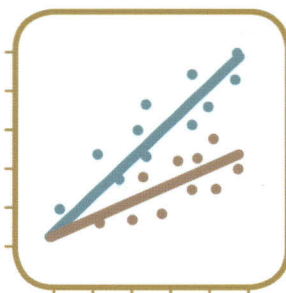
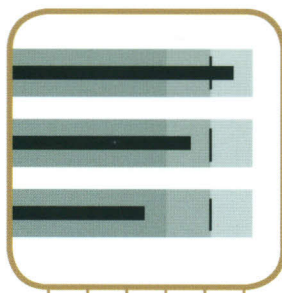
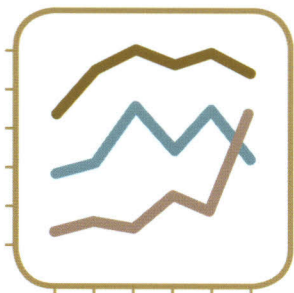


INFORMATION DASHBOARD DESIGN

The Effective Visual Communication of Data



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O'REILLY®

Problems with dashboards today

Dashboards in historical context

Current confusion about what dashboards are

A working definition of "dashboard"

A timely opportunity for dashboards

Above all else, this is a book about communication. It focuses exclusively on a particular medium of communication called a *dashboard*. In the fast-paced world of information technology (IT), terms are constantly changing. Just when you think you've wrapped your mind around the latest innovation, the technology landscape shifts beneath you and you must struggle to remain upright. This is certainly true of dashboards.

Live your life on the surface of these shifting sands, and you'll never get your balance. Look a little deeper, however, and you'll discover more stable ground: a bedrock of objectives, principles, and practices for information handling that remains relatively constant. Dashboards are unique in several exciting and useful ways, but despite the hype surrounding them, what they are and how they work as a means of delivering information are closely related to some long-familiar concepts and technologies. It's time to cut through the hype and learn the practical skills that can help you transform dashboards from yet another fad riding the waves of the technology buzz into the effective means to enlighten that they really can be.

Today, everybody wants a dashboard. Like many newcomers to the technology scene, dashboards are sexy. Software vendors work hard to make their dashboards shimmy with sex appeal. They taunt, "You don't want to be the only company in your neighborhood without one, do you?"

They warn, “You can no longer live without one.” They whisper sweetly, “Still haven’t achieved the expected return on investment (ROI) from your expensive data warehouse? Just stick a dashboard in front of it and watch the money pour in.” Be still my heart.

Those gauges, meters, and traffic lights are so damn flashy! You can imagine that you’re sitting behind the wheel of a German-engineered sports car, feeling the wind whip through your hair as you tear around curves on the autobahn at high speeds, all without leaving your desk.

Everyone wants a dashboard today, but often for the wrong reasons. Rest assured, however, that somewhere beyond the hype and sizzle lives a unique and effective solution to familiar business problems that are rooted in a very real need for information. That’s the dashboard that deserves to live on your screen.

All That Glitters Is Not Gold

Dashboards can provide a unique and powerful means to present information, but they rarely live up to their potential. Most dashboards fail to communicate efficiently and effectively, not because of inadequate technology (at least not primarily), but because of poorly designed implementations. No matter how great the technology, a dashboard’s success as a medium of communication is a product of design, a result of a display that speaks clearly and immediately. Dashboards can tap into the tremendous power of visual perception to communicate, but only if those who implement them understand visual perception and apply that understanding through design principles and practices that are aligned with the way people see and think. Software won’t do this for you. It’s up to you.

Unfortunately, most vendors that provide dashboard software have done little to encourage the effective use of this medium. They focus their marketing efforts on flash and dazzle that subvert the goals of clear communication. They fight to win our interest by maximizing sizzle, highlighting flashy display mechanisms that appeal to our desire to be entertained. Once implemented, however, these cute displays lose their spark in a matter of days and become just plain annoying. An effective dashboard is the product not of cute gauges, meters, and traffic lights (Figure 1-1), but rather of informed design: more science than art, more simplicity than dazzle. It is, above all else, about communication.

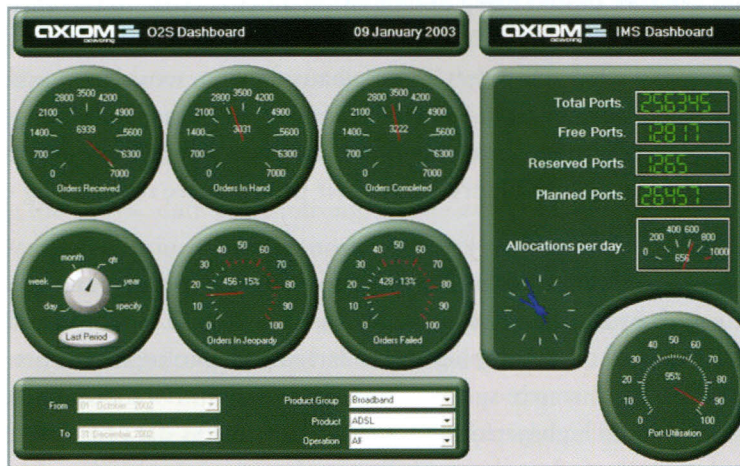


Figure 1-1. A typical flashy dashboard. Can't you just feel the engine revving?

This failure by software vendors to focus on what we actually *need* is hardly unique to dashboards. Most software suffers from the same shortcoming—despite all the hype about user-friendliness, it is difficult to use. This sad state is so common, and has been the case for so long, we've grown accustomed to the pain. On those occasions when this ugly truth breaches the surface of our consciousness, we usually blame the problem on ourselves rather than the software, framing it in terms of “computer illiteracy.” If we could only adapt more to the computer and how it works, there wouldn't be a problem—or so we reason. In his insightful book entitled *The Inmates Are Running the Asylum*, master designer Alan Cooper writes:

The sad thing about dancing bearware [Cooper's term for poorly designed software that is difficult to use] is that most people are quite satisfied with the lumbering beast. Only when they see some real dancing do they begin to suspect that there is a world beyond ursine shuffling. So few software-based products have exhibited any real dancing ability that most people are honestly unaware that things could be better—a lot better.

Alan Cooper, *The Inmates Are Running the Asylum* (Indianapolis, IN: SAMS Publishing, 1999), 59.

Cooper argues that this failure is rooted in an approach to software development that simply doesn't work. In a genuine attempt to please their customers, software engineers focus on checking all the items, one by one, off of lists of requested features. This approach makes sense to technology-oriented software engineers, but it results in lumbering beasts. Customers are expert in knowing what they need to accomplish, but not in knowing how software ought to be designed to support their needs. Allowing customers to design software through feature requests is the worst form of disaster by committee.

Software vendors should bring design vision and expertise to the development process. They ought to know the difference between superficial glitz and what really works. But they're so exhausted from working ungodly hours trying to squeeze more features into the next release that they're left with no time to do the research needed to discover what actually works, or even to step back and observe how their products are really being used (and failing in the process).

The part of information technology that focuses on reporting and analysis currently goes by the name *business intelligence* (BI). To date, BI vendors have concentrated on developing the underlying technologies that are used to gather data from source systems, transform data into a more usable form, store data in high-performance databases, access data for use, and present data in the form of reports. Tremendous progress has been made in these areas, resulting in robust technologies that can handle huge repositories of data. However, while we have managed to warehouse a great deal of information, we have made little progress in using that information effectively. Relatively little effort has been dedicated to engaging human intelligence, which is what this industry, by definition, is supposed to be about.

A glossary on the Gartner Group's web site defines business intelligence as "An interactive process for exploring and analyzing structured, domain-specific information... to discern business trends or patterns, thereby deriving insights and drawing conclusions" (http://www.gartner.com/6_help/glossary/GlossaryB.jsp). To progress in this worthwhile venture, the BI industry must shift its focus now to an engaging interaction with human perception and intelligence. To do this, vendors must base their efforts on a firm understanding of how people perceive and think, building interfaces, visual displays, and methods of interaction that fit seamlessly with human ability.

Even Dashboards Have a History

In many respects, "dashboard" is simply a new name for the *Executive Information Systems* (EISs) first developed in the 1980s. These implementations remained exclusively in the offices of executives and never numbered more than a few, so it is unlikely that you've ever actually seen one. I sat through a few vendor demos back in the 1980s but never did see an actual system in use. The usual purpose of an EIS was to display a handful of key financial measures through a simple interface that "even an executive could understand." Though limited in scope, the goal was visionary and worthwhile, but ahead of its time. Back then, before data warehousing and business intelligence had evolved the necessary data-handling methodologies and given shape to the necessary technologies,

the vision simply wasn't practical; it couldn't be realized because the required information was incomplete, unreliable, and spread across too many disparate sources. Thus, in the same decade that the EIS arose, it also went into hibernation, preserving its vision in the shadows until the time was ripe... That is, until now.

During the 1990s, data warehousing, *online analytical processing* (OLAP), and eventually business intelligence worked as partners to tame the wild onslaught of the information age. The emphasis during those years was on collecting, correcting, integrating, storing, and accessing information in ways that sought to guarantee its accuracy, timeliness, and usefulness. From the early days of data warehousing on into the early years of this new millennium, the effort has largely focused on the technologies, and to a lesser degree the methodologies, needed to make information available and useful. The direct beneficiaries so far have mostly been folks who are highly proficient in the use of computers and able to use the available tools to navigate through large, often complex databases.

What also emerged in the early 1990s, but didn't become popular until late in that decade, was a new approach to management that involved the identification and use of *key performance indicators* (KPIs), introduced by Robert S. Kaplan and David P. Norton as the *Balanced Scorecard*. The advances in data warehousing and its technology partners set the stage for this new interest in management through the use of metrics—and not just financial metrics—that still dominates the business landscape today. *Business Performance Management* (BPM), as it is now commonly known, has become an international preoccupation. The infrastructure built by data warehousing and the like, as well as the interest of BPM in metrics that can be monitored easily, together tilled and fertilized the soil in which the hibernating seeds of EIS-type displays were once again able to grow.

What really caused heads to turn in recognition of dashboards as much more than your everyday fledgling technology, however, was the Enron scandal in 2001. The aftermath put new pressure on corporations to demonstrate their ability to closely monitor what was going on in their midst and to thereby assure shareholders that they were in control. This increased accountability, combined with the concurrent economic downturn, sent Chief Information Officers (CIOs) on a mission to find anything that could help managers at all levels more easily and efficiently keep an eye on performance. Most BI vendors that hadn't already started offering a dashboard product soon began to do so, sometimes by cleverly changing the name of an existing product, sometimes by quickly purchasing the rights to an existing product from a smaller vendor, and sometimes by cobbling together pieces of products that already existed. The marketplace soon offered a vast array of dashboard software from which to choose.

Dispelling the Confusion

Like many products that hit the high-tech scene with a splash, dashboards are veiled in marketing hype. Virtually every vendor in the BI space claims to sell dashboard software, but few clarify what dashboards actually are. I'm reminded of the early years of data warehousing, when—eager to learn about this new approach to data management—I asked my IBM account manager how IBM defined the term. His response was classic and refreshingly candid: "By data warehousing we at IBM mean whatever the customer thinks it means." I realize that this wasn't IBM's official definition, which I'm sure existed somewhere in their literature, but it was my blue-suited friend's way of saying that as a salesperson, it was useful to leave the term vague and flexible. As long as a product or service remains undefined or loosely defined, it is easy to claim that your company sells it.

Those rare software vendors that have taken the time to define the term in their marketing literature start with the specific features of their products as the core of the definition, rather than a generic description. As a result, vendor definitions tend to be self-validating lists of technologies and features. For example, Dr. Gregory L. Hovis, Director of Product Deployment for Snippets Software, Inc., asserts:

Gregory L. Hovis, "Stop Searching for Information—Monitor it with Dashboard Technology," DM Direct, February 2002.

Able to universally connect to any XML or HTML data source, robust dashboard products intelligently gather and display data, providing business intelligence without interrupting work flow...An enterprise dashboard is characterized by a collection of intelligent agents (or gauges), each performing frequent bidirectional communication with data sources. Like a virtual staff of 24x7 analysts, each agent in the dashboard intelligently gathers, processes and presents data, generating alerts and revising actions as conditions change.

Mark Leon, "Dashboard Democracy," *Computerworld*, June 16, 2003

An article in the June 16, 2003 edition of *Computerworld* cites statistics from a study done by AMR Research, Inc., which declares that "more than half of the 135 companies... recently surveyed are implementing dashboards."

Unfortunately, the author never tells us what dashboards are. He teases us with hints, stating that dashboards and scorecards are BI tools that "have found a new home in the cubicles," having moved from where they once resided (exclusively in executive suites) under the name Executive Information Systems. He gives examples of how dashboards are being used and speaks of their benefits, but leaves it to us to piece together a sense of what they are. The closest he comes to a definition is when he quotes John Hagerty of AMR Research, Inc.: "Dashboards and scorecards are about measuring."

While conducting an extensive literature review in 2003 in search of a good working definition, I visited DataWarehousingOnline.com and clicked on the link to “Executive Dashboard” articles. In response, I received the same 18 web pages of links that I found when I separately clicked on links for “Balanced Scorecard,” “Data Quality and Integration,” and “Data Mining.” Either the links weren’t working properly, or this web portal for the data warehousing industry at the time believed that these terms all meant the same thing.

I finally decided to begin the task of devising a working definition of my own by examining every example of a dashboard I could find on the Web, in search of their common characteristics. You might find it interesting to take a similar journey. In the next few pages, you’ll see screenshots of an assortment of dashboards, which were mostly found on the web sites of vendors that sell dashboard software. Take the time now to browse through these examples and see if you can discern common threads that might be woven into a useful definition.

By including these examples from the web sites of software vendors and a few other sources, I do not mean to endorse any of these dashboards or the software products used to create them as examples of good design, nor as extraordinary examples of poor design. To varying degrees they all exhibit visual design problems that I’ll address in later chapters.