

Chapter 1

Getting in the Dashboard State of Mind

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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 muddled. 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.

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

	A	B	C	D	E	F	G
1	National Park Overnight Visitor Stats						
2	Period	Backcountry Campers	RV Campers	Tent Campers	Concessioner Logging	Concessioner Campgrounds	Total
3	Jan-05	2,397,098	4,446,370	3,934,114	3,235,039	838,932	14,851,553
4	Feb-05	2,395,236	4,378,491	4,221,920	3,386,345	814,734	15,196,726
5	Mar-05	2,329,845	4,663,020	4,153,999	3,312,100	650,088	15,109,052
6	Apr-05	2,424,227	4,596,036	3,601,198	3,317,010	644,543	14,583,014
7	May-05	2,579,716	4,232,793	3,747,293	3,486,041	725,979	14,771,822
8	Jun-05	1,978,867	3,943,183	3,586,062	3,527,045	733,121	13,768,278
9	Jul-05	1,680,414	3,759,294	3,460,005	3,538,176	743,256	13,181,145
10	Sep-05	1,644,691	3,788,528	3,955,795	3,726,504	786,102	13,901,620
11	Oct-05	1,574,706	4,043,206	3,921,104	3,787,463	852,820	14,179,299
12	Nov-05	1,617,706	3,937,271	3,929,665	3,880,622	865,694	14,230,958

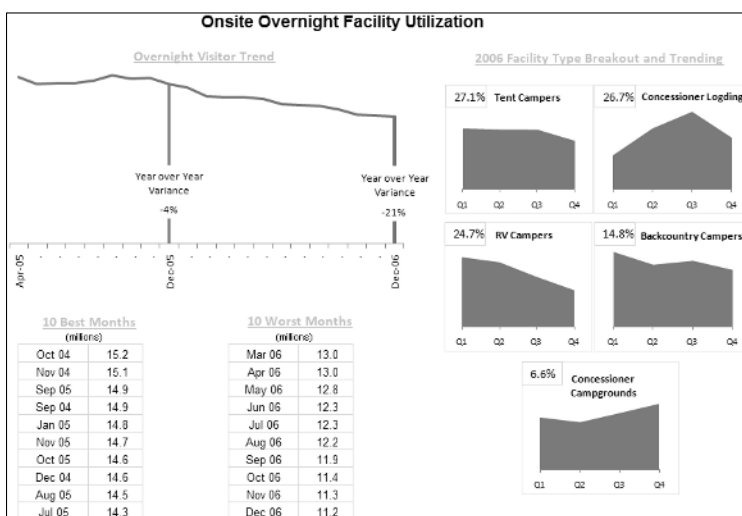
Defining dashboards

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.

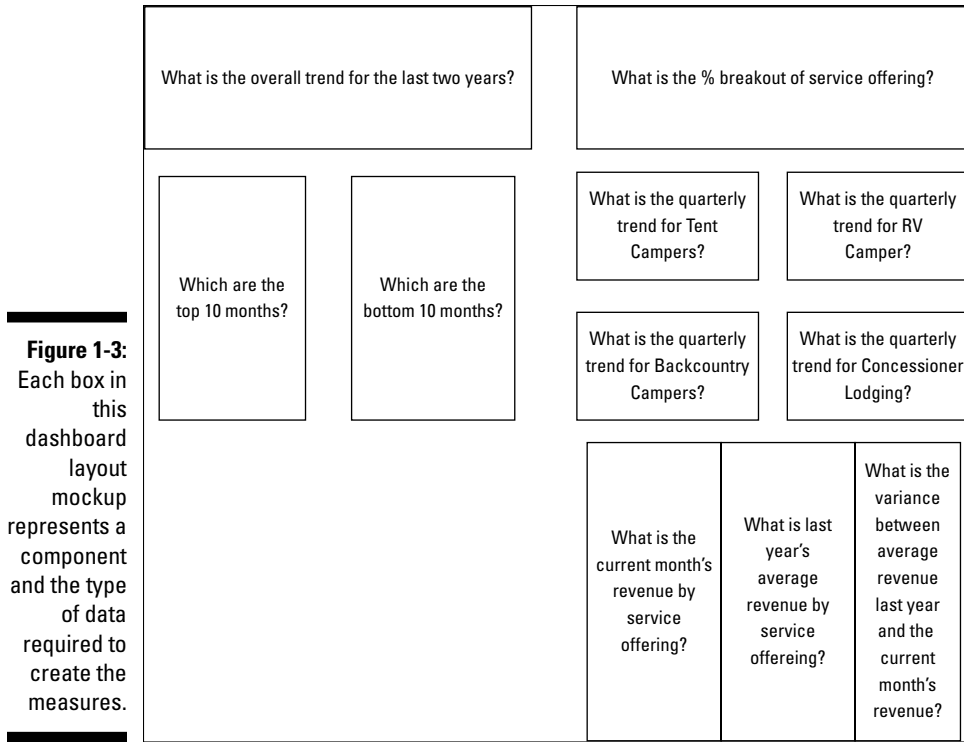


The topic of creating effective KPIs for your organization is a subject worthy of its own book and is out of the scope of this endeavor. For a detailed guide on KPI development strategies, pick up David Parmenter's *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs* (Wiley).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



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.

1	1	2	3
1	1	2	2
2	2	2	3
3	3	3	3

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.

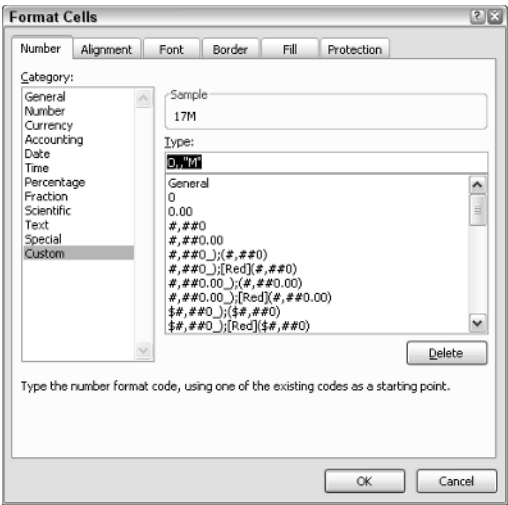


Table 1-1 lists some common format codes and how they affect numbers.

Table 1-1	Number Format Codes
<i>Number Format Code</i>	<i>How 16,906,714 Would be Displayed</i>
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.