CHAPTER 1

Introduction
“I see what you mean.” We understand and interpret the world through our sense of vision. If we hope to share understanding in large organizations, we have to find ways to communicate a consistent, coherent message to hundreds or even thousands of individuals across large distances, time zones, and even cultures. The fastest and most effective way to do this is through the presentation of data-driven insights displayed as graphs, tables, maps, simple statements, and patterned visuals. Business intelligence dashboards and reports are exactly this—attempts at visual communication. If we are to communicate effectively, however, we must pay close attention to the visuals we present to each other.

About Oracle Business Intelligence 11g

Oracle Business Intelligence 11g is one of the most capable and comprehensive business intelligence platforms in the marketplace. The average user size for an OBI 11g implementation is more than 2,000 users. These are very large, very complex implementations. Building an OBIEE implementation is much like constructing a 40-story office building for several thousand employees. Many of the tools, techniques, and data structures are necessarily geared to a very large scale. In contrast, many smaller business intelligence systems operate at a decidedly smaller scale. This is particularly important to the discussion of data visualization, or, if you prefer, design. The approach one takes to designing a functional modern skyscraper and making it “beautiful” is somewhat different in terms of the materials, tools, and techniques that are used when contrasted with designing a modern house and making it beautiful. Much of the “beauty” that lies in a modern office building exists in the functional environment of moving people physically through the structure and providing them expected services (such as plumbing, heat, air, light, and so on). There is a fundamental difference between designing something practical that is expected to be used simultaneously by thousands of people and designing something customized for a single family.

Business Intelligence System Goals

One of the most important attributes of a large enterprise business intelligence system is its ability to drive a common understanding of an organization’s business situation. This situation can be characterized differently. We often organize analysis in three ways:

- **Position analysis** looks at the “state” of the organization at a point in time. You can think of it as a “snapshot.” That snapshot can use a “wide-angle” lens and capture a very broad landscape from great distances or heights, or it can be highly focused and extremely detailed.
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- **Performance analysis** characterizes what has happened over a period of time, with specific attention paid to the end position. This typically involves summaries and “slices and dices” of categorized information.

- **Flow analysis** evaluates a particular type of data or account and how additions and subtractions to it change over a period of time. Although most people are familiar with (or have heard of) cash flow, there are several other types of flow, such as inventory flow, customer flow, data flow, and so on.

There are almost always multiple ways to visualize data, just as there are multiple ways to characterize analysis. There is not a “defined hierarchy” of value in which we can say “this is better than that, which is better than the other.” There are always multiple perspectives and methodologies, and they all have both advantages and disadvantages.

**NOTE**

*We will stay focused on the topic of data visualization and not address the inner workings of OBIEE software and the complexities of its environment. For instruction on how the software works, several excellent titles on Oracle Business Intelligence are available—in particular the Oracle Press book Oracle Business Intelligence 11g Developers Guide by Mark Rittman.*

Understanding visual perception and the representation of quantitative information is a life-long study, and far more content has been collected on these subjects than can be presented in this book. Reports, dashboards, and interactive BI displays all share the same issues of the most optimal way to present information so that it informs users and supports decision making. The need has never been greater to translate vast amounts of data into information that provides evidence for choices between alternative actions and promotes a shared understanding of business situations and situational dynamics.

This brief overview highlights three key concepts:

- BI reports and dashboards should be viewed primarily as communication devices, and both the principles of human cognition and the needs of the individual user should help guide their proper use.

- BI reports and dashboards are used either in the exploration of data or in the explanation of data.

- It’s much easier to misuse BI tools than to use them well.
Humans Evolved to Sense the World, Not to “Do Numbers”

Computers are very powerful tools for manipulating large sets of data and performing all kinds of mathematical operations, including aggregation, division, correlation, regression, K-means attribute clustering, and Markov Logic Network construction. However, it turns out that as human beings, we’re not terribly good at seeing objects and translating them into numbers. Indeed, once there are more than about seven of something, we have a hard time counting exactly how many there are at a glance, and we settle for knowing that there are “a whole bunch.”

We’re even worse at visualizing basic mathematical operations such as addition, multiplication, and division. Visualizing complex mathematics takes a tremendous amount of time and practice, and like juggling while riding a unicycle, the average person can’t do it easily. We humans are good, however, at other things, such as finding patterns in raw visual data and constructing three-dimensional schemas; we dynamically interpret colors and light levels and the size and angle relationship of lines. We’re good at understanding moving objects and motion in general; we’re good at navigating landscapes; we’re superb at recognizing patterns. In fact, we’re so good at recognizing patterns that we insist on seeing them even when they’re not there, and we often refuse to acknowledge a new pattern that violates an existing pattern. Our brains are optimized for helping us survive in the wild, but not for deciphering BI dashboards and reports.

We all know that BI systems provide value to organizations only when they are used. Calvin Mooers coined his famous Mooers’ Law and its corollary in 1959:

An information retrieval system will tend not to be used whenever it is more painful and troublesome for a customer to have information than for him not to have it.

Where an information retrieval system tends not to be used, a more capable information retrieval system may tend to be used even less.

This reminds us that there may be a natural resistance to using BI systems in many situations. BI systems may point out situations that managers don’t want to address. Compounding this, when BI systems poorly present or distort data, they ultimately lead to misuse, mistrust, or abandonment of the system. Proper visualizations and data presentation lead to business insights and build trust in the system. As executives and managers begin to rely on them, they improve their decision-making abilities. Effective BI interfaces also build a more coherent and consistent view of the business and its operational environment.
Basic Principles of BI Dashboards
The effective implementation of BI systems requires both knowing the basic principles of data communication and thinking critically about who is using a BI system, how they are using it, and what their needs and goals are. In his seminal work, *The Visual Display of Quantitative Information*, Edward Tufte emphasizes five key principles:

- Above all else, show the data.
- Maximize the data-ink ratio.
- Erase non-data-ink.
- Erase redundant data-ink.
- Revise and edit.

If Tufte’s advice is to be followed, only information that is absolutely necessary for the contextual understanding of the data will be depicted. The general rule for BI displays is “less is more.” Eliminate as much visual clutter as possible and let the data present itself as simply as possible. Drop shadows, 3-D effects, and extra graphic elements should be avoided because they draw attention away from the data. The purpose of business intelligence systems is to relate a clear message about data that is easily understood and interpreted consistently across the highest percentage of users. It is not about entertainment or visual interest for the sake of decoration. Designers of business intelligence reports, graphs, and dashboards should approach data visualization the way Strunk and White approached writing in *The Elements of Style*, by stating their case with “cleanliness, accuracy, and brevity.”

Many of the built-in data-visualization tools such as graphs suffered as computers became more powerful and additional “visual effects” were added—not for the sake of communicating a message more effectively, but rather for the sake of “eye candy” or simply because the effects had become possible. Software designers forget that data visualization is a representation or a visual metaphor, and the emphasis should be on making it as easy as possible for people to interpret and understand the information consistently and accurately. Instead, they get sidetracked by trying to represent physical objects, by replicating cockpits and physical dashboards designed for very different purposes, such as flying a plane, and by adding unnecessary design elements unrelated to analytic communication needs. The best example of this is the use of three-dimensional renderings of pie charts, bar graphs, and line graphs. Three-dimensional renderings do not add any quantitative content that is not present in two-dimensional renderings, and they misrepresent and distort values in order to add the illusion of depth. Software designers contribute to this problem by showcasing new features in a product that implementers then copy in an attempt to appear “fresh” or “cool.”
Two books in particular offer clear and accessible information on human cognition and visual processing: Visual Intelligence: How We Create What We See, by Donald Hoffman, and Information Visualization: Perception for Design, by Colin Ware. These works provide the scientific justification for the summary statements in this book.

Every schoolchild is exposed to optical illusions and understands that magicians trick us. However, adults (particularly in large organizations) sometime forget that the presentation of information must be designed carefully according to the way it is perceived. This involvement in and active guidance of the visualization process is sometimes less than ideal. Too many people will simply accept the system defaults set at the time of installation, but these are seldom reflective of fundamental data visualization best practices. Of course, this does beg the question of whether an organization should set system defaults and establish an organizational style guide so that those who are less inclined to edit and improve the presentation or who are simply in a hurry do not produce poor results. This important topic is addressed more fully in Chapter 12.

BI Systems Need Training

BI implementations typically require tremendous time and money, but also offer the potential for significant returns in comparison with the investment in developing and deploying the system. Just as most developers benefit tremendously from training, not only in the functional aspects of software systems (“this button does that”) but also in basic system architecture strategy and data flows, users become far more effective in reading and understanding a BI system when they are shown both the basics of “how” and “why.”

Most executives and managers have not had training in visualizing data, and many may also have not had training in analysis techniques and are therefore unlikely to do either properly by chance. The most successful BI implementations “finish the project” by including a training budget that is not spent within a compressed amount of time at the end of implementation when everyone is exhausted. Rather, a relatively modest portion of the total project budget should be allocated to training and workshops and should be spread over the first year of implementation. A series of classes on visualization and data analysis with executive users in combination with follow-up sessions (often one-on-one with highly placed executives) reinforce the information and ensure that the BI system is fully leveraged by the organization. What people can learn in initial training is limited because they can absorb only so much information at a time, so these follow-up sessions allow those who will rely on the BI system to expand their use of it more completely. As they gain experience, they are able to learn more and leverage the tools in a more sophisticated and complete manner.
Dashboard Best Practices
What is the most important part of your dashboard? If you want to draw attention to certain areas of your dashboard, you need to know what draws the eye. The three most powerful ways to draw attention are motion, color, and alignment/position.

Motion Demands Attention and Cannot Be Ignored
Motion draws the human eye more effectively than size, shape, color, pattern, or any other visual characteristic. It is now possible in many dashboard systems to embed scrolling messages and incorporate moving displays of data. These displays will command attention, and if the user requires constant monitoring of changing data, such displays can be extremely effective. However, these displays can also be extremely annoying. Using motion can be distracting and often calls attention away from other important features of the dashboard interface. Make certain that motion is used sparingly so that the dashboard doesn’t become distracting and annoying to the user community.

Color Is Powerful
Color is a powerful visual clue and should be used consciously and sparingly. Colors will stand out immediately against a plain background but can easily be missed when bright and overly garish colors dominate the screen. The overreliance on bright colors is a major drawback of many BI dashboards and reports. Bright colors should only be used in exceptional situations to call attention to unusual circumstances.

Keep in mind that approximately 10 percent of men and 1 to 2 percent of women have some form of color blindness. Red/green is the most common form of color blindness. Therefore, designs requiring the distinction between red and green are best avoided for general use. Also, the more color is used, the less effective it is. Soft, muted colors are recommended for the vast majority of visualizations. The online tool ColorBrewer 2.0 (colorbrewer2.org) offers several selections of color palettes that are professionally designed. Although ColorBrewer was designed with map interfaces in mind, its color palettes are also good for most dashboard designs. See Chapter 11 for more information about color choices.

Alignment and Position
Humans are relatively good at comparing and seeing alignment (or lack thereof), which is why we’re so quick to understand and interpret basic bar graphs. People can immediately see fine distinctions between adjacent bars and whether they’re higher or lower. We tend to form patterns so that we see “wholes” before we see
“parts.” Most people using business dashboards read from left to right and from top to bottom, so choosing where you place things and how you organize your overall layout is very important.

As good as we are at seeing alignment, we’re actually not so good at judging relative sizes. If you want people to see that something is bigger than something else, it has to be significantly bigger. Size can indicate importance on dashboards, but only in the sense that “this is excessively, unusually large so that you’ll look at it.”

A Little Bit about Tables

When precise values are required, it’s generally better to show numbers in text rather than as a graph or some other complex visualization. Eliminate grid lines in tables or render them in a light gray. Basic tables are best used for data lookup, not for data comparison. Other visualizations, including charts and graphs, are useful in comparisons and pattern recognition.

Most tables can be immediately improved through the removal of unnecessary gridlines. When tables were hand-drawn, gridlines enabled people to keep their columns and rows straight. If tables are properly designed, gridlines are generally unnecessary. Place related information in close proximity and provide space between unrelated data. This will help the user understand the layout of tables more than trying to separate information through the use of lines. It can also be effective to use highly contrasted display styles with different tables to help differentiate between various data sets. One of the real strengths of OBIEE is its ability to combine data from different sources for simultaneous presentation. One of the most basic methods for communicating “hey, we want you to see these data sets at the same time, but you should be aware that they are different” is to use different formatting and styles for them. Of course, this only works if you are otherwise consistent in your use of formatting and styles. Differences should always be a conscious choice to communicate to the audience, not a result of haphazard development or design.

Although massive tables can be displayed, requiring users to scroll excessively should be avoided. If scrolling is unavoidable, make sure the titles and headers are locked so that users can immediately see what an entry is associated with. Many tables suffer from the display of too much detail. Particularly for budgets and forecasts, where future values are estimates, excessive detail not only clutters the interface, it implies a level of precision that does not exist.

Conditional formatting asks the system to apply a format such as a background color to a table cell based on the results. This can vastly improve the user’s ability to recognize a significant value because color draws the eye very effectively. However, a screen of blaring colors does little to impart meaning. The sparing use of soft colors can more easily attract attention to a particular value than can a screen of
bright colors. Conditional formatting is especially powerful for data exploration when users are looking for anomalies or for patterns in the data. Regular reports can often be improved by removing colors that do not highlight extraordinary information or are not communicating a pattern directly (as they are in “heat map” styled tables). It is best to avoid putting any text in color because colored text is more difficult to read.

We often see dashboards with a large selection of prompts where users can assemble very large tables containing dozens if not hundreds of columns. Although the desire for some executives and managers to “have everything” available for inclusion on a dashboard is understandable, organizations should not encourage these “one table to rule them all” strategies. Every element (table, graph, text, icon, and so on) that is placed on a business intelligence dashboard should have a primary purpose and then be designed to best accomplish that purpose. Broadly speaking, dashboard prompts and selection mechanisms should not function as unlimited query design tools. Users who want to perform ad hoc analysis on large, complex data sets should generally use OBIEE’s “Analyses” interface (also known as “Answers”) and learn how to appropriately filter and form their queries. Of course, exceptions can typically be made for highly placed executives who lack an interest in learning how to create and edit their own analyses but still possess a strong desire to define large tables of numbers.

Chapter 2 covers these points in greater depth and gives other tips specifically on using tables.

**Background Thoughts on Graphs**

When we design a graph, we have to carefully think about what it is we want to convey. Thoughtful consideration of choices between alternatives is the key to designing effective graphs. All graphs have a primary message or purpose. Sometimes that message is determined in advance, and the graph is designed to communicate that primary message to a broad audience. Sometimes graphs do not have a predetermined message, but rather are designed to uncover or reveal patterns and relationships in data there were previously unknown. It should be noted that data analysis and perception are individual activities, like reading a book, and are not a shared experience such as attending a concert. Although some may argue that the search for new insights is the primary purpose of business intelligence systems, for many large organizations the primary value of business intelligence systems lies in the creation of a shared understanding of business situations and dynamics and fostering a sense of strategic coherence often is difficult if not impossible without a shared foundational view of organizational data. These shared and common presentations of business information should be designed to present an objective, agnostic view of business situations.
A carefully designed visual presentation of a major point does not mean the view is distorted or biased. To the contrary, visualizations have to be designed carefully in order to avoid bias, distortion, and confusion arising from inconsistent interpretations. Indeed, the worst kinds of distortions are those unintentional or unconscious ones that arise because of a lack of care in the design process. Just as someone needs skill and practice to prepare excellent-quality meals, conscious decisions regarding details are necessary to prepare excellent data visualizations. Although it’s possible to get lucky and fix something tasty for a big crowd without much prep, making carefully considered decisions each step of the way greatly increases the chance for success.

Data Visualization Graph Views

There are four common data visualization graph views:

- **Line graphs**  Line graphs are best used to depict a pattern over a continuous range (such as time). Unlike bar graphs, line graphs can be valued within a range to highlight more granular detail without distorting the meaning of the chart. Any time a different data range is used, it should clearly marked. Line graphs should maintain a rectangular shape (roughly according to the Golden Proportion, or approximately 5:8). If the graph is excessively tall and
narrow, the data will show an excessive amount of change. If the graph is short and wide, the change will be minimized.

- **Bar graphs**  Bar graphs depict the value of nominal data. Bar graphs should start with zero and use a clear scale. Bar graphs are often used for comparison of the value of data items in a group with one another. Bars should be depicted as two-dimensional objects.

- **Pie graphs**  Pie graphs are used for the comparison of the size of individual data items in a set with the size of the whole set (most typically as percentages totaling 100 percent). Pie graphs are not effective when too many items are included (more than seven or eight) and are best used for approximate relationships. Data visualization guru Stephen Few recommends avoiding the use of pie charts altogether. Pie graphs should never be depicted as three-dimensional objects, because the relative size of the pieces of a pie are distorted to achieve the illusion of perspective.

- **Scatter plots**  Scatter plots depict combinations of two measurements—one on the x-axis and one on the y-axis. They are most useful for visually displaying the relationship between those two measurements. Scatter plots can represent hundreds of individual data points and are useful for seeing overall patterns in the comparison of two variables.

Chapter 3 covers these points in greater depth and gives other tips specifically on using graphs.

**Map Views Communicate Effectively**

The new inclusion of map views as a native view type in OBI 11g adds greater value than almost any other addition. People intuitively recognize and know how to navigate landscapes and easily make the abstraction to geographical representations of location. Spatial representations of data make sense to most people and provide an extremely dense visualization. The interactive capabilities of maps further promote the involvement of users and offer an ideal interface for master detail linking and other interaction effects.

Chapter 4 covers these points in greater depth and gives other tips specifically on using maps.

**Dashboard Design Examples**

Let’s now look at some of those general principles in a sample dashboard. Think of this as a “sneak preview” of what lies ahead in other chapters.
Oracle’s OBIEE SampleApp
Throughout this book we will be using Oracle’s OBI SampleApp Virtual Machine as a source for information and inspiration. Most of the examples are pulled from SampleApp V406. You can download the SampleApp virtual machine at the SampleApp home page at:


The OBIEE SampleApp is a standalone VirtualBox VM for creating a comprehensive collection of examples and integrations designed to demonstrate Oracle BI capabilities and product integrations.

The Sample Dashboard Is a Good Start
Let’s look at the 11.10 Flights Delay overview dashboard page, pictured in Figure 1-1, from Oracle’s SampleApp V406. This dashboard has several attributes that make it a

![Flights Delay overview dashboard from Oracle's SampleApp V406](image-url)

**FIGURE 1-1.** The Flights Delay overview dashboard from Oracle’s SampleApp V406
significant improvement over the typical dashboard of large tables seen every day in large corporations and government agencies. After we review some of the key features of this dashboard, we’ll look at some suggested improvements and a slightly different version that should set the stage for the rest of the book.

The Flights Delay dashboard summarizes and presents publically available information regarding flight departure and arrival information for several years. Information regarding delays and their causes is also included.

The Flights Delay overview dashboard has more visuals than tables. Typically, a minimum of 60 percent of the dashboard should be composed of graph views rather than table views. The ratio of three graphs to one table is about right. The prompts are organized on the leftmost column. Placing the prompts in that position or along the top of the dashboard provides a consistent location for users to easily find them, and they do not move depending on the content presented in the dashboard (OBIEE dynamically adjusts the position of content based on the data returned).

At the top-left corner, you can see a small two-cell table and a small summary bar chart underneath it, as shown in Figure 1-2. This “contextual” information regarding the current data selections and what is being represented in the table and graph views is valuable to users. The raw numbers tell the user that out of the 6,235,242 flights in the data set, only 3,709,454 are being reported. This table is actually created via a narrative view. Small tables are typically more useful than large tables. One of the most common data visualization “mistakes” is an overreliance on big tables. The meaning and purpose of this table is clear, and it’s extremely effective. The small bar chart presents the same information, but allows the user to perceive at a glance how many of the flights are being represented by the current data selection. The bar chart and the table are repeated on several pages of the dashboard and offer consistent contextual information about more detailed and involved views.

**FIGURE 1-2.** Small tables and graphs are big communicators.

All four featured views are strong visualizations. The pivot table features yellow and red conditionally formatted cells calling attention to the results. The Line and Bar Combo graph utilizes an indexed measure, ensuring a normalized presentation of the number of flights for a hierarchy of airports (displayed as a slider prompt with animation). Map views are always a preferred methodology for displaying data that has a geographical component. Scatter plots (particularly when they employ background data range bars, as this one does) can show the relationship for hundreds or even thousands of individual data points across two dimensions.
Improving a Dashboard from SampleApp

Although we are in deep admiration of the Flights Delay overview dashboard, a few visualization "tweaks" can be made that can strengthen it even more (see Figure 1-3). This discussion will preview some of the topics we delve into later in this book.

Several changes are immediately apparent. The first is the placement of the map in the upper-left quadrant (1). Maps communicate data faster and more intuitively than any other visualization method. In the revised dashboard, the map is placed in the most visually dominant space on the dashboard and the pivot table is moved below it. Placing maps in the upper-left position and tables toward the bottom (and right) of dashboards is a preferred arrangement for the following reasons:

- Tables are ideal for looking up precise values and act in support of overall conclusions, which are more succinctly communicated in maps and graphs.
- Graph views show patterns and typically have a main point. Graphs better summarize a major insight than do tables and deserve a more prominent placement.
Tables and pivot tables can often be expanded both horizontally and vertically in OBIEE dashboards and affect other views below and to the left of the table.

Specifically in the map, notice that the color ramps have been changed in the revised dashboard (2). In the original, the color-fill for the region started with a dark blue for the fewest number of flights and progressed to a light blue for the highest number of flights. However, it is more intuitive to use the light blue to reflect fewer flights and the dark blue to reflect more flights. Additionally, the color ramp progression for the variable-shaped circles is changed to a “sequential” color scheme that more accurately reflects progression. (Throughout the book, Dr. Cynthia Brewer's Colorbrewer2.org website is used to specify preferred color schemes for data visualization.)

The grid lines in the pivot table have been changed to a less intrusive white color (3). (Note that grid lines can often be eliminated completely.) Also, spaces or “padding” was added to the columns (4) to help organize the data and make the table more readable. In addition, the column headers were aligned to the right for numeric columns and to the left for text columns (5). Note that the yellow and red conditional formatting (6) for cells exceeding the threshold value has been retained because the information is important and deserves to be so visually prominent. Indeed, it could be argued that the conditional formatting is more pronounced in the revised dashboard than in the original, despite the less prominent placement, simply because there is less saturated color in the revised dashboard and therefore the yellow and red cells stand out more.

The scale of the Line Bar Combo graph was changed to be exactly 100 points for the indexed value, and the scale is shown (7). Also, a scale marker was added at an index value of 50% for context purposes (8).

Explanatory text was added to the Scatter Plot graph to indicate that a Log/Log scale has been used (9). Although the relationship between the variables is more perceptible with the Log/Log scale, its use should generally be avoided for dashboards intended for a broad, general audience, and it should always be labeled specifically when it is used.

The column structure in the dashboard layout has been changed from two columns (one for prompts and one for visualizations) to three columns (10). The visualizations are organized into Flight Delay Performance by Geography and Late Flight Trends. Aligning the visualizations and separating the columns with a light rule better organizes the dashboard and makes it easier to see the relationships between the visualizations. There are other slight “tweaks” that have been made, and there is no doubt that plenty of reasonable edits remain.

Tradeoffs are always involved in making choices when you’re designing visualizations and dashboards. One of the key decisions that must be made is to determine how much time will be invested in editing and tweaking visualizations.
and dashboards. The cost in terms of time must be balanced against the return of better understanding and improved consistency in interpretation. This is covered in more depth in Chapter 7. However, many organizations are often too quick to accept the default settings and therefore suffer from having less optimal visualizations for years.

Where the World of Business Intelligence Data Visualization Is Headed

Many of the latest trends for data visualization overall, and for Oracle specifically, mirror the discussion in the earlier part of this chapter. Two trends in particular are the use of a cleaner look and the adoption of a common “grammar of graphics” methodology.

There is a strong movement toward a “cleaner” interface with fewer visual gimmicks and extraneous graphics. As of the writing of this chapter, Oracle’s latest “skin” release is called Skyros (named after the Greek island). Here is a quote from the Skyros release document:

“Skyros…embodies a fresh, lighter weight and cleaner appearance…. Specific design changes includes a focus on current UI visual design trends, such as a flatter, cleaner display. It uses light and/or white color themes, with a few touches of well-placed color. In addition reduced use of gradients and borders replaces background images, enhancing the lighter weight feel.”

This fits extremely well with a strategy of deemphasizing the use of gradients, 3-D effects, and bright colors in data visualization graphs. The sparing use of color will make its placement more important and more effective in drawing the eye and highlighting important evidence and database insights. Even Apple Computers, long held in high esteem for their sense of design, is abandoning their preference for the graphic representation of real-life items (called “skeuomorphism”) in favor of a flatter, cleaner look. This is likely a long-term trend that will continue to see the emphasis placed on the accurate visual representation of data along with a de-emphasis on visual decoration and embellishment. One might say that as business intelligence systems have grown in size and scale, we are moving toward a “Miesian” aesthetic, where less is more and clean lines and balance are more treasured than garish flourishes and screams for attention. You can see this Skyros style reflected in Figure 1-4.

The second major trend is movement toward a “grammar of graphics” approach to data visualization. We are already seeing some fantastic extensions of OBIEE with JavaScript, D3, R (ggplot2 package), and other “open” scripting languages. The primary paradigm is to define objects and attach attributes to them, which includes
FIGURE 1-4. Screenshot from Oracle’s press release announcing their new “Skyros” CSS, which has a cleaner look than the older “FusionFX” style.
the maturation of web interfaces toward HTML5 and away from Flash. This approach deals with graphics more as combinations of components (and structures). You can think of this as “data poetry,” where structure and syntax (in short, “composition”) all become essential elements of a thoughtful communication. Just as the patterns and “rules” of grammar guide how we formulate sentences and combine and organize them to form larger works, the patterns and rules of graphics guide the formulation of graphs and visualizations. This is addressed more in Chapter 5. A finer integration of “grammar of graphics” style methods can be anticipated in future releases of OBIEE.

Summary
Editing and improving business intelligence visualizations and dashboards takes a certain amount of time and effort. We should be guided not by “taste” or opinion, but rather by understanding the fundamentals of human visual perception and cognition. Our job is to present data accurately and clearly. We must understand that visualizations, which are presented as communications to broad audiences to explain certain business situations, are different from exploratory dashboards, which are designed to reveal previously unknown results to an individual. There is a great emphasis in many data visualization circles on “discovery,” and several parts of this book are dedicated to this subject. However, there is also a need to leverage the power of business intelligence systems and dashboards to communicate a shared, coherent understanding of business information across large organizations—that is, to explain organizational position and performance. Much of this book deals with the strong need to understand the implications of design choices for queries, views, and dashboards as they relate to communicating to a large, diverse audience.