Dashboard Design: Why Design is Important

By Richard Brath and Michael Peters

Effective design is crucial for dashboards. A good information design will clearly communicate key information to users and makes supporting information easily accessible.

Dashboards and visualization are cognitive tools that improve your "span of control" over a lot of business data. These tools help people visually identify trends, patterns and anomalies, reason about what they see and help guide them toward effective decisions. As such, these tools need to leverage people's visual capabilities. With the prevalence of scorecards, dashboards and other visualization tools now widely available for business users to review their data, the issue of visual information design is more important than ever.

Consider NASDAQ's unique situation. The exchange needed to communicate to the average investor what was happening in the stock market each and every day. However, as NASDAQ is a purely electronic stock exchange, there was no physical trading floor to take a television camera and no one to interview. The solution was ingenious: NASDAQ created MarketSite at Times Square in New York City, which provides a 6x20 video wall with real-time graphic displays on the current state of the market. The result: networks such as CNN and CNBC, now broadcast more than 150 stories each day from this location.

Would NASDAQ have been as successful using standard bar charts? NASDAQ's unique, clear graphics are critical for a broad audience to quickly assess the market information, thereby successfully communicating information to business professionals and consumers, and adds value to both the networks and NASDAQ's brand.

Focus on the User

Every information user whether an analyst, senior manager or knowledge worker needs access to good, clear information. Unfortunately, given the plethora of chart and graph widgets available and lack of training in graphical methods, it is possible to make ineffective displays!

Right Metrics and the Right Visuals

Consider the gauge in Figure 2, which has been a favorite of software vendors. The gauge on the bottom is clearly about profit, but on the first or second day of the quarter, profit is meaningless. Further, what is the target profit – is it $580,000 or is it $870,000?

In the top example, there are no units of measurement identified – are they days, weeks or hours? Again the target is suspicious. Zero is implied as the target, but is not realistic (all deliveries require some amount of time). In both cases, the gauge representation does not provide an explicit indication
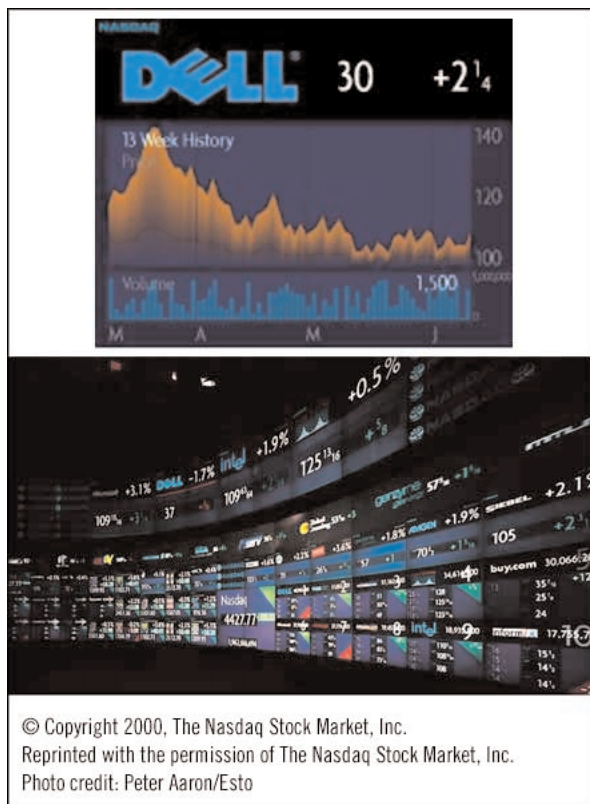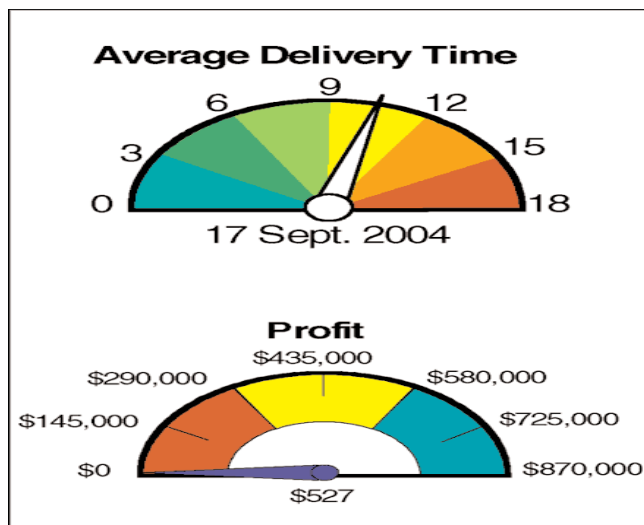
Figure 1

Figure 2

of the target measure and uses a lot of color and space to indicate very little information – a single value!!

In both the NASDAQ and gauge examples, a key element to designing an effective representation is understanding the information consumer's needs:

- What metrics do the users need to see?
- What context does each metric require to make it meaningful? (Target? Variance? Trend? Breakdown by region?)
- What is the visual representation that best communicates the metric. (Should the visual be a gauge, a table or a bar chart with a reference line? Should a pie chart or bar chart be used? What about a line chart versus a scatter plot or some entirely unique visual?)

Business Purpose

As important as the individual metric and graphic that represents it is the overall business goal of the dashboard. Is the dashboard intended to keep 50,000 staff aligned to strategic goals or is it for managing a departmental goal such as minimizing risk exposure, managing marketing campaigns, optimizing supply chains or monitoring network threats?

How do people use the dashboard. What is the action to be taken upon viewing the high-level information? Most likely, the first response to a poor number will be "Why?" In NASDAQ's case, the human news correspondent provides the story behind the number, but in a typical business case, some form of more detailed information will be required and should be easily accessible within the same interface. Consider the following visual dashboard for a risk management report shown in Figure 3.
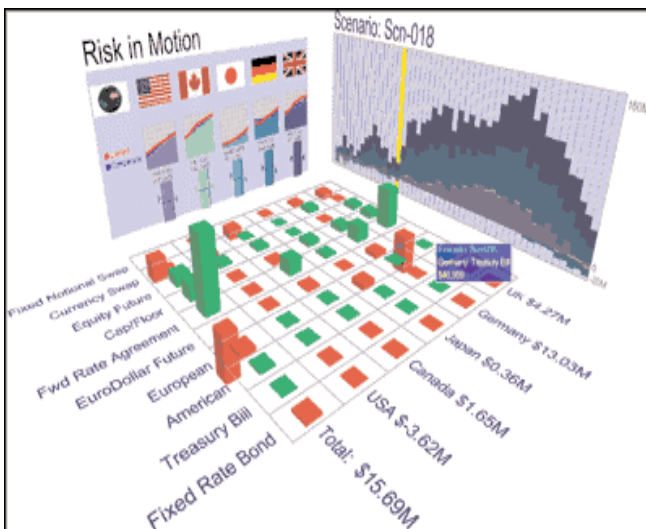

Figure 3

The right wall shows the profit and loss trend over time. The floor shows the decomposition by country and inventory category of the profit and loss. The left wall shows the causal factors (interest rates, stock market indexes, currency indexes). Simple controls enable the

viewer to step through the time sequence to see when the changes occurred and the key drivers behind the changes. The user is able to understand cause and effect, trends and correlation to key drivers thereby getting a clear picture of where we are and how we got here – all in a single, integrated view.

Thus, one key element is of design is to have a detailed understanding of user needs – both at a high level (business goals, decision requirements, workflow) and at a low level (appropriate metrics, context and visuals). Users bring insights, experience and business objectives which are the most important factor in starting to design a successful solution.

Sketches, Mockups and Prototypes

Sketches and mockups help everyone conceptualize possible solution. Whether as simple as a tabular list of metrics and indicator icons or as advanced as a 3-D visualization, sketching the proposed dashboard significantly accelerates the design process, while simultaneously reducing the risk of delivering the wrong solution. These sketches can be as simple as whiteboard drawings or PowerPoint mockups.
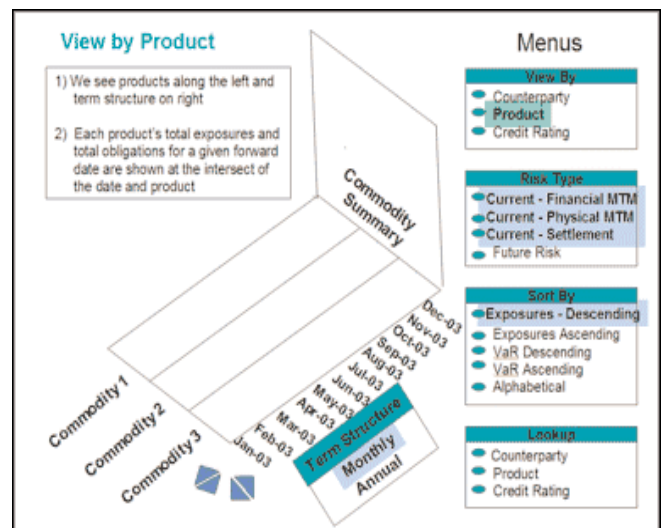

Figure 4

Figure 4 shows an example of an early mockup of the risk dashboard shown in the previous section. The drawing was created by the business users after a whiteboard session. With these simple drawings, everyone was able to articulate what they needed to see and how they would like to interact with it. As a discussion vehicle, this drawing proved invaluable:

- The business users were able to create various "walk-through" scenarios to understand if the solution would handle their various requirements;
- The technical staff were able to understand what data and infrastructure would be required for the application; and

- The overall design and project team were able to refine these ideas into a visual design and a supporting technical architecture.

Getting the right design for the visual interface is critical to success – a poor interface can have negative impact:

- A glitzy dashboard, such as the gauge examples or extruded – D pie charts, may obscure or miss key information;
- A complex dashboard, such as patchwork solution of many different technologies, may be too arduous to use to provide any value.

However, an optimal visual interface can provide value far beyond the numbers depicted in the picture. In one particular case, the right visual interface saved a $5 million technology infrastructure project that was too difficult to use.

Iterate

Consider this sequence of sketches and the final visualization for a network management monitoring dashboard as shown in Figure 5.
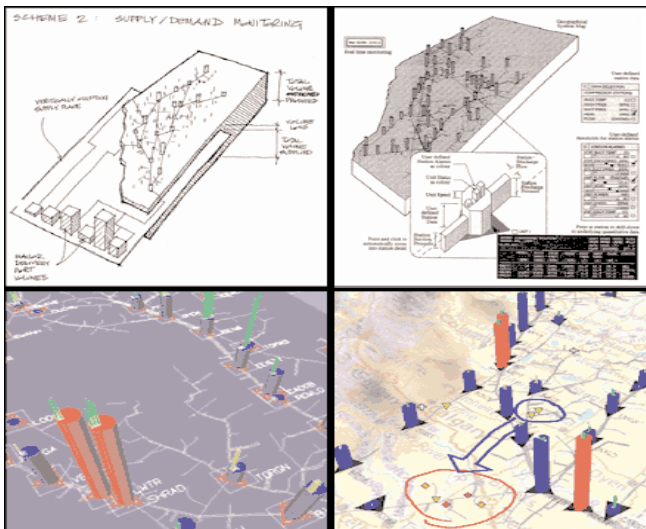

Figure 5

Over the course of various iterations of sketches and prototypes, many aspects of the design of this dashboard changed. By using the sketches and prototypes, the design process helped everyone refine their needs and requirements. For example, certain areas required more detailed information to be available at the "top" level. Additionally, it became clear that various interactive drill-down capabilities would be required as was the integration of analysis and planning tools.

Design iteration helps everyone refine vague design ideas into the best possible solution. It also engages everyone to invest in the progression of the overall solution, which results in a higher degree of success.

Creativity and Expertise

All the dashboards shown have a unique visual design. In our experience, we have created hundreds of dashboards and most are unique. It is unlikely that there is a ready-made dashboard that will fit all the needs of a complex organization or a complex system (such as ERP or CRM) each with particular insights and proprietary ways of adding business value. You can't put a Jeep's dashboard in a Mini.

The entire reason for creating the dashboard is to assemble the unique collection of metrics with the appropriate visual presentation and easy interfaces to understand and drill down to the data level required to make effective decisions. Each company has a unique culture and has unique strengths. Each has a competitive advantage that can be reflected in their unique processes and the data captured in these processes. Each department has unique expertise and capabilities.

Creativity, whether generated internally, or with the help of consultants, potentially opens up new, innovative solutions. Individuals and organizations with expertise in the design and implementation of dashboards can help: they bring depth of understanding, experience of successes and failures from previous projects, research and diversity of skill sets. If budgets are not available, do as designers and consultants do – look to examples and case studies of other projects and other successes available in print.

Effective design is crucial for dashboards. A good information design will clearly communicate key information to users and makes supporting information easily accessible. The entire business will benefit from higher performance. Understand who your user is, what they need and what their business goal is. Iterate through sketches, mockups and prototypes to explore, evaluate and narrow down prospective solutions. Use creativity and expertise, both internal and external, to get the best ideas and the right result.

For more information:
Getting the right metrics and using the right business graphic:
- Balanced Scorecard Institute (*www.bscol.com*)
- Edward Tufte: Envisioning Information (http://www.edwardtufte.com/tufte/books_ei)
- Stephen Few: Show Me the Numbers (http://www.perceptualedge.com/library.htm)

Paper Sketches and Prototypes:
* Richard Brath: Paper Landscapes (http://www.oculusinfo.com/papers/PaperLandscapesMar02-2N.pdf)

Creativity:
* Look at white papers, case studies and research papers from industry analysts and vendors. Or books on information design and information visualization (e.g., http://www.infovis.net/Library/books.htm)

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For more information on this subject, please visit the *DM Review* Business Intelligence Online Conference and Expo at www.dmreview.com/confrenceandexpo. The authors conduct a presentation on BI's Last Mile: Dashboards and Visualization.

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