy employed. Others are more predictive lead indicators that help modify marketing execution to take advantage of future opportunities.

Each of the KPIs is reported as a numerical score, which is why this is more of a scorecard than a dashboard. However, the use of three color zones — green (shown in figure 2.2 in light blue) indicating performance at or beyond the goal, yellow (shown in gray) signaling results slightly below the goal, and red (shown in dark blue) flagging performance well below the goal — increase the graphic absorption potential, making it a much more effective structure overall.

By communicating results visually to show strengths and weaknesses, marketing can clearly see how it is performing on its objectives and where to focus its efforts, not to mention its resources. In this case, it is clear that Hilton needs to address both the widespread problems at Hotel E, as well as the overall poor scores on the mystery shopper program.

To assist in identifying areas of potential value growth, customized priority reports identify the key drivers of customer satisfaction upon which marketing and its colleagues in other departments should focus. This helps the organization concentrate its efforts on the elements of a Hilton stay most important to guests.

Hilton puts a priority on improving its strategies, business processes, and balanced scorecard toward ensuring that its stated value drivers adequately describe how the company can best meet its corporate goals. Continuous improvement of the Hilton balanced scorecard, nicknamed STP for Situation-Target-Proposal, is a multiphase process for determining a course of action.

FIGURE 2.2 — HILTON PERFORMANCE DASHBOARD

					Revenue maximization		Value proposition			
Rank	Rating	Property	Brand standards compliance	Operational effectiveness (EBITDA)	Room RevPAR*	RevPAR* index	Guest comment cards	Customer-satisfaction tracking study	Team-member survey	Mystery shopper
1	6	Hotel A	100%	$20,730	$123.77	123.7	6.36	6.20	80%	94.91%
2	6	Hotel B	100%	8,065	$73.15	106.4	6.35	6.09	75%	91.32%
3	5	Hotel C	100%	2,584	101.12	103.8	6.30	6.04	81%	89.84%
37	3	Hotel D	95%	16,252	93.59	99.9	5.73	5.10	69%	85.31%
51	0	Hotel E	95%	3,055	88.17	94.0	6.08	5.68	67%	88.67%

Significantly short of goal (red zone) | Less than goal (yellow zone) | Meets or exceeds goal (green zone)

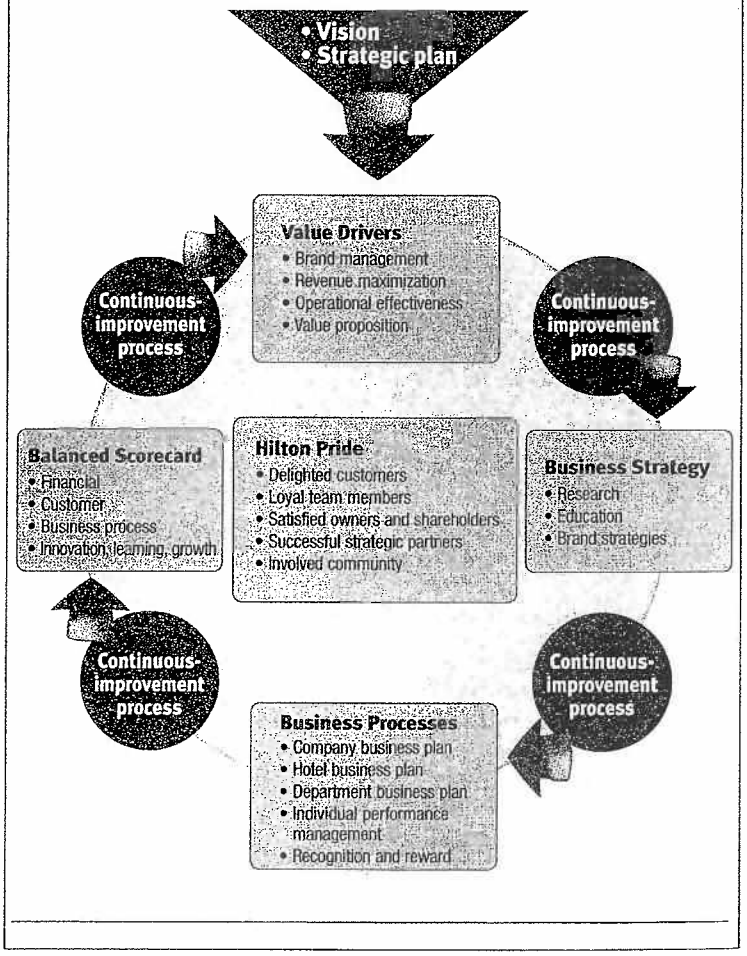
* Revenue Per Available Room

Although the power of the Hilton brand attracts guests to the properties for their first stays, sustainable, long-term profitability relies on customer loyalty. Using the balanced scorecard, Hilton was able to deliver a 3% higher profit margin than other full-service hotels. Between 2000 and 2002, this translated to a 100% increase in stock price.

Non-financial measures such as customer satisfaction, likelihood to recommend Hilton, and likelihood to return to Hilton have improved as well. Hilton has bettered the price-value relationship at its properties while raising its room rates, so guests have not fallen away from the brand despite increases to the cost of their stays.

At a strategic level, use of the balanced scorecard also has increased brand equity by reinforcing quality control of the Hilton experience. These diagnostic successes meant that Hilton Garden Inns, from launch, could command premium rates over competitors.[2]

FIGURE 2.3 — HILTON VALUE CHAIN



CONCLUSION

So, where are you on the Ladder of Insight? Using this framework, you can begin to look at the next steps up the levels of measurement proficiency so you can identify which stage your company is in and what the next steps up the Ladder of Insight might look like. That perspective will help you envision what you want your dashboard to do for you and allow you to map out the stages of progression you would like to see it go through over time.

Seeing the road ahead will help deliver a more practical dashboard that's equipped to take you where you want to go, not just show you where you are today.

Sources

1. *MarketingNPV Journal*, vol. 1, issue 2.

2. *MarketingNPV Journal*, vol. 1, issue 6.

CHAPTER 3

Align Your Dashboard Right from the Start

Most of us have a pretty keen ability to look backward and know where we've been. Many of us have even advanced that skill to be able to look around and know where we are at the moment. But knowing whether you're on track for where you expect to be six, 12, 18 months from now ... that's something only a very few managers have mastered.

Today, marketing reporting, and to some degree financial reporting, is primarily a function of gathering sales data at the end of a reporting period, massaging it into charts and graphs, and then circulating it for discussion or comment. And for most, even this is no small accomplishment.

This diagnostic approach is rooted in the instinctive human learning method of interpreting past experiences to frame future expectations. At best, that process is effective at helping the organization see where it's recently been. Only through very intuitive methods do companies attempt to project the trajectory of performance into the future so they can manage to the desired outcome. And only a very few managers possess the innate (or artistic) ability to properly view diagnostic information and project it with reasonable accuracy, overcoming their own perceptual filters and assimilating the collective wisdom of their entire team.

Add to that the marketer's DNA being built more historically on spending money than making money and you can understand why marketers have very well-developed rear-view skills.

This is the fundamental human frailty dashboards are designed to overcome.

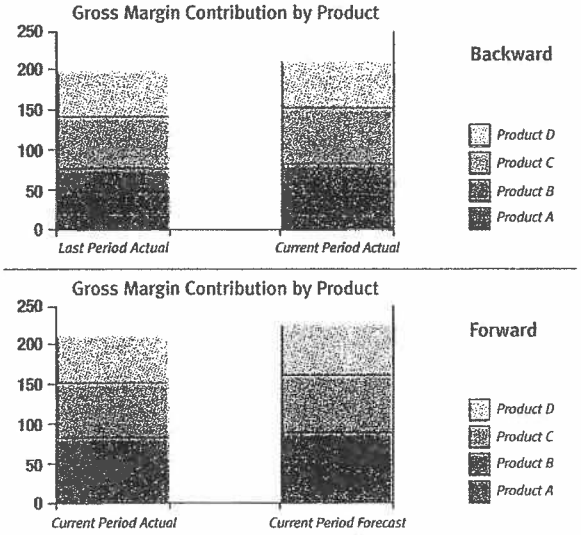
Without a doubt, there is benefit to having diagnostic measurements on your dashboard. But without components that help you predict the future, the dashboard is only expanding the limitations of memory, not improving decision making.

Think again about the dashboard on your car and how it works with your vision and stored experiences. You keep your eyes fixed on the road ahead with only quick glances at the dashboard to see how speed, fuel level, and engine stress will affect the desired outcome of arriving at your destination. Your brain makes millions of calculations per second to adjust the turn of the wheel, the pressure on the gas pedal, and the search for rest areas along the way. You might even have reviewed a map before starting out to form a mental picture in your mind of where you were going.

Today's vehicles are increasingly equipped with some "forward-looking" dashboard capabilities. Compasses are being replaced by GPS systems that provide real-time mapping to guide you to your destination, alerting you in advance to upcoming turns. Fuel gauges are evolving to become distance-to-empty meters that display not just the current level of the tank, but how far you can go before stopping based on average fuel economy. These advances make driving easier and more efficient. However, most marketing dashboard metrics are still being presented in the form of current vs. prior period. That's helpful in terms of seeing the trend to the current point in time. But, to use the vehicular metaphor, it would be like driving forward while looking in the rear-view mirror — more than a little dangerous.

Depicting historical trends has only one purpose — to improve the accuracy of predicting where you are likely to be in the future. Consequently, all of the metrics on a marketing dashboard should be compared to a *forecast* for where they're supposed to be at that point in time relative to the longer-term goals. That way, the dashboard answers the question, "Where is my projected outcome vs. my target outcome?"

FIGURE 3.1 — BACKWARD-LOOKING VS. FORWARD-LOOKING



Proper marketing dashboard readings give you an indication of whether you're on the right course, at the right speed, and have enough gas in your tank to get to your *desired* destination, not just any destination. If the dashboard says you're off course, you can look at past-performance data for diagnostic insights and ideas on how to course-correct, but no longer will looking back be your central focus. A well-designed dashboard will always be looking ahead.

But before your forward-looking dashboard can take shape, you need to be certain that your destination and your desired outcomes are calibrated with those of senior management and the company overall.

Identifying the Right Destinations

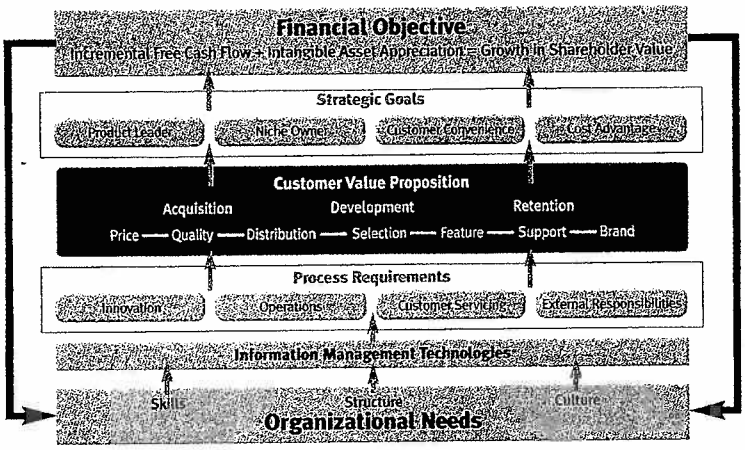
Step #1: Aligning Marketing Goals with the Organization

In Chapter 1, we talked about the path to credibility — alignment, measurement, objectivity, and accountability are the key steps toward credibility with senior management.

Strategy mapping, an approach developed by Robert S. Kaplan and David P. Norton[1] (inventors of the balanced scorecard) is one way to

kick off that process. You can use a strategy map to align marketing's goals with the rest of the organization and in the process define the role of marketing and the critical dimensions of creating the right customer value propositions. It's the first step toward selecting the right metrics for what will eventually become your marketing dashboard.

FIGURE 3.2 — SAMPLE STRATEGY MAP #1



Source: Adapted from Strategy Maps *by Robert S. Kaplan and David P. Norton, Harvard Business School, 2004. Reprinted with permission.*

Figure 3.2 shows the relationships among:

- the company's financial objectives;
- the strategies intended to achieve them;
- the customer value proposition(s) required to execute the strategies;
- the business processes required to deliver on the value proposition(s);
- the information management systems to support the business processes; and
- the organizational skills, structures, and culture necessary to pursue the objectives successfully.[2]

Financial objectives always boil down to growth in profits and appreciation of tangible and intangible assets — brands, customer relationships, distribution channels, etc. — which add up to overall shareholder value. While your specific metrics will vary, it's important to place highest-order financial goals at the top of the map.

The strategies intended to achieve these goals can be very customized and circumstantial, but they are normally some variation on the themes of:

- **Product/service leadership:** Being the best product or service in your field. Think Lexus, Armani, or Dell.
- **Niche domination:** When you're so close to the needs of a sub-segment of a market that you obtain competitive advantage in uniquely satisfying it. Gymboree Play & Music won over the high-end preschooler moms interested in an indoor experience for kids with more personal attention and nicer facilities than the local YMCA.
- **Customer convenience:** The ability to leverage customer relationships to cross-sell deeply. Verizon, for example, bundles local, long-distance, and wireless phone service with Internet service in a single bill to create a barrier to exit.
- **Low-cost position:** Engineer cost reduction so far below competitors that price becomes the defensible differentiator. Wal-Mart has this strategy perfected.

The customer value proposition is really the core of the strategy map. Its purpose is to move customers to behave as you would like them to — trying your product or service, extending their relationships with you, or remaining loyal to you in the face of competitors. The customer value proposition often mixes elements of pricing, quality, brand image, distribution, feature, and function to successfully leverage the company's strengths or exploit competitive weaknesses.

Achieving the desired customer value proposition often depends upon strong business processes in several supporting areas of operations, including product development, customer service, and regulatory or social issues management. These processes guide the organization to focus and execute on the things most directly required for success.

Undoubtedly, most of these critical processes will have as baseline needs some form of information management platform — not just the technical pieces of computers and data networks, but the way information is shared and used around the company. Most often, these platforms go beyond internal process facilitation, reaching outside of the company to suppliers, distributors, and, in some cases, customers.

The organizational elements of the *right* skills, structure, and cultural characteristics set the foundation for the successful delivery of information management, process, customer value proposition, strategy, and financial objectives. Without these well-developed organizational basics, no amount of gymnastics at higher levels will deliver consistently on the company strategy.

The strategy map helps to clarify marketing objectives and priorities. It also helps to identify the relationships between traditional marketing intermediary measures (brand awareness and equities, product trial, customer retention and satisfaction, distribution, etc.) and the ultimate business results of revenues, profits, and shareholder value.

FIGURE 3.3 — SAMPLE STRATEGY MAP #2

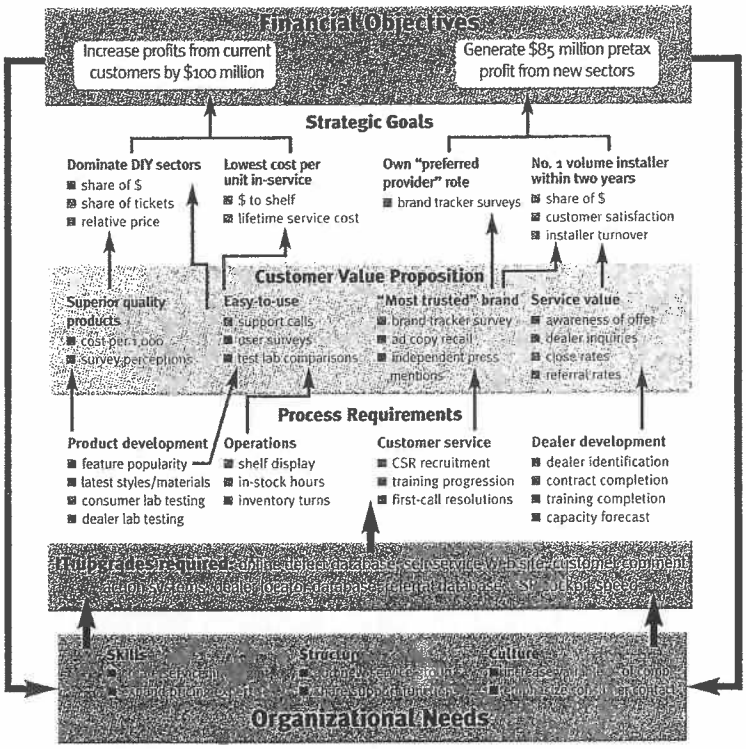


Figure 3.3 might represent a company that manufactures products purchased directly and installed or assembled by end users. The blue bullet points under each of the process, value proposition, and strategy components are possible metrics that could give shape to a marketing dashboard. It may also help clarify the role of marketing within the organization, which is important in developing a truly effective dashboard.

Step #2: Identifying Critical Performance Metrics Based on the Role of Marketing in Your Company

By now we've all heard about the Spencer Stuart survey that found that the average CMO's tenure is about 22 months — hardly long enough to see any major initiative through.[3] The key toward longevity, however, may be setting a role for the marketing department that fits the goals of the CEO.

A 2004 study by the Association of National Advertisers and Booz Allen Hamilton suggests that CMO success is first and foremost a function of knowing what role you're signing up for.[4] They suggested that there are three different roles of marketing organizations within companies.

Role #1: A Marketing Services Organization

The marketing department is a service provider to the rest of the organization. It provides the benefits of centralization in:

- media buying;
- advertising and marcomm materials development and production; and
- coordination of vendors and agencies.

Role #2: The Marketing Department as Advisor

As a corporate marketing function, the marketing department helps align marketing plans of multiple business units with overall corporate strategies in terms of:

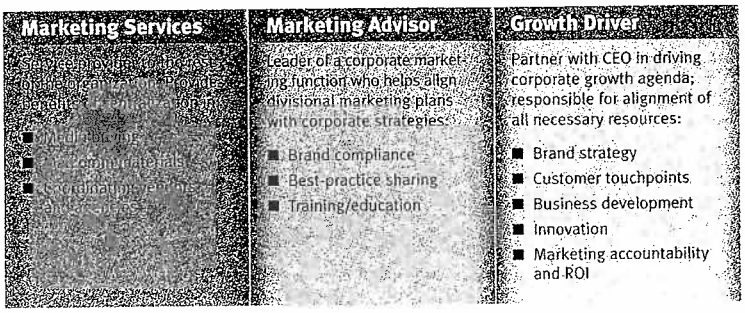
- brand development, uniformity, and compliance;
- best-practice sharing across business units; and
- training/education to improve the breadth and depth of marketing skills throughout the company.

Role #3: Marketing as Growth Driver

The marketing department is the engine of growth for the CEO in driving the corporate agenda; it is responsible for alignment of all necessary resources including:

- brand strategy and execution;
- customer touchpoint and customer experience management;
- product development and innovation;
- customer value development; and
- marketing accountability and ROI.

FIGURE 3.4 — THREE BASIC ROLES FOR MARKETING[5]



There may be other models or hybrids of the ones above. Regardless, knowing what role marketing is playing in pursuit of the company objectives and confirming it with the CEO and the rest of the executive committee sets the boundaries of the playing field on which marketing is expected to perform. In the process, it suggests some clear opportunities for important dashboard metrics.

Once you have better clarity on how marketing fits into the company strategy map and once you've confirmed the role of marketing in the organization, you need to identify the critical performance objectives for the marketing organization. It's impossible to build a relevant dashboard without knowing what those objectives are.

A good performance objective has three components: direction, magnitude, and timeframe.

Here's an example: "I will achieve a 20% increase in market share in the next 12 months." Increasing market share is the direction.

Twenty percent is the magnitude. Twelve months is the timeframe. If you take any one of those three components away, you're left with an ineffective statement of objectives open to subjective interpretation. If you take away the magnitude and just say, "I'm going to increase market share," you have no way to judge how much money you should invest in trying to achieve your goal or how much risk (i.e., spending) you should undertake to do so. If you take away the timeframe and just say you're going to achieve a 20% market share increase, you might be thinking that five years is a reasonable timeframe, while the CEO is thinking one year.

The three parts of a critical performance objective force you to close all the doors of subjectivity. And much like building a dashboard on forecast vs. "rear window," the process forces you to really think about what exactly it is that you plan to accomplish and how well your strategies and tactics are aligned to do so.

It's also fairly apparent how the three specific dimensions of critical objectives establish some potentially important candidates for dashboard metrics.

The next step is to see how well the tactics, programs, and activities are aligned with the strategy map and critical objectives.

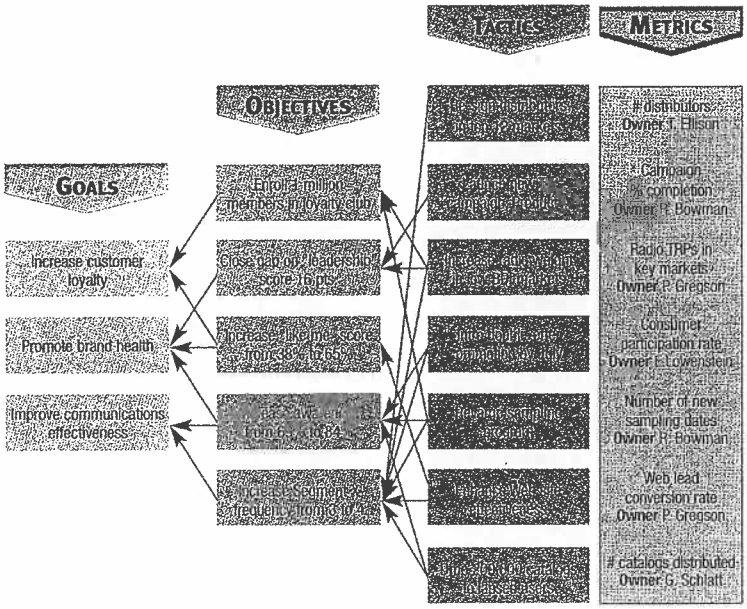
Step #3: Resource Mapping

Another effective way to begin identifying the right marketing dashboard metrics is to graphically map out the "many-to-many" relationships between marketing goals, objectives, and tactics/initiatives. The simple process of deciding what are goals vs. objectives vs. tactics brings all marketing department activity into focus, exposing gaps and redundancies for the benefit of resource reallocation and continuous improvement.

Each tactic, program, or initiative should have its own success metric for determining if the investment achieved the desired result. As drivers of successful outcomes, these success metrics then become predictive candidates for inclusion in the dashboard.

But what if you have too many? How can you determine which ones matter most? Obviously we don't want a dashboard with dozens or hundreds of metrics diluting focus from the most important ones.

FIGURE 3.5 — RELATIONSHIP MAP BETWEEN MARKETING GOALS, OBJECTIVES, AND TACTICS/INITIATIVES

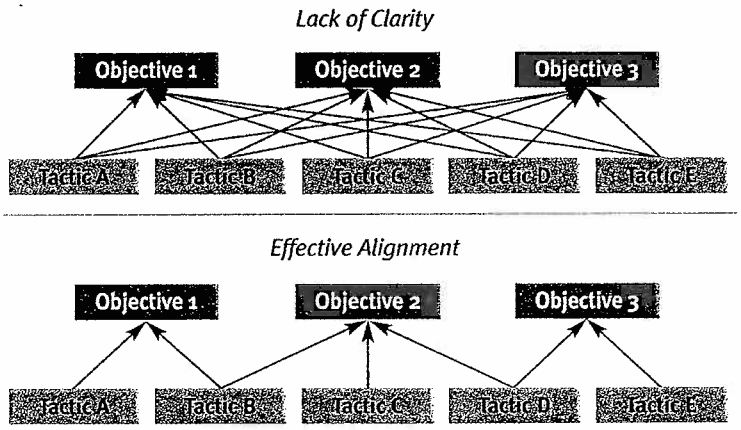


One way to filter many candidate metrics to fewer, more insightful selections is to weight the contribution of each tactic to the achievement of objectives and each objective to the attainment of goals. Analytical techniques can help establish these relative weightings if data is available. However, it's more likely that you'll need to discuss and debate the weightings as a group to build consensus on which elements of the map really drive results. The tactics with the greater weightings are the ones most likely to drive desired outcomes and thereby the best prospects for predictive dashboard metrics.

This approach often stimulates conflict among owners of competing initiatives, so you may want to undertake this with the help of some impartial facilitation. Eventually it will build extraordinary alignment on your marketing team — focusing your priorities in a way your department has never seen. And along the way, you might find that some of your tactics investments are "orphans" — they really don't line up well with any of the objectives you've set. That discovery is actually a great opportunity to reallocate money. Switch off those orphans and shift dollars to initiatives aligned with priority goals.

It is not uncommon to find that the first pass at the resource map shows that all the tactics are mapped back to all or most of the objectives, which suggests that either the purpose of each initiative is not very clearly defined, or that the relationships among goals, objectives, and tactics are not sufficiently distinct.

FIGURE 3.6 — COMPARING RESOURCE ALIGNMENT



Either way, these outcomes are signs that there is significant room for improvement in clarifying exactly what you are trying to accomplish and how you are pursuing it. All of which is important spadework before designing your marketing dashboard.

Step #4: Test Causal Relationships

Once you have clarity on the relationships among tactics, objectives, and goals, testing causal relationships can help identify the very best predictive metrics for your dashboard.

Of course, the only way to truly prove that a given marketing initiative drove profitable sales is to establish a pure test vs. control experimental design in which all other variables are accounted for, leaving only the marketing stimulus to explain the change in sales.

Unfortunately, this is most often an impractical way to measure large-scale marketing in a world in which network TV purchases are more efficient than spot buys, and environmental and competitive forces are impolitely adding variables faster than you can control

them. But there are ways to get some insight from which to draw conclusions.

Many large marketing organizations have already invested in sophisticated media- or marketing-mix models that use complex statistical regression techniques to isolate the contributory value of various marketing stimuli in achieving sales or profits. In effect, these models take into account the marketing activities by day or week and compare them to actual sales to find correlations between cause and effect. In some cases, these models are quite comprehensive, incorporating not only advertising by media, but direct marketing, channel initiatives, and all other tactical components of the marketing plan. In others, only the media elements (TV vs. print vs. radio vs. direct mail) are covered by the model, with many other tactics operating outside the spectrum of analysis.

Even with such a mix model, it is still quite difficult to prove pure correlation between marketing investment and sales. Often, the outputs from the models indicate that there are some clear relative winners between various marketing-mix elements — e.g., radio might prove much more correlated to sales results than outdoor advertising — leading you to fine tune your resource allocation by media. But you still don't really know just how much the overall advertising effort drove sales as distinct from the simultaneous influence of channel pricing, customer service experience, current events, or competitive promotions. Factor in the impact of creative effectiveness, weather patterns, or media stories, and you wind up with correlations that at best tend to be in the middle range of certainty, leaving open significant doors of doubt for finance to step through and reject your analysis. In fact, it's not uncommon for mix models to explain only 15% to 25% of the variance in sales or margin, leaving the balance to be considered as "base" sales — presumably those that would have occurred even without the marketing stimulus.

The point is, these models can be quite helpful in "answering" the question, "Is marketing generating incremental profit?" However, they're not particularly effective at answering the CEO's real question: "Should I spend half as much as I do today on marketing or twice as much?"

To get that answer, you need to employ a series of measurement processes to identify the real drivers of marketing effectiveness, including:

- panel studies of customers and prospects, recording their progression through the sales funnel over time in relationship to marketing activities;
- continual survey research among samples of the target audience to gauge the impact of marketing investments individually or collectively on the relative shifts in purchase consideration or behavior from one period to the next; and
- econometric models of customer behavior from transaction files to measure the changes in the collective value of the customer base in response to marketing activities.

While each of these methods can play a role in gathering insight about what works and what doesn't, there is no silver bullet. Sometimes, the best strategy is to gather the preponderance of evidence from multiple measurement approaches to identify the elements of the marketing plan that are *most likely* driving future financial outcomes, and then constantly test the insights gained to get more accurate at predicting the outcome of a change in an element of the marketing stimulus package.

This is precisely the role the marketing dashboard should play — helping you graphically correlate learnings from multiple sources into an overall picture of marketing effectiveness designed to facilitate the asking of good questions more than the answering of unanswerable ones.

Making your dashboard predictive takes time. It requires that the marketing organization put sound measurement processes into place and then use them to continually challenge long-held assumptions about what works and why. Eventually, over time, you learn to focus in on the things that are most likely to be predictive and prove their accuracy. Most often, this turns out to be the discovery of several predictive components, none of which are perfectly reliable, but when viewed collectively are accurate the vast majority of times.

Remember, the dashboard is intended to continually present you with evidence of your ignorance. By constantly comparing actual results to forecast, you are forced to continuously improve your forecasting ability and learn from each day's new errors. It's supposed to make you a less fallible human, not Merlin the Magician. Keep pushing the limits of your human powers to identify the root-cause elements of success. These are the best candidates for truly predictive dashboard metrics.

If you completely lack any data or the budget for research, fear not. In Chapter 8, you'll see some helpful tools for uncovering causal relationships when analytics aren't an option.

Five Ways to Improve the Quality of Your Forecasting

> *"It's tough to make predictions, especially about the future."* — Yogi Berra

Even if you're still working with a No. 2 pencil and scrap paper, there's no reason you can't produce outstanding quality forecasts with more predictability and reliability than you've ever experienced before.

While advanced mathematics and enormous computational power have improved significantly, few would argue that forecasting is an exact science. That's because at its core, forecasting is still mostly a human dynamic in which accuracy is dependent upon:

- asking the right people the right questions;
- the willingness of those people to answer truthfully and completely;
- the ability of the forecaster to separate the meaningful elements from the noise; and
- the openness of the forecaster to suggestions of process improvement.

That last point is key: process improvement. Consistently good forecasting isn't a mathematical exercise performed at regular intervals (e.g., quarterly) as much as it's an ongoing process of gathering and evaluating dozens or hundreds of points of information into a decision framework. Then, when called upon (e.g., quarterly), this decision framework can output the best forward-looking view grounded in the insights of the contributors. While software can facilitate process structure by prompting for specific fields of information to be included, it cannot make judgments on the quality of the information being input. As we've said, "Garbage in, garbage out."

1. Be Specific

As simple as this sounds, knowing exactly what you are forecasting is the most important step to success. It might seem pretty obvious that if you want to forecast sales, forecast sales. But what question are you really trying to answer? Unit sales? Gross margin? Market share? Customer value?

Also, what period of time do you need to cover? The longer out the forecast goes, the less reliable it is in the out years. This becomes especially important if your forecast is intended to anticipate the market size of a new category that will cost tens of millions or more to enter.

In general, forecasts fall into one of two categories: operational and strategic. Operational forecasts manage the existing organization one or two steps ahead of today's reality. Strategic forecasts look further out into the future to help focus the company's long-range planning. In mature market categories (toothpaste, personal computers, pet foods, etc.), the operational time horizon could be two to five years and the strategic 10 or more.

2. Be Structured

There are many reasons to take a structured, methodical approach to forecasting. First and most obvious is the importance of not leaving out key information that might affect the forecast. Also, there is the quality control factor and the benefit

of double- and triple-checking all the assumptions and formulas. But among the less obvious benefits of structure are:

- the removal of personal biases that might unknowingly be causing participants to filter their inputs or interpretations;
- the continuity of consistently improving upon the process over time, regardless of turnover among key input or executional resources;
- the auditability of the approach to determine where things might have gone awry at various steps in the process; and
- the confidence your rigor will inspire when others evaluate your work and are by necessity forced to accept some subjective judgments and assumptions.

Structure needn't be costly or time-consuming. In its simplest form, it is taking the time to map out and document all the inputs into the forecasting process; describing (in writing) the apparent relationships between causal factors; noting all assumptions and calculations in an easily referenced manner; and recording the accuracy of the resulting forecasts over time, alongside observations on emerging factors that might have influenced the results.

3. Be Quantitative — with or without "Data"

If you have lots of historical data at hand, quantitative forecasting methods such as moving averages, time-series analysis, and exponential smoothing create a much greater likelihood of developing a strong forecast, provided you have enough historical data to use them. But even if the only data you have are a series of "finger-in-the-air" estimates, you can still take a more disciplined quantitative approach by building simulations that explore the "what-if" scenarios often hidden in best guesses at average outcomes.

Regardless of the quantitative approach you use, keep in mind that like power tools, mathematics can be really dangerous in the hands of the inexperienced. Hiring someone with strong statistical skills to determine the most appropriate quantitative method(s), given your data (or lack thereof),

provides yet another comparison point to check against your experiential judgment.

Even if you choose to disregard the forecast derived by crunching the numbers, at least the exercise caused you to think about your instincts a bit harder. More likely, the quantitative process will raise questions about assumptions and data anomalies, which will highlight previously overlooked risks relevant to the forecast.

4. Be More Than Quantitative — Find Causal Factors

Straight statistical extrapolation is fine for simple situations with short time horizons. But more variables can affect the forecast over a longer horizon. The factors most likely to influence the forecast need to be identified and their possible impacts assessed as closely as they can be.

Sometimes causal factors can be obvious. For example, when forecasting anticipated growth in sales of sunglasses, one should take into account weather forecasts, since abnormally sunny or rainy weather can dramatically influence consumer purchase behavior. Other times, if you look more closely, causal relationships aren't so obvious, which is why you wouldn't normally guess that Seattle is the No.1 market in America for sunglasses per capita. Seattle? Rainy, overcast Seattle? It turns out that since the sunshine is far less frequent, people have a habit of losing their sunglasses between uses and need to constantly buy new ones.

The first step in identifying causal factors is to convene an "expert panel" of people from within your organization who possess several years of experience. Supplement the panel with suppliers, channel partners, or leading academics in the field and ask them to identify and rank the things that tend to make sales go up or down. Try to translate the responses into definitions of factors for which there are historical measures — like weather, industry sales of complementary products, medical conditions, etc. Where necessary, look for proxy measures that might be reasonably good approximations

of the real factor — like population growth is a proxy for demand for haircuts.

Once you've identified some potential causal factors or proxies, again look to statistical methods like regression models to test the extent to which the causal factor is truly causal (e.g., is directly or inversely related to actual historical sales). Allow the quantitative process to remove any personal bias about which factors might be most causal. Also allow it to eliminate causal elements that are linked and, thereby, redundant.

Many forecasting experts agree that evaluating the results from multiple forecasting approaches is indeed the best way to ensure that you have the fullest perspective on the possible outcomes. Armed with that perspective, you can apply your experience and instinct to determining the most likely forecast scenario.

5. K.I.S.S.

As with most things in life, simplicity is a virtue in forecasting. Einstein said, "Things should be made as simple as possible, but no simpler." In forecasting, we interpret that to mean that an accurate and reliable forecasting process should be comprehensive enough to identify the truly causal factors, but simple enough to explain to those who will need to make decisions upon it.[6]

Tips on Forecasting with Existing Data

There are dozens of ways to forecast from historical data (see more in Chapter 8). The type of forecast you are making and the number and nature of the causal variables will determine which of the many statistical techniques are most appropriate to your forecasting challenge.

As a marketing manager, you don't need to know the merits of regression, exponential smoothing, Box-Jenkins, or other statistical methods. What you do need is a Ph.D. consultant or university

professor to test a broad range of methods against your historical data to determine which methods are most accurate and/or most practical for your forecasting needs.

Once you have selected the appropriate statistical methodology for your forecast, you can choose from numerous inexpensive PC-based forecasting tools that can crunch the data fast, speeding up your forecasting process. The benefit of carefully selecting and then sticking with an automated software tool is that you begin to build consistent forecasting processes and measurement benchmarks. (It also doesn't hurt to have one in place when the CEO asks you to have a revised forecast of unit sales by country under three pricing scenarios on his desk that afternoon.)

You don't have to be a rocket scientist to select and use a tool. Today's forecasting tools are built to be used by decision makers, not quants. For the most part, they have friendly interfaces and drag-and-drop actions to run the program. There are some 40-plus desktop forecasting tools on the market that range from simple Excel plug-in modules to sophisticated software packages, priced from $50 to $5,000-plus. But don't expect a "plug-and-play" experience. These tools all require some degree of a learning curve and familiarity with statistics. If you're just starting out, you might want to stick with the basic spreadsheet approach.

There is no power in a forecast if those who need to trust it cannot understand or explain the logic and process behind it. Recognizing forecasting to be a complex human decision process is the first step toward dramatically improving your batting average and improving the accuracy and reliability of the forecasts coming out of your department.

Conclusion

Preparing your organization to isolate the right kind of metrics for your dashboard starts with a mission of self-discovery. Don't be concerned with lack of data or analytical skills. Many of the most important questions to answer can be discussed around a conference room table, leading to greater clarity and focus on what's really paramount.

Remember, it's particularly important not to bite off more than you can chew in the initial effort — don't go for quantity of metrics, go for finding a select few of the most informative, forward-looking measurements that fit your organization and reflect your clarity on the role of marketing in helping the company meet its stated goals.

SOURCES

1. Kaplan, Robert S. and Norton, David P., *Strategy Maps*, Harvard Business School Press, 2004.

2. *MarketingNPV Journal*, vol. 1, issue 6.

3. Welch, Greg, Spencer Stuart, "CMO Tenure: Slowing Down the Revolving Door," July 2004.

4. ANA (Association of National Advertisers) and Booz Allen Hamilton, "Are CMOs Irrelevant? Organization, Value, Accountability, and the New Marketing Agenda," 2004.

5. *MarketingNPV Journal*, vol. 2, issue 1.

6. *MarketingNPV Journal*, vol. 1, issue 3.

PART II

What Do We Measure? Choosing the Right Metrics for Your Dashboard

CHAPTER 4

Develop an "ROI" Framework: Key First Steps to Identifying the Right Dashboard Metrics

There's very little sense in creating a great, forward-looking dashboard for a poorly designed automobile. By that, we mean that a marketing dashboard is useless — without the solid mechanics of profitability management behind it.

Actually, that might be overstating it a bit. You can certainly *create* a dashboard without this infrastructure — it just won't be worth much. This is exactly what we see time and again: Eager dashboard builders create elaborately layered charts and graphs of metrics that don't really provide any insight into the underlying causes affecting their business or the trajectory they're unknowingly committed to.

This chapter will zero in on two concepts necessary to bring the underlying discipline of profitability management into your marketing organization: funnel management and profit optimization. Together, they create a framework for measuring and improving marketing effectiveness. If they already exist in your company, dashboard construction will be primarily a methodical design exercise. If they do not, you have some work to do before you begin thinking about what your dashboard will look like.

Funnel management provides a structure for learning how awareness translates to attitudes, attitudes to preferences, preferences to behaviors, and behaviors to profits. It is a simple and efficient tool that blends the classic advertising "hierarchy of effects" model with elements of strategic sales management. Funnel management takes a large group of potential prospects and defines the stages through which the group is transformed into a valuable selection of

dedicated customers. Using such a tool allows marketing professionals the opportunity to monitor almost daily progress toward measurable profits.

FIGURE 4.1 — THE MARKETING FUNNEL

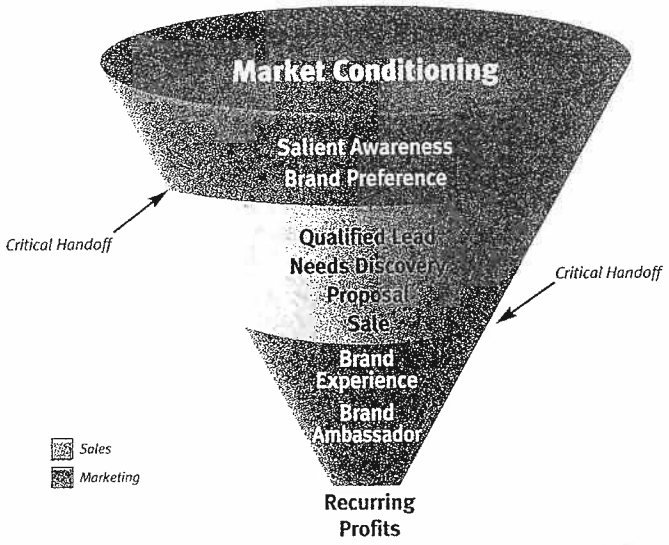
One of marketing's key objectives is to produce specific consumer or customer behaviors that lead to positive financial outcomes. A marketing program or initiative may have a specific purpose in moving prospects through one stage of the funnel — such as building brand preference or generating qualified leads. But these marketing investments only pay back when incremental profits are derived at the end of the funnel. We can create huge numbers of aware brand disciples in the marketplace, but if they're not buying from us (at profitable prices), the investment is wasted. This is why it is so critical to identify and plug the leaks in the funnel.

There's no practical way to build a 100% leak-proof funnel process. At each stage of the funnel, some prospects or customers will leak out as their needs or circumstances change or competitive entreaties lure them away from you. Nevertheless, the goal of funnel management is clear: Plug the leaks. When you find and plug leaks, you create incremental profits. If only one out of every 100 prospects who become aware of your product buy it, you have 99% leakage, or waste. Even if some of that spending is expected to pay back in the form of latent customer conversions, understanding and

plugging the leaks can substantially improve the return you derive from your investments in getting prospects into the top of the funnel.

Linking the marketing portion of the funnel to the sales portion is an excellent way to map and test the relationships between marketing's efforts at brand development and demand generation, and the sales force's ability to take that demand and turn it into profitable customer relationships. Too often, companies separate marketing from sales, creating a "handoff" mentality in which each department believes it is doing its part, but the other is not pulling its weight.

FIGURE 4.2 — INTEGRATED MARKETING/SALES FUNNEL



An integrated funnel (figure 4.2) provides an informative view of marketing performance at all stages. It represents the progression from unaware prospects to profitable "brand ambassadors." It also begins to dissect the process to enable linkage analysis in the search for correlations of how success in generating progress through certain stages of the funnel leads to further progression.

Once those links become clear, strategies and tactics can more easily be aligned and targeted to specific stages of funnel progression in which the effect would maximize impact from marketing investments. One way to measure this impact is using ROI.

The simple formula for calculating ROI is:

$$\text{ROI} = \frac{\text{NPV of Incremental Profits (Incremental Revenue – Expenses)}}{\text{Initial Expenses}}$$

"NPV" is the net present value of a series of profits realized over a period of time, discounted back to current dollars.

Many marketers and academics have denounced the use of an ROI formula in measuring marketing effectiveness as "too limiting" or possibly "misleading." We agree. Used in the wrong way or poorly manipulated, ROI calculations can be as imprecise and subject to misinterpretation as any other statistical or financial assessment tool. (See Expert View on the next page.)

However, when used properly in the context of driving more profit — not just getting the highest possible ROI score — ROI measurement is a reasonable way to standardize the process of gauging the *relative* value of one marketing investment against another.

If every marketing investment is held to the standard of ultimately creating some profitable change in customer or market behavior, then we can successfully compare *all* proposed investments using a standardized assessment process to identify those offering the greatest potential for driving profits. Sure, we might need to make some assumptions, but if we place some significant effort on trying to anticipate the intended behavior changes upfront in the planning stages, we can often identify ways to better structure our investments to help promote reliable measurement of results. This in turn helps us see where our assumptions were accurate, where they were less so, and why. Over time, our assumptions get better and better in planning our investments and achieving maximum return.

A consistent framework for assessing marketing returns allows marketing executives to:

- identify places where spending is most effective;
- correlate the individual and collective impact of marketing initiatives on prospect or customer behaviors, then link those behaviors to the financial value drivers;

- reallocate people or dollar resources towards greater impact — for example, this can include taking an underperforming initiative and retargeting it toward a high-value segment, eliminating unprofitable channel gaps and addressing identified leaks in the funnel progression; and
- extend campaign-level profitability to customer-level profitability across multiple acquisition, retention, and cross-sell campaigns that will optimize customer value.

EXPERT VIEW: MARKETING MEASUREMENT

Tim Ambler
SENIOR FELLOW, LONDON BUSINESS SCHOOL

You're no fan of return on marketing investment (ROMI) as a metric are you?

AMBLER: *It's arithmetically flawed. If you're looking at the return from marketing, you would normally look to things such as net cash flow or shareholder value that subtract costs from revenue. But what ROMI does is divide revenue or profits by costs, and when you start dividing rather than subtracting, you open the door for some erroneous conclusions. For example, if you spend $1 million and generate $500,000 net incremental profit, you have a 50% ROI. But if you spend $100,000 and generate $200,000 incremental, you get a 200% ROI. Which is better for the company? ROI doesn't give you the whole picture. Free cash flow can be so much more important to most companies.*

Another concern is that marketers driven to increase ROMI can do so by cutting the "I," and that isn't generally an effective strategy for growth. ROI works when you have to make a choice between options that require the same amount of scarce capital and the choices are mutually exclusive. But discounted cash flow (DCF) would still be the preferred metric in such cases. Marketing is not a once-off capital sum (for which ROI was invented) but a continuous stream of expenditures which the company makes every year.

So are you advocating more of an NPV or DCF approach?

DCF is fine for measuring the future potential of any activity compared with another. Assuming you do DCF on a normal accounting

basis, you are evaluating alternative marketing initiatives against each other on the basis of expected cash flows for the current year and for several years into the future. That's fine. But that is quite different from trying to evaluate the results of the marketing you've done up to the present time.

If you're looking at actual results, you want to know what has happened up until now. You don't want to confuse that with what might take place in the future. So you have to take the short-term profit you've achieved and see if your brand asset (I call it brand equity) has gone up, in which case you want to take even more *credit for achieving both short-term profit and increase in brand assets. But if the brand assets have gone down, your short-term profits aren't viewed quite so positively. This is very important when looking at things like price promotions.*

Are you suggesting that organizations need to do a much better job of defining their objectives upfront?

I think that's true, but that's not what people do. The biggest predictor of what will be in this year's marketing plan is whatever was in last year's marketing plan, not some change in objectives.

Short-term profit is fairly easy to benchmark against other investments the company might make. But how do you measure "brand equity," as you define it?

This is difficult. In a perfect world, it would be nice to value brand equity at its present value, because then you could express brand equity in short-term dollars. Unfortunately, you can't do that. You need to look at a dashboard of key brand equity measures and be broad-minded enough to accept multiple components of your assessment instead of a single financial number — with the idea that a dashboard gives you a better idea of what the state of your marketing activity is.

That sounds like an approach intended to increase confidence in marketing's "accountability" vs. one intended to specifically measure return.

Yes, and therein lies the challenge when it comes to explaining how marketing really works to non-marketing people, particularly financial

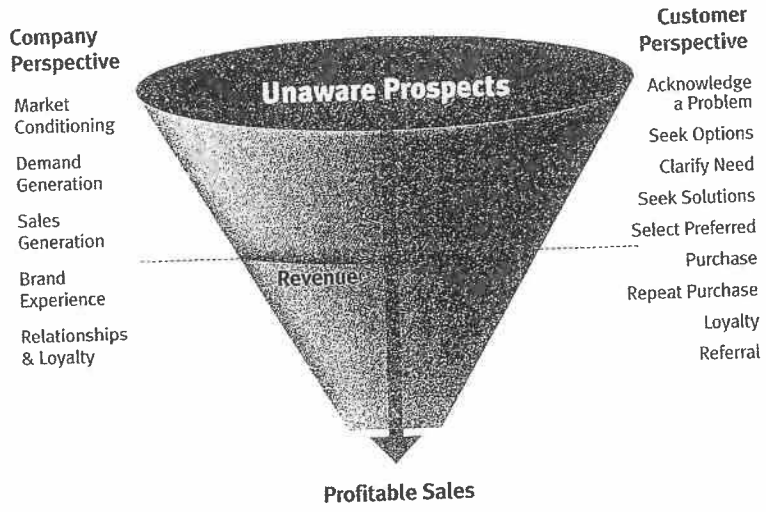
people. The financial people would like everything measured in dollars (as we all would), but it's just not practical. You would need to make too many assumptions along the way and the validity of your ultimate numbers would be suspect at best. Now, I'm all for marketing people becoming as financially literate as possible, but the financial people must become more marketing literate as well. And it comes back to the point about setting objectives. If the financial people are involved in the marketing planning process, as they should be, then they will come to understand that the dashboard is really the only way to do it.[1]

Mapping the Funnel

One of the most important roles for marketing is to motivate prospects to progress through stages in the funnel. The funnel tracks changes in customer behavior that result from a single activity or series of marketing activities to sales, which are then linked to financial outcomes. On your dashboard, this will be reflected in terms of:

- understanding where marketing performance is succeeding versus failing; and
- establishing links between funnel stages to help predict future outcomes.

FIGURE 4.3 — SAMPLE MARKETING/SALES FUNNEL



The marketing and sales funnel in figure 4.3 represents progressive stages that targeted prospects may pass through from initial awareness to forming an opinion to purchasing and then conducting an ongoing relationship with the company.

On the left side of the funnel is the company perspective of the progression path. On the right, there is the prospect/customer perspective. At corresponding points in each path, "interest" turns into a sale and economic value is created.

We could go into great depth of detail on what the various stages of funnel progression might look like, but first it might be helpful to have some background on these progression pathways.

Over 100 years ago, marketers first conceived a model for consumer purchasing behavior. Originally, it was suggested to be a very simple model of four stages:

Awareness ➤ Interest ➤ Desire ➤ Action

Conventional wisdom was that the consumer followed this progression in deciding what to purchase and when.

In the 1960s, the HOE (hierarchy of effects) model was developed upon the assumption of a three-stage process in consumer behavior:

Cognition ➤ Affect ➤ Behavior

"Cognition" represented the process of becoming specifically aware of a solution to fit one's need; "affect" was the process of becoming emotionally engaged in the purchase; and "behavior" was the resulting purchase.

Over the past 40 years, all this has proven time and again to be *wrong*.

The HOE model may be right for some categories and some consumers at some points in time, but it fails miserably as a predictor of how most people buy in most categories most of the time. It assumes a sequential linearity of the buying process that just isn't true in many (if not most) occasions. True, you are unlikely to buy

something you are not aware of. But, you might just become aware of it by seeing it on the shelf at the checkout counter and decide, on impulse, to pick it up. No emotional bonding required.

So why do we bring it up if it's so wrong?

The real value of the HOE model to marketers isn't in its accuracy as much as its existence. The mere fact that we have such a model as a starting point to begin to consider how our own categories work and what the linear or non-linear stages of progression might be among our own customers is highly beneficial in forcing us to think "outside-in" from the customer perspective. It encourages us to map out the models that work in our own business, see where the critical prospect/customer progressions might be, and better understand what causes those progressions to work or what obstacles prevent them.

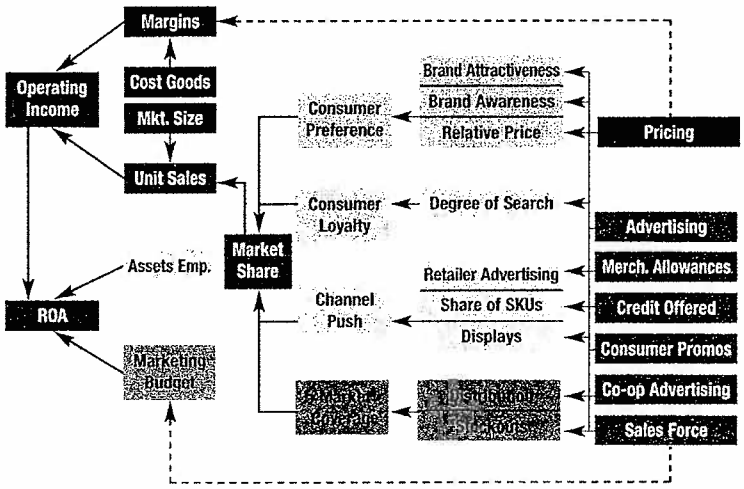
The funnel we've been discussing here is likewise just a conceptual tool to map the process of how customers become customers. Prospects may progress through the entire funnel in less than a minute (someone choosing an impulse item off a crowded shelf in a retail outlet) or extend over several years (a business making a major technology investment).

Chances are that these funnels do *not* accurately describe your business and the way your customers buy. However, by now you hopefully understand that the challenge is to map out the one that *does* work for you.

The model in figure 4.3 shows one way that awareness turns into attitudes that translate into behaviors. It has never actually been proven to be a fully accurate view of what really happens between the consumers' ears, but *testing* its applicability to or limitations within your industry/product may illuminate some clear correlations, positive or negative, that should help you continue to refine your understanding of the pathway from awareness to purchase and repurchase.

Figure 4.4 shows another method of mapping the marketing and sales inputs into the customer buying process and links those to financial outcomes.

FIGURE 4.4 — MAP OF MARKETING AND SALES INPUTS INTO THE CUSTOMER BUYING PROCESS WITH LINKS TO FINANCIAL OUTCOMES



Source: Copyright © 2005 Dave Reibstein and Paul Farris, The Wharton School of the University of Pennsylvania. Reprinted with permission.[2]

This is a good example of the challenge most marketing departments need to undertake to better correlate marketing investments to business outcomes.

Regardless of what your "funnel" looks like, by the time you get to the bottom, only a small portion of the initial prospects actually convert into sales. Those who leak out along the way generally fall into one of two main categories:

1. the wrong target — someone highly unlikely to ever convert to a sale; or
2. a good prospect that your marketing efforts haven't yet won.

Generally speaking, profitability will improve if you spend less budget and effort on trying to prevent the "wrong target" types from leaving and more on improving your effectiveness against the "good prospects." Diagnosing the nature of leakage helps ensure that you don't focus too much spending at the top of the funnel, only to lose prospects later when you have no formalized program in place to hold on to them.

Leakage is a particular problem in organizations in which marketing generates leads that are handed off to sales. Marketing may dramatically improve its effectiveness in increasing lead volume, but if sales can't close more deals, the entire process is of little value to the company. The same gap can occur in an organization in which brand spending is effective at increasing salient awareness and strong brand preference, but the marketing initiatives intended to convert brand preference to actual sales are ineffective.

A closer look at why the marketing-sales handoff most often fails reveals the most likely causes:

- Marketing increases lead volume beyond sales capacity.
- Marketing increases lead volume with the wrong target — a group that has a low incidence of closing.
- Marketing and sales are not aligned on the key value propositions and communication strategies.
- Sales has other priorities and isn't working the leads provided by marketing.

To adequately diagnose the areas for greatest improvement, we need to break down the funnel into as many discrete stages as possible from both the company and the buyer's perspectives — with the latter being most important.

Mapping the funnel from the company's perspective is the typical approach that will make sense as we build strategic and tactical plans. But the classic "supply-chain" marketing models often overlook the subtleties of the demand process in the marketplace. Mapping the funnel from the buyer's perspective can be much more insightful, helping marketers to better understand the market forces behind conversion and leakage.

Mapping Your Funnel Step by Step

1. Map the funnel stages from the buyer's perspective for each important market segment that exhibits a unique buying process: Apply what knowledge you have of your industry/category, and be sure to highlight your assumptions for future investigation through research. Try to isolate each stage in prospecting and relationship development in which portions

of the audience might fail to progress and the underlying causes (see Chapter 8 for some good tools to apply here).

2. **Define key measurement points within the funnel:** The percentage of successful conversions from one stage to the next is known as the conversion rate. Tracking conversion rates is useful for projecting performance and identifying key profit improvement opportunities. It might be tempting to measure progression through every stage in the funnel with regular frequency, but realistically, you may be limited to select points along the way based on measurability or cost constraints. The most important points are critical gateways that tend to accelerate or restrict the pace of flow through the funnel. For example, a chemical company we know has found that once a prospect orders a sample of some new chemical product, that prospect is five times more likely to become a customer. Consequently, they know how much they can spend to generate a sample request and how much the sample request is worth in potential customer value. These key prediction points are the highlights of the funnel.

3. **Track progression through the funnel:** You can do this by measuring general movement of groups of prospects period over period (the "pig in the python" method) or by tracking individual customers with whom a direct relationship exists. Measurement methodologies include database analysis, panel studies, and quantitative research. Your funnel should factor in lag time so the progression performance can be fully reflected in projections.

4. **Establish linkage patterns:** Funnel management requires an understanding of how changes at one stage in the funnel are likely to affect future stages. For example, if a marketing initiative increases consideration and purchase intent, does that appear to translate into more sales meetings and higher close rates, or are additional tactical initiatives required? Start with observations from experience if that's all you have. You might use some facilitated sessions to capture the experiences of a group of marketing and sales personnel and make your collective assumptions off this "tribal knowledge." If you have data, statistical regression approaches provide the greatest

degree of certainty. The point is, work with what you have and refine your thinking. Then, put the continuous improvement process in place to get more reliable estimates over time.

5. **Monitor and validate projections:** Making assumptions based on past performance is all we have at the beginning, but it's important to realize that marketing performance is subject to continual change in dynamic markets. Be on the watch for changes in conversion and leakage throughout funnel progression so you can initiate corrective actions quickly.

CMO View: Understanding the Funnel

Joe Tripodi
Chief Marketing Officer
The Allstate Corporation

Lately, we've been working on "remixing" our marketing. Instead of spending 100% of our marketing dollars in the last year on very general brand messages that attack very broad segments of the marketplace, we're getting much more focused in regards to fine-tuning and refining our programming and call-to-action marketing. We want to determine more directly and overtly the relationship between the spend and the results.

Allstate isn't likely to transform fully into a Geico model of 100% direct response marketing. We're not going to go there, but we're certainly going to move a long way toward getting people to better understand that if we spend X, the result will be Y.

At the end of the day, when you look at the process for how we build the business, marketing is there at the top of the funnel, driving demand generation. We're not there in an agent's office, nor is anyone from the marketing department closing the sale. So, we work hard to get everybody to understand what their roles are in the overall funnel. If someone in the agent network says, "This advertising isn't working — it's not driving incremental sales," marketing needs to be able to say, "Well, wait a minute. Look at all the incremental 'quoting' that we drove." All this extra quote volume is a reflection of driving consumer demand. The inquiries are there, but the sales aren't closing. Are the quality of the leads good? If not, maybe the advertising is broken. Otherwise, we may be looking at a distribution system issue,

not a marketing issue. Either way, it's important to find out fast and take the corrective actions.

From a process point of view, deconstructing the sales funnel and then getting everyone to understand their role is critically important to continuous improvement in our business.[3]

Strong Funnel Management Gives You:

- The baseline measures to assess how an event in one stage of the funnel will flow through to subsequent stages of the funnel, including the financial outcome. Supported with a structured measurement process, this type of analysis can guide budgeting based on the assumed results.
- An understanding of the lasting effect of funnel progression. If brand awareness or product interest is generated without follow up, at what point does that buyer's interest dissipate? Alternatively, if we believe that demand generation investments have a multi-year payout, the funnel helps us test that hypothesis and attempt to measure it specifically.
- Tighter integration of marketing tactics. The timing, message, and objective of each marketing tactic needs to be mapped to the funnel so that the performance of related programs can be assessed over independent initiatives to see if the whole is adding up to more than the sum of the parts.

Key Measurements from the Funnel That Feed into the Dashboard Include:

- actual progression rates from stage to stage;
- projected continued progression over future periods;
- expected profits from financial value drivers (tied to expected profits at the bottom of the funnel);
- cost per funnel progression; and
- frequency of leakage rates by reason.

Establishing an "ROI" Framework

Used appropriately, ROI can be one of the most helpful metrics for marketing. It illuminates the primary drivers of short-term financial

performance from your current portfolio of marketing investments and allows you to prioritize future budget allocations. It also creates a means to manage risk — perhaps for the first time — in your marketing plan.

An effective ROI framework includes a detailed marketing and sales funnel, financially sound ROI calculations, and profit-driven strategic and tactical planning processes. This is how you begin to talk the language of your CFO. But getting there may not be easy.

A 2004 survey conducted by Forrester Research and the ANA found "a lack of consensus among marketers on how to measure/define their return on investment (ROI) in marketing."[4] The top choices were Incremental Sales Revenue Generated by Marketing Activities (66%) and Changes in Brand Awareness (57%). Other top choices referred to purchase intentions, attitudes, market share, and leads.

None of these are correct.

Is there a right answer to how marketing ROI is defined? Yes. If you were to ask individuals how they defined and measured the ROI on their stock portfolio, what kind of responses would you expect? Most investors will not be satisfied if their stock portfolio returns are defined as "most popular stocks" or "most likely to grow." They also won't be satisfied if they get high growth rates that are more than offset by high commission fees.

ROI is an efficiency measure built on incremental profits. Not revenue. Profits. It's about the return (in new profits) you get from investing past profits. Calculating ROI on anything other than profits is misleading at best, and *will* undermine your credibility amongst your peers in finance.

The first step in creating your ROI framework is to standardize the ROI calculation and define the data points used in that calculation. The formula must be constructed with complete financial integrity to meet the standards of the CFO and other executives outside of marketing. Return on investment provides the ratio of incremental profits generated to the proposed marketing investment. The investment

and return must reflect the net present value (NPV) of the stream of future cash flows. Once again, the formula is:

$$\text{ROI} = \frac{\text{NPV of Incremental Profits (Incremental Revenue – Expenses)}}{\text{Initial Expenses}}$$

The ROI calculation should reflect the projected or actual impact of a specific marketing initiative you identified during funnel mapping. The marketing initiative may be a campaign, a subcomponent of a campaign, a series of integrated campaigns, or any initiative designed to profitably influence customer behaviors.

Remember that the goal is not to maximize ROI but to use ROI as a tool to maximize profits. Profitability is optimized for a marketing initiative when the point of diminishing returns is identified and the last dollar spent meets the threshold or hurdle rate set by the company.

To accomplish this, you must use a multilevel analysis consisting of independent, incremental, and aggregate ROI or NPV measures. The independent measure is done for a stand-alone marketing initiative at its smallest feasible design. From there, incremental measures are run as the target audience size is expanded, as new media channels are added, and/or as offers or other enhancements are made to the core initiative. An aggregate measure then encompasses the complete initiative and possibly multiple initiatives that together have a greater impact than when run independently. This multilevel approach is critical to reflecting the need for integrated campaigns to fully motivate prospects through the entire funnel.

Your financial model can exist in an Excel spreadsheet or more sophisticated software. You'll also have to figure out how to streamline access to data. Critical business intelligence is also required. The goal is to simplify the process so marketers can input the known and assumed values of the initiative, project the return and assess alternative scenarios, and modify the strategic and tactical plans to reflect the highest profit potential.

At every stage, think about how the findings might eventually look on your dashboard. If you can't visualize the findings on

a dashboard, ask yourself if you should really be doing these particular measurements.

The most challenging part of determining marketing effectiveness is often measuring the incremental impact that results from executing the marketing initiative. The key challenges include:

- identifying a reliable "baseline" of sales activity that would have resulted in the absence of marketing;
- getting access to necessary data;
- designing measurements that leverage the right mix of methodologies available;
- allocating the resources necessary for measurement and analysis; and
- establishing a measurement hierarchy based on profit potential.

The measurement hierarchy defines what gets measured, how often, through which methodology, and at what cost. This is done based on the reality that it is not practical or possible to measure everything. With the sales funnel and financial return model in place, you should know where the greatest profit impact exists and what measures will give the most insight. High priority measurements could include identification of customer-level profitability, assessing a specific media channel, optimizing a high frequency campaign, or measuring leakage rates at select points in the funnel.

The ideal measurement methodology is classic experimental design (test vs. control) in which the isolated independent variable can be proven to be the exclusive cause of changes in the ultimate outcome. Unfortunately, the conditions to conduct such pure tests are rarely present. So where marketplace realities complicate the assessment environment, marketing-mix modeling and agent-based modeling are popular approaches for assessing marketing performance. The former attempts to use statistical regression to find correlations between various elements of the marketing or media plan and the resulting sales or profits. The latter uses much more sophisticated multivariable techniques to measure the performance of entire markets and market segments in response to small changes in stimulus elements (marketing programs). There are also quantitative research surveys, panel studies, direct observations, and pre-/post-measurements. Strong measurement plans incorporate a blend of these methodologies.

Risk-Adjusted Returns

Globalization, multichannel marketing, supply-chain management, strategic alliances, regulations, corporate governance — marketing is riskier today than ever. To put their companies at competitive advantage, marketers need to take more calculated risks. Yet to most marketing departments, "risk management" is limited to customer credit and vetting vendors — functions usually handled by finance or purchasing.

For marketing executives, risk management is a trial-and-error evolution. Has this agency produced good work previously? Will this vendor deliver on time? Experience has fine-tuned our instincts to a point where we intuitively assess risks based upon a combination of hundreds of deliberately and subconsciously collected data points.

Many executive committee members still view marketing as the last bastion of significant risk exposure. Everyone else from finance to operations, HR to IT employs robust risk-assessment tools and processes and highly effective ways to demonstrate the risk-adjusted outcomes of their key projects. They talk in terms of "net present value" of "future returns" associated with an investment made today. They link their recommendations to the bottom line and present their cases in such a way as to reassure not just the CEO, but also their peers, that they have carefully analyzed the financial, operational, organizational, and environmental risks and are proposing the optimal solution with the best likely outcome.

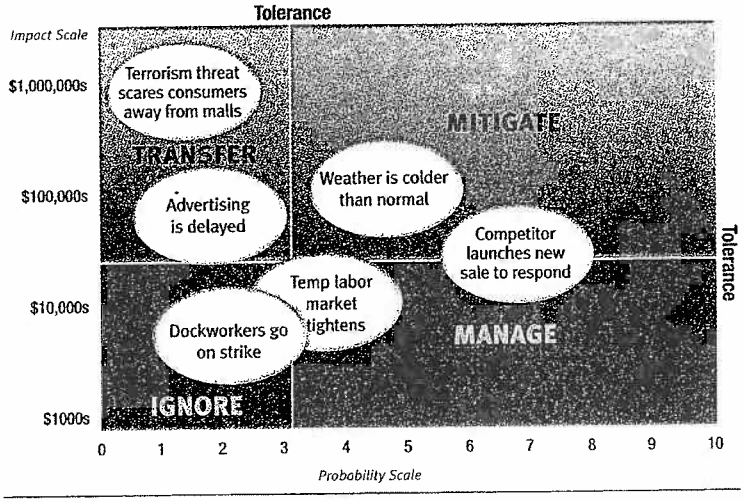
This process needs to be carried into the marketing measurement platform. Each proposed initiative or program should be evaluated not just on its total potential return, but on its risk-adjusted potential.

Here's an example: Let's say we're a retailer planning a holiday sale. We plan to run $1 million of TV advertising to drive traffic into stores during this one-day extravaganza. Using the reach and frequency data we get from our media department, combined with our assessment of the likely impact of the advertising copy, we estimate that about one million incremental customers will visit our stores on that day. If only 5% of them purchase at our average gross-margin per transaction of $20, we break even, right?

Unless, of course, it rains. In that case, our media will reach far more people watching TV inside, but far fewer will venture out to shop. Or maybe the weather will be fine, but one of our competitors will simultaneously announce a major sale event of their own featuring some attractive loss-leaders to entice traffic into their stores. Or maybe there will be some geopolitical news event that disturbs the normal economic optimism of our customers, causing them to cancel or postpone buying plans for a while.

Any or all of these things could happen. It only takes one to completely mess up the projected return on the $1 million investment in sale advertising.

FIGURE 4.5 — RISK MANAGEMENT MATRIX



A strong measurement framework requires that each marketing initiative be thoroughly risk-assessed to identify all the bad things that could happen, the likelihood of them happening, and the potential impact if they did. The project forecast is then reduced accordingly. So if rain would cause a 50% drop in estimated store traffic and the weather forecast shows a 30% probability of rain in the area, our forecast for the event should be reduced by 15% (50% x 30%).

This structured risk-assessment approach will highlight investments that are more prone to external risk factors and modify their rosy expectations accordingly. In the end, high-risk, high-reward initiatives may be just what's required to achieve business goals, but wouldn't you rather know that's what you are approving, instead of finding it out later when high hopes are dashed?

The bibliography at the back of this book presents some excellent reading suggestions on risk-assessment and risk-management strategies. No marketing measurement framework is complete without the risk-management component in place.

Conclusion

Any discussion of dashboard development needs to begin with a thorough analysis of your ability to map and measure basic marketing performance. That means devotion to two critical concepts: funnel management and profit optimization.

While linear models linking awareness to perceptions to behaviors are rarely found to be accurate, they do provide a practical jumping-off point for beginning to ask the right questions. Mapping your funnel processes helps to clarify how marketing actions are intended to stimulate customer behaviors, which in turn create incremental cash flows. Exploding these processes out in detail helps create alignment while simultaneously drawing attention to some potentially powerful leading indicators for your dashboard.

The best dashboards are all about the infrastructure of an organization's measurement system. You can't see the inner workings, but without attention to their quality, the dashboard will be irrelevant from the start. We've found that many funnel and measurement efforts miss the boat by looking internally — focusing exclusively on financial results instead of buyer behavior. Focusing on buyers, even if it means developing entirely new ways to watch their behavior, leads you directly to the elements that produce profitability. And those are the areas worthy of priority consideration for your dashboard.

SOURCES

1. *MarketingNPV Journal*, vol. 1, issue 4.

2. Reibstein, Dave and Farris, Paul, The Wharton School of the University of Pennsylvania, 2005.

3. Tripodi, Joe, The Allstate Corporation.

4. ANA (Association of National Advertisers) and Forrester Research, "Marketing Accountability and Technology," 2004.

CHAPTER 5

The Obvious Types of Metrics (in Some Not-So-Obvious Forms)

When it comes to choosing metrics for a marketing dashboard, measurements are not only specific to industry, but to company, to division — right down to the specific department and the critical objectives at hand. As we've said, the marketing dashboard can be anything you want it to be as long as it shows the forward-looking information that benefits you most. In fact, the marketing dashboard should be tailored to meet the specific goals, objectives, and strategies of *your* company, its structure, and its unique culture.

Nevertheless, there are some categories of dashboard metrics that are appropriate in many circumstances. In this chapter and the next, we'll go over some of the more common ones. In Chapter 7, we'll take a look at some of the metrics you're likely to forget but shouldn't.

One note of terminology and philosophy as we begin our descriptions: Marketers show a tendency to use dashboard metrics that relate to revenue (topline sales) as opposed to profits (bottom line). This is a critical error that not only risks misleading decision makers about the effectiveness of marketing investments, but also perpetuates the cynicism with which other departments view marketing.

The potential to be misleading is relevant in that marketing costs must be allocated to the sales they generate *before* we determine the net incremental profits derived from the marketing investment. If we spend $5 million in marketing to generate $10 million in sales, fine. If the cost of goods sold (COGS, fully loaded with fixed cost allocations) is less than $4 million, we probably made money. But if the COGS is more than $4 million, we've delivered slightly better

than breakeven on the investment and more likely lost money when taking into account the real or opportunity cost of capital.

Presenting marketing effectiveness metrics in revenue terms is seen as naive by the CFO and other members of the executive committee for very much the same reason as outlined above. Continuing to do so undermines the credibility of the marketing department, particularly when profits, contribution margins, or even gross margins can be approximated.

Why Revenue Metrics Can Be Dangerous

In our experience, there are several common rationalizations for using revenue metrics, including:

- limited data availability;
- an inability to accurately allocate costs to get from revenue to profit; and/or
- a belief that since others in the organization ultimately determine pricing and fixed and variable costs, marketing is primarily a topline-driving function that does not influence the bottom line.

To the first of these, we empathize. Many companies suffer from legacy sales reporting infrastructures where only the topline numbers are available or updated with a minimum of monthly frequency. If you're in one of those, we encourage you to use either the last month's or a 12-month rolling average net or gross margin percentage to apply to revenue. Finance can help you develop reasonable approximations to translate revenues to profits in your predictive metrics. You can always calibrate your approximations later when the actual numbers become available.

If you suffer from the second of these, an inability to allocate costs precisely, consider using "gross margins after marketing" (revenue less COGS less marketing expenses). Most companies know what their gross margins are by product line, and most CFOs are willing to acknowledge that incremental gross margins after marketing that exceed the overhead cost rate of the company are likely generating incremental profits. This is particularly true in companies in which the incremental sales derived from marketing activities are not necessitating capital investments in expanding production or distribution capacity. In short, engage finance in the conversation and collectively work to arrive at a best guess.

If you find yourself in the third group, you need to get your head out of the sand. The reality is that the mission of marketing is to generate incremental *profits*, not just revenue. If that means working with sales to find out how you need to change customer attitudes, needs, or perceptions to reduce the price elasticity for your products and services, do it. Without effective marketing to create value-added propositions for customers, sales may feel forced to continue to discount to make their goals, leading the entire organization into a slow death spiral — which, ironically, will start with cuts in the marketing budget.

If you *identified* with this third group, this should be a wake-up call that your real intentions for considering a dashboard are to *justify* your marketing expenditures, not really measure them for the purpose of improving. If that's the case, stop here and return this book. You're wasting your time. Your CEO and CFO will soon see your true motivation and won't buy into your dashboard anyway.

But if reading this is bringing you some personal enlightenment, re-read Chapter 3 and commit yourself to developing an effective strategy map. Then, draft a role of marketing contract to review with your CEO before you read on.

Having said all that, there are some times when using revenue metrics is highly appropriate. Usually those relate to measurements of share-of-customer spending or share-of-market metrics that relate to the total pie being pursued, not those attempting to measure the financial efficiency or effectiveness of the marketing investment.

In addition, be especially careful with metrics featuring ROI. If ROI is a function of the net change in profit divided by the investment required to achieve it, it can be manipulated by either reducing the investment or overstating the net profit change beyond that directly attributable to the marketing stimulus. Remember that the goal is to increase the net profit by as much as we can, as fast as we can, not just to improve the ROI. That's just a relative measure of efficiency in our approach, not overall effectiveness.

So, speaking of marketing efficiency metrics, let's start our review of common dashboard metrics here. Remember, most of these metrics

are applicable to many industries. Try to extend our examples to your world to see if a given metric would be insightful for you.

Marketing Efficiency Metrics

Value/Volume Ratio

This is a basic calculation of marketing efficiency. It is the ratio of your estimated share of gross profits you're getting in your category compared to your share of the total volume sold in the category. For example, if you have a 19% share of volume by gallons of all the gas sold, but you only have a 14% share of total gross profits in the category, your value/volume ratio is 74% (14% divided by 19%). A ratio of less than 100% suggests you are buying your volume share through discounting and may need to course-correct by either reducing costs without reducing volume or by reducing the price elasticity of your customers through efforts to increase the perceived value of your product.

Marketing Cost Per Unit

Whatever your business, you sell "units" of something. It might be widgets or cases of widgets. It could be numbers of locomotive engines. Perhaps pounds of chemicals. Whatever your "units" are, you should be able to easily find out how many your company sells over a period of time. If you take the total marketing expense over that same period of time and divide by the number of units sold, you get a marketing cost per unit (MCPU). $1,000,000 in marketing expense divided by 250,000 units is $40 MCPU. Over time, you'd like to see the MCPU decline. You might also want to track your MCPU against your best estimates of your competitors.

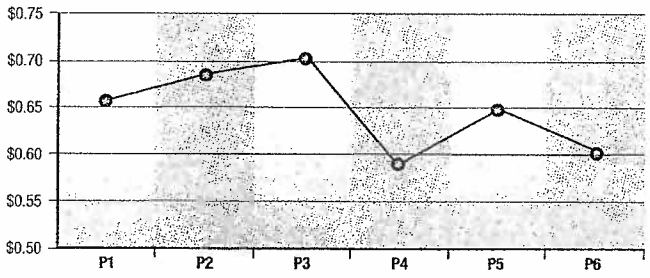
Lag time is an important consideration if you're using MCPU. A dollar spent today on marketing may not influence a unit sale for several weeks or months. There is a strong argument that some of the money you're spending in marketing today is intended to create a long-term effect on unit sales that might not even show up in the current year. Regardless, you can likely discuss the lag time factors as a group (including finance) and arrive at an agreement on the expected timeframe of impact of the components of your marketing plan. When those expenses with long lag times are laid out on a calendar like the one in figure 5.1, they begin to overlap with short-term program expenses to create a total marketing cost

in the current period. This provides the numerator for the calculation against the denominator of current period unit sales.

Over time, your accuracy at spreading marketing costs out over the proper period will increase, and hopefully your MCPU will improve as a reflection of increased efficiency.

FIGURE 5.1 — MARKETING COST PER UNIT

	P1	P2	P3	P4	P5	P6
Short-Term Programs	$2,435	$3,372	$2,889	$2,351	$3,253	$2,925
Amortized Long-Term Program A	$1,350	$350	$200	$100	$0	$0
Amortized Long-Term Program B	$0	$0	$2,150	$750	$400	$200
Total Marketing Investment	$3,785	$3,722	$5,239	$3,201	$3,653	$3,125
Total Units Sold (000s)	5738	5455	7539	5449	$5,823	$5,186
$ Marketing Per Unit	$0.66	$0.68	$0.69	$0.59	$0.63	$0.60



Marketing-Mix Productivity:

Marketing-mix models attempt to correlate investments in different communications media — broadcast, Internet, direct mail, print, outdoor — to actual sales volume. By using transactional data from all their points of sale, some companies can figure out the optimal mix for allocating marketing dollars. Unfortunately, most companies do their mix modeling on revenue, not profits. A dollar spent in one channel does not necessarily generate the same margin on a dollar in sales — so when discounting is done, sales may jump, but at the expense of profitability.

The scope of this book prohibits an in-depth discussion of mix models, but if you do have a mix model, consider reporting on the

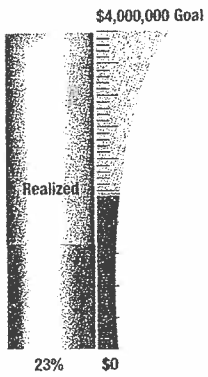
dashboard your overall contribution on total mix. If your modeling suggests you are getting $1.63 of contribution margin on each dollar of investment covered by the model, then your efficiency is 63%, before cost of capital. Showing how that efficiency improves over time will demonstrate good stewardship of company resources. Just be sure to keep the measurements consistent as market conditions (e.g., media rates, competitive activities, etc.) change.

Return on Important Initiatives

If there are one or more big-spending initiatives in your marketing plan like a substantial overhaul of your Web site, a new packaging launch, or just a big direct-marketing campaign, it may be appropriate to post the overall return for that project separately on your dashboard. If someone had to expend political capital to get the money to spend, you can underscore your commitment to getting the best return for the company's money by putting your progress right out where everyone can see it.

If the project has a target return that will take some time to achieve, consider reporting the work in progress, graphically comparing the present return to the goal in the form of a "thermometer" chart like the one in figure 5.2 below.

FIGURE 5.2 — PROFIT RETURN ON "PROJECT SPECTRE"



Program/Non-Program Ratio

This metric gives you the opportunity to look at the allocation of marketing resources to value-creating activities vs. overhead. Think about how charities are evaluated on the percentage of total funds raised that are distributed to the targeted recipients as opposed to salaries and overhead.

The higher the ratio, the more efficient the operation. The best charities are consistently in the 90%-plus range. What's your ratio? If the total marketing budget is $5 million, of which $4 million is allocated to specific program or campaign costs and $1 million to non-program costs, then your program/non-program ratio is 80%. There's your benchmark. Moving forward, you might set goals to increase that to 90% within two years.

It can be difficult to determine the line between value-creating activities and overhead, particularly when it comes to things like agency fees, payroll, staff development, or other issues. If this metric seems relevant to your situation, have a team develop a proposed delineation between program and non-program expenses and then try to apply it consistently over time. Consider breaking it into three categories instead of two:

- direct program resources;
- indirect program resources; and
- non-program resources.

Where you start from is less important than how well you progress toward your goal and keeping your definitions consistent.

Program/Payroll Ratio

This metric is a simpler form of the program/non-program ratio above. Take the total marketing budget and isolate the non-payroll-related expenses from the payroll dollars (fully loaded if applicable) to get a baseline of how the resources are allocated to customer-reaching activities vs. internal process management. Many marketing departments that do this for the first time are shocked at how high the percentage of total resources allocated to payroll are. It's not uncommon in some multidivisional B2B firms or others that don't do much advertising to find a 50/50 ratio.

Again, there's no particular benchmark for the right ratio beyond the target that you believe is reasonable given your marketing objectives. Importantly, everyone knows this metric can be easily manipulated by spending more money on existing advertising campaigns or shifting personnel from marketing into sales or operations. But if the metric is relevant to you, you'll find a way to define it in a manner that you can consistently apply in search of improvement in payroll leverage.

There might be 50 more metrics on this list based upon your company and industry. Understanding the purpose of marketing efficiency metrics is a good way to start the process of designing your own.

Customer Metrics

Here are a few thought-starters for how the customer might appear on the marketing dashboard.

Active Customer Counts

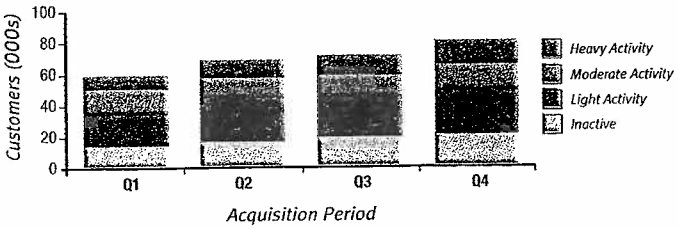
How many of your customers are "active" — consistently purchasing above some minimally acceptable level over time? This measure of customer-base vitality may tell you quite a bit about who is responding to your marketing activities and who is not. Consider looking at cohort groups of active customers by longevity if relevant. For example, what percentage of customers who first bought from you three years ago are still buying at least quarterly? What about those whose first purchase occurred only in the past 12 months? What is the difference between the two and why does it exist? How much are the groups purchasing and what is the product/service mix?

This metric might be even more telling when looked at from a profitability perspective than from a revenue view, but if vitality is really the question, revenue may suffice. If you don't have customer-specific transaction data but find this metric insightful, consider initiating either a panel study or tracking study of customers. Just keep the methodology consistent from period to period and the change over time will be more relevant than the absolute levels. And remember to keep the orientation towards the predictive. For example, let's say that we knew there were 400 plastic-stamping companies who purchased a chemical compound from us that helped keep the plastics malleable. At any given point in time, we know how many of them

our company is doing business with and we have an action plan to increase that number. If we structure this correctly on the marketing dashboard, we will be able to monitor our results against our plan and see if we're projecting to close the gap on time and on budget.

FIGURE 5.3 — ACTIVE CUSTOMERS BY INCEPTION COHORT

	Q1	Q2	Q3	Q4
Inactive	12	15	17	19
Light Activity	21	17	25	28
Moderate Activity	16	14	15	17
Heavy Activity	9	12	13	16



Segment Mobility

You can do frequency distributions of customers by *value* — the percentage or actual number of customers contributing different levels of profit or gross margin. Even if you can only define groups of customers in terms of low, moderate, and high profitability, these categories will give you more insight than topline revenue breaks.

You could also do frequency distribution of customers *across product lines*, meaning that you'll begin to track customers that are only buying one product during a time period vs. others who are buying two or more. Customer longevity is another option that gives you a broader picture of how well you're keeping customers in the fold.

Some companies develop combinations of value metrics that place customers into multidimensional segments that describe current and potential future value. RFM (recency, frequency, and monetary) analysis is the most common approach. Others use different combinations specific to their own circumstances. If you have a segmentation

scheme that provides insights into future customer value (particularly in bottom-line terms), use it. Show how the customer base is migrating from one segment to another (hopefully more profitable) one. This is called segment mobility. See the example in figure 5.4.

FIGURE 5.4 — SEGMENT MOBILITY

Net Change in Segment Count vs. Forecast

	To Segment:				
From Segment:	A	B	C	D	E
Segment A	1	4	3	2	1
Segment B	0	4	12	4	-4
Segment C	0	1	0	1	2
Segment D	0	0	-3	0	4
Segment E	0	0	0	5	-1

Some even prefer to focus on the velocity of segment mobility — the rate at which customers are migrating from one segment to another. All of these can become tremendously insightful, predictive metrics that forecast the health of the business.

The bottom line here is that frequency distributions are preferable to statements of average numbers because a simple frequency distribution graph implicitly tells you a lot more than an average ever can.

Share of Customer

Share of customer is your percentage of the total business that a customer does in your category. If the customer spends $3,600 a year on groceries and spends $1,200 a year in your grocery store, you have a 33% share of customer. This is another metric that works best in the form of a frequency distribution demonstrating mobility.

Share of customer is relatively easy to apply in categories in which the total annual purchase volume is more certain. For example, in retail gasoline, history has shown that the vast majority of consumers purchase between 1,000 and 1,200 gallons per year. So it's not that difficult to estimate share of customer if you know how much they purchased from you. But if you don't have transactional data on your customer's purchases or don't know what the likely total

consumption volume is, you'll need to explore panel studies or survey techniques to develop estimates and then measure improvements over time using a consistent methodology.

Customer Loyalty, Repurchase, or Referral

There are lots of ways you can define "loyalty." Loyalty can be defined transactionally, meaning a person purchased from your company a certain number of times in a given period — a.k.a. the repurchase rate. Or loyalty can be defined emotionally, pointing to those customers who express a preference to do business with you in the future.

In the case of the former, you might choose to use dashboard metrics that portray the number or percentage of customers who purchased once, twice, or three-plus times in the last quarter vs. forecast and the prediction for the next few quarters. Or, if you are limited to survey data on attitudes and intentions, you might choose to highlight the percentage of respondents indicating top box or top two box answers to purchase intentions and look at:

- how this most recent survey compares with prior surveys and the forecast response for this time period; and
- how the expectation for the future may change.

Customer Experience Monitors

Here we get into the measurement of how consumers tell us they're happy or unhappy with what we're doing. They include the following:

- **Satisfaction levels:** Satisfaction measures are always great candidates for a dashboard because they demonstrate information everyone wants to know. The trick, though, is to express this information predictively. Some companies are finding that one simple question is accurately predicting customer repurchase rates: "How likely are you to refer a friend or family member to do business with us in the next few months?" If that simplicity works for you, the answer to that one survey question can be a very predictive dashboard metric once calibrated.
- **Quality perceptions:** Perceptions of quality are a terrific way to measure part of the customer experience. Understanding where you are meeting, exceeding, or falling short of expectations can help identify ways to improve the price/value relationship and decrease customer price elasticity.

- **Order-cycle completion:** This is the time it takes from the minute you receive an order from a customer to the time that order leaves your factory or reaches your customer's hands — depending on how you define the cycle. Across industries, order-cycle completion tends to be highly correlated with customer satisfaction. It's a common dashboard metric because faster completed order times with accuracy can be easily calibrated over time as being predictive of reorders.
- **Involvement/engagement levels:** Beyond just transactional behavior, profitable customers might have a tendency to be more involved with you or engaged in the relationship. This engagement can take many forms, including responses to customer surveys, providing testimonials, completing customer comment cards, or other alternatives. If you can establish that involvement among your customers and it's predictive of increasing customer profitability, reporting involvement and engagement levels on your dashboard is very appropriate.
- **Repurchase intentions:** Survey-driven findings indicate how likely customers are to repurchase and how much they'll spend when they do. It is important to know that these findings contain margins of error because there is a tendency for the consumer to either overstate or understate their intentions. However, if you survey consistently with the right methodology over time and are able to track the stated intention to the subsequent actual behavior, you can develop a correction factor that you can apply to a stated intention. That will give you a fairly accurate, highly predictive view of how much you're likely to sell to that customer or segment of customers in the future.
- **Compliments/complaints:** This is a test for your inbound channels — call centers, Web sites, etc. The nature, frequency, and magnitude of compliments or complaints are worth tracking on an ongoing basis as long as you can add some predictive value to the measurement.
- **Resolution turnaround times:** When you have a problem, how fast do you fix it? If your company is in a turnaround situation in which you know you have customer issues that need repair, this is a worthy subject to measure.

No company is going to find all of these measures appropriate. But depending upon where you are in organizational sophistication and capability, some of these may be effective metrics for your

dashboard. The whole area of customer experience monitors is often overlooked as dashboard metrics because of concerns that self-reported responses are methodologically suspect. But if you spend the time to develop a good methodology and you apply it consistently, the error factor normalizes over time. In other words, you see the same type and magnitude of error in each iteration of the survey, thereby eliminating the error and leaving only the real trend.

For example, if your Uncle Ernie consistently overestimates the number of loud teenage kids on his block by 5% to 10%, you can rely on his estimates in the future by subtracting 5% to 10% from whatever number he gives you. Likewise, if you find the error rate in self-reported purchase activity among customers is consistent over time, you can calibrate it to actual purchase activity with a high degree of confidence. You can use it to be very predictive with respect to future sales.

Return on Customer℠

Your customers are assets. Properly nurtured, they'll improve in profitability over time as they look to you to meet more of their needs. They'll hopefully purchase from you more efficiently and with less price elasticity.

You spend a certain amount of money to attract, retain, and nurture these customers. They in turn not only buy from you, but also refer others to do the same. In some industries, the lifetime value of these customer relationships can be ascertained within reason. When that lifetime value per customer is multiplied by the number of customers, you get a total value of the customer base. The investment you make in securing and defending those customers can then be compared to the change in the value of the base to get a "Return on Customer." For example, if you spent $25 million last year and achieved a net change in customer value of $50 million, your Return on Customer would be 100%.

This is an emerging thought process in gauging asset value. It has many potential challenges for most businesses. But if your company is oriented toward customer value creation, it might be a direction worthy of consideration for your dashboard with two caveats: First, as with most ROI metrics, be careful not to focus on the percentage return. It can be manipulated by reducing spend or claiming growth

associated with marketing that would have occurred without the marketing stimulus. Second, believing that any single all-encompassing metric can consistently and accurately gauge marketing effectiveness is wishful thinking at best.

Brand management is a crucial aspect of marketing effectiveness and we'll dedicate ourselves to brand scorecard metrics in Chapter 6. In Chapter 7, we'll explore some less traditional dashboard metrics that may nevertheless be highly relevant for you.

Conclusion

Marketing efficiency metrics are very common starting places for marketing dashboards. Likewise, most dashboards include some perspective on customer profitability evolution. We've presented some examples of effective metrics in these categories as thought-starters to help you identify relevant metrics for your industry and company. We also underscored the importance of incorporating customer experience metrics as the voice of the customer on your dashboard.

Sources

Return on Customer is a registered service mark of Peppers and Rogers Group, a division of Carlson Marketing Group, Inc.

CHAPTER 6

Putting the Brand on the Dashboard: Building a Brand Scorecard within Your Dashboard

The marketing dashboard is intended to track both the inputs — the marketing activities being undertaken — and the outputs — the financial results generated. If you've followed closely so far, you can see that leaves the possibility of a gap in the middle, which is the asset that's being created beyond the P&L in the mind of the customer.

Measuring the long-term value of marketing in creating customer preference and loyalty for your brand(s) is critically important in determining the return from the investment. Depending upon your industry or category, 50%, 60%, 70%, or more of your marketing expenditures may be in support of programs and initiatives that cannot be shown to have short-term effects on incremental profits, but *can* be shown to improve the health of the brand in the marketplace. But if this "brand health" isn't something we can easily translate into forecast profits this year, we need to treat it as an asset — something that generates positive returns over a longer period of time.

This is where a brand scorecard comes in. The brand scorecard tracks the health of the brand in the minds of the customers. Whereas the marketing dashboard tends to look at things more from the company's point of view — "What investments are made in programs and initiatives and what I should expect to get out in terms of customer behavior?" — the brand scorecard asks, "What do our major constituencies of interest think and feel about our brand and how well is our brand supporting our desired value propositions?"[1]

In a comprehensive marketing dashboard, the brand scorecard stands somewhere in the middle between the inputs and the outputs.

Let's take a look at what the critical elements of a brand scorecard are, how many constituencies it should reflect, and why it deserves to be treated specially within the dashboard.

The Problem with Brand Scorecards Today

There aren't enough of them. That's the problem with brand scorecards today.

If you ask 100 companies to show you their brand scorecard (and we have), 20 will look at you quizzically, another 20 will show you elaborate consumer surveys of brand attribute ratings, and the remaining 60 will pull out a research summary of the latest scores on the classic "hierarchy of effects" waterfall:

- 74% of consumers are aware of the brand on an unaided basis
  - 61% indicate an overall favorable impression of the brand
    - 47% indicate a willingness to try the product

... and so on.

The problem with this typical waterfall is that it never actually connects awareness or preferences to value creation, and as such is seen by the CFO and the rest of the finance department as "marketing mumbo jumbo" used to justify spending money.

Awareness is a not an achievement unto itself. Each of us is personally aware of a great many companies that we know nothing about. We don't know what they make or do, and even if we do, we have no clue as to why we might want to buy their product or service. We may have an awareness of these companies, but no *salience* to that awareness that places it into a proper context for us.

Salience itself may have multiple levels. I may know IBM makes computers, but I may not know they make the kind of Web servers I need for my company. Or maybe I know they make Web servers, but I think they offer solutions only in the high-performance/high-priced end of the market.

Preference also has many potential dimensions and degrees. I may prefer to drive a Jaguar, but have no realistic hope of ever being able to afford one. I might thereby "prefer" the Hyundai to the Kia, but do I really "prefer" the Hyundai?

The aforementioned example indicates how brand preference is of little value absent the proper context. My preference for a given brand should be measured within the context of those that are physically available to me and within my affordability zone. Preference should also be measured in a temporal context — relative to the point in time when I am most likely to translate my attitudes into behavior and buy.

When it comes to willingness to try the brand, the wheels really come off. Just because I'm willing to try it doesn't mean I ever actually will. Maybe if I get a coupon for 50% off I'll consider it, but if it's not available where I normally buy, my willingness is strictly theoretical.

Purchase intentions are only valid when the prospective customer has the appropriate salient awareness, knows where to buy the product, understands what the tradeoffs are within the competitive set, and has the money and desire to act. Only then are the intentions appropriately qualified.

There's little doubt that salient awareness, contextual preference, and qualified purchase intentions *can* be valuable indicators of the potential economic value of the brand. But until they are unlocked and flowing freely from the minds and hearts of the customers to their wallets and into our company treasury, we must find a way to measure them for what they are: Assets. Good intentions. Accumulated goodwill toward the brand that has not yet translated into a financial outcome.

> *A brand is a reservoir of future cash flows not yet realized.*
>
> — Tim Ambler, Senior Fellow, London Business School[2]

The role of the brand scorecard within the marketing dashboard is to reflect the evolution of these brand assets and continually gauge the potential value of the demand they represent. For this unique reason, we recommend setting up the brand scorecard as a separate-but-linked portion of the overall marketing dashboard. Doing so helps to highlight both the input/output importance of the dashboard and the asset-nurturing insights of the brand scorecard.

To begin, let's look at the potential cornerstones of any consumer/customer brand scorecard.

Four Key Attributes for the Brand Scorecard

Every company and possibly every brand will have its own view of the most crucial components of the customer's brand decision process. Some choose to use syndicated approaches to brand measurement like Young & Rubicam's BrandAsset® Valuator or Millward Brown's Brand Tracker. Others have developed an exhaustive battery of brand attributes they measure through elaborate tracking studies. Regardless of the approach you are using (or if you're just starting out), the key consideration is to find the elements that are most predictive of the future behavior of prospects and customers.

In general, there are four dimensions of brand measurement that tend to bind the customer to the brand:

- the functional performance of the underlying product or service;
- the convenience and ease of accessing the product or service;
- the personality of the brand (a.k.a. "the one for me"); and
- the pricing and value component.

The functional dimension seeks to measure the customer's (or prospect's) perceptions of the more tangible aspects of their brand experience. Is the product of sufficient quality? Does it work as promised? Is it more durable, more flexible, more efficient, more yellow, more professional, more appropriate to the intended task than perceived substitutes? Each brand is intended to deliver a combination of functional benefits to the user, be it a toothpaste, financial services, or silicone polymers. The brand scorecard should reflect how well these functional elements are perceived by the experience of regular customers vs. the newly acquired customers and how they compare to the perceptions of the imminent prospects vs. those in the target audience at large.

Each brand also has, as part of its fundamental equity structure, perceptions and knowledge about where to buy the product or try the service. Can I get it at my local mass merchant store? Do I buy it on the Web? Will an agent come to my home? The degree to which the prospects are aware of how they would acquire or access the brand

and their perceptions of the acceptability of that avenue are important components of the brand asset value. Likewise, the perspectives of the current customers of the ease of access through the present distribution channels provide an important opportunity to validate or question the current business process.

Brand personality is very important in many categories. As marketers, we all understand how one soft drink might have a different "personality" than another. For many years now, marketing researchers have used personification exercises to get consumers to describe a product as male/female, young/old, progressive/conservative, outgoing/shy. Corporate brands also tend to have key personality traits like "reliable," "trustworthy," "innovative," etc. If you can establish that certain personality profiles, when attached to your brand, increase the likeliness of prospects becoming customers and customers buying more, then those critical elements should be on your brand scorecard.

Last, but certainly not least, brands often exist for one primary purpose — to differentiate competitive offerings and prevent commoditization of the market. Brands are used to imbue certain companies or products with a premium value perception that commands a premium price. In other categories, brands are used to capture the consumer gratitude for being the lowest price provider. In either extreme, or at any point in the middle of that spectrum, every brand has a price/value component to it that is either the bedrock of its success or a competitive requirement to compete effectively. This "absolute price" perception is often worthy of tracking on the brand scorecard.

The second dimension of pricing is the "relative price" — a measure of the extent to which prospects and customers perceive that your brand offers good "value for the money." Continuously gauging the relative price perceptions is an effective way to quickly identify opportunities for market or margin share increases.

The combination of functional, accessibility, personality, and value attributes of the brand often provide a well-rounded picture of how well the brand asset is growing and how much untapped cash flow is waiting to be unlocked.

But you have to do the spade work to understand the links between brand equities and financial success in your category. What is often thought to cause people to purchase — Brand A seems to do the job better than Brand B — quickly goes out the window when the choice is guided by, "I really can't be bothered to think about it. Brand A is available now, and Brand B isn't." If this is common in your category, then some kind of distribution weight or availability of the product can be a more important scorecard metric than one that measures the degree to which the customers believe your brand has a special functional characteristic or has a personality "like me."

Sometimes it's sufficient to have your brand just penetrate the competitive set and then out-execute the competition on distribution or packaging. Knowing what *really* drives your brand category is critical to selecting the scorecard metrics that will be both most diagnostic and most predictive of future success.

This generic framework can be applied across different categories, although the weight of the individual components may actually vary dramatically.

Timing Your Measurements

Another important thing to consider is that brand perceptions aren't static — consumer loyalties can last over a lifetime or end in a few short days. And that often runs counter to a company's own brand perception, which can remain pointlessly unchanged. Most companies, even many with huge research budgets, don't carefully monitor the clarity, or lack of clarity, their brand has with customers and prospects at any given point in time. A brand value proposition that made a lot of sense under one set of industry circumstances may degrade to irrelevance and become a commodity position if it stays too long in one place.

Most often, brand attributes are monitored in large-scale tracking studies conducted in "waves" three, six, or 12 months apart. If your category evolves faster than the frequency of your tracking studies, these periodic reads may provide irrelevantly historical information and present a picture that bears little resemblance to today's reality

— especially when you consider that it often takes four to six weeks from the end of survey fielding until the report gets on your desk.

Many organizations are today migrating towards "continuous" brand tracking, with smaller samples fielded each week or each month that are then read in the aggregate over a rolling six, eight, or 12 weeks. While a bit more expensive, this approach can provide much more timely insights into the shifts of the marketplace, not to mention the potential to measure the impacts of marketing stimulus programs on brand attributes with greater reliability.

The bottom line is you need to clearly know what your brand is and what it means to the target customer. If you don't, you are prone to serious over- or underestimations of your brand strength. One such failure was Reebok's attempt to market a Reebok brand of water. Reebok thought that Reebok stood for health. In reality, it stood for running shoes. Why would anyone want to drink water out a shoe?

Without an effective brand scorecard, you might not have an accurate picture of where your brand stands or where it's headed. With one, you have no excuses not to.

In Search of a Reliable Measure of Brand Equity

By Jonathan Knowles, Senior Strategist, Wolff Olins

Accountability is the new black for marketers. According to a survey taken earlier this year by the Association of National Advertisers (ANA) of 1,000 marketing executives, 66% ranked the accountability of marketing as their number-one concern. A similar study by the CMO Council revealed that 80% of respondents were "dissatisfied" with their ability to measure ROI.

While the desire of marketers to demonstrate that they are allocating marketing investments as efficiently as possible is admirable, they are doing themselves a disservice with their current obsession with ROI. By interpreting marketing accountability solely in terms of a metric of short-term payback, marketers are reinforcing the impression of marketing as a merely tactical discipline.

The bigger question — and the one that will earn marketers a seat at the boardroom table in a way that no amount of ROI measurement can — is whether brands truly are assets that enable the business to generate superior returns over time.

The first point for marketers to recognize is that, to qualify as an "asset" in financial terms, a brand needs to be measured in terms of its ability to generate future cash flow.

The second point is even more important: Value can only be created by changes in customer behavior. Changes in customer attitudes are nice, but in and of themselves they do not generate cash flow.

This means that many of the traditional metrics favored by marketers — awareness, familiarity, and quality — are no longer suitable as measures of brand equity. They still do a good job of measuring the scale of a brand's market presence and the likelihood that the brand will make it into a given customer's consideration set. However, they do a poor job of explaining the final purchase decision, and therefore do not provide a reliable measure of the brand's ability to generate cash flow.

The reason for this is that Total Quality Management (TQM) has driven genuinely bad products and services out of the market. Those that remain are all of satisfactory quality, meaning that the customer now faces a bewildering array of good alternatives. In response to this, the basis for the final purchase decision has expanded from simply, "What will you do for me?" to, "What will you do for me — and mean to me?"

So the third point is that brand equity needs to be measured in a way that captures the source and scale of this emotional augmentation that the brand provides to the underlying

functionality of the product or service. Only such a definition of brand equity will identify the extent of the customer utility that the brand has created.

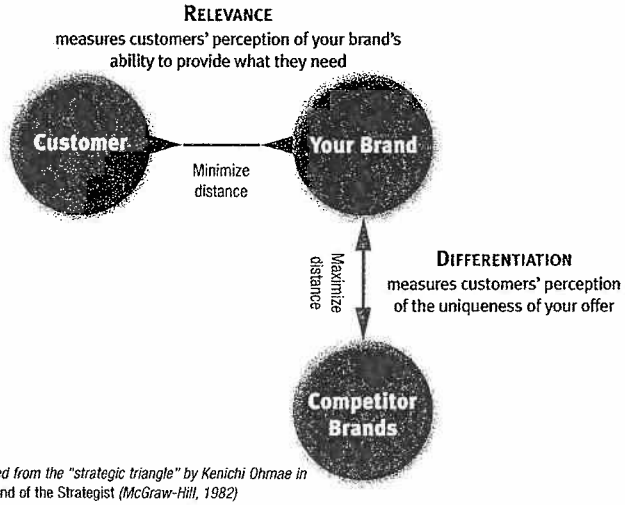
There are two promising candidates for how this equity can be measured:

- The first type of approach measures equity in terms of "outcomes," such as the extent to which customers are prepared to stake their personal or professional reputation behind a brand by recommending it to others or the price premium they are prepared to pay.
- The second type of approach measures equity in terms of the scale and nature of the utility that the brand delivers to customers.

One of the best known examples of the "outcome" type of approach is the work of Fred Reichheld, the author of *The Loyalty Effect* (1996) and *Loyalty Rules* (2001). His simple premise is that "willingness to recommend to a friend" is the single most reliable measure of brand equity. Specifically, your "net promoter" score (the number of people willing to recommend your brand minus those who are not willing to do so) provides an accurate predictor of your company's growth prospects.

In similar vein are approaches that stress "willingness to pay a price premium" as the truest test of the existence of brand equity. And the advantage of these approaches is that they provide a direct input into a valuation model like the "revenue premium" methodology advocated by Professor Don Lehmann of Columbia University.

The limitation of "outcome" approaches is that, while they may accurately quantify how much brand equity you enjoy, they provide limited insight into what creates this equity.



Adapted from the "strategic triangle" by Kenichi Ohmae in The Mind of the Strategist *(McGraw-Hill, 1982)*

The second type of approach tries to quantify the extent of brand equity that a brand enjoys by measuring the degree of "relevant differentiation" provided (although most do not explicitly use this term). Relevant differentiation is an important metric because it measures the success of marketing in terms of the extent to which two goals have been achieved — maximization of the perceived fit between your brand and your customer's needs, and maximization of the perceived differentiation of your brand vs. its competitors. A high relevant differentiation score provides insight into why a certain brand is perceived to be uniquely capable of meeting customer needs.

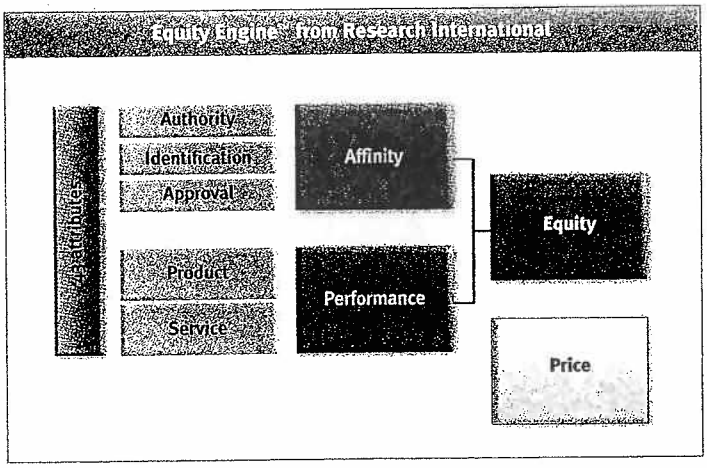
Following are profiles of a number of well-established brand equity models that seek to identify the scale and sources of brand equity.

Equity Engine℠

Equity Engine℠, developed by Research International, is one of the most elegantly parsimonious models of brand equity. Essentially, it expresses brand equity as a combination of the functional benefits delivered by the brand (performance) and the emotional benefits (affinity). Underlying each

of these macro constructs is a further layer of analysis that expresses performance as a function of product and service attributes, and affinity as a function of the brand identification (the closeness customers feel to the brand), approval (the status the brand enjoys among a wider social context of family, friends, and colleagues), and authority (the reputation of the brand).

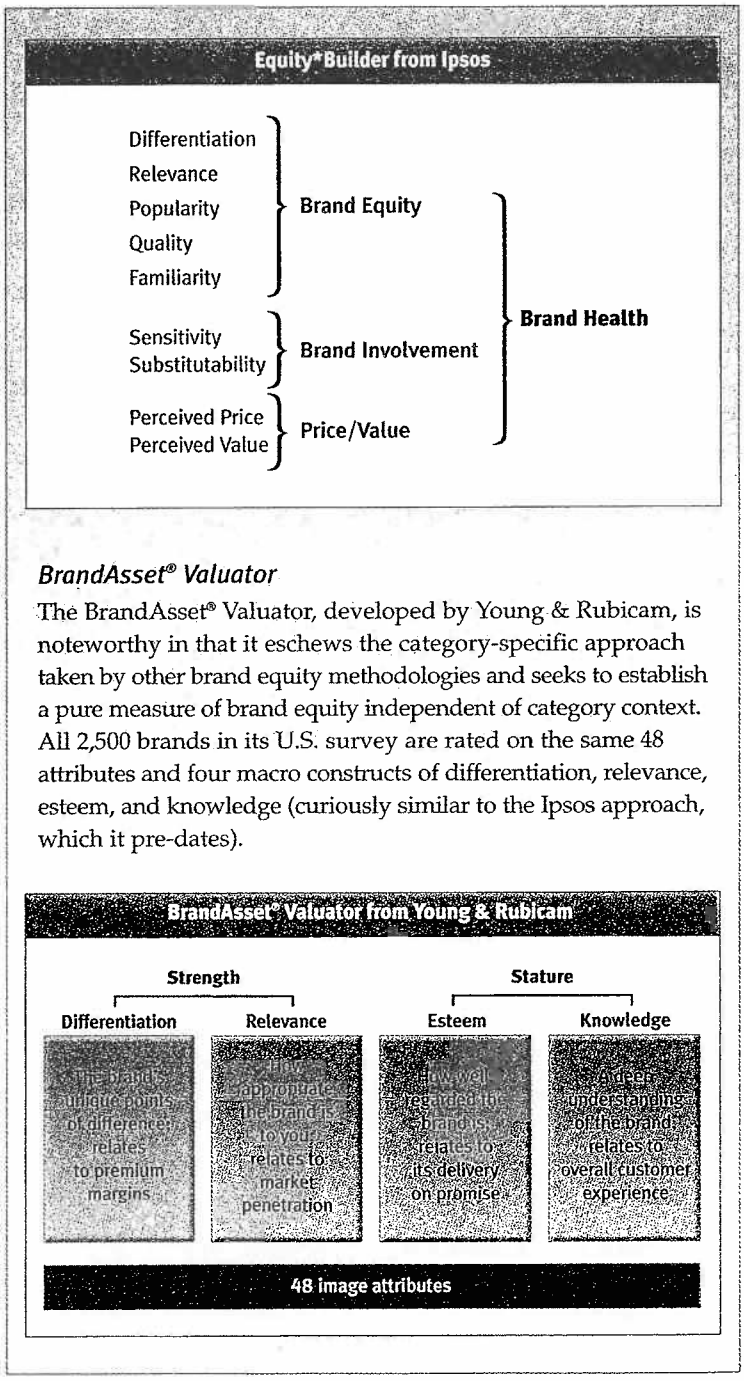
Equity Engine℠ incorporates a form of conjoint methodology that establishes the price premium that a brand's equity will support while still maintaining a "good value for money" rating from customers.



*Equity*Builder*

Equity*Builder, the methodology developed by the Ipsos Group, is more uniquely focused on establishing the emotional component of brand equity. Importantly, it situates a brand's attitudinal equity (measured in terms of differentiation, relevance, popularity, quality, and familiarity) in the context of the degree of customer involvement with the category in question.

Similar to Equity Engine℠, Equity*Builder also explicitly addresses how brand equity translates into perceived value and price.



BrandAsset® Valuator

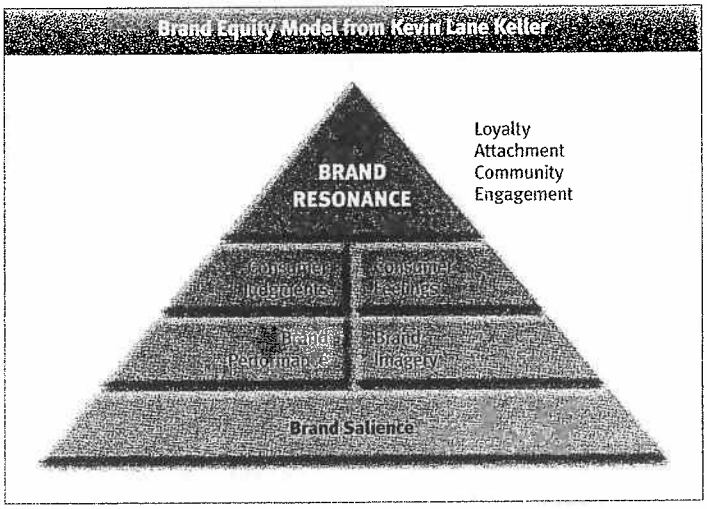
The BrandAsset® Valuator, developed by Young & Rubicam, is noteworthy in that it eschews the category-specific approach taken by other brand equity methodologies and seeks to establish a pure measure of brand equity independent of category context. All 2,500 brands in its U.S. survey are rated on the same 48 attributes and four macro constructs of differentiation, relevance, esteem, and knowledge (curiously similar to the Ipsos approach, which it pre-dates).

The constructs of differentiation and relevance are then combined into a single metric of brand strength that, through Young & Rubicam's collaboration with the financial consultancy Stern Stewart, has been shown to provide a powerful explanation of superior market value. The constructs of esteem and relevance are combined to form brand stature that, interestingly, is correlated to current market share but not potential for growth.

Kevin Lane Keller's Model

Although not available as a commercial methodology, Kevin Lane Keller's brand equity model is worthy of mention because of his authority within the brand equity measurement arena. (He is professor of marketing at the Tuck School of Business at Dartmouth and recently co-authored the 12th edition of *Marketing Management* with Philip Kotler.)

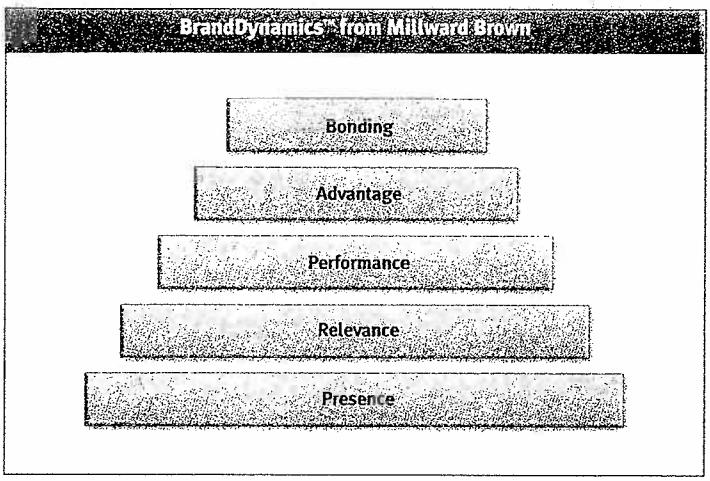
Kevin Lane Keller mirrors the Equity Engine℠ approach by seeing the brand as a blend of the rational and the emotional, measured in terms of performance characteristics and imagery. Customers' relationship to a brand can be plotted in terms of their altitude on the pyramid of engagement and their relative bias towards a rationally dominant or emotionally dominant relationship.



BrandDynamics™

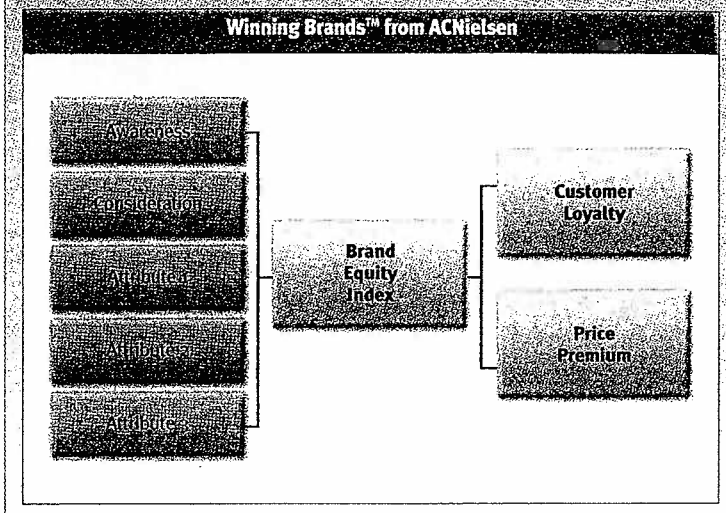
The notion of a pyramid of engagement is echoed in the BrandDynamics™ methodology developed by Millward Brown. This approach characterizes the relationship that a customer has with a brand into one of five stages: presence, relevance, performance, advantage, and bonding. "Presence" customers have only a basic awareness of the brand, while "bonded" customers are intensely loyal, at least in their attitudes. The underlying premise is that the lifetime value of customers increases the higher up they are in the pyramid.

All of the aforementioned approaches suffer from the fact that they are attitudinal in nature and have yet to establish the definitive relationship between measures of attitudinal engagement/loyalty and observed behavior.



Winning Brands™

Winning Brands™ is the methodology developed by ACNielsen. In contrast to the attitudinal approach to brand equity measurement embodied in the other approaches described, Winning Brands begins from a behavioral observation of brand equity. Brand equity is measured in terms of a customer's frequency of purchase and the price premium paid. Once favorable behavior is observed, the methodology seeks to analyze the attitudinal characteristics of those customers.



The strategic component of brand development involves the creation and nurturing of a long-lived corporate asset. Of potentially greater importance than a credible ROI model for marketers is the development of a robust methodology for defining and measuring brand equity in a way that meets the financial requirement for an asset, namely that it represents a source of incremental cash flow over time. This means that the focus needs to be on the metrics that capture and explain customer behavior, not simply customer attitudes.

Originally appeared in MarketingNPV Journal, *vol. 2, issue 3, pages 16-19.*

Brand Value vs. Brand Valuation

To be a useful tool for organizational planning and resource allocation, the brand scorecard needs to go beyond attribute ratings and incorporate a second key measurement — an understanding of brand value.

There's a difference between "brand value" and "brand valuation." Brand value is the strategic and financial value of the brand to your company today. Brand valuation is a financial exercise intended to put a price on the brand over and above the discounted future cash

flows. The difference can be subtle. Tim Ambler of the London Business School uses this metaphor to describe the two: "Since I live in my house and plan to do so for some time, its *value* to me is the shelter and comfort I derive from it. When I'm prepared to consider selling it, I'll be interested in the valuation." Brands work much the same way.

Let's look first at brand value.

Brands create value for companies in several ways:

- They create customer loyalty, resulting in a lower cost of customer reacquisition and greater likelihood of future sales from existing customers.
- They lower the perception of risk the company presents to the financial marketplace, resulting in lower borrowing or financing costs.
- They establish negotiating leverage with suppliers and vendors who seek to be associated with them.
- They establish the perception of continuity of cash flows into the future amongst investors, thereby increasing the multiple over the company book value that investors are willing to pay for stock.

If these dimensions of brand value are relevant ways for you to gauge the potential return you will create by investing in brand development activities, then they should be reflected on your brand scorecard. You may choose to reflect it in competitive comparisons of expected customer lifetime value, perceptions of company "quality" amongst investors and analysts (either through syndicated methods like CoreBrand® or through proprietary research among targeted analysts), an index of company borrowing costs that isolates brand contributions from other marketplace and company variables, or a survey of brand influence within the vendor community.

The most common measure of brand value is one of the difference between market capitalization and either "book value" — the value of the company's total balance sheet assets — or the net present value of expected future cash flows. Unfortunately, it's not often reasonable to assume that the difference is mostly attributable to brand value. Channel dominance, patents and technical advantages,

sales force effectiveness, and other non-brand elements can be responsible for a big portion of the "intangible" value of the company.

Nevertheless, if your category is one in which investments in brand development are less directly justifiable in terms of customer financial behavior in the near term, you may need to incorporate some element of brand value in your analysis. The best advice we can offer is to sit down with your CFO and discuss the ways you might agree on measuring the brand asset. Typically those fall into two classes. The first is made up of top-down models that seek to explain valuation in terms of the lift in share price that the brand gives you over and above what the company would trade at without a brand. The second approach comes at it from the bottom up. Often called the "economic use" approach, this is an attempt to measure how much incremental cash flow the brand provides over and above what you would get with a "generic" product. The two are philosophically very well aligned. One comes from the macro and hopes to explain the micro, and the other hopes to aggregate the micro to explain superior valuation for the company.

"Brand valuation," on the other hand, may be relevant to you if your portfolio of brands includes some acquired from other companies, or if you anticipate selling one or more brands at some point in the not-too-distant future.

Accounting regulations in the United States and many other countries require companies to keep close tabs on the "goodwill" assets they carry on their balance sheets from past acquisitions. If the CFO has reason to believe that any acquired brand is no longer worth its carrying value on the balance sheet, she must take a write-down against earnings on the P&L to revise the estimate of value in a process called "asset impairment."

As a result, companies with acquired brands often need to continually monitor the value of those brands on their brand scorecard to prevent any sudden surprises in earnings.

Similarly, if your company anticipates selling itself in the whole or just selling one or more brands in its portfolio, you may want to begin tracking brand valuation over the period leading up to the sale to understand which potential investments help increase the

valuation and which might actually detract from it. The brand scorecard can be useful in this regard, too.

If you're not marketing acquired brands or planning on selling your own, the remaining reasons to do brand valuation are mostly tax-related or technical/financial and likely not important for a brand scorecard.

Don't Waste Time with Brand Valuation

By David Haigh, Founder and CEO, Brand Finance, and Jonathan Knowles, Senior Strategist, Wolff Olins

There is widespread acceptance among senior management that strong brands represent significant assets of a business. With high levels of competition and excess capacity in virtually every industry, strong brands enable companies to differentiate themselves and to provide a basis for ongoing customer loyalty.

At the same time, there is a widespread but erroneous assumption that brands need to be valued. The publication of tables of brand values in magazines such as *BusinessWeek*, *Forbes*, and a number of marketing publications has raised the profile of brand valuation but unfortunately has done so without clarifying its purpose.

It is an obvious point but one that bears repeating — the mere act of valuing an asset, whether financial, tangible, or intangible, does nothing to improve its quality. Most companies do not need an answer to the question "What is the value of my brand?" except for the specific purpose of accounting for goodwill after an acquisition. Rather they need an answer to the question "How — and by how much — does my brand contribute to the overall success of my business?" It is this insight into the sources of customer value and the economic cost of delivering that value that will enable them to run more successful businesses. Brand value on its own provides nothing more than bragging rights at corporate cocktail parties.

In light of this, we suggest that companies should begin from the position that they do not need to value their brand(s)

unless they have compelling answers to the following:

- What commercial objective will be served by a brand valuation?
- What is the asset we will be measuring if we do a brand valuation?

What Commercial Objective Will Be Served by a Brand Valuation?

In our experience, there are three basic reasons why a brand valuation may be justified:

1. It is required for accounting purposes.
2. It will inform the terms of a prospective transaction.
3. It will enhance our management of the brand.

Accounting purposes

Since March 31, 2004, gone are the significant differences that previously had separated international and U.S. rules on accounting for business acquisitions. Both U.S. and international rules (respectively Financial Accounting Standard 141 in the United States and International Financial Reporting Standard 3 from the International Accounting Standard Board) require that all identifiable intangible assets of the acquired business be recorded at fair value. This ends the previous practice of treating the excess of the purchase price over the net tangible assets acquired as a single goodwill figure.

Now there is a requirement that this single goodwill figure will be broken down into a number of specific intangible assets, leaving only a small residual amount of unidentified goodwill. The types of intangible assets that are now to be expressly recognized include technology-based assets, such as patents; contract-based assets, such as leases and licensing agreements; artistic assets, such as plays and films; customer-based assets, such as customer lists; and marketing-related assets, such as trademarks and brands.

If you acquired a number of brands as a result of an acquisition, U.S. and international rules now require you to report a

value for these brands on your balance sheet. A recent example is the acquisition of the Miller Brewing Co. by South African Breweries. The Miller brands represent $4.5 billion of the $6.5 billion of intangible assets that appear on the SAB Miller balance sheet for 2003.

Transactional purposes

The second circumstance in which a brand valuation may be justified is to inform the terms of a prospective transaction. The transaction may be internal or external.

The two most common types of internal transactions involving brands are securitization or tax planning. Securitization involves raising funds against the security of future revenues, such as the $55 million that David Bowie raised in 1997. The "Bowie bonds" were backed by the future royalties anticipated on his pre-1990 records. Despite a lot of discussion, brands have rarely been used as the collateral in asset-backed securities.

Brand-based tax planning is, by contrast, a relatively common practice. Companies transfer the ownership of their brand and other intellectual property assets to a central holding company. The central IP holding company then charges a royalty for the use of these assets to the operating companies, enabling a portion of the profits of these operating companies to be shielded from local taxes. Obviously, the fiscal authorities require demonstration of the value of the brand asset that provides the basis for these royalty payments.

External transactions involving brands usually take the form of acquisitions of branded companies or of licensing of brands from third parties. In each case, commercial due diligence is required to verify the economic value of the asset being acquired or licensed and to inform the discussion over the deal terms. In the case of acquisitions, the knowledge that accounting rules now require allocation of the purchase price between the different types of assets acquired has heightened the significance of the preacquisition due diligence process.

Management of the brand

The third commercial purpose that can be served by a brand valuation is the one that offers both the most opportunity for value enhancement and the greatest danger of wasted effort and expense.

In contrast to the technical and financial applications of brand valuation outlined here, in this case, the purpose of the valuation is purely to improve marketing's effectiveness. In theory its goal is to measure the extent to which brands enhance the underlying business performance and valuation of the company. In practice, the valuation model often gets subverted and used for defending marketing budgets.

The second major source of danger is that a brand valuation for marketing purposes requires greater thought about the nature of the asset being valued. Brand valuations for technical and financial purposes generally focus on a narrow definition of brand as the bundle of legally enforceable intellectual property rights that the brand owner has established. These center on the trademark itself but frequently also encompass the associated goodwill that the brand enjoys among its customers.

The specific details of the extent of the assets covered in the acquisition of a branded company were powerfully illustrated by Volkswagen's acquisition of Rolls Royce Motors for $667 million in 1988. The acquisition included all of the physical assets of the production of Rolls Royce and Bentley automobiles. But BMW, in a separate transaction, acquired the rights to use the Rolls Royce trademark in automobiles for $62 million.

Where a brand valuation is being contemplated for marketing purposes, considerable emphasis should be placed on determining the nature of the asset being valued.

What Is the Asset We Will Be Measuring If We Do a Brand Valuation?

In our experience there are three distinct definitions of the asset, all of which are sometimes referred to as the brand.

A logo and associated visual elements. This is the most specific definition of brand, focusing on the legally protectable, visual, and verbal elements that are used to differentiate one company's products and services from another's and to stimulate demand for those products and services. The main legal elements covered by this definition are trade names, trademarks, and trade symbols.

However, in order to add value, trademarks and trade symbols need to carry "associated goodwill" in the minds of customers based on the experience or reputation of high-quality products and good service.

A valuation based on this definition of brand is more properly called a trademark valuation.

A larger bundle of trademark and associated intellectual property rights. Under this definition, "brand" is extended to encompass a larger bundle of intellectual property rights such as domain names, product design rights, trade dress, packaging, copyrights in associated colors, smells, sounds, descriptors, logotypes, advertising visuals, and written copy.

Some commentators have interpreted the intellectual property rights included in the definition of brand to encompass tangible as well as intangible property rights (for example, to include the recipe and production process in the case of Guinness). This more holistic view is consistent with the opinion that brand is a much broader and deeper experience than the logo and associated visual elements.

This is the definition of brand that is generally intended when talking about a brand valuation in a marketing context.

A holistic company or organizational brand. The debate as to which intellectual property rights should be incorporated into the definition of "brand" often leads to the view that brand refers to the whole organization within which the specific logo and associated visual elements plus the larger bundle of "visual

and marketing intangibles" and the "associated goodwill" are deployed.

A combination of all these legal rights, together with the culture, people, and programs of an organization, all provide a basis for differentiation and value creation by that organization. Taken as a whole, they represent a specific value proposition and foundation for strong customer, supplier, and staff relationships. This definition of brand serves as the basis for a branded business valuation. This broader perspective on the business is of significant value to those with strategic planning responsibilities. It illuminates the principal value drivers of the business and identifies how brand perceptions and preferences affect consumer purchase behavior and enrich staff and supplier relationships. As such, it makes a substantive contribution to understanding the sources and scale of a company's competitive position. It quantifies the size of the asset that the brand represents and — perhaps more important — identifies ways in which the value can be enhanced.

Going for Substance over Style

It comes as a surprise to many business professionals that the majority of brand valuations are performed for purposes other than marketing. But, as we have outlined here, there is a demonstrated commercial purpose for brand valuation in the context of accounting, tax planning, and commercial due diligence. Brand valuation for marketing purposes suffers from some muddled thinking.

Most senior marketers embrace the idea of value-based brand strategy and see brand valuation as a means to this end (and a basis for a compelling presentation to the C-suite). We applaud this goal but still advise caution before valuable resources are committed to a brand-valuation exercise. The process of valuing intangible assets such as human capital or brands is fraught with issues of definition, methodology, and measurement, with the result that the exercise frequently fails to deliver the expected benefits. For this reason, we recommend that significant thought be given to the interrelated issues of the

commercial goal that will be supported by the brand valuation and the definition of "brand" to be used in the valuation.

Doing so will avoid some of the most frequent issues that arise due to the need to reconcile the economic, management reporting, and accounting perspectives on brand. It will also clarify whether the goal of value-based brand strategy and management might not be better served by devoting resources to better understanding the sources of customer value and the relative strength of a brand's equity rather than to brand valuation.

Originally appeared in MarketingNPV Journal, *vol. 1, issue 6, pages 17-19.*

Measuring All the Relevant Constituencies

As you might tell from the previous discussion of brand value and valuation, when we set up a brand scorecard we need to monitor the health of the brand with at least four key audiences: customers, employees, relevant society at large, and investors. Your circumstances might dictate including additional constituencies such as channel partners, agents, regulators, etc.

A good scorecard should cover employee perspectives on the brand, as well as customers and prospects. It's particularly important in service and retail industries, as associates are increasingly asked to play ambassadorial roles. Many companies consider the entire associate population to be "brand managers" as they define the ultimate customer brand experience in their attitudes and actions. Elements like brand understanding, pride of association, and referral willingness or behavior are terrific indicators of the quality of brand equity amongst the employee population.

Depending on the nature of the product or the company, you might also look at societal perspectives on the brand. Society is the place where the brand and corporate reputation intersect. Is the brand considered to be a good corporate citizen? Is it known as an active, contributing member of the community? These measures are often seen to be like placing water into buckets in advance of a fire breaking out. When something adverse happens in the marketplace — like

a chemical truck overturning, a microscopic contamination of a food supply chain, or product tampering on a wide scale — the media will relentlessly whip consumers into a frenzied call for heads to roll. If you haven't stored up goodwill within the community, one minor event can spiral out of control and cost billions in lost sales and market value.

Similarly, you may need to keep water in the bucket of regulatory agencies just in case a fire breaks out in the legislature. If your long-term plan anticipates petitioning these bodies for permission to do business in new ways or raise rates at some point in the future, you'll want to ensure the field has been suitably fertilized before you plant those seeds. This can be a significant value lever for the company and a very tangible competitive advantage.

The investor perspective is also often critical. Not only is it related to the short-term cost of borrowing as we discussed above, but somewhere built into the investor's perspective is the quality of management. This is where lists like *Fortune*'s "Most Admired Companies" come in. While this is often a lagging indicator (behind customers and employees), it is nevertheless highly correlated with premium company valuation.

Companies who depend upon their broadly known corporate brand (e.g., Home Depot, Wal-Mart, or Citigroup) should constantly measure the societal corporate reputation space. It doesn't matter too much how Tootsie Roll is regarded by society at large, but if you have 300,000 employees, you are very visible in the community and will need to have public opinion on your side at one point or another.

In regulated industries, it may be government agency opinions that count. Brand equity represents a very pragmatic understanding of how much influence this company has among people that matter. And those people may matter because they're able to influence regulation or they may matter because they influence decision making in terms of investments. Arthur Andersen is a good example. This was a company that had spent all their energy generating goodwill with their customers. But when they found themselves in the midst of a public relations firestorm, they had no water in the buckets of positive brand equity among the societal and investor communities.

When you look at the strategy General Electric described in a recent article in *Fortune* magazine, Jeff Immelt, the chairman, identified three things he wants GE remembered for: innovation, efficiency, and virtue.[3] Here's a company that understands the multidimensional game in which it is engaged. When the stakes are that high, reputation becomes a kind of currency that gives you permission in a corporate sense in the same way your corporate brand gives you permission in a consumer sense. If your CEO has emphasized the importance of any or all of these additional constituencies in your company's success plan, be sure to reflect the important diagnostic and predictive elements of it on your brand scorecard.

CASE STUDY

THE ELI LILLY APPROACH
USING A BRAND SCORECARD TO ADVANCE THE CORPORATE BRAND

There's no doubt that pharmaceutical brands have become household names, especially since drug manufacturers started advertising their latest cures directly to consumers. Any TV watcher can tick off a list of popular medicinal remedies, from Allegra to Viagra, from Prevacid to Prozac. But the labs behind labels rarely come to the consumer's mind. Why? Because pharmaceutical marketers have neglected corporate branding.

Eli Lilly and Co. decided to put an internal push behind its corporate brand as products like Cialis, an erectile dysfunction medication, entered the dialect of drug therapies and other promising pharmaceuticals filled the company's R&D pipeline. Their reasoning was that a strong corporate brand lends credibility to new and competitive products, and few industries today experience the cutthroat competition that pharmaceuticals do. Pressure comes not only from other pharmaceutical developers but from the Food and Drug Administration and Medicare, as well as the managed-care organizations and health insurance providers that control its marketshare.

For four or five years, Lilly executives counted the building of a corporate reputation among their top organizational initiatives and discussed the coming brand-to-action process with employees at all levels.

Constituency Research

In 2002, Lilly conducted research about the perception of its brand

from the inside out. It wanted to use employees to activate the corporate brand, so it supplemented standard customer satisfaction results with the insight of Lilly's workforce. Once it set its aims against employee reports, it launched internal training sessions led by senior managers across the business to teach employees how to act in accordance with the emerging corporate brand. It wanted their behaviors to reflect customer desires of an experience with Lilly.

Additional research conducted through this process gathered the impressions of physicians and managed-care organizations to understand how close Lilly was to delivering on its newly defined brand promise and where its commitment didn't seem evident at all.

The Eli Lilly & Co. corporate brand has four platforms on which it acts:

- *developing breakthrough products;*
- *owning medical expertise;*
- *listening and responding actively to customers; and*
- *being reliable and trustworthy in all business practices.*

The Brand-to-Action Process

Once employees completed the brand-to-action training, they went forth with new objectives that were measured by group and accessible to brand managers and the 27 top executives on a brand health scorecard. The findings were reviewed quarterly.

Employee surveys solicited information on the effectiveness of the training, asking:

- *Have you heard about Lilly's corporate branding initiative?*
- *Have you attended training on it?*
- *Has the training made an impact on the way you do your job? If so, how?*

The results exposed the brand champions and the slackers among senior management to Sherrie Bossung, manager of the corporate brand, and the corporate suite. Eighty percent of employees responded positively to the survey, confirming their exposure to the brand plan and their involvement in bringing it to the market. But that alone did not signal improvement in the organization's branding.

Employees subsequently answered questions on the value of the training to their everyday responsibilities and on their ability to make a difference in market perception of the brand.

Governance Structure and Rollout

What surprised the corporate branding team was that the more employees learned and understood the corporate brand, the more they challenged their managers and the senior executives on corporate brand strategy and implementation. Front-line employees long had seen where the Lilly brand fell short on meeting customer expectations but had little success in convincing senior management of external

FIGURE 6.1 — ELI LILLY'S BRAND SCORECARD

Outputs

	(% favorable) '02 Research	Dec. '03 Results	'04 Target Revised
Employee Awareness/Perceptions			
■ Recall All Four Attributes+		XX%	XX%
■ Recall of Breakthrough Products+		XX%	
■ Recall of Medical Expertise+		XX%	
■ Recall of Active Listening and Responding+		XX%	
■ Recall of Reliable and Trustworthy+		XX%	
■ Recall of Tagline+	XX%	XX%	XX%
■ Belief Lilly Is Living the Brand++		XX%	XX%
■ Perceived Value and Impact++	XX%	XX%	XX%
Employee Brand Action			
■ Seen Changes in Int'l/Ext'l Interactions++	XX%	XX%	XX%
■ Brand Event Participation		XX%	XX%
■ Impact of Brand Emphasis on Job		XX%	XX%
External Focus			
■ External Focus Metric		XX%	XX%

disappointments with the company. Once Lilly defined its identity and enlisted employees to build it in the marketplace, reps and researchers and all the others whose input was sloughed off previously had a greater ear into which to shout the complaints they heard.

The corporate branding initiative not only enlarged the ear of Lilly's leadership but the eye of it, too. Where the company once saw only numbers — sales revenue — it began to see the progression of the sales process. And this eye-opening led to expanded metrics, including measures of the impact of product success and the influence of the brand on customer relationships. Lilly realized that while it may

Performance

	'03 Baseline	'04 Results	'05 Target		'04 Baseline	'05 Target
Wall Street				**Phys. Brand Equity**		
■ Breakthrough	XX%	XX%	XX%	■ Overall Preference	XX	XX
■ Expertise		XX%	XX%	■ Breakthrough	XX	XX
■ Listening	XX%	XX%	XX%	■ Expertise	XX	XX
■ Trustworthy	XX%	XX%	XX%	■ Listening	XX	XX
				■ Trustworthy	XX	XX
Alliances						
■ Listening	XX%	XX%	XX%			
■ Trustworthy	XX%	XX%	XX%			
Patient Brand Equity						
■ Overall Preference		XX	XX			
■ Breakthrough		XX	XX			
■ Expertise		XX	XX			
■ Listening		XX	XX			
■ Trustworthy		XX	XX			
Payer Brand Equity						
■ Overall Preference			XX			
■ Breakthrough			XX			
■ Expertise			XX			
■ Listening			XX			
■ Trustworthy			XX			

Footnotes:
Employee POP scores based on representative sample of largest 10 markets:
U.S., Mexico, Germany, Spain, Italy, Canada, Japan, Australia, France, and U.K.
Composite score of multiple attributes

have made its numbers with some accounts in the past, it had hurt its customer equity.

Looking Inward: Eli Lilly's Scorecard

Senior management has changed its focus as a result. The company of scientists and analytical thinkers had to see data and numbers attached to brand influence before they took brand and customer equity seriously. Just a couple of years ago, Lilly didn't measure corporate brand equity at all and rationalized each weakness exposed by customer satisfaction surveys as a market fault, not a Lilly problem. The use of a dashboard has cemented dedication to the corporate brand and Lilly has launched additional workshops that attempt to change market perceptions of the company through better employee training and empowerment.

More recently, Lilly's marketing strategy folks have merged the brand health scorecard onto a dashboard that also tracks product equities. In this first marketing cycle with the tool, they look in tandem at what people think of their products as well as what they think of Lilly, mapping both to sales trends, and develop strategies that advance the performance of the entire equation rather than improving product sales at the expense of long-term customer and brand value. These strategies include customer segmentation and account-specific marketing messages that reflect the needs and wants of individual customer relationships.

This new, personalized voice motivates greater sales and encourages customers to see value in Lilly, not just its products. It has turned the process of marketing products into the practice of marketing the corporation, which can be leveraged to build product brands.

Lilly's corporate brand speaks to several constituencies, not just customers. It has acted as an internal change agent, affecting employees and increasing their confidence in and loyalty to Lilly. It has benefited Lilly's recruiting efforts, drawing potential employees to Lilly as a caring, innovative, ethical place to work. It has aided the formation of new alliances with biotech firms. And it has engaged managed-care directors who now see Lilly as a trustworthy and reputable firm.

Finding the Drivers of Success

Now that you have the framework for the many dimensions of brand equity that might be important in creating asset value, how do you tell which ones are the most predictive of financial outcomes? The most common approach is attribute correlation and covariance.

To begin, let's say you have a tracking study out in the market in which you've identified 15 key brand attributes and have a sampling of customers and prospects rating your brand vs. competitors on each attribute. You survey 100 people each month and read the results on a rolling three-month basis.

Your tracking study should include gathering self-reported information on the volume (and/or type) of purchase activity each respondent has had in the category for the past month, quarter, year — whatever timeframe is relevant to purchase cycles in your category. You are interested in understanding the purchase patterns across you and your competitors.

Now, using statistical regression techniques, you can correlate brand attribute ratings to purchase activity or purchase intentions to identify the attributes that are most strongly associated with increased category or brand purchase behavior.

Simple, right? Hardly.

There are a great many places where this approach can get derailed or become seriously misleading.

First off, self-reported purchase behavior can be significantly different from actual purchase behavior. Sometimes, people forget how much they bought and which brands. Other times they tell little white lies to protect themselves from the judgment of others (even the interviewer). If you can connect a specific individual's survey responses back to that person's actual purchase behavior as reflected in your transactional files, you can close the gap somewhat. If not, you might consider conducting a separate study specifically among a group of category consumers and check to see how self-reported behavior varies from actual purchases, then use that as an error factor to adjust what you get from your tracking studies.

Second, attributes are commonly "lumped" together by consumers into positive and negative buckets, making it difficult to see any one attribute as a real driver to a greater degree than others. This is the covariance effect — a statistical term indicating the extent to which two or more elements move in the same direction. Sometimes it's helpful to group attributes with high covariance into "factors," or higher-level descriptions. For example, the attributes "offers good value for the money" and "is priced competitively" might be grouped into a factor called "price appeal." As long as you aren't grouping so many attributes together into a few still undistinguishable factors, you can still get a strong feeling for which elements of the brand scorecard might be most important.

There are many more ways that this process can become subtly misleading. If you're not a research professional or statistician, you might consider consulting one of each in your methodology design. But, time and again, interviews with researchers suggest that the best approaches start with exhaustive qualitative research among customers and prospects to identify the possible list of driver attributes and articulate them in ways that are clear and distinct to survey respondents.

Done correctly, this effort can help focus the brand scorecard on the specific aspects of brand equity that have the greatest potential to drive incrementally profitable customer relationships. Find those nuggets, and you've got the makings of a powerful brand scorecard.

Permission: The Brand Frontier

One final candidate for a well-rounded brand scorecard is brand permission. Permission is the degree to which the target customers would be receptive to seeing the brand associated with new or related products or services. Earlier, we raised the example of Reebok and water. Reebok had no consumer permission in the water category, but they may have had a great deal of it in exercise equipment, non-apparel sporting goods, or even publishing.

If you have a desire to identify ways to extend a powerful brand into new areas, your brand scorecard should measure the degree to which the target customer is receptive to the idea. This is also captured through surveys, and subject to the same challenges as the surveys discussed above. Just because the consumer says they think

your brand could add value to their perceptions of diesel engines doesn't mean they'll switch. But if it's critically important to develop permission in one or more areas of strategic interest, then it's probably worthy of including on your brand scorecard (along with volumetrics) as a leading indicator of potential developing sectors.

Conclusion

The brand scorecard tracks asset development that often lies between spending and profit realization. It points to the leading indicators of future profits to be realized in terms as specific as possible. This uniquely complex responsibility warrants a separate-but-linked position within the marketing dashboard where the predictive elements can be refined in the context of all the other critical learning, and not isolated as a series of "intermediary" metrics expressed in marketing mumbo jumbo.

An effective brand scorecard includes:

- customer and prospect perceptions of the most meaningful brand attributes, often including those relating to functional attributes, availability, personality, and price/value;
- perspectives of other important constituencies including employees, the community, regulators, and the investment community;
- measures of brand value to gauge the longer-term component of value created by brand investments; and
- some reflection of brand valuation monitoring for acquired brands or those likely to be sold at some point in the foreseeable future.

Sources

1. *MarketingNPV Journal*, vol. 2, issue 3.

2. Ambler, Tim, Senior Fellow, London Business School.

3. Gunther, Marc, *Money and Morals at GE*, *Fortune* magazine, November 15, 2004.

CHAPTER 7

The Metrics You're Most Likely to Forget

The greatest insight often comes from unexpected places. We think that's true of the mixture of metrics you'll eventually select for your marketing dashboard. In Chapter 5, we covered the more conventional examples of metrics that you might install after customizing them to fit your business. In Chapter 6, we discussed the brand metrics best depicted on the brand scorecard. In this chapter, we'll examine some critical metrics you may not have considered for your marketing dashboard but that may be among the most insightful and predictive you'll install.

There are quite literally hundreds of prospective dashboard metrics to consider, but only a few that will provide any leading-indicator insight. The goal here is to point out some of the places where we normally find high correlations to company profitability. Some of these measures are often viewed as tangential to "marketing" but are, in fact, very much related to the quality and effectiveness of marketing activities. Others are frequently dismissed as "softer" measures, but are nonetheless critical to a foundation of success. Keep in mind, only you can determine which of these are right for your dashboard.

Let's begin with one of the most often overlooked areas: channel management.

Channel Metrics

If you have various distribution channels for your products, then your success is largely dependent upon the strength of those channels. The right channel metrics can monitor your progress at shaping,

influencing, and managing your business to ensure the end customer is getting the best brand experience and you are getting the best return on your channel investments. Here are a few potential channel metrics to consider.

Channel Coverage

If you're selling wireless phones through independent retailers, you'll want to make sure you're covering all the places where people are buying those phones. Companies that manage their distribution chains contractually — through independent agents, sales representatives, or other partners that help them get business done — can get clarity on prospect reach and market penetration from a dashboard metric on this issue. It can be even more forward-looking if coverage incorporates prospective channel partners in various stages of finalizing agreements and building out facilities.

Channel Relationship Mix

With the level of decentralization and outsourcing in business today, companies may not have full control over the players who staff their distribution channels downstream. Major oil companies like Shell and ExxonMobil don't manage every stop on their distribution chains anymore, but they still have to keep track of how their products are selling at the consumer level. Monitoring the evolving mix of channel relationship types helps to keep the focus on the strategic importance of channel leverage strategies.

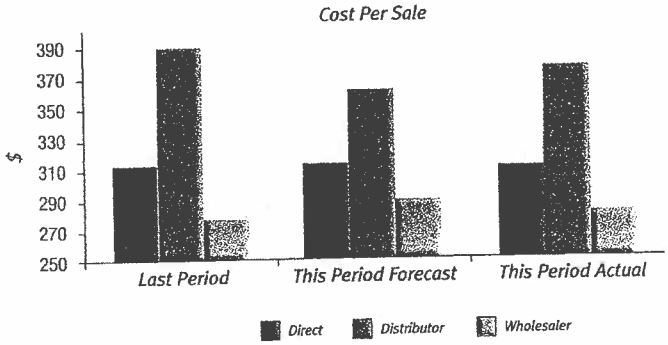
Relative Channel Performance

When you have multiple types of channels, you can often structure ways to look at marketing returns by channel — which gives you a view toward opportunities to optimize investments across channels. You might, for example, find that the cost-per-sale in one channel is significantly lower than the others. This raises the question of how much more money could be spent in selling through that channel before the returns begin to diminish (an optimization challenge). Monitoring these relative channel performance measures can provoke key questions about how resources are being allocated and help forecast the need for revitalizing efforts or planning capital investments.

Channel Stock Positions

Stock-outs can be a critically limiting factor to growth. Customers get annoyed when they go out of their way to come in only to find

FIGURE 7.1 — RELATIVE CHANNEL PERFORMANCE



you're out of something they think you should have. The loss can be permanent. If monitoring and forecasting in- and out-of-stock ratios is crucial to your business, then it's relevant for your dashboard. The forward-looking component of this measurement relies on good sales forecasting (see Chapter 3) to help you spot problems with your inventory before they happen. It can also help you better manage the range of merchandise you carry and watch your inventory turns more closely.

Channel Perceptions of Marketing

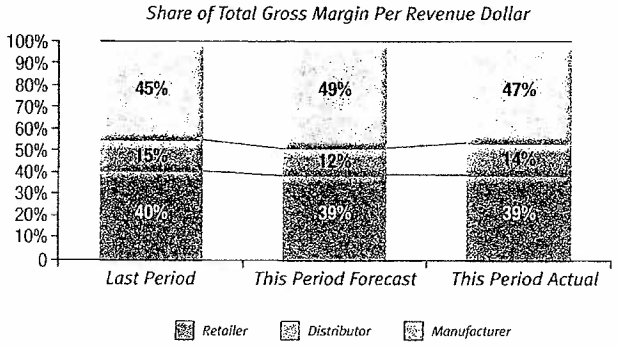
There's been very little dashboard activity in this area to date, but this is a measurement category worthy of careful consideration. Many of the same companies that spend millions on research to understand customer and employee views spend nothing on capturing channel perspectives. This is not only crucial to businesses like fast food franchisors and automobile manufacturers who must coordinate local marketing activity with regional co-ops of franchisees, but can be equally important to manufacturers of all types selling through Lowe's, Target, or other retailers for which the opinions of the category buyers and the sales floor associates can make or break marketing effectiveness. It's also important to industries that distribute through agent networks, wholesalers, or independent sales organizations.

Channel Power Measures

There are a number of different ways you can measure channel power, but the most compelling is how much margin you're keeping

vs. your channel partners. If the markup to the final consumer is greater than the wholesale markup, it stands to reason that you have ceded some significant power to the channel. Reclaiming some of that margin is a worthy pursuit for marketing and monitoring and forecasting channel power gives you some sense of how effective you are at changing bottom-line performance through brand building or product innovation.

FIGURE 7.2 — CHANNEL POWER



Organizational Metrics

In Chapter 3, we introduced you to the strategy map as a tool for aligning the role of marketing with the company and clarifying the requisite business processes, information flows, and organizational skills, tools, and culture.

It seems paradoxical, therefore, that the same companies that spend millions of dollars each year on training and development completely overlook marketing organizational effectiveness on their marketing dashboards. We don't hear too many arguments that the relationship between employees and customers is critical to the business, nor do we hear anyone bemoan the value of a better-skilled, more efficient workforce. So if it's really important to you that your organization is staffed with the right people with the right skills focused on the right things, you should be looking for dashboard elements to measure your progress.

But which organizational dashboard metrics tell you the most? The following are just a few examples.

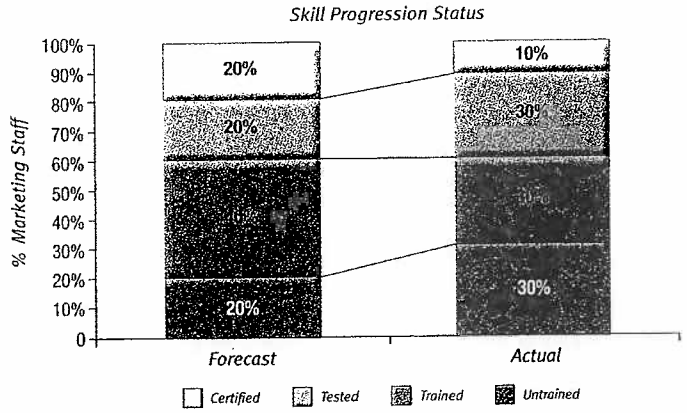
Staffing Considerations

A dashboard can highlight whether you're working at full complement and deploying the available capital effectively. You might elect to reflect this as a simple percentage of approved headcount filled, or perhaps segmented on a percentage basis by newly filled vs. trained vs. highly experienced people. Or you might choose to be more forward-looking by monitoring hours worked by current staff vs. approved complement as a means of forecasting overtime costs or just highlighting potential staff burnout by correlating total hours to historical and forecast turnover or tenure rates.

Another important dimension of staffing is skill sets. Many companies emerge from the strategy-mapping process with great clarity on the skills their department will need to hit its objectives. They then engage a training company or university to develop a curriculum to improve the specific desired skills either broadly across the marketing organization or in narrow pockets of specific expertise. Using the dashboard to monitor penetration of your target employees that have achieved the requisite or desired level of training, education, certification, or skill proficiency is mission critical and very appropriate. Skill proficiency is actually a great metric for the dashboard if you believe that training is a forerunner for success.

Succession eligibility is another great monitoring metric for the overall health of the organization. There are two ways to view succession eligibility: first, as the percentage of your senior staff who have

FIGURE 7.3 — SKILL PROFICIENCY



groomed replacements ready to step in for them, or second, as the overall percentage of marketing staff who are ready to step up to the next job if they had to. Either of these can be presented in stages of readiness ranging from not-at-all to ready-to-go, which will give you a more dimensional feeling for the progress your organization is making.

If success in your organization is directly related to employee proficiency and satisfaction, then monitoring employee feedback on your dashboard can be a terrific leading indicator. Many organizations have formal voice of the employee (VOE) programs that survey the employee population frequently on their knowledge, understanding, and enthusiasm for the company's mission and strategy. Others choose to measure overall job satisfaction as the likelihood of referring a friend or family member to buy from or work for the company in the next 90 days. These make strong dashboard metrics to the degree they can be correlated to marketplace success.

Innovation

As we write this book, growth is the predominant component of most CEOs' strategies. They are looking for new products, new customers, new markets, and new sources of profitable revenue. So why aren't more CMOs putting metrics for their product pipeline on a dashboard?

FIGURE 7.4 — VOICE OF THE EMPLOYEE

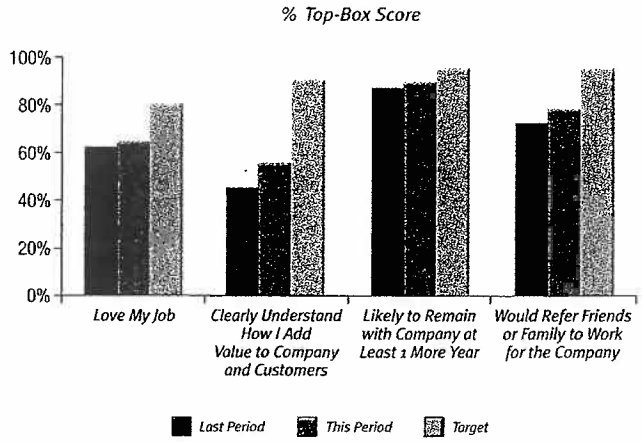
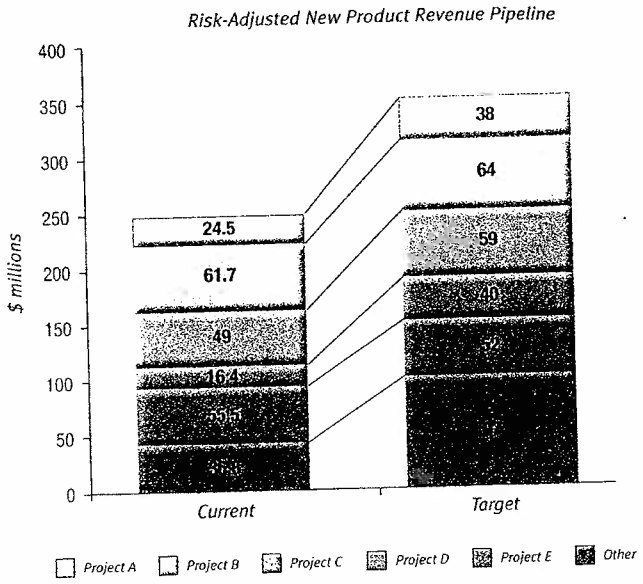


FIGURE 7.5 — INNOVATION PIPELINE



You can use a dashboard effectively to monitor the risk-adjusted revenue forecasts for products or services in various stages of market readiness. At a glance, this will give you terrific insight into the probability of meeting your long-term organic growth objectives. If the pipeline looks like it's stalling, you'll get an early warning indicator with sufficient time to put more resources on solving the problems or expanding the search for new opportunities.

Your dashboard is also an excellent way to track the percentage of marketing resources being spent on new product work. It helps to forecast the expected return from product development and compare it, at a glance, to the return derived from other marketing initiatives. In the end, the dashboard helps determine if innovation is being taken seriously in your organization.

Critical Project Progress

If you're building a data warehouse to transform your marketing process and strategy, you should consider monitoring that project

plan on your dashboard. If you're consolidating multiple brands, sales forces, or distribution channels during a merger, then metrics that describe the stage-gates in those processes are terrific candidates to include. Whatever is important — really important — should appear on your dashboard, if you can dissect it into stages of completion, dollars, timelines, or all of the above.

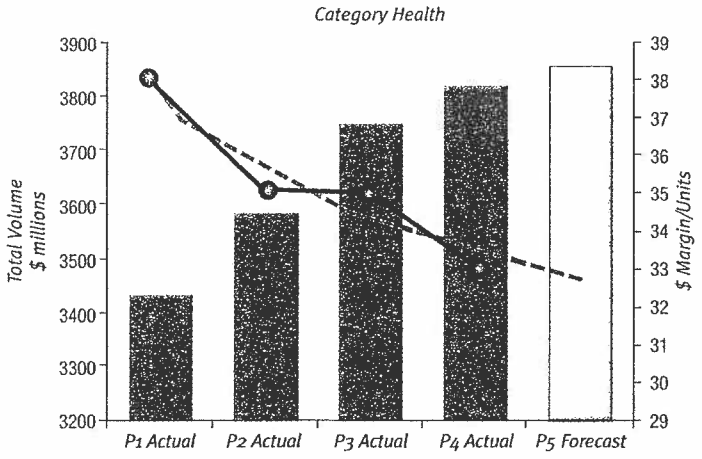
Environmental Metrics

There are many variables in the business environment that can mean the difference between success and failure. Obviously, the environmental variables affecting your business will be different from those in another industry or category. Here are a few of the more common considerations worthy of dashboard inclusion.

Market Growth

The health of your current markets is a critical barometer of future performance. How fast is your category growing? How many net new customers are coming into the category each day/week/month? Is the consumption pattern per customer changing for the better? Are they changing for the worse? Category health metrics like these should give you a clear sense of any rising or falling tides that may lift or crash your boat.

FIGURE 7.6 — CATEGORY HEALTH



Competitive Health

Start tracking the margins of your competitors with every source of information you have. A dashboard is perfect for a constant reading on the ratio between how fast your products are growing and how fast your category is growing overall. It may be nice to know that the sales of a particular product of yours were growing by 8% a year, but a shock to find out that the category was growing by 12% and you were losing share all along.

You also need to find a way to track pricing at retail (or the final sale to end users) across you and your competitors. Keeping an eye on category price elasticity can be a strong leading indicator of purchase trends and keep you in a proactive stance on margin management. While you're at it, consider burrowing into the overall category pricing structure. This goes further than comparisons at retail to monitor how wholesale prices are moving and how raw material pricing projections might create a threat to your product pipeline and ultimately affect future costs.

Also keep an eye out for potential mergers among competitors that may decimate your channel power or shut you out of key customers.

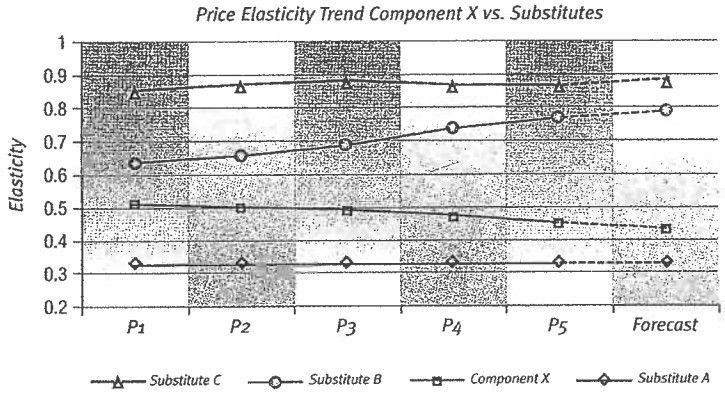
Monitor your substitute categories of products closely to help forecast market tightening. In the chemical business, for example, there's often more than one compound that a manufacturer can use to reach a certain end result. Knowing how prices are moving in each compound class can keep you ahead of the demand curve for your own products.

You might also monitor the entry/exit barriers to your business. If the cost to enter your business starts to fall, be prepared for more competition. If it rises, better times could be ahead.

Weather

This should be self-explanatory. If weather has a big impact on your business, track weather forecasts closely. Not that we're suggesting weather is a good dashboard metric, but the long-range temperature and precipitation indices are often important elements of sales forecasts and even more often very insightful diagnostic tools.

FIGURE 7.7 — SUBSTITUTION PRICE ELASTICITIES



There are dozens of companies specializing in providing detailed weather forecast data. Find the one that offers it in a form most applicable to your needs.

Trends and Demographics

Looking at the evolution of the world around you is critical. You might want to know the demographic data on who's been buying your product and whether that information is likely to undergo significant change. Changes in fashion, hairstyles, automobile engineering, family dynamics, music, and many other facets of life can have definitive impacts on businesses selling raw materials or component parts far upstream from the end consumable.

Tracing your product or service from your point of delivery through to its very end user can be extremely helpful in identifying the potentially disruptive forces at work around you and focusing attention on how to monitor them most effectively.

Macroeconomics

Consumer confidence and energy price forecasts are important to most companies, but depending on your business, public health projections, savings rates, or interest-rate forecasts might have more relevant meaning.

Macroeconomics is one of the easiest areas to find statistical correlations to your sales or profits. Most macroeconomic factors are tracked in time series by some governmental or educational institution and the data is cheap, if not free. If you haven't done so yet, you might want to hire an academic consultant to test for some correlations for your company as a means of challenging conventional wisdom and identifying the emerging changes in your business in the larger economic context.

Start by developing a long list of hypotheses about which macroeconomic factors *might* be drivers of your business. Then review the list with your university consultants to see what they might add and ask them to run some correlations. Based on what they come back with, look to refine your hypotheses further, and, after a few iterations, you'll likely hone in on the best environmental leading indicators.

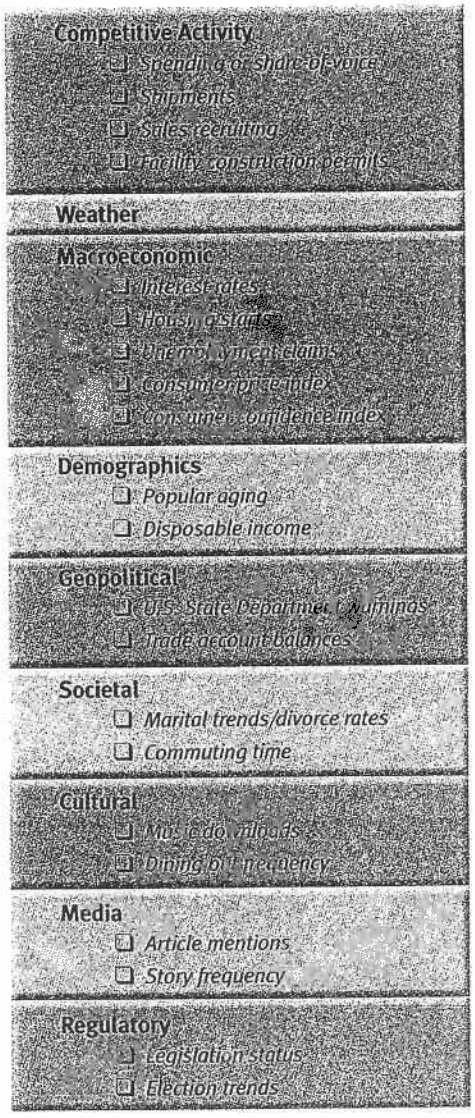
Geopolitics

In a world gripped by 24-hour news and volatile events at home and abroad, it never hurts to keep an eye on how economic and social events affect the spending of money. The effect September 11th had on the investment and travel industries worldwide still lingers in the minds of many marketers, not to mention their customers. The dashboard is not an ideal place to track geopolitical events, but it can be a great way to monitor long-term shifts in political ideologies as a pre-cursor to anticipated changes in governments, consumer attitudes and behaviors, or regulatory changes. One company we know closely monitors an index of consumer "values," which it has found to be correlated to future sales of its publications. There are plenty of syndicated research services out there tracking many dimensions of these variables. If you can't find one already existing that meets your needs, consider investing in a custom approach or launching a collaborative industry effort.

Media

The advent of major media-tracking databases has made it much easier to track ideas and opinions in the world today. If your business is heavily influenced by how people think or feel about a particular issue, you can quickly establish a tracking approach to measure the number of times the issue is mentioned in the media by day, by media channel, by geographic territory, etc.

FIGURE 7.8 — SAMPLE ENVIRONMENTAL LEADING INDICATORS



Alternatively, you can use the same services to track your own brand or industry and monitor the number of positive or negative mentions you are getting. This is especially helpful if you are intent on measuring the effectiveness of a public affairs or media relations program.

Regulation

Most businesses operate under government regulations. In fact, most operate under *many* government regulations. The majority of them aren't a direct concern for the marketing dashboard, but some are. For example, compliance with consumer privacy laws is a critical marketing regulatory concern. Industry pricing collaboration can also be a crucial regulatory issue.

Tracking the regulatory environment on the marketing dashboard serves two purposes. First, it keeps the organization focused on the importance of remaining in full compliance and presents the current (and forecast) levels of compliance. Second, it serves as an important support point should you ever need to demonstrate to regulators, judiciary, or the public at large just how much emphasis you put on being a good corporate citizen.

CONCLUSION

There are hundreds of potentially insightful marketing metrics worthy of being included on your marketing dashboard, but only a few that will give you the real insight into marketing effectiveness you're looking for. We've provided a few possible starting places to look for the areas of insight where you might not have thought to look before.

Building an effective marketing dashboard is as much an exercise in creativity and problem solving as most other marketing functions. Ultimately, the quality of your dashboard is a function of your ability to identify the hidden metrics that distinguish between success and failure. Only you will know what those are. Thinking through the list presented here should help stimulate other areas of thought.

But remember ... the effectiveness of your dashboard is likely to be inversely proportional to the number of metrics you put on it. Your objective is to find the fewest number of metrics to tell the story that needs telling.

CHAPTER 8

How to Overcome Data Deficiency: Sound Approaches to Fill the Void

There is a measurement frenzy going on in marketing today. This is admirable, even altruistic. To meet the goals of top management, marketers are digging up more data than ever, applying rocket-science analytics to it, and believing that the resulting numbers will speak for themselves.

But what's really going on, even in organizations with enough sophistication and money to make great things happen, is the biggest mistake in marketing measurement today. Companies are focused on what they *can* measure instead of what they *should* measure.

Throughout this book, we've been talking about weaning yourself from past-performance data as your primary measurement system. In this chapter, we're going to share some important tools and techniques to accomplish that.

Does This Sound Like Your Organization?

CMO: "I'm getting some pressure to report on the return we're getting from our marketing spending."

VP: "We don't have that data, but what we do have are advertising spending by media, brand awareness tracking studies, and sales by division for each of the past six quarters."

CMO: "Well, won't that give us a good view into the question?"

VP: "We could build a media-mix model to see which campaigns are generating the best results and then adjust our plans to duplicate the successes."

CMO: "OK, go do that."

Six Months Later...

VP: "The media-mix model says that for every dollar we invest in advertising, we're getting $14.23 in incremental sales."

CMO: "That's huge! Now we can go to finance and tell them that if they give us that extra $10 million in ad budget, we'll bring home *$140 million* in sales!"

VP: "Well ... not exactly. We did look at message saturation levels, and we still have some room to improve before hitting those. But what we didn't look at was what an *extra* $10 million might do since it would have to include an assessment of not just how we'd spend it, but how the competitors might respond and how our channel partners would adjust their plans. It's a tricky problem, but we could solve it with another six months and some more modeling."

CMO: "Will that answer the original question about what we're getting from our marketing spending?"

VP: "Sort of. There will always be some wiggling in the assumptions underlying the model. And I'm already sensing that finance isn't buying into the whole approach."

CMO: "Well, then, we'd better push harder to fill the gaps."

"Filling in the gaps" — remember that phrase. It's exactly the right thing to do. Somehow, you need to reach beyond the data at your fingertips to find answers to the really hard questions like, "What return am I getting on marketing spending?" But be particularly careful, as the same rationale often leads to the following potential dangers:

1. **Establishing artificial metrics:** This happens when the search for mathematical answers to tough problems feeds the marketer's innate desire for simple solutions. Absent some sort of magic formula that fully predicts bottom-line impact from marketing spending, there is a strong tendency to stop short and settle for predicting such intermediary metrics as awareness, preference, persuasion, repurchase intentions, and other key stops on the path to profitability. Not only does this effort fail

to address the original question of marketing's impact on the bottom line, it leaves the rest of the company unfulfilled in its desire to really understand the link between marketing and profitability. Worse, it reinforces the jargon of marketing and builds higher, thicker walls between the people who really understand these concepts and those who don't.

2. **Framing too narrowly:** What's the problem with focusing only on areas for which data is readily available? First, you will at best be reinforcing the current ways of looking at and managing the business. If your framework is restricted to what you have data for, you are perpetuating the limitations of the business, not expanding its reach. Second, you risk creating an illusion of progress. People want to go home at night feeling like they've accomplished something each day. That puts a significant amount of emotional pressure on you to use the tools and information at your fingertips. But if you cave in to this desire to "just get something done," you wind up allocating all your precious resources and fail to break the cycle of familiarity. Besides, once you've picked all the low-hanging analytical fruit, top management will still be hungry for answers to questions you haven't yet attempted to answer.

3. **Being precisely wrong:** Science can be dangerous. Analytical tools, even in the hands of those who are well-trained in their application, are still wholly dependent upon the quality of the hypotheses against which they're applied. Start with a vague hypothesis and you will likely end up with a very specific answer that may cause you to solve the wrong problem. Time, money, and credibility are squandered in the process.

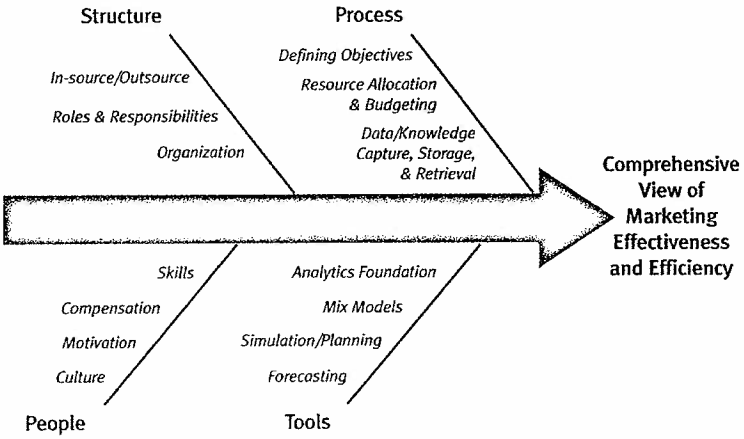
Understand Why You Don't Have the Data

Before you try the approaches we suggest in this chapter, it makes sense to try to understand the reasons *why* the data you think you need to measure marketing isn't available. Asking this question may force some essential critical thinking about what you're really trying to accomplish and the staffing and resource issues at the root of the problem.

The fishbone exercise is an analysis tool that provides a systematic way of looking at problems and the contributing factors. It's also called a "cause-and-effect diagram."

Here's how it works:

FIGURE 8.1 — FISHBONE DIAGRAM



1. Decide on the main problem or issue you want to study — and put it at the head of the fish. You might define that problem as "Inability to Measure Marketing Effectiveness" and use the rest of the skeleton to highlight obstacles to be overcome. You can also take a more positive spin by using a label like "Achieving Full Accountability for Marketing Investments" at the head and using the rest of the diagram to identify all the required steps and sub-components of success.

2. As you can see, each bone of the fish has a category label. Major categories might include people, process, tools, resources, systems, or suppliers. Use whatever headings relate to what you've written at the head of the fish.

3. Start brainstorming with your team to identify the factors within each major category that may be affecting the problem.

The question to ask is: "What are the issues affecting this category?" Be particularly careful to not let the dominant personalities in the group steer the exercise in parochial directions.

4. Work backward up each fishbone to write down sub-factors. Keep asking, "Why is this happening?" until you no longer get useful information.

5. Analyze the results of the fishbone after team members agree that the chart is complete. Do this by looking for those items that appear in more than one major category. These repeaters become your most likely causes. These discoveries should create the foundation for an action plan for how to proceed without data.

Another good thing about the fishbone exercise is that it's a great way to bring in constituents from outside the marketing department — finance, sales, or SBU leaders — to get them to talk about their own departmental measurement challenges. You listen to their problems, they listen to yours, and soon you have allies in your process to overcome obstacles to measurement. Most importantly, they may have already come up with some novel metrics you can adapt for your specific purposes.

If there's nothing else you learn from this chapter, remember that to measure marketing effectiveness, you will have to get comfortable working without data. Treat it as the norm, not the exception. Great managers are those who get exceptional results from ordinary resources in tough circumstances. You can too if you:

- start by developing and framing the right questions to ask;
- plan your approach to answering them *as best you can* today, putting your best estimates on the dashboard for all to see and enhance;
- articulate a path to continuous improvement in measurement process over time; and
- involve the key influencers in architecting the process to ensure collaboration and acceptance.

FINDING DRIVERS WITHOUT DATA

Many times when a problem surfaces, it doesn't arrive with enough data to determine exactly what is causing it. The data vacuum is a breeding ground for opinions and theories about how to fix the problem.

Imagine a marketing promotion for a wireless telecom company that is failing due to inconsistent implementation among internal and third-party sales channels. A team of people representing the areas of marketing planning, sales, channel support, and finance have boiled down dozens of possible reasons for the failure into the following possible root causes:

A. Program not clearly defined
B. Program not integrated with other elements of the marketing plan
C. Rapid introduction has stretched resources
D. Lack of channel support capacity
E. Lack of time and resources
F. External factors driving inconsistency of execution
G. Planning approach non-standardized
H. Poor communication between business units

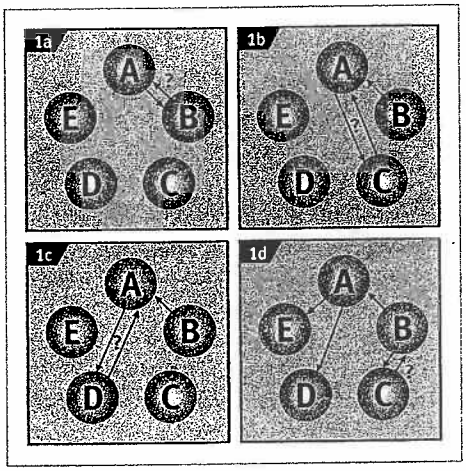


FIGURE 8.2

Sound Familiar?

A simple way the team can test the relative strength of each possible cause is to assess the relationship between each pair of variables in turn to determine whether there is a causal or influence relationship between them and in which direction the relationship might be stronger.

For example, if it compared A to B, the team might surmise that B would tend to cause A because lack of integration with other plan components would make it difficult for people to know how it fit in with the current activities and therefore make the program more confusing. If team members next compared A to C, they might find no particular causal relationship. The team would then compare A to D, A to E, and so on, drawing arrows to indicate causal relationships (see figure 8.2). After finishing with A, the team would do the comparisons with B until it had completed the entire network of relationships between the variables.

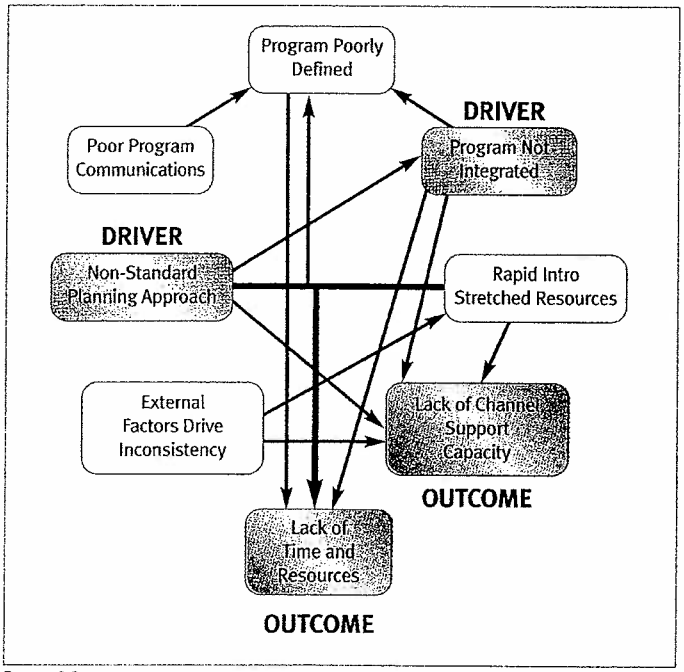


FIGURE 8.3

The final graphic (figure 8.3) would then show how many arrows were coming out of and going into each variable's box. The relationship between arrows out and arrows in is a good indicator of which variables are the drivers (most arrows out) and which are the outcomes (most arrows in). The highest priority is then placed on addressing the drivers, knowing that outcomes would improve simultaneously.

This approach, sometimes called an interrelationship diagraph, can be a powerful way to get different perspectives aligned behind a common approach when facts and data are in short supply.[1]

Mining the Shadow of the Doubt

When you have the data, use it. If you're lucky enough to have the right data in the right quantities, let your analytical scientists drive and put your instincts in the passenger seat long enough to watch and learn. When you don't have the data and you can't buy it or develop a clear proxy for it from some other source, you need to know you can *make* the data yourself.

That probably sounds heretical to many of you who've invested a great deal of money and energy in beefing up your analytical capabilities. But where the analytics leave off, we succeed or fail by the quality of our guesses.

The secret lies in *response modeling*, a tool that will help you make better guesses by talking to people with the right experience.

Aside from a few purely direct-response businesses like catalog retailing, there is no business today capable of completely and comprehensively measuring marketing effectiveness without some doubt. Even the soundest efforts require that significant assumptions be made to fill the gaps in the data or deal with the uncertainties of dynamic markets.

- How will competitors react if we do X?
- Will distributors increase or decrease support?
- What are commodity prices likely to do?

Response modeling is a process that will help you forecast based on the best human expertise you have. In its simplest terms, you gather a group of people in your organization that you believe have the experience to make good guesses on specific issues you want to track. Next, you walk that group through a structured question-and-answer process — essentially a response card — in which you ask each of them very specific questions that zero in on a target with scores attached to each questions.

You might ask a group to predict where a certain product is going to be 12 months from now, then ask them to break that prediction down on a month-by-month basis. Then you ask a series of questions designed to understand the drivers of the outcome and the relationships between the variables. For example:

- What would happen to sales if we doubled our advertising?
- What would happen if we cut it in half?
- What if we see one or two competitors flood our space with similar products?
- Based on that situation, what would we see if we doubled our advertising spend? Cut it in half?

During a series of meetings over several days, the group thrashes out the most likely scenarios and debates the answers to these structured questions and the assumptions underlying them. The responses are entered into a computer model.

Example: If every manager were asked about the likely effect on profits if advertising were increased by 25%, it would produce a spectrum of possible outcomes from "no effect" (or maybe even "modest decrease") to "modest increase" to "significant increase." Those outcomes could be plotted on a curve to show the range of expected outcomes.

Now if we asked for expectations for a 25% decrease, we could also plot those. And if we continued both up and down to 50%, 75%, and 100% increases, as well as 50%, 75%, and 100% decreases, we'd have a pretty clear set of predictions that we could statistically translate into a response model.

If we wanted to get more complex, we could ask the same group to predict the outcome of simultaneously changing advertising spend *and* changing direct mail. Human beings with experience in the business will use their knowledge and intuition to develop individual best-guess outcomes. The matrix might look like this:

FIGURE 8.4 — RESPONSE GRID: CHANGE IN FORECAST SALES RELATING TO CHANGES IN ADVERTISING AND DM SPENDING

Change in ad spend/ change in DM spend	-100%	-75%	-50%	-25%	No Change	+25%	+50%	+75%	+100%
-100%	-80%	-70%	-60%	-40%	-30%	-20%	-15%	-10%	-10%
-75%	-70%	-60%	-50%	-30%	-25%	-15%	-10%	-5%	-5%
-50%	-60%	-50%	-40%	-30%	-20%	-10%	-15%	5%	15%
-25%	-50%	-40%	-30%	-25%	-10%	-5%	20%	10%	25%
No change	-40%	-30%	-20%	-20%	0%	20%	30%	50%	60%
25%	-30%	-20%	-10%	-5%	10%	10%	40%	40%	70%
50%	-20%	-10%	0%	5%	0%	40%	60%	70%	75%
75%	-10%	-10%	-10%	-10%	-5%	50%	60%	70%	75%
100%	-10%	0%	15%	20%	-15%	60%	70%	80%	80%

In other words, the collective perspectives of the brightest minds in the company, especially those that disagree on likely outcomes, create a universe of possible outcomes that can be represented by a mathematical algorithm that says for every change of x%+/- in ad spend, profits will change +/-y%.

The model you create represents the collective tribal wisdom on a particular issue that might otherwise be tough to turn into a metric because *you don't have the data.* In direct marketing, response models are used to forecast the likely marketplace response given a certain combination of creative messages. By varying the questions, you can come up with a response model that represents the expected success rates of various changes in inputs on desired outputs.

Response models are really nothing more than a highly structured way of helping a management team direct its experience into an aggregated best guess. This may seem unpredictable, but in reality it helps identify the subtle relationships between actions and outcomes while removing some of the risk of any single individual being wildly wrong.

Every manager can form an opinion on the likely result of a certain action or inaction solely on the basis of their experience. The cumulative experience base within a company is often the most powerful untapped data source. Harnessing those individual perspectives into a collective view often provides tremendous insight helpful in making hard decisions. Of course, this approach is vulnerable to bad guessing by the entire group (which would be the Achilles heel of the company anyway), or even to sabotage by those who have an axe to grind against a certain form of spending. But if your group is diverse enough, it's not hard to minimize these risks and improve the quality of the outcome.

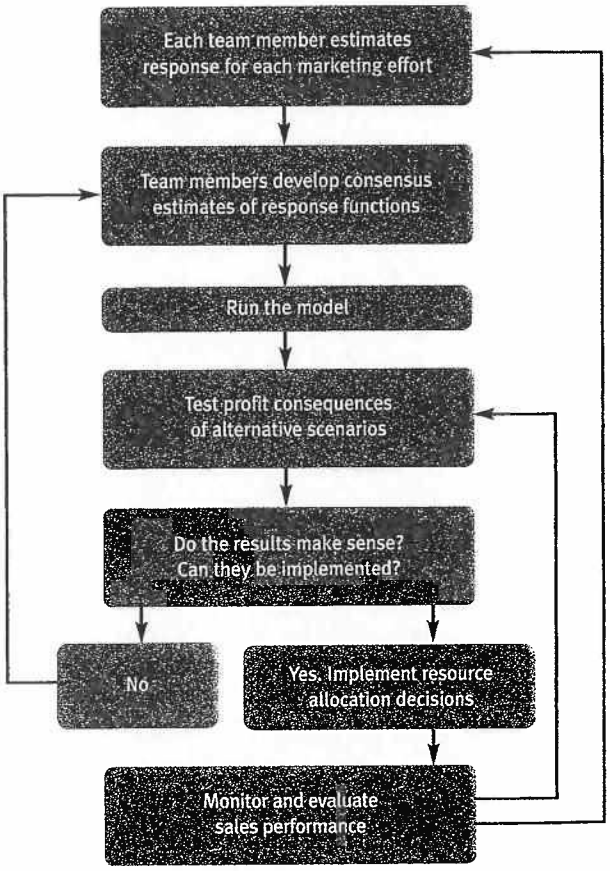
The Benefit of Adding More Variables

Response models can be as simple or as complex as you'd like them to be, thanks to software now out on the market. You can also use this process to track several variables, such as brand awareness, distribution, perceived quality, or service satisfaction and see how each element has affected sales. Over time, you could measure executives' perspectives on how a single change in one variable or all of them might affect sales overall.

Today's desktop software lets us go even further — three, five, even 10 or more variables, although the process gets too arduous for the managers at some point. And the resulting response models provide the basis for forecasting what results are likely to be given proposed changes to spending patterns. In the end, this process should also yield a concise list of leading indicators that really do belong on your dashboard.

Even before you migrate your discoveries to the dashboard, another benefit from response modeling is that it can be used to build a crude version of a media-mix model for organizations without the transactional data to do so. The collective experience of the group might help define an optimal spending pattern that serves multiple constituencies.

FIGURE 8.5 — RESPONSE MODEL PROCESS



SUPERCHARGING YOUR RESULTS

You've built your response models and your collective result shows that changes in three variables — perceived product quality, price competitiveness, and service satisfaction — are most likely to drive incremental sales. With this data from the manager panel, you can build a simulation model to test the relative sensitivity of each variable as a driver of increased profits.

Desktop simulation tools like Crystal Ball® or @RISK are inexpensive (under $2000), powerful, able to plug right into Excel, and relatively easy to use if you know a normal distribution from a logarithmic one. There are even lower-priced versions like XLSim® for those who don't know the difference, but you'll trade off some flexibility.

Using one of these packages, you can fit the shape of the response curve that you received during the manager panel to one of dozens of standard probability distribution curves. You can set the upper, lower, and most-likely ranges of response, then run thousands of simulations to see which of the input variables are the biggest drivers of profits and test the degree to which they affect each other. All done right there on your desktop.

FIGURE 8.6 — MONTE CARLO SIMULATION OUTPUT

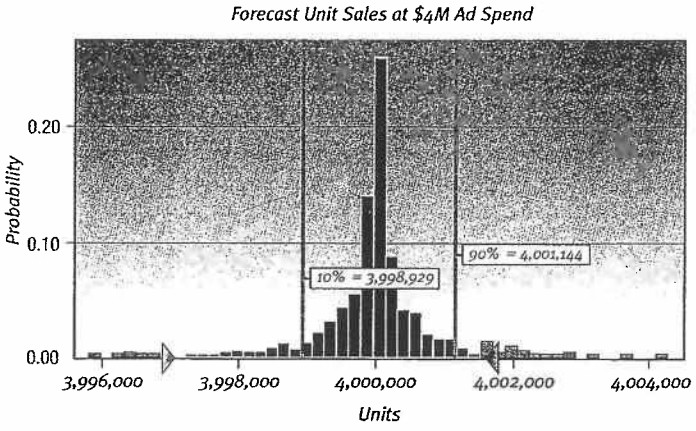
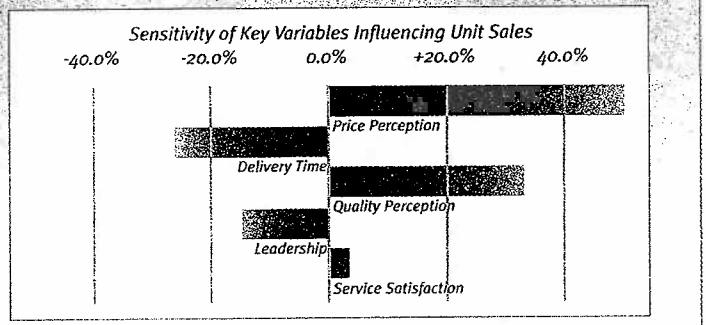


FIGURE 8.7 — TORNADO SENSITIVITY



Road-Testing with Consumers

Of course, once we understand which of the variables are the drivers of profitability and how they might relate to one another, we should begin to augment our manager-panel perspective with some voice-of-the-customer research. Testing our hypothesis on real customers and even rejecters can help you validate and refine your no-data perspective, perhaps even identifying variables you missed completely.

Once validated, quantitative research can then be used to begin tracking the evolution of the key perceptual drivers on a quarterly, monthly, or even weekly basis. This data can then be compared to actual sales and marketing investment data to evolve toward a highly disciplined way of confirming predictive metrics and using them to forecast business results.

Other Ways to Forecast

We keep repeating how necessary it is that you look forward in the way you select, collect, and analyze data that will end up as metrics for your marketing dashboard. We obviously don't need analytics to measure last month's sales. They are what they are. The real questions should be, "Where did they come in vs. expectations? How do they stack up to the forecast we've created through various forms of analysis?"

Keeping the focus on performance vs. forecast serves to underscore the question of how well we have forecast our results. If our forecasts are bad, why? How can we improve them? These are the questions that stimulate organizational learning and growth. They also keep us from spending precious time determining why this period was lower than last. Who cares? We should concern ourselves with this period vs. expectations for this period and as an input into future periods.

Response modeling is the first stop on the list of techniques for doing so. There are a few others:

The Delphi Method

This method utilizes several expert panels (functional or cross-functional; preferably a mix of insiders and outsiders) who are asked to provide a forecast.[2] Each forecast is weighted equally and the results are shared between panels. The members continue the discussion in an effort to fine-tune their forecast with points raised by other panels. If the panels' forecasts begin to converge, a final forecast can be drawn from the average of all the forecasts. Otherwise, the dialogue focuses on why the divergence persists and what the key variables of divergence are.

The Delphi method is similar to building response models, but looks only at the question of convergence for reliability, not development of a predictive model.

Nielsen's BASES Model

If you have a new product to be distributed in supermarkets, drug stores, or discount stores, ACNielsen's BASES database of 25 years of product launch history might be a great starting point. The methodology looks at thousands of products with similar characteristics, consumer receptivity, and marketing plans and forecasts sales under flexible sets of assumptions. Unfortunately, BASES is limited to just these kinds of retail locations. It doesn't extend to hardware, electronics, or stores other than those in the three above categories.

The Diffusion Model

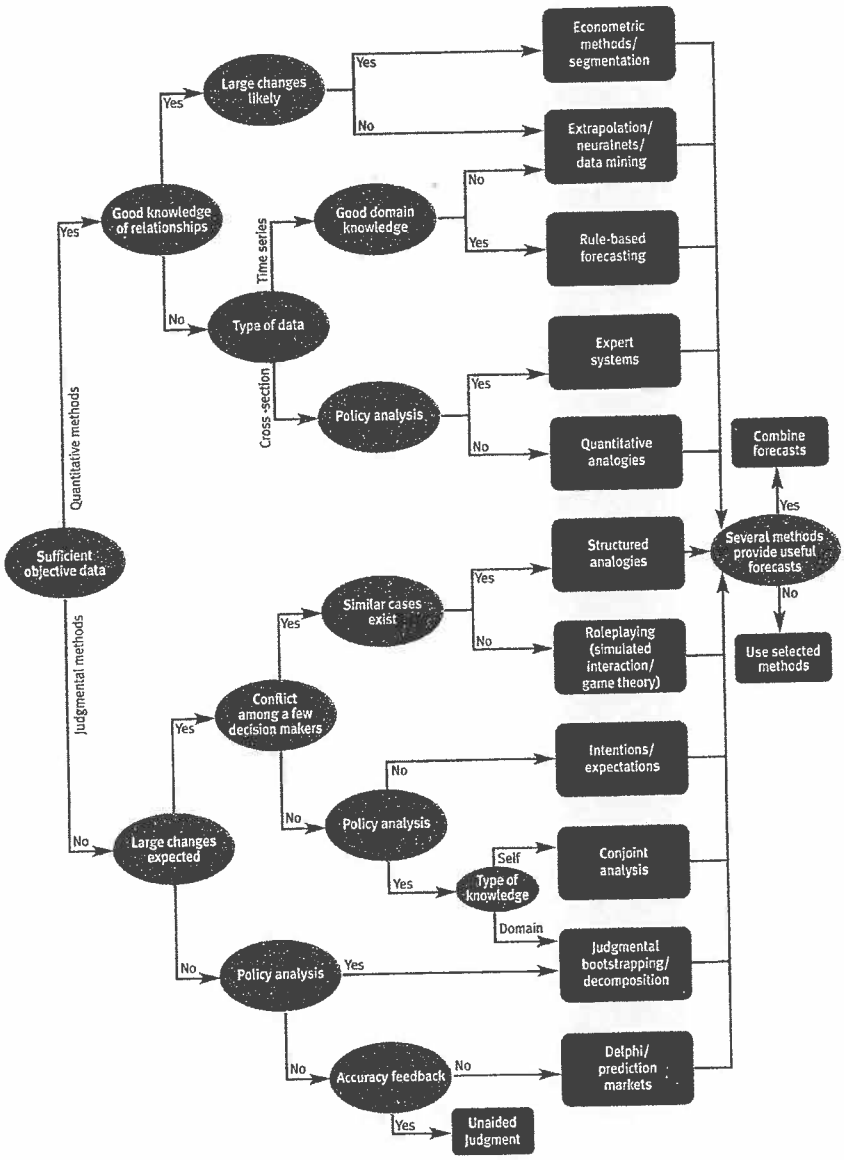
This widely used mathematical model uses rates of product adoption and usage spread from other established products to predict the rate of new product acceptance into the market. Often called the Bass diffusion model, after the professor who popularized the method, it looks at the pace of adoption of a product or service over time and maps it out as a linear function. Products with similar characteristics (categories, user segments, price points, etc.) can be used as proxies for new products by using the published coefficients of adoption and diffusion and then adjusting to fit your expectations. It is very applicable to both durable and non-durable goods across a wide variety of categories.

And there are many other approaches as well ...

Figure 8.8 can help you in determining what kind of forecasting process or methodology is most likely the right one for you. Created by Professor J. Scott Armstrong of The Wharton School, it allows you to trace your way down the selection tree to find the path that best describes your situation. At the bottom, you'll see the type of forecasting process that meets your needs.

There are so many good techniques available today to help overcome data challenges. Thanks to Six Sigma and Lean, many companies are already employing these techniques, although perhaps not yet in marketing measurement. These approaches can be combined and supplemented with market research to develop a custom process that best suits your needs. Be careful to check your preferred approach with someone experienced in forecasting before you go too far down the road of time, money, or reputation to ensure your efforts are sound.

FIGURE 8.8 — SELECTION TREE FOR FORECASTING METHODS



Source: Prof. J. Scott Armstrong, The Wharton School of the University of Pennsylvania, April 2005. Reprinted with permission.[3]

CONCLUSION

Not having the right data is no longer a valid excuse for leaving key business drivers off your dashboard. Find a disciplined way to get at best estimates of the data you seek. Create a continuous improvement path to begin collecting and validating it. And look to the intersection of quantitative research and basic statistical tools to help refine and enhance both your diagnostic and predictive capabilities.

While many may be concerned with the validity and reliability of these methods, the alternative of doing nothing should be of greater concern. If our approach to filling data gaps involves key stakeholders from finance, sales, and operations, the resulting models are much more likely to be both accurate and accepted as the "best we can do."

Remember that credibility is a function of accountability and perceived objectivity. Letting your executive committee know you're implementing the methods suggested in this chapter will go much further towards establishing that credibility than a dozen analysts working in secret to crack the elusive code of marketing effectiveness.

SOURCES

1. *MarketingNPV Journal*, vol. 1, issue 4.

2. *MarketingNPV Journal*, vol. 1, issue 3.

3. Armstrong, J. Scott, "The Selection Tree Forecasting Principles," 2005.

PART III

Going Live: Implementing Your Dashboard

CHAPTER 9

Keep It Simple: Design the User Experience Before Committing to Execution

Give yourself some credit: Human beings have an incredible ability to take in visual information. If the Internet has taught us anything, it's that any kind of data presented simply and sensibly speeds up our ability to read, to collect, to synthesize, and to analyze.

So, let's ask the question again — what does a dashboard do? It allows us to read, collect, synthesize, and analyze in a matter of seconds. Sometimes, it happens in a fraction of seconds. The faster, the better.

This is why the *presentation* of the metrics you choose for your marketing dashboard is just as important as the process you've taken to find them. Today, graphics are everything. Graphics — designed images — are critical to the success of the marketing dashboard because images can be absorbed into the brain quicker than the written or spoken word. After a long day of reading reports and sitting in meetings, tabular data is a turnoff. Rich, colorful charts edited to emphasize the most critical information are friendlier to the eye and more easily recorded by the brain.

This chapter will discuss how we best receive information and how to apply such concepts to the design of your dashboard. Even if your dashboard appears on a weekly sheet of paper dropped into your colleagues' inbox, the principles you'll learn here will help you make sure that sheet of paper is a must-read for everyone in your organization.

What Are You Looking at?

Your age is a telltale sign for the way you were trained to receive information. Consider that today's 60-year-old manager spent most of his formative years looking at black-and-white TV, while 23-year-olds began staring into a computer screen from the time they toddled off to preschool. The rest of us fall somewhere in the middle.

What's the point of this generational exercise? That visual acceptance of information has accelerated in the last half century to the point where visual presentation of information is a constant. We think, learn, and communicate differently because of it. That's why graphics have moved to the forefront of everything we do.

Yet as you take on the responsibility of building the marketing dashboard, understand that you can't just hand a bunch of metrics off to a graphic designer and expect her to spit back a dashboard metric that's both pretty and informative. You need to take responsibility for knowing something about the design process. You need to let that knowledge guide your selection of elements for your dashboard. This is something of a challenge because most senior managers have never had to think about the essential principles of good design for charts and graphs.

Harvard cognitive psychologist Stephen M. Kosslyn states there are three principles of the limits of visual information:[1]

1. The Mind Is Not a Camera. We may think we're recording every image in front of us, but our brains are actually very selective:

- We are attracted to brighter colors and symmetrical shapes.
- We associate elements of similar color and shape as actually being related.
- We process visual data in channels of orientation, color, and motion — changes in any one of those channels forces us to readjust the others.
- It is more difficult for us to judge things like area, intensity, and volume.
- Spatial relationships between items require more effort.
- We tend to try to interpret two-dimensional patterns as three-dimensional if possible, but not very accurately.

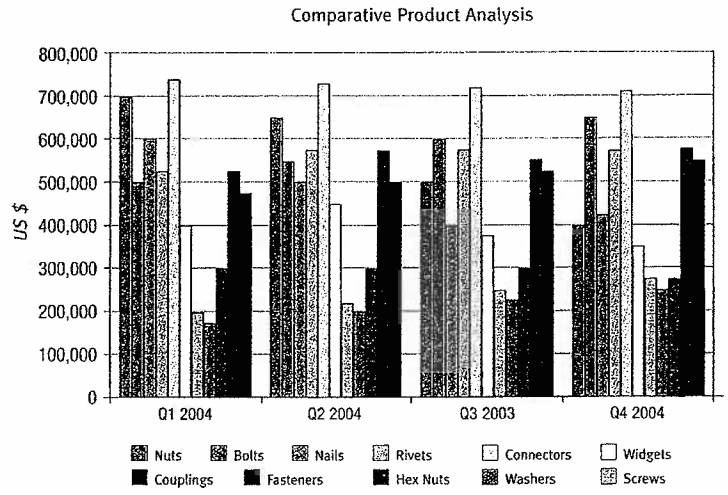
2. The Mind Judges a Book by Its Cover. You may be the most skeptical person on earth, but visually, you're as gullible as the day you were born:

- We trust our vision so much that we have a tendency to believe that what we see is true.
- Our basic instincts make us sensitive to changes in our visual field and we try to interpret them — which is why any perceived change in a familiar pattern is assumed to be informative.

3. The Spirit Is Willing, but the Mind Is Weak. We are only aware of our inability to detect and absorb visual information at a sub-cognitive level:

- Short-term memory is limited in how much information it can hold before we begin to get confused and make misjudgments. It's like the short-term memory is in a transitory state, much like the RAM in your computer.

FIGURE 9.1 — CAN YOU ABSORB THE MEANING OF THIS CHART?



- We attempt to process new information against our stored patterns in our long-term memory, which is far from neatly cataloged. Long-term memory can surface randomly — like when you recognize your sixth-grade English teacher in the supermarket after 30 years.

- We reflexively gather information in a way to minimize the effort required to understand it. Whether we are conscious of it or not, we work to fit things into existing patterns.
- We often stop short of finding the best answer to problems we solve. It's what Nobel Prize winner Herb Simon referred to as "satisficing" — essentially accepting what you see as real. You don't choose to work any harder; you just want to accept what you see and move on.

Design Concepts for Non-Designers

Dashboard designs get into trouble most often because they overuse our short-term memory. Either due to their complexity or simple matters of bad design, a dashboard that fails to understand the psychology of our visual responses can either underwhelm or overwhelm a viewer. Your staff may look at your hard-researched metrics and move on because they don't make any kind of connection. For all the effort you're pouring into your dashboard effort, you can't afford to let this happen.

Lynd Bacon, Ph.D., President of LBA Associates, offers the term "cognitive load" to describe the energy necessary to interpret what is being visually conveyed.[2] He suggests the following ideas to guide the creation of all marketing messages:

- Don't eliminate necessary complexity. Instead, make it easy for the viewer to understand the relevancy of the complexity.
- Make the underlying technology completely transparent.
- Don't separate the viewer from the information by obfuscating it with bad design.

This is a tall order. Executives know what's in their heads and they know how to give orders. But they can't create a graphically savvy dashboard with those skills.

A case in point most of us are already familiar with — the overly busy PowerPoint presentation. Many of us already think we will be better judged if we jam as much information into each page view we present, just in case we get asked a question. Our solution? Point to the slide. The solution *should* be to draw more attention to the most

important details of the communication and a dedication to communicating them simply, clearly, quickly — and attractively.

Bacon adds that the *effectiveness* of any graphical presentation equals the ability to:

- **Be understood** — Based on the presentation, the viewer can explain it with accuracy.
- **Be quick** — The viewer can absorb the information quickly, with minimal cognitive load.
- **Be remembered** — The viewer can recall the information accurately.
- **Be easy to use** — In the case of a dashboard, each level of information has to be easy to reach and easy to find.
- **Be appealing** — Like anything you want people to gravitate to, it has to look good.
- **Be illuminating** — A good presentation causes us to see what we never expected to see.

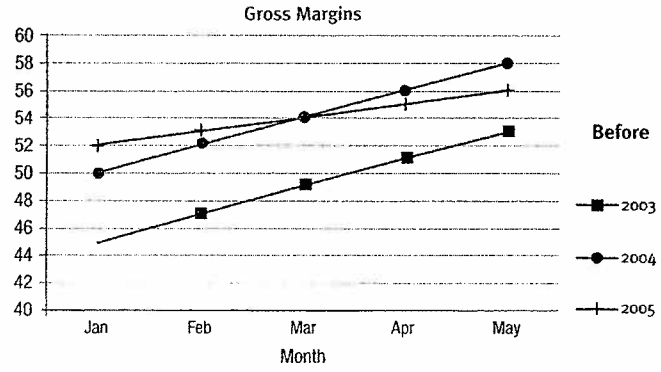
Principles in Practice

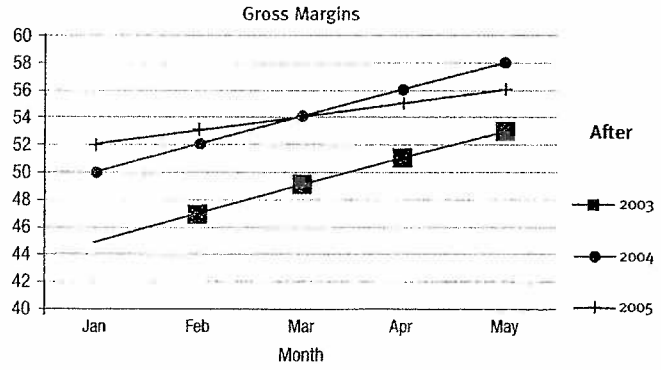
The primary purpose of the dashboard is to be able to allow you, at a glance, to see how well you're performing against other key metrics so you can quickly determine what's working and what's not. It should also allow you to see where you're going to be next month or next quarter in your performance based on current data.

Picking up on Kosslyn's ideas, we offer the following design guidelines to apply when creating a dashboard:

- Changes in size or brightness attract attention (figure 9.2).

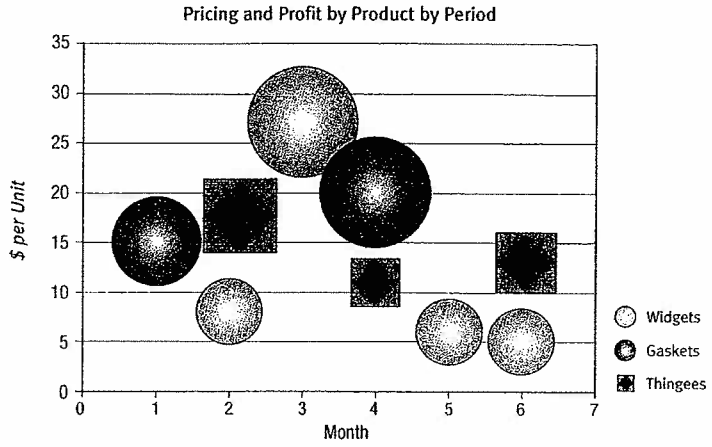
FIGURE 9.2 — CHANGES IN SIZE OR BRIGHTNESS ATTRACT ATTENTION





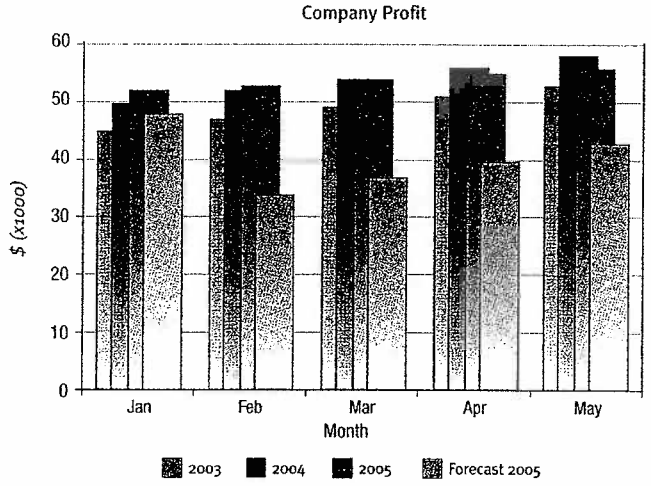
- Elements similar in color or shape tend to get grouped into patterns and are interpreted as being similar or related (figure 9.3).

FIGURE 9.3 — USING SHAPES AND COLORS TO ASSOCIATE ELEMENTS



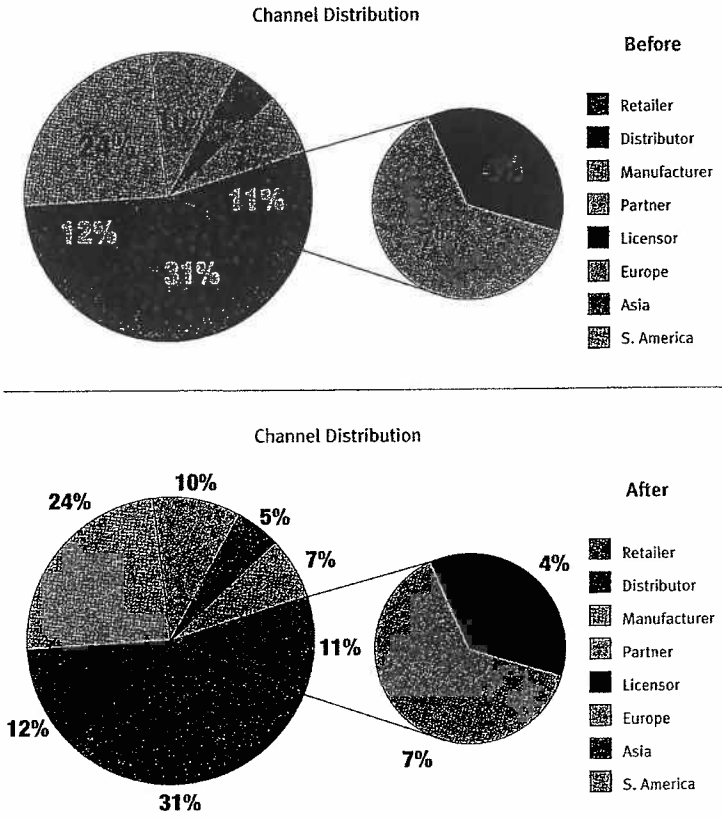
- Warm hues suggest foreground; cooler ones, background (figure 9.4).

FIGURE 9.4 — FOREGROUND VS. BACKGROUND



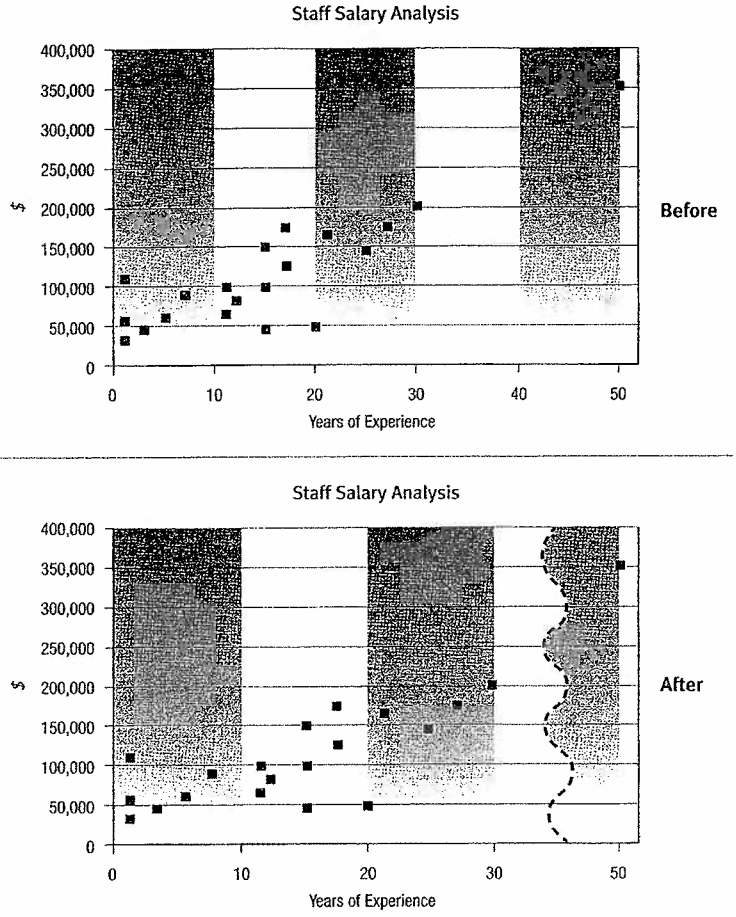
■ Keep values out of plot area if you can (figure 9.5).

FIGURE 9.5 — MOVING VALUES OUT OF PLOT AREAS



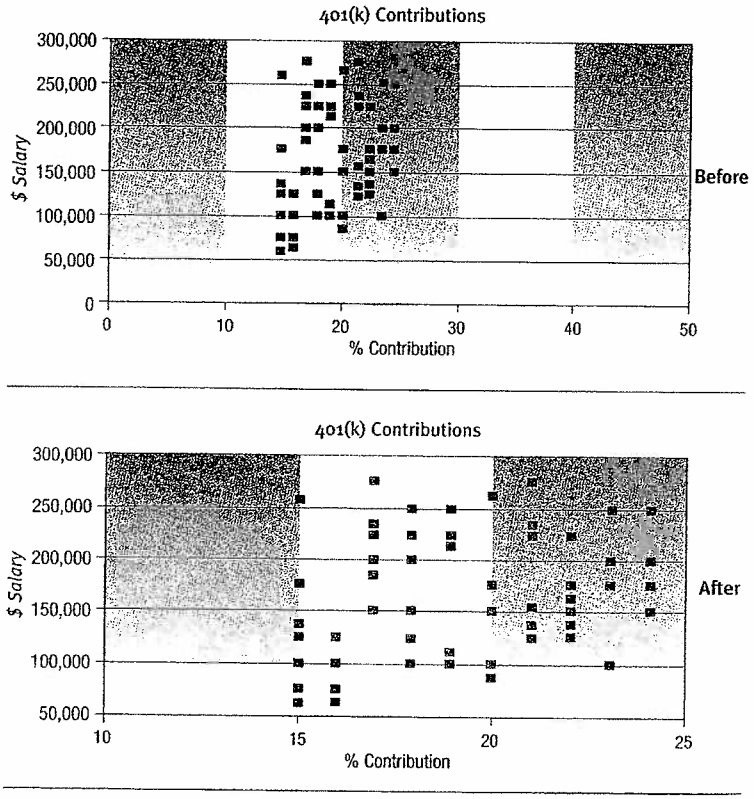
- Don't allow elements in any single chart to be too distant from one another — makes it harder to relate them — increasing the tendency to "dismiss" them as irrelevant (figure 9.6).

FIGURE 9.6 — CONTROLLING THE SEPARATION OF ELEMENTS



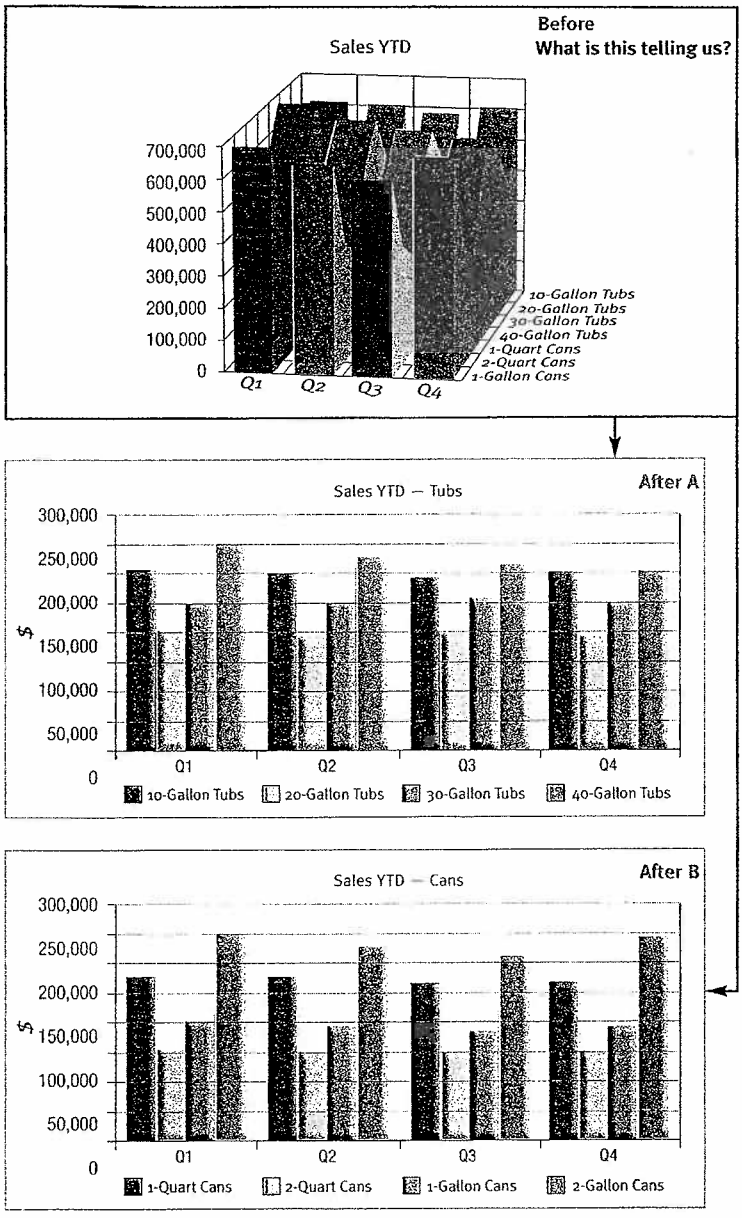
- Design to allow maximum detection of data points. Avoid the "blob" — improve understanding of relevance between data elements (figure 9.7).

FIGURE 9.7 — AVOIDING THE "BLOB"



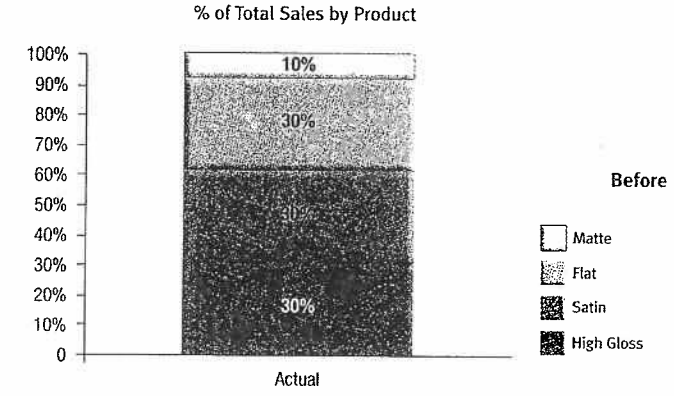
- Watch the data/ink ratio: There needs to be a balance of information and design. An over-designed page will look too technical and an overly simplified one looks almost childish. You need the design to be inviting, but not at the expense of communicating the key information (figure 9.8).

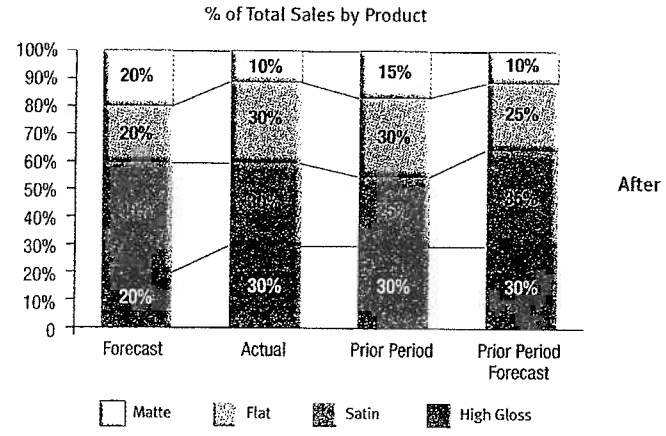
FIGURE 9.8 — MANAGE THE DATA/INK RATIO



- Each chart/graph should answer the question, "Compared to what?" Time series charts do so by definition, but point-in-time charts need to have the capability to compare to prior periods, control factors for same period, other products, etc. As discussed earlier, we prefer charts to compare current performance to forecast, to keep the emphasis on always looking ahead vs. back (figure 9.9).

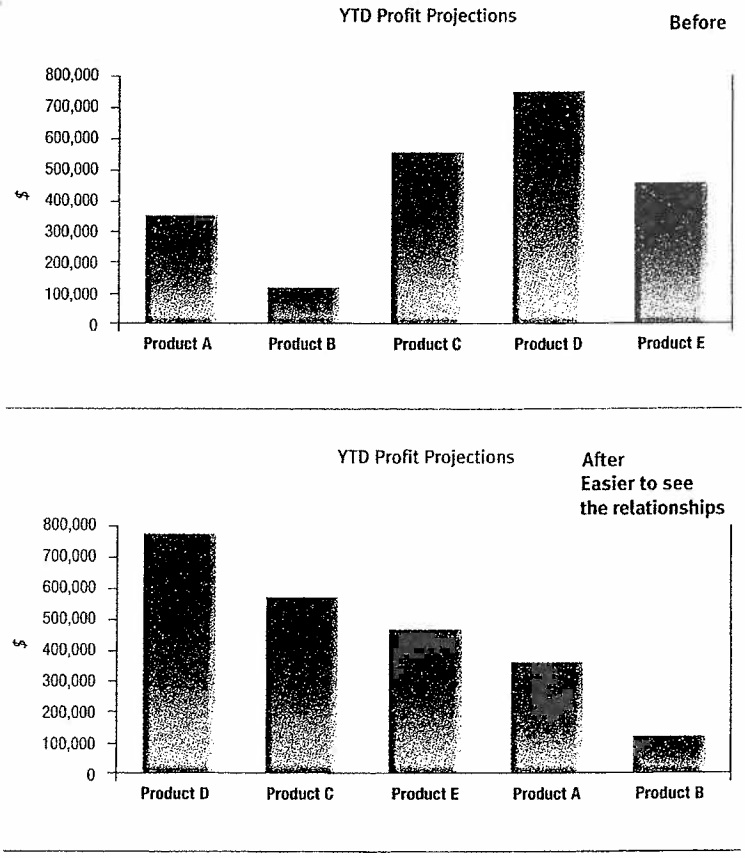
FIGURE 9.9 — COMPARED TO WHAT?





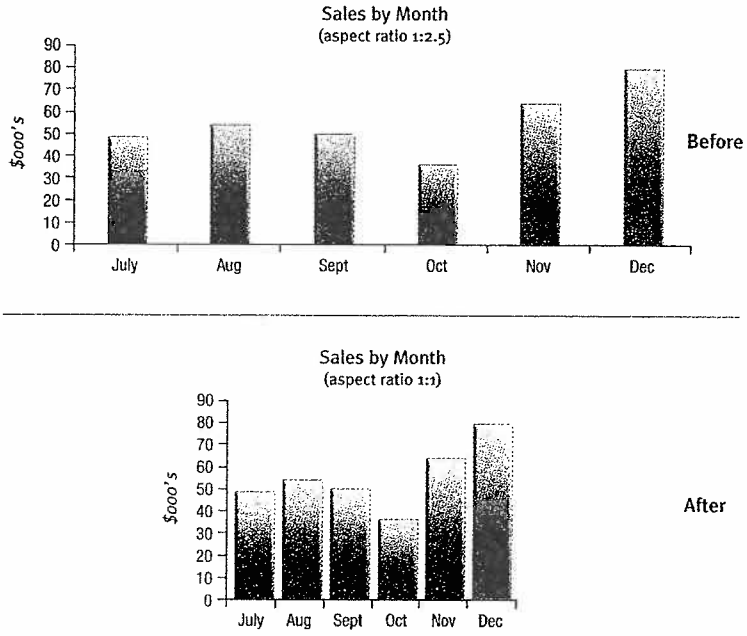
- Always follow the eyes. People read left to right, top to bottom. Design to make that easy and have the most impact.
- Do "main effects" ordering, which means you should present data from highest to lowest or least to most, uniformly increasing or decreasing in size (figure 9.10).

FIGURE 9.10 — MAIN EFFECTS ORDERING



- Avoid using gridlines unless subtle comparisons of elements are required.
- Aspect ratio is the ratio of the height of the graph to the width of the graph. Standard televisions are 4:3 aspect ratio. Widescreens are 5:9. Ideally, use 1:1 when X and Y are measured in the same units. Try to stay within +/-0.25 either way (figure 9.11).

FIGURE 9.11 — PRESENT APPEALING ASPECT RATIOS



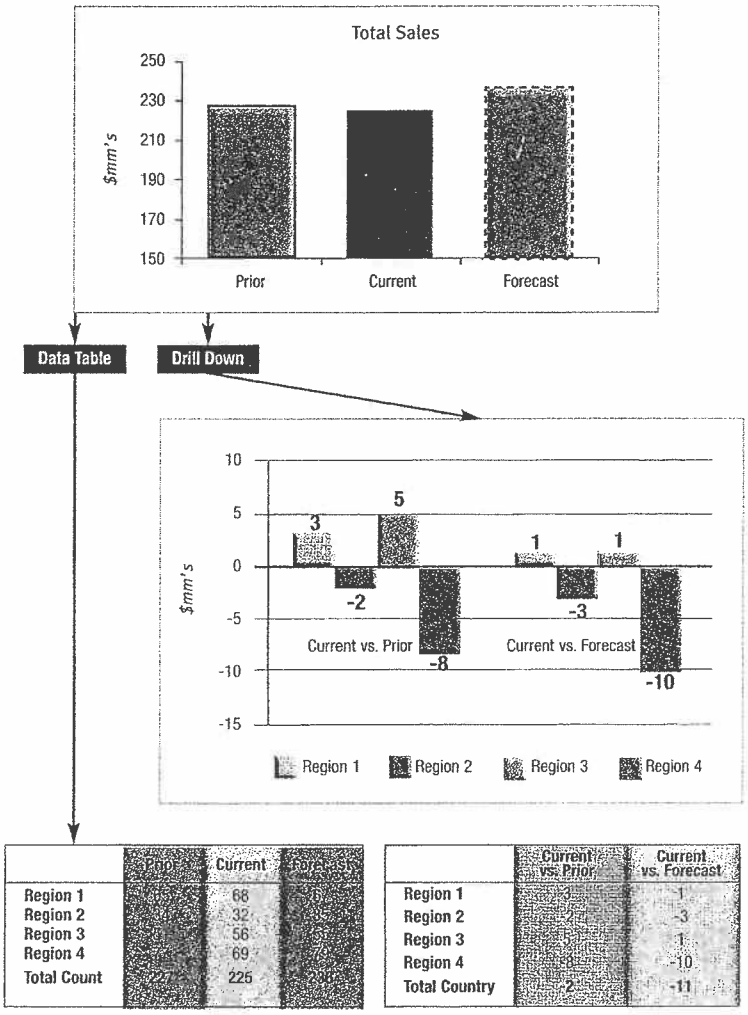
- Label clearly and comprehensively. Use legends whenever more than one element is depicted in a chart. Each chart should have a title and a timeframe.
- Finally, be, in Einstein's words, "as simple as necessary, and no more."

More Rules of the Road

Now that you're more confident in your knowledge of how to graphically present data more effectively, the following are some of the key considerations for successful dashboard designs that marry multiple graphical elements.

1. **Always consider the audience:** Generally, the more senior the viewer, the higher level the first page summary should be. Also, consider the technical skill of each audience group you have, since that will drive their usage.
2. **Keep your dashboard light, with as few metrics as possible:** Have you ever looked at a chart in a book or newspaper that seemed way too crowded with type or pictures? You probably turned the page, right? Those rules apply here. Less is definitely more. Redundant metrics waste time and therefore lessen the managerial value of the final toolset you create.
3. **Consider a "drill-down" series of dashboards with appropriate variations:** Your CEO, CFO, and other top-level executives probably don't need to see every single dashboard metric you've created in the marketing department. They don't have the time, and you don't want to give anyone an excuse to micromanage. That's why it makes sense to design not just one dashboard, but a series of dashboards with appropriate metrics for different audiences. You're not building a walled system, just a series of nested dashboard pages with "drill-down" capability (see figure 9.12) that can allow anyone to look at the metrics they need at any given point in time. Think of yourself as an editor trying to please various readerships. You may be on the same team, but different executives want different data — give it to them. Also, if you want to keep different groups from trespassing into proprietary data, password-protect various areas of the dashboard to keep eyes where they should be.

FIGURE 9.12 — DASHBOARD DRILL-DOWN SCHEMATIC



	Prior	Current	Forecast
Region 1		68	67
Region 2		32	35
Region 3		56	55
Region 4		69	79
Total Count	227	225	236

	Current vs. Prior	Current vs. Forecast
Region 1	3	1
Region 2	-2	-3
Region 3	5	1
Region 4	-8	-10
Total Country	-2	-11

4. **Look and feel are crucial:** Remember what we said about cognitive load — no more than three to 10 elements per page, and limit the types of graphical devices used in any one page to three. You and your team are best qualified to determine the mix of metrics and how receptive your audience will be to the way you present them. If you do seek outside advice, err on the side of simplicity. As a general rule, changing a two-axis chart to three axes increases the degree of readership difficulty by a factor of 10. Try to live within a two-axis world.
5. **Plan to refresh data on a regular basis:** The frequency with which you refresh the data on your dashboard should correspond to the needs of your business. If things change enough on a day-to-day basis to warrant a reassessment of resource allocation, then it makes sense for the dashboard to be revised daily based on that new data. However, for most companies, even those with real-time sales tracking, business patterns are unlikely to change more often than weekly. For some, it's monthly or quarterly. The people who make day-to-day decisions in a department may need more frequent updates than senior officers of the company. Again, if senior management wants to drill down, they can, but use your resources to update those to whom frequent updates are mission critical. Take the time to plan your dashboard integration with your data warehouse, campaign management tools, marketing enterprise systems, and other software solutions. If you have all of these software solutions working already, you might consider putting your dashboards online, where this information will be more accessible and significantly cheaper to maintain.
6. **Paper or plastic?** We've seen some very sharp and effective marketing dashboards in the form of low-resolution color printouts dropped in people's mailboxes (the real kind, not the "e-kind"). We've also seen some fairly lousy ones presented in some slick and expensive "real-time" online intranets or e-mail links. We can't stress enough that the medium you choose should fit your culture, your need for speed, and your breadth of distribution. If you don't require such frequent updates and your organization's staff is friendlier with paper, by all means, do paper. But if you need to update your dashboard frequently or distribute many versions to many constituents, go electronic. The No. 1 priority is to have

it read and understood by the people making the decisions at all levels. Everything should support that one simple goal.

7. **Roll out:** The well-executed dashboard doesn't require training per se, but as part of the roll-out, it makes sense to have a formal introduction in the style each of your target audiences will receive. Introducing the marketing dashboard may be a good way to spend a little quality time with the board or the executive committee of the company, so don't rule out those opportunities. Making a presentation should be one of your strong points already, so maybe we don't need to say this, but ... know your audience and sell it.
8. **Don't fob off this project:** Building an effective marketing dashboard is a lot of work, and it will require continued work and planning once it's launched if it's going to stay effective. It is not a part-time project for the most "get-it-done" person in your department. It is also not something you can delegate to your analytics group. But if you make the effort to do your first marketing dashboard right, particularly with the help of some unbiased external perspective, it will be the most rewarding and effective undertaking you'll experience in your job. It will also build staff morale for a marketing team that currently suffers from lack of attention from senior management.

The most important rule of all? Follow your culture. If it's conservative, design traditionally. If it's innovation-driven, be innovative. If it's technical, be scientific. A dashboard design initiative can be created internally along the guidelines we've suggested, but it never hurts to have additional expert assistance in creating the model that works for you.

CONCLUSION

There are some specific design techniques that facilitate the rapid and accurate absorption of data. These techniques recognize the incredible strengths and inherent limitations of our human visual acuity. But there are some distinct cultural tips to keep in mind when it comes to effective dashboard design. Know your company culture and reflect it in your dashboard design. Know your users and let their needs and preferences dictate your choice of publication medium and update frequency.

With some careful study, even the most complex data can be presented simply and effectively. The key is going beyond your own personal filters of what "looks good" and doing your homework on what is most likely to work for the audience to result in an effective measurement tool.

Sources

1. Kosslyn, S.M., "Graphics and Human Information Processing," *Journal of the American Statistical Association*, 1985.

2. Bacon, Lynd, "Graphical Data Analysis and Visualization Techniques for Marketing Research," AMA Art Forum Proceedings, 1996.