Overview

Good Design. This chapter examines 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 determine whether a performance dashboard succeeds or fails.

Visual design is important because business users don’t have to use a performance dashboard; in most companies, 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 or consumes too much time and effort for the value it delivers. They will go elsewhere to obtain the information they need, or they will rely on intuition and gut feel alone.

Good dashboard design instantly connects users to actionable and relevant data. Stephen Few, a visualization expert and author, writes: “The dashboard does its primary job if it tells you with no more than a glance that you should act. It serves you superbly if it directly opens the door to any additional information that you need to take that action.”1

Challenges. Creating dashboard displays is challenging, and few report designers—the people who create dashboard screens in most organizations—have sufficient background in visual design to do a good job. Most rely on their own visual sensibilities combined with feedback from business users, who also lack knowledge of basic visual design principles. The process of mocking up dashboard screens is often a case of the blind leading the blind.

The result is a visual interface that is cluttered and unnecessarily complicated, forcing users to work too hard to discern pertinent facts and navigate to relevant underlying detail. Unless business users can consume dashboards at a glance—or in “big visual gulps,” as Few says—they will abandon dashboards and revert to former, less than optimal habits of consuming information.

Despite the challenges, designing dashboard displays is rewarding. It is the fun part about building performance dashboards, the icing on the cake, if you will. Dashboard design is where all the elements of a performance dashboard system come together to address business issues. It’s like the grand finale when systems architects finally see the fruits of their efforts and business users get excited about using the new system.

Before You Start

Although it’s tempting to jump right into selecting layout designs, chart types, color palettes, fonts, and navigation controls, there are a number of things that you should keep in mind before beginning the design process. Some of these are fundamental principles of information delivery that bear repeating; others are overlooked steps in a dashboard project plan.

Focus on Requirements and Data First

The quickest way for a magazine to boost sales is to put a picture of a pretty woman on the cover. The same holds true for performance dashboards. A surefire way to get funding for a dashboard project is to show executives a mock-up of a dashboard screen with their metrics wrapped in appealing graphics. However, selling and delivering a performance dashboard are two different things.

Says a performance manager at a major telecommunications company:

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.

Requirements. When gathering requirements for a performance dashboard project, it is critical to focus on what information users need and how they plan to use the dashboard rather than how they want to view the data it contains. 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 mock-up at the end of the requirements process, once developers have a solid understanding of the information that users need to do their jobs. For example, the nine-step dashboard design workshop described in Chapter 11 produces a requirements document written in English that defines goals, questions, metrics, targets, drill paths, and data, among other things, that developers need to build a dashboard prototype.

Data. It’s also critical to ensure that you populate the dashboard with high-quality data that business users trust. Business users always underestimate the time and money required to source, clean, and integrate data for dashboard and BI projects. Often data acquisition consumes 80 percent of the work involved in delivering a performance dashboard. This is especially true if the dashboard does not source most of its content from a data warehouse that adheres to a rigorous data cleansing and validation process.

Prototypes. Without a strong data foundation, a performance dashboard is just a pretty face without much personality: intriguing at first, but quickly dissatisfying. Even a dashboard prototype should incorporate accurate data. Otherwise, you’ll be on the defensive during most of the prototyping session, explaining the origins of your data and why it’s not accurate. And you’ll have missed a brilliant opportunity to gain traction for the new system. I’ve known cases where business managers hurriedly began making calls to fix operational problems that they spotted while providing feedback on a dashboard prototype.

Know Your Users

It is one thing to build a visually elegant performance dashboard, and it is another to get business users to use it. As discussed in Chapter 2, 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. To encourage adoption and use, performance dashboards need to be tailored to the needs of each target group.

For example, some executives today prefer to receive reports via e-mail, while others like to print out various screens, and some desire offline electronic versions that they can examine while traveling. To address these types of requirements, one BI team trained each executive’s administrator to use the dashboard and generate output in the executive’s preferred method. “We told executives, don’t worry about accessing the tool, we’ll train your assistants to get you the information for you,” the team lead said. At another company, the project leader spent 30 to 60 minutes with each executive describing how to use the tool. The project lead also configured the dashboard screen to match the executive’s preferences to ensure adoption and buy-in for the project from the top.

Executives may need extra hand holding, but power users need additional leeway. Power users usually are not satisfied with functionality geared to casual 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. These could be online analytical processing, visual analysis, or ad hoc reporting tools.

Enlist Visual Designers

Report developers who design dashboards tend to overcomplicate the display, using too many colors, borders, frames, and images. As developers, they take pride in understanding and exploiting all the features and functions in a software tool. Unfortunately, this backfires with dashboard displays.

When left to their own devices, report developers overemphasize the design at the expense of the data. This creates cluttered, overdecorated displays where everything competes for attention and thus nothing of importance gets communicated. “Focus should always be placed on the information itself, not on the design of the dashboard, which should almost be invisible,” writes Few.2

Interior Decorating. Designing dashboards is not unlike decorating a room in your house. Most homeowners (like me!) design as they purchase objects to place in the room. When we buy a rug, we select the nicest rug; when we pick out wall paint, we pick the most appealing color; when we select chairs and tables, we find the most elegant ones we can afford. Although each individual selection makes sense, collectively the objects clash or compete for attention.

Smart homeowners (with enough cash) hire interior decorators who filter your tastes and preferences through principles of interior design to create a look and feel in which every element works together harmoniously and emphasizes what really matters. For example, the design might highlight an elegant antique coffee table by selecting carpets, couches, and curtains that complement its color and texture.

Recruiting Design Experts. Thus, to optimize the design of your performance dashboard, it is important to get somebody on the team who is trained in the visual design of quantitative information displays. Although few teams can afford to hire someone full time, you may be able to hire a consultant to provide initial guidance or find someone in the marketing department with appropriate training. Ideally, the person can educate the team about basic design principles and provide feedback on initial displays.

But be careful: Don’t entrust the design to someone who is a run-of-the-mill graphic artist or who is not familiar with user requirements, business processes, and corporate data. For example, a Web designer will give you a professional-looking display but probably will garble the data—he or she might use the wrong type of chart to display data or group metrics in nonsensical ways or apply the wrong filters for different user roles. And any designer needs to take the time up front to understand user requirements and the nature of the data that will populate the displays.

Partnership. Ideally, report developers and design experts work together to create an effective series of dashboard displays, complementing their knowledge and expertise. This partnership can serve as a professional bulwark against the misguided wishes of business users. Although it’s important to listen to and incorporate user preferences, ultimately the look and feel of a dashboard should remain in the hands of design professionals. For example, most companies today entrust the design of their Web sites and marketing collateral to professional media designers who work in concert with members of the marketing team. They don’t let the chief executive dictate the Web design (or they shouldn’t anyway).

Books. There are many good books available today to help dashboard teams bone up on visual design techniques. Stephen Few’s Information Dashboard Design book is a must-read. He delves into greater detail in two other books, Show Me the Numbers and Now You See It. Few and others have drawn inspiration from Edward R. Tufte, whose book The Visual Display of Quantitative Information is considered a classic in the field. Tufte has also written Visual Explanations, Envisioning Information, and Beautiful Evidence.

Create a Prototype

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 performance dashboard. The best way to get the process going is to create a prototype that you’ve developed in conjunction with a visual designer or based on knowledge you’ve gained from reading selected books.

Soliciting Feedback. Then get users’ feedback. But don’t ask questions like “Do you like how this looks?” Rather, have users focus on whether the dashboard makes it easy to find the most important information. For example, ask “Do the items that need attention stand out?” Or “When scanning the revenue section, can you easily detect the trend?”

Allow users to tweak the layout and design, but do not let them overhaul it completely (unless it is really poor). Also, do not start with a blank screen or let users create the prototype on their own. They have fixed ways of viewing information, usually limited by what they’ve grown accustomed to seeing and doing in the past.

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.

How Much Data? The prototype should contain a modicum of real user data. Perhaps it’s only a row or two, but it should be enough to lend the dashboard an air of reality and give users a sense of ownership of the prototype and project. Meanwhile, a subset of the development team should be working on a parallel track, sourcing and preparing data that was defined in the requirements-gathering session. Working on the back and front ends of the dashboard simultaneously accelerates deployment and brings to the surface problems that might derail the project if development is done sequentially.

For instance, the prototyping sessions might reveal that a particular dimension or attribute is no longer needed and that new dimensions or fields have to be added. This knowledge can save the back-end team considerable time if it hasn’t already sourced the data.

Employ Usability Labs

Fine-tuning. Once the prototype is finalized and populated with data, then you need to test the dashboard display in a real-life setting. In the best of all worlds, your company has a usability lab that enables you to observe workers using the performance dashboard in a laboratory setting. Usability labs employ cameras and recorders to document users’ hand, eye, and body movements and record their verbal comments. The labs also interview users to get their reaction to the application. Ultimately, the labs help determine how intuitive an application is and where users get hung up in the visual interface. They can rescue poorly designed dashboards from oblivion but also polish well-designed dashboards to make them even more accessible and usable.

Says an IT director at a financial services company:

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 after our dashboard went live to test it with real users. Some of the advice involved making small cosmetic changes, such as moving some icons and cleaning up the layout. But other advice gave us a better understanding of how the system behaves from the perspective of business users, 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.

Do It Yourself. If your company doesn’t have a formal usability lab, don’t despair. You can create an informal lab on your own and still glean a lot of valuable insights. Simply recruit a handful of people from different segments of your user population to test the dashboard prototype for 15 minutes. The best candidates are ones who are gregarious and can provide a running commentary of what they see and experience.

When you put these people in front of a screen, most immediately will begin examining the data and interacting with the dashboard. Ask them to verbalize everything they do, think, or experience. Just in case, have a few tasks for them to perform based on their role. For example, ask an executive to print the current view or export to Excel, a manager to filter the data, and power users to calculate a new column and change chart types. Take copious notes or record the session and transcribe the dialogue later.

Once the session is finished, talk with the test subjects and get them to summarize their experiences, identifying what they liked and didn’t like and where they got confused or lost. Once you conduct several sessions, you’ll identify several things that you can do to tweak the visual display to improve its usability.

Iterate

Like key performance indicators (KPIs), a dashboard display is never finished. Even with prototypes and usability testing, you are not likely to build the perfect display the first time. In addition, user preferences and requirements change over time, which will force a rewrite, and you’ll devise new ways to visualize data after watching how users interact with the dashboard or examining dashboards at other companies. After a while, you’ll need to redesign the dashboard display to keep it relevant, fresh, and attractive.

“Designs are iterative,” says John Rome, associate vice president at Arizona State University. “We keep dreaming up new ways to visualize data to enhance adoption and usage.” Rome spent considerable time learning the basics of visual design and now employs a staff member who has a visual design background. They’ve redesigned the look and feel of several dashboards in the past several years.

Guidelines for Creating Displays

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 in, we ignore it and move to something else. For this reason, it is imperative to spend time and effort designing the initial screen of a performance dashboard. This 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 may use it only begrudgingly.

Less Is More. However, this does not mean that we need to apply painterly touches or create a visual masterpiece. 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 easy things we can do to enhance the visual appeal and usability of the dashboard and scorecard screens we create. General guidelines for creating dashboard displays that jump out and grab users rather than force them to study a display to discern important facts are presented next.

Display Information on a Single Screen

The first and toughest goal of a dashboard designer is to squeeze relevant information onto a single screen. Users should not have to scroll down or across a screen to view critical data. That is too much work when all users want to do is glance at the screen to monitor what is going on.

Out of Sight. Similarly, users should not have to click on a radio button to compare data that should be logically grouped together on a single display. All information needed to make an immediate assessment should be instantaneously viewable. Data that are out of sight are out of mind.

Few writes:

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.3

Top-level Display. Of course, this doesn’t mean that the entire performance dashboard should consist of a single page of information. A good dashboard summarizes all relevant information on a top-level display so users can monitor performance at a glance. But then, if desired, users can navigate to detailed data or related views with a single click to explore underlying causes of problems or issues surfaced in the monitoring layer.

Balance Sparsity and Density

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 arbitrarily restrict the number of metrics and risk excluding those that meet bona fide business requirements or should be viewed together to deliver the full story.

How Many? What is the ideal number of objects to place on a dashboard screen? Should we design sparse, uncluttered displays with a minimum of objects to optimize at-a-glance monitoring and enhance retention? Or should we pack the dashboard with enough objects to give the complete picture?

The answer is that dashboard designers need to balance the twin demands of sparsity and density. There is always a trade-off between these two, but following good design principles can help you create a dense dashboard layout that is also highly accessible and legible. Thus, you shouldn’t limit the dashboard to a fixed number of objects, but you should always be aware when the display reaches its saturation limit.

The ratio between sparsity and density often varies by type of user and individual preference. Although there are no hard-and-fast rules, operational workers typically prefer denser displays of data, packed with detail and containing as much text as charts. In contrast, managers or executives prefer to scan a dozen or so metrics highlighted with stoplights and accompanied by an associated chart or two.

Evolving Perceptions. In addition, users who are intimately familiar with the data and processes represented on the dashboard can consume more information than those who are new to the space. Experienced users will get frustrated if they have to click multiple times to view information that belongs together. In fact, they might prefer a spreadsheet, despite its ungainly aesthetics and endless tables, because it gives them all the information they need in one ungainly gulp.

In contrast, novice users or people unfamiliar with a dashboard’s business domain can’t absorb as much information all at once. They prefer a simpler display with fewer items. Over time, as they gain more experience and become more familiar with the dashboard elements, they, too, will find the display limiting. At this point, savvy dashboard designers deliver a more advanced view by exposing more objects and functionality.

Eliminate Decoration

Preserving Real Estate. The 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. “That’s because graphics convey more information in less space and we process visual information more rapidly than other types of information,” says Few.

However, most dashboard developers get carried away with graphical elements, spurred 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 information quickly. Part of the problem is that most vendors try to simulate an automobile dashboard on a computer screen and try to outgizmo each other with graphical effects. Thanks to evangelization by Few and other design experts, vendors have reined in some of their more egregious design instincts but still make these capabilities available to unsuspecting dashboard developers.

As a rule of thumb, every dashboard developer should ask: “Do the graphics provide the clearest, most meaningful presentation of the data in the least amount of space?” For example, radial gauges waste a lot of space due to their circular shape. Stoplights and thermometers that look like their real-life counterparts also consume too much real estate.

Nothing Signifies Something. Few says, “Don’t waste visual content with an entire stoplight, just show a single icon (for example, a circle) next to a metric.” He goes one step further and recommends not showing a symbol or icon at all if performance is acceptable. Users subconsciously recognize that the absence of an object carries meaning, like “no news is good news.”

Use an Intuitive Layout

Many developers stare at a blank dashboard screen and don’t know where to begin. Or they rush into the job without thinking at all. It’s safe to say that most need guidance about where to place various components, including metrics, charts, filters, tabs, help text, and other controls, on a dashboard screen to optimize the visual design.

Templates. Although there are no definitive rules, one place to start is to examine designs used by well-known, information-rich Web sites visited by millions of people, such as Yahoo, Amazon, and others. These sites have been scrutinized by Web site designers and redesigned numerous times to optimize usage and navigation. Although Few disagrees that Web site templates make good dashboard designs, imitating such templates gives users a familiar look and feel and ensures that they know how to navigate your dashboard. For example, Arizona State University patterns its dashboards after common Web site templates. (See Exhibit 12.1.)

EXHIBIT 12.1 Web Templates

Courtesy of Arizone State University.

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Predefined Layouts. Some dashboard products use a Web publishing metaphor that lets users drag and drop components anywhere on the screen. Although this method offers tremendous flexibility, it can be overwhelming without a template to follow. Some dashboard products provide templates that offer predefined combination of panes, such as 2 × 2 or 3 × 4. Although these can accelerate deployment, they may also limit your ability to match the design to user needs, so employ them with caution.

Position and Placement. The way objects are positioned on a dashboard display tells a story and communicates meaning. For example, elements in the top left quadrant receive the most attention, followed by the upper right and lower left quadrants. The bottom right quadrant gets the least attention.

Therefore, designers place elements that deserve the greatest prominence in the upper left quadrant, followed by less prominent information in the other quadrants. Sometimes designers use arrows to step people from one section of the display to another if there is a logical sequence or flow to the data. Or they number elements to indicate a visual flow.

The center of a dashboard can also serve as a major focal point, especially when a graphic placed there is set apart visually from what surrounds it using a border or white space. However, few designers place objects in the middle of a dashboard because this makes the remaining space too narrow to display other items.

Groupings and Flows. Designers also group like elements together 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 items. When designers cannot place items together, they use hues, shapes, or fonts to link related elements on the page.

Arrange Components Intelligently

Besides panes and charts, a performance dashboard contains other components that need to be arranged on the screen in an optimal fashion: tabs, filters, help menus, and bread crumbs.

Tabs. Folder tabs at the top of dashboard are an appropriate way to differentiate content based on a user’s role. Since most users wear many hats in an organization, they need quick access to multiple dashboards, each representing a different role they play. Tabs group functional content that belongs together, enabling users to switch quickly between roles instead of having to scroll through a hierarchical folder structure to launch a new dashboard or report.

Tabs also make it easy for dashboard architects to build a dashboard once and deploy it many times. Each dashboard is simply a role-based view of the same content running on the same platform. This method saves time and money compared to creating a new dashboard each time a user or group requests one.

However, users should not be shown tabs that don’t pertain to their role. For example, a poorly designed dashboard might show tabs for sales, marketing, maintenance, and flights—functions that a single person is unlikely to be responsible for. This clutters the display and tempts users to waste time. A good dashboard platform enables an administrator to select the appropriate tabs to display to each user or group.

Filters. Filters enable users to change data in a chart by refining a query against a set of data. They represent the most basic form of dashboard interactivity. Filters let users drill down a hierarchy to view more detail, drill up to view aggregated data, or drill across to view different dimensions (e.g., sales by product versus sales by region). When a user applies a filter, every graphic associated with the filter refreshes with new data.

A classic design mistake is to place filters (or other controls) in an ambiguous location on the screen. The problem arises because filters can apply to every chart on a page, a selected group of charts, or an individual chart. Without proper visual cues, viewers can’t discern to which charts a filter applies.

Typically, universal filters are placed in close proximity to their associated charts, which should be grouped together and enclosed by a light border. Filters for individual charts usually are placed above the object—sometimes in a chart-specific toolbar—so it’s obvious that the filter applies to that chart alone.

A visual analysis tool may have dozens of universal filters for each page in the dashboard. By selecting and deselecting filters, users can rapidly explore data from different perspectives. To facilitate such exploration, these filters should always be visible and activated with a single click. The best way to display these types of universal filters is in a navigation band, usually on the right- or left-hand columns of the dashboard screen.

Filters can be controlled by radio buttons, check boxes, or drop-down lists. Radio buttons are used when viewers can select only one filter at a time, whereas check boxes and drop-down lists enable users to select multiple filters at once. Drop-down lists hide filters behind an icon and are more compact than check boxes but harder for users to manipulate. Users usually must hold down the control key to select multiple items in a drop-down list.

Bread Crumbs. Bread crumbs enable viewers to keep track of where they are and where they’ve been while navigating a multilayered dashboard environment. Essentially, bread crumbs document the filters users have applied to a chart or page of charts and the pages they’ve viewed. Ideally, the items in a bread crumb list are active, making it easy for users to return to a previous view.

Text. Text can be a valuable addition to a performance dashboard. Sometimes text is the only way to communicate important information, such as top 10 customers, bottom 10 products, projects at risk, or highest-performing salespeople. Text also works when it is dynamically linked to metrics in the form of annotations. In other words, users attach comments to a metric to explain its performance, forecast the future, or outline action steps to rectify a problem.

However, static text simply takes up space. For example, some dashboard designers feel compelled to add help text to a dashboard. This is a mistake. Once users figure out how to use the dashboard, they will never need to look again at the text, which just clutters the screen. A better choice would be to create a help button that users can click if they need more information.

At a bare minimum, you need to add text to dashboards to create tabs, headings, filters, and numeric values in tables and charts. Scorecards often use text in strategy maps, gap analyses, initiative descriptions, and performance summaries.

Fonts. Selecting the right fonts for different elements is important. You should pick a font that is easy to read—such as Times New Roman, Arial, Tahoma, or Helvetica—and avoid ones that are overly fancy or unusual. Use one font throughout the dashboard, varying font size where needed. A standard font size for reading is 12 point for Times New Roman and 10 point for Arial, which work well in dashboards.

Use a bigger font size for tabs and section headings and a smaller font size for supplementary information, such as legends or footnotes. Chart and table headings should be the same size as the main text but highlighted in bold. Axis labels and row/column headings in large charts or tables also benefit from bold highlighting. If desired, use a complementary font for headings. For instance, many designers use a serif font (e.g., Times New Roman) for the main text and a sans serif font (e.g., Arial or Helvetica) for headers.

Deemphasize Design Elements

A classic mistake that developers make is to focus on the dashboard design rather than the data itself. Just because developers can create frames, borders, backgrounds, and shading doesn’t mean that they should. These background graphics can compete with real data for attention.

For example, look at a vendor’s demo dashboard in Exhibit 12.2. Thankfully, this is not a real dashboard because it breaks all the rules in this chapter, plus many others. The dashboard has three shades of background color: one for the dashboard, another for the tabs, and another for the charts. The ostensible purpose of this background shading is to differentiate the four panes and charts within them.

EXHIBIT 12.2 Poorly Designed Dashboard

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White Space. However, a more expertly designed dashboard doesn’t resort to background shading to differentiate panes or charts. (See Exhibit 12.3.) In fact, it doesn’t use any shading at all, which is merely distracting. Instead, it makes clever use of white space to differentiate its three panes (i.e., “key figures,” “top/worst 10,” and “revenues per sales channel %”). The white space between the panes is slightly greater than the white space between individual metrics within each pane. Visually, we perceive the difference at a subconscious level, and we automatically group items based on the variation in white space that separates them.

Gestalt. The use of white space to group items is an example of the Gestalt principle of proximity. About two dozen Gestalt principles of perception describe visual characteristics that cause people to group objects together. The principles are based on psychological research conducted in Germany during the early 1900s. It would be wise to explore all the Gestalt principles before designing a dashboard. (See Exhibit 12.4.)

EXHIBIT 12.3 Well-Designed Airline Dashboard

Courtesy of Andreas Lipphardt. This dashboard was built using BonaVista MicroCharts.

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Muted Lines. The well-designed airline dashboard (see Exhibit 12.3) jams almost 50 KPIs (each of which consists of multiple metrics) onto a single page. Yet it is very legible. An executive can quickly rifle through each of the KPIs without getting bogged down or visually misplacing adjacent metrics. The dashboard accomplishes this through the use of muted, dashed lines to separate each metric. You can imagine how different the user experience would be if the designer had used bold, continuous lines to separate the KPIs. It would not work nearly as well. Muted lines also work well inside charts or graphics to separate elements that would be hard to differentiate otherwise, as we’ll see shortly.

Colors. In the spirit of less is more, you should avoid using color except to highlight things that viewers need to see, such as a subpar KPI. If you do use colors, Few recommends using muted earth tones rather than primary colors. To emphasize a single element, don’t change the color, just shift the saturation or brightness, which is enough to distinguish the object from the rest. Increase the brightness of elements that should jump out at users and decrease the brightness or eliminate color altogether for all other elements. (See Exhibit 12.8 for an example.)

EXHIBIT 12.4 Gestalt Principle of Proximity

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EXHIBIT 12.5 Color-Blind-Friendly Graphic

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It’s also important to remember that 8 percent of men and 2 percent of women are color blind; thus, using color exclusively to communicate meaning will backfire for a small minority of users. To compensate, many dashboard designers complement colors with symbols or use pop-ups that display text when a user hovers a cursor over the dashboard object. (See Exhibit 12.5.)

Leverage Dashboard Themes

These guidelines are a lot to remember, and they are only the tip of the iceberg. Ideally, dashboard vendors should bake these guidelines into their products in the form of themes and templates that you can adapt to meet your company’s branding and preferences.

A good theme will select a palette of complementary colors, fonts, lines, and other elements that are applied automatically when objects are inserted into the dashboard. A good template will help position objects on the screen to ensure proper flow and balance the twin demands of sparsity and density.

When evaluating dashboard products check whether they offer themes and templates and evaluate whether any resemble your company’s look and feel or can be adapted to your needs. Vendors’ design IQ is rapidly increasing; there is no reason that you should suffer with a product that provides minimal design guidance.

Guidelines for Designing Charts

Many of the principles described for designing a dashboard apply to designing charts or graphs. The key is to focus on the data, not the chart. Make sure the graph communicates the key message in the data and doesn’t obscure it. Few writes, “Graphs give shape to numbers, and in doing so, bring to light patterns that would otherwise remain undetected.”4

Less Is More

I create a lot of charts for research reports, and long ago, I discovered that the default chart templates in Excel are just plain ugly. They incorporate too many elements that occlude the meaning of the data I’m trying to communicate. I now use a custom template that strips most of the offending clutter from a standard Excel chart.

Exhibit 12.6 shows two Excel charts that display the same data but use different chart types and effects. The second is cleaner and easier to read. That’s because I stripped out the gridlines, shading, borders, legend, and scale that appear in the first chart. I also rotated the second chart so the bars run horizontally, enabling viewers to read category text from left to right instead of diagonally from bottom to top, which is awkward.

In addition, I reordered the bars so that the longest one is at the top and the shortest at the bottom. (However, if the chart used an ordinal scale with an implicit order, such as January-February-March or highest to lowest, I would have not changed the order of the bars.) Finally, I added one element to the chart: data labels for each bar. I prefer these over a quantitative scale because many people want to know exact data values and don’t want to estimate the numbers visually.

The principle depicted in the “Before” and “After” charts is simple: Less is more. Don’t let the chart itself overwhelm the data it’s trying to communicate. Strip out unnecessary elements; avoid graphics that look like their real-life counterparts; and don’t use three-dimensional charts. Decorating a chart takes up valuable real estate and distracts the eye.

EXHIBIT 12.6 Before and After

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Make Comparisons Easy

Charts make it easy for people to visually compare things, such as sales across regions or profits over time. Instead of reading numbers one by one in a table or row and calculating their differences, a chart enables us to “see” the difference visually at a glance. We can identify relationships and patterns more quickly when data are displayed graphically instead of textually.

Eyes of the Beholder. Of course, the chart designer must understand the underlying patterns in the data and what information matters most to viewers. With this knowledge, the designer can select the proper dimensions for axes in a chart or table. For example, if managers want to compare product sales by region, which of the two charts in Exhibit 12.7 best meets their need?

The charts contain the same data but are arranged to communicate different messages. The first chart is ideal for regional managers who want to see sales in their region and compare their performance to other regions. The second chart is ideal for a product manager who wants to see product sales across regions to understand which products sell best where. Designers enable these quick comparisons by placing data in the appropriate axes (including the legend) based on what users need to see. Given the wrong chart, managers would have to work twice as hard to glean the same information even though each chart contains identical data.

EXHIBIT 12.7 Comparing Comparisons

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Side by Side. To communicate comparisons clearly, it is best to place numbers or items side by side rather than far apart. This enables the viewer to consume the information in a single visual gulp rather than having to look back and forth across the page to make the same comparison. Charts that require less eye movement are easier to consume.

Scalar Proportions. It’s also important to ensure that charts portray relationships between variables correctly. This means designers must pay attention to the quantitative scales that they use. For instance, one outlier can wreck the visual relationships in a bar chart, such as when sales for every product range between $10,000 and $25,000 but one exceeds $500,000. In this case, the chart’s scale would be so big that it would obscure the relationship between all products except the outlier.

In another case, if variables have similarly high values, designers may be tempted to create a bar chart whose scale begins at an arbitrary high number so the relationships among bars is more obvious. Although is an admirable gesture, it can create a visual mismatch in which the proportional length of the bars is different from the actual numeric relationship between the items. For this reason, bar charts always should start at zero. (This does not apply to line charts, however.)

Use Preattentive Processing

Preattentive processing is visual perception that occurs below the level of consciousness. It detects specific visual attributes at rapid speed. Dashboard designers can leverage these attributes to highlight critical data values and relationships that viewers should notice when glancing at a dashboard or chart.

EXHIBIT 12.8 Attributes of Preattentive Processing

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Exhibit 12.8 shows nine visual attributes that dashboard designers can exploit to make things jump off the dashboard page and immediately get the attention of viewers: shape, size, saturation, enclosure, markings, color, line width, orientation, and position. You can see quickly how each attribute makes a single element stand out from the rest.

For example, color is a common technique for highlighting poor performance in a KPI. Rather than creating a stoplight image, dashboard designers merely need to place a red dot next to a subpar KPI. Or they can use saturation to highlight a single bar among many in a bar chart that they want users to focus on. (See Exhibit 12.9.)

Predefine Drill Paths and Interactivity

Drill Paths. A chart should enable viewers to drill down effortlessly to see detailed data. It is best to predefine drill paths that users need and bake them into the system. Ideally, users only see drill paths that are pertinent to their role and aren’t overwhelmed with too many options.

However, some users eventually will feel constrained by predefined navigation paths and request more latitude to explore data. When this happens, administrators should activate a right-click feature that exposes additional navigation options for these individuals only.

Functions. In the same way, some individuals may desire additional functionality to manipulate the output of charts and tables. Administrators should be able to turn on chart-specific toolbars that expose new functions to these users, such as sort, calculate, annotate, export, and switch between chart types, among other things.

EXHIBIT 12.9 Use of Preattentive Processing

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Be careful not to expose too much functionality too quickly to a general audience. Users can be so distracted by icons and overwhelmed by options that they stop using the tool. Think how popular Google has become by exposing a single function on its home page—keyword search—even though it has close to 100 applications to offer. Less is more.

Drill Actions. Software vendors have yet to devise a standard way to perform drill-downs, and many techniques employed today are not intuitive. Some dashboard products require users to right click to view a dialogue box—an awkward movement for most casual users. Others require viewers to click on one or more drop-down boxes to specify the parameters and then click a “go” button. Although power users like having multiple drill paths and parameters, casual users do not.

The ideal way for users to drill down is by left clicking on the actual metric name, alert, bar, or other attribute that catches their attention. They click once to view a new table or chart populated with data. They can click again to drill down even farther. Once they become familiar with the navigation metaphor and desire more interactivity, administrators can activate right-click options.

Choose the Right Graph

Graphs come in many shapes and sizes. Selecting the right graph type makes a big difference in your ability to communicate the meaning of the data. The brief descriptions on Exhibit 12.10 should help you better discern when to use which type of graph.

EXHIBIT 12.10 Graph Selections

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Summary

Dashboard design is not about making something visually pleasing or pretty; it’s about communicating the meaning of the data. Too often, however, the visual design of dashboards obscures the meaning of the data in them.

Good dashboard design uses the least amount of ink to highlight key trends or relationships within the data. It leverages Gestalt principles of perception, preattentive processing, and other visual techniques to group, highlight, or sequence what’s interesting in the data and minimize the rest. It selects the right graphs to monitor performance, examine relationships, or interactively explore the data.

Wise dashboard developers get training in the basics of designing visual displays of quantitative information and team up with experts to fine-tune dashboard prototypes before getting user feedback. They also leverage usability labs—whether homemade or professionally managed—to get vital clues on the effectiveness of their dashboard designs.