Making Everything Easier!™

3rd Edition

Microsoft® Excel® Dashboards & Reports

FOR DUMMIES®

A Wiley Brand

Learn to:

- Analyze data and report it in a way that makes sense
- Slice and dice data from different perspectives
- Create eye-catching and understandable reports, visualizations, and dashboards
- Automate redundant reporting

Michael Alexander
Microsoft MVP

Excel® Dashboards & Reports

FOR DUMMIES®

A Wiley Brand

3rd Edition

Excel® Dashboards & Reports

FOR DUMMIES®

A Wiley Brand

3rd Edition

by Michael Alexander

FOR DUMMIES®

A Wiley Brand

Excel® Dashboards & Reports For Dummies®, 3rd Edition

Published by: **John Wiley & Sons, Inc.,** 111 River Street, Hoboken, NJ 07030-5774, www.wiley.com

Library of Congress Control Number: 2015958876

ISBN: 978-1-119-07676-6; 978-1-119-08881-3 (ebk); 978-1-119-07677-3 (ebk)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

Contents at a Glance

Table of Contents

Introduction

The term *business intelligence (BI),* coined by Howard Dresner of Gartner, Inc., 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.

Over the past 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 has 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 managers would scoff at the thought of using Excel as a BI tool, Excel is inherently part of the enterprise BI tool portfolio. Whether or not IT managers are keen to acknowledge it, most of the data analysis and reporting done in business today is done by using a spreadsheet. You have several significant reasons to use Excel as the platform for your dashboards and reports, including

- **Tool familiarity:** If you work in corporate America, you are conversant in the language of Excel. You can send even the most seasoned of senior vice presidents an Excel-based reporting tool and trust that he will know what to do with it. With an Excel reporting process, your users spend less time figuring out how to use the tool and more time looking at the data.
- **Built-in flexibility:** In 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 that 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 let you create mechanisms that don't lock your audience into one view. And because you can have multiple worksheets in one workbook, you can give your audience 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 resource and time limitations. With Excel, not only can you develop reporting mechanisms faster, but you also have the flexibility to adapt more quickly to changing requirements.
- **Powerful data connectivity and automation capabilities:** Excel is not 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 multibillion-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, it's true that Excel has so many reporting functions and tools 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. Using a few fundamentals and some of the new BI functionality that Microsoft has included in this latest version of Excel, you can go from reporting data with simple tables to creating meaningful reporting components that are 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 is not a guide to visualizations or dashboarding best practices — although those subjects are worthy of their own book. This book is focused on 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 stand-alone chapters that you can selectively refer to as needed. As you move through this book, you'll be able to create increasingly sophisticated dashboard and report components. After reading this book, you'll be able to

- Analyze large amounts of data and report them in a meaningful way.
- Gain better visibility into data 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. I assume that you

- Have already installed Microsoft Excel.
- Have some familiarity with the basic concepts of data analysis, such as working with tables, aggregating data, and performing calculations.
- 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' instruction. The idea is that as you go through each part, you will be able to build dashboards of increasing complexity until you're an Excel reporting guru.

Part I: Getting Started with Excel Dashboards & Reports

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, you will learn the impact of a poorly planned data set and will discover 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. Chapter 3 starts you off with some fundamentals around designing effective data tables. Chapter 4 shows you how you can leverage the Sparkline functionality found in Excel. Chapter 5 provides a look at the various techniques that you can use to visualize data without the use of charts or graphs. Chapter 6 rounds out this section of the book by introducing you to pivot tables and discussing how a pivot table can play an integral role in Excel-based dashboards.

Part III: Building Advanced Dashboard Components

In Part III you go beyond the basics to take a look at some of the advanced chart components you can create with Excel. This part consists of three chapters, starting with Chapter 7, where I demonstrate how to represent time trending, seasonal trending, moving averages and other types of trending in dashboards. In Chapter 8, you explore the many methods used to *bucket* data — putting data into groups for reporting, in other words. Finally, Chapter 9 demonstrates some of charting techniques that can help you display and measure values versus goals.

Part IV: Advanced Reporting Techniques

Part IV focuses on techniques that can 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. Chapter 12 shows you how pivot slicers can add interactive filtering capabilities to your pivot reporting.

Part V: Working with the Outside World

The theme in Part V is importing and exporting information to and from Excel. Chapter 13 explores some of the ways to incorporate data that does not originate in Excel. In this chapter, you find out how to import data from

external sources as well as create systems that allow for dynamic refreshing of external data sources. Chapter 14 wraps up this book 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 *Dummies* series titles. The chapters found here each present ten or more pearls of wisdom, delivered in bite sized pieces. In Chapter 15, I share with you ten or so chart-building best practices, helping you design more effective charts. Chapter 16 offers a run-down of the ten most commonly used chart types, along with advice on when to use each one.

Icons Used In This Book

As you read this book, you'll see icons in the margins that indicate material of interest (or not, as the case may be).This section briefly describes each icon in this book.

Tips are nice because they help you save time or perform a task without having to do a lot of extra work. The tips in this book are time-saving techniques or pointers to resources that you should try in order to get the maximum benefit from Excel.

Try to avoid doing anything marked with a Warning icon, which (as you might expect) represents a danger of one sort or another.

Whenever you see this icon, think *advanced* tip or technique. You might find these tidbits of useful information too boring for words, or they could contain the solution you need to get a program running. Skip these bits of information whenever you like.

If you don't get anything else out of a particular chapter or section, remember the material marked by this icon. This text usually contains an essential process or a bit of information you ought to remember.

Beyond the Book

A lot of extra content that you won't find in this book is available at www.dummies.com. Go online to find the following:

- **Excel files used in the examples in this book can be found at**

  www.dummies.com/extras/exceldashboardsreports

  This book contains a lot of exercises in which you create and modify tables and Excel workbook files. If you want to follow the exercise but don't have time to, say, create your own data table, just download the data from the Dummies.com website at www.dummies.com/extras/exceldashboardsreports. The files are organized by chapter.

- **Online articles covering additional topics at**

  www.dummies.com/extras/exceldashboardsreports

  At this page, you'll find out how to use conditional formatting to build annotations into your charts, add an extra dynamic layer of analysis to your charts, and create dynamic labels, among other details to aid you in your Excel dashboards journey.

- **The Cheat Sheet for this book is at**

  www.dummies.com/cheatsheet/exceldashboardsreports

  Here, you'll find an extra look at how you can use fancy fonts like Wingdings and Webdings to add visualizations to your dashboards and reports. You'll also find a list of websites you can visit to get ideas and fresh new perspectives on building dashboards.

- **Updates to this book, if we have any, are also available at**

  www.dummies.com/extras/exceldashboardsreports

Where to Go from Here

It's time to start your Excel dashboarding adventure! If you're a complete dashboard novice, start with Chapter 1 and progress through the book at a pace that allows you to absorb as much of the material as possible. If you're an Excel whiz, skip to Part III, which covers advanced topics.

Part I

Getting Started with Excel Dashboards & Reports

Go to www.dummies.com for great Dummies content online.

In this part . . .

- Discover how to think about your data in terms of creating effective dashboards and reports.
- Get a solid understanding of the fundamentals and basic ground rules for creating effective dashboards and reports.
- Uncover the best practices for setting up the source data for your dashboards and reports.
- Explore the key Excel functions that help you build effective dashboard models.

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 come with thinking about New York. I admit it's a stretch, but I'll 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 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 and understand the core attributes of what are considered to be reports and dashboards.

Defining reports

The report is 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 drill-downs, similar to Excel's Subtotal or Pivot Table functionality.

The key attribute of a report is that it doesn't lead a reader to a predefined conclusion. Although reports can include analysis, aggregations, and even charts, reports often allow for the end users to apply their 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 toward any predefined judgment or analysis; it's simply presenting the aggregated data.

	A	B	C	D	E	F
4		Number of Visitors (thousands)				
5		2001	2002	2003	2004	2005
6	Great Smoky Mountains NP	9,198	9,316	9,367	9,167	9,192
7	Grand Canyon NP	4,105	4,002	4,125	4,326	4,402
8	Yosemite NP	3,369	3,362	3,379	3,281	3,304
9	Olympic NP	3,416	3,691	3,225	3,074	3,143
10	Yellowstone NP	2,759	2,974	3,019	2,868	2,836
11	Rocky Mountain NP	3,140	2,988	3,067	2,782	2,798
12	Cuyahoga Valley NP	3,123	3,218	2,880	3,306	2,534
13	Zion NP	2,218	2,593	2,459	2,677	2,587
14	Grand Teton NP	2,535	2,613	2,356	2,360	2,463
15	Acadia NP	2,517	2,559	2,431	2,208	2,051
16	Glacier NP	1,681	1,906	1,664	2,034	1,925
17	Hot Springs NP	1,297	1,440	1,561	1,419	1,340
18	Hawaii Volcanoes NP	1,343	1,111	992	1,307	1,661

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 — you see only the key pieces of information relevant to support the goal of this dashboard, which in this case would be to get some insights on which parks would need some additional resources to increase visitor rates. Finally, by virtue of its objective, this dashboard effectively presents you with analysis and conclusions about the trending of overnight visitors.

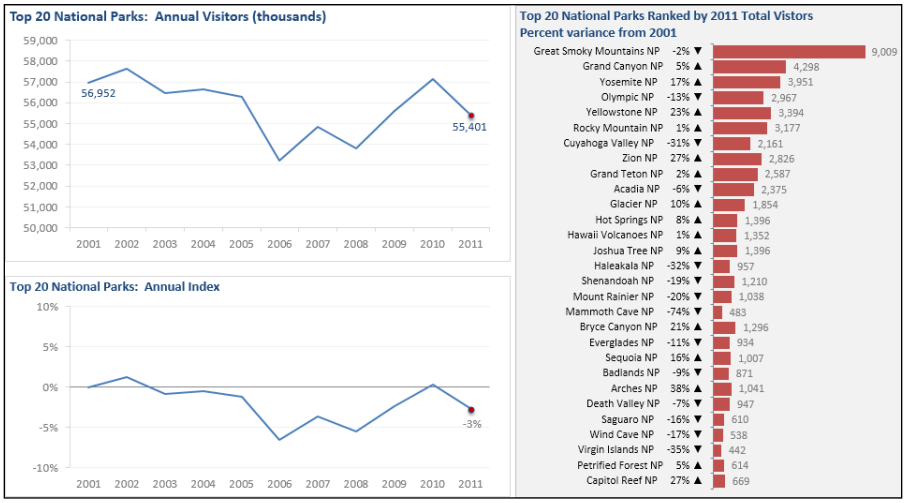

Figure 1-2: Dashboards provide at-a-glance views into key measures relevant to a particular objective or business process.

Preparing for Greatness

Imagine that 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 these types of situations happen more than you think. I'm

continually called 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 this can be for a single analysis, imagine running into it again and again 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 for, and purpose of, 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 ask about the source of the initial request. Talk to the requesters about what they're 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 a few of the end users to 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 Publishing, Inc.). That 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 good practice to avoid nice-to-know data in 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, rather than simply add 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 past 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 past two years?" you can imagine a chart component answering this 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.

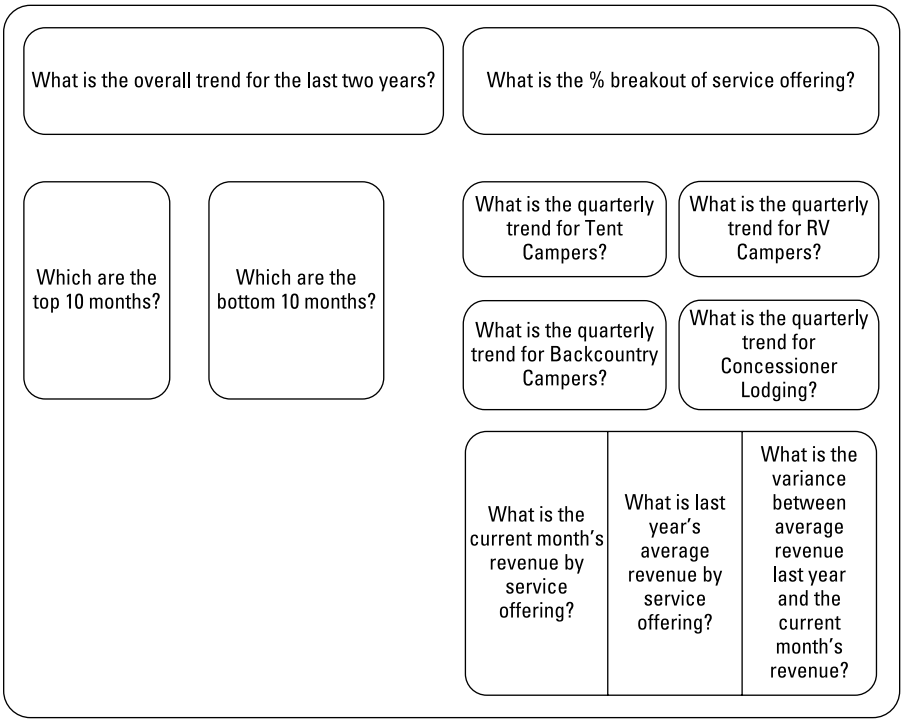

Figure 1-3: Each box in this dashboard layout mockup represents a component and the type of data required to create the measures.

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 whether the data required to produce those measures is 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 dashboard development time, data refresh intervals, and change management.

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