JULY 2006

# Deploying Dashboards and Scorecards

By Wayne W. Eckerson

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## Table of Contents

About the Author . . . . . 2
About TDWI. . . . . 2
About TDWI's Best Practices Reports . . . . . 2
Acknowledgments. . . . . 2
Executive Summary . . . . . 3
Research Methodology. . . . . 4
Demographics . . . . . 4
Why Performance Dashboards? . . . . . 5
Convergence of Two Disciplines . . . . . 5
What Are Dashboards and Scorecards? . . . . . 6
The Three Threes . . . . . 6
What a Dashboard is NOT . . . . . 8
The Difference between Dashboards and Scorecards . . . 9
How Do You Architect Dashboards and Scorecards? . . . . . 9
Performance Dashboard Trends . . . . . 11
Best Practices in Deploying Dashboards and Scorecards . . . . 20
You Get What You Pay For . . . . . 20
Plan for the Long Haul . . . . . 20
Plan for Real Time. . . . . 21
Develop on a Single Platform. . . . . 21
Develop Effective Metrics . . . . . 22
Conclusion . . . . . 23

## About the Author

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Eckerson is the author of many in-depth reports, a columnist for several business and technology magazines, and a noted speaker and consultant. He has recently written a book titled *Performance Dashboards: Measuring, Monitoring, and Managing Your Business*, published by John Wiley & Sons in October 2005. He can be reached at weckerson@tdwi.org.

## About TDWI

TDWI™ is the premier provider of in-depth, high-quality education and research in the business intelligence (BI) and data warehousing (DW) industry. Founded in 1995, TDWI is dedicated to educating business and information technology professionals about the strategies, techniques, and tools required to successfully design, build, and maintain DW implementations. Within the community it serves, it provides a comprehensive resource for professional development and fosters knowledge sharing and the advancement of research. TDWI sponsors and promotes a worldwide Membership program, quarterly educational conferences, regional educational seminars, onsite courses, certification, solution provider partnerships, an awards program for best practices, resourceful publications, an in-depth research program, and a comprehensive Web site (www.tdwi.org).

## About TDWI's Best Practices Reports

This report series is designed to educate technical and business professionals about new and emerging BI technologies, concepts, or approaches. Research for the reports is conducted via interviews with industry experts and leading-edge user companies and a survey of BI and DW professionals.

This series is complemented by TDWI's Technology Market report series, an exclusive benefit for TDWI Members that describes a community of vendors and products in a particular technology market to aid Members in researching products and making purchasing decisions.

## Acknowledgments

TDWI would like to thank many people who contributed to this report. First, we appreciate the many users who responded to our survey, especially those who responded to our requests for phone interviews. Second, our report sponsors who diligently reviewed outlines, survey questions, and report drafts. Finally, we would like to recognize TDWI staff members and others whose work made this report possible: Xandra Green, Denelle Hanlon, Deirdre Hoffman, and Marie McFarland.

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## Executive Summary

Dashboards and scorecards resonate with business users because they conform to the way users work, rather than forcing them to conform to the way analysis and reporting tools work. These applications let users monitor the status of KPIs at a glance and alert users via pager, e-mail, or wireless devices when performance deviates from predefined targets.

Dashboards and scorecards are the most visual elements of a performance management system that merges the functionality of BI technology and performance management. Besides displaying metrics visually, these full-fledged information systems let users drill into detailed data to identify the root causes of problems and intervene while there's still time.

Dashboards and scorecards are still in their infancy. Many organizations today build their own systems, although vendors have begun to offer commercial products with robust capabilities. Today, most dashboards and scorecards support fewer than 50 users and maintain less than 50 GB of data. However, most organizations say their dashboard or scorecard implementations are enterprise in scope, pull data from 8 to 9 distinct sources, and cascade metrics down to four levels of the organization.

Many organizations report that they haven't spent a lot of money deploying a dashboard or scorecard. However, most of these "low-cost" dashboards or scorecards either leverage an existing BI and data infrastructure, or they have been bootstrapped to rapidly meet pressing business requirements. In the end, you get what you pay for: if you need to integrate complex data from multiple systems and scale the system to support hundreds or thousands of users in an automated way, then you will need to build a data infrastructure, and that is not cheap. Quickie dashboard products that demo great are tempting, but they must be thoroughly evaluated on their ability to support your organization's long-term requirements.

Dashboards and scorecards represent next-generation business intelligence because they are easy to use for a majority of business users who find traditional reporting and analysis tools too complex. In addition, dashboards and scorecards are critical elements in supporting business performance management processes, which enables executives to more effectively communicate, monitor, and adjust business strategy and plans.

**Survey Methodology.** The survey cited in this report was conducted in February 2006 and received 716 responses, of which 689 were considered valid. The majority of respondents were corporate IT professionals from large companies in the U.S. We did not count responses from vendors or academics. The survey was split into two sections: one focused on dashboards, the other on scorecards. We only counted responses to questions in these sections from individuals whose organizations had already implemented a dashboard or scorecard or were in the process of doing so. There were 299 and 199 respondents, respectively, who met these criteria.

## Research Methodology

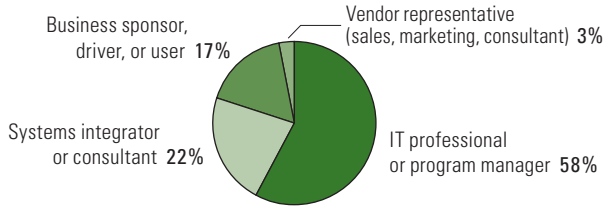
**Report Scope.** This report is designed for business and technical executives who wish to learn best practices in deploying dashboards and scorecards. The report defines dashboards and scorecards and describes them in the context of BI and performance management disciplines. It also describes major trends in the delivery of dashboard and scorecard solutions and provides recommendations and guidance on the best ways to deploy these solutions.

**Methodology.** The research for this report is based on a survey that TDWI conducted in the winter of 2006 as well as interviews with BI practitioners, consultants, industry analysts, and report sponsors. TDWI contacted BI professionals in its database and 1105 Media's database. (TDWI is a business unit of 1105 Media, Inc.) The survey received 716 responses, of which 689 were considered valid. We did not count responses from vendors or academics. The survey was split into two sections: one focused on dashboards, the other on scorecards. We only counted responses to questions in these sections from individuals whose organizations had already implemented a dashboard or scorecard or were in the process of doing so. There were 299 and 199 respondents, respectively, who met these criteria.

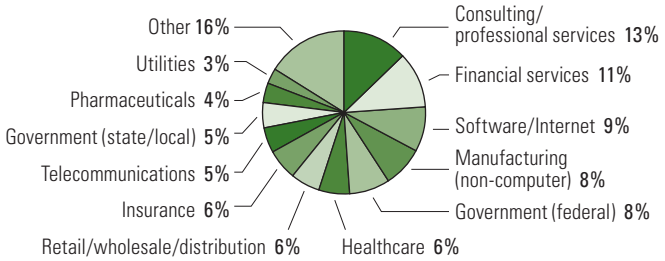
**Survey Demographics.** A majority of the survey respondents (58%) are corporate IT professionals. The remainder are BI consultants (22%) and business sponsors/users (17%). Most of the respondents work in IT organizations that support the entire enterprise (62%) with the remainder working in divisional or departmental groups. Slightly more than one-third of respondents (39%) work at companies with revenues of less than $500 million. Almost one-third (29%) work at companies earning between $500 million and $5 billion in revenues. The rest work at companies with more than $5 billion in revenues (18%) or don't know the revenues of their firms (13%). Most respondents are based in North America (68%) or Europe (15%) and work in a range of industries, but the largest percentage are in consulting (13%) and financial services (11%). Consultants were asked to fill out the survey with their most recent client in mind.

## Demographics

### Position

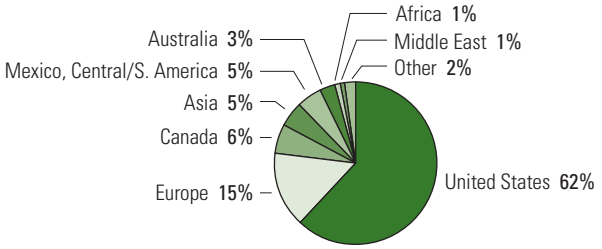



### Industry

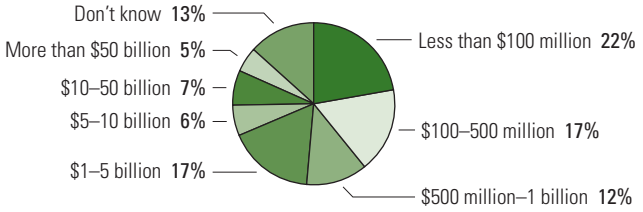



(The "other" category includes industries with less than 3% of respondents.)

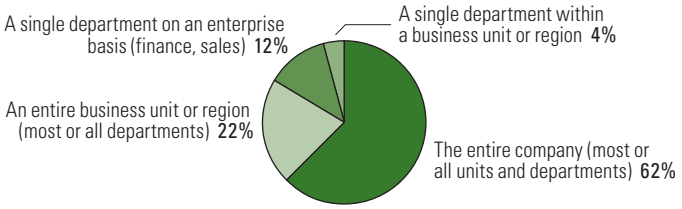
### Region




### Company Size by Revenue




### Scope of Organization Supported




*Based on 689 qualified respondents.*

# Why Performance Dashboards?

## Convergence of Two Disciplines

Dashboards and scorecards represent the convergence of two distinct disciplines in desperate need of each other: performance management and business intelligence. Like long-lost siblings, these two disciplines have struggled on their own to deliver real business value and gain a permanent foothold within organizations. But together they offer an unbeatable combination whose whole is greater than the sum of the parts.

**The whole is greater than the sum of the two disciplines.**

**Performance Management.** Performance management is the process of measuring progress toward achieving key goals and objectives in order to optimize individual, group, or organizational performance. Performance management encompasses strategy-setting, goal-setting, planning, budgeting, forecasting, and modeling techniques.

**Business Intelligence.** Business intelligence (BI), on the other hand, consists of the tools, technologies, and processes involved in turning data into information and information into knowledge to optimize decision making. BI encompasses data warehousing, data integration, reporting, analysis, and data mining technologies.

Together, these two disciplines provide a powerful new way to communicate strategy to all employees and monitor and analyze business activity designed to optimize performance. The result is a dashboard or scorecard—a new type of performance management system—that uses BI technologies to apply performance management techniques on an enterprise scale.

**Three Major Benefits.** When properly deployed, dashboard and scorecard systems offer three main benefits:

1. **Communicate Strategy.** They provide executives with a powerful means to communicate key strategies and objectives continuously by tailoring metrics to each employee based on his or her role and level in the organization. As an agent of organizational change, dashboards and scorecards enable executives to get the entire organization marching in a coordinated fashion toward the same destination.

**Performance dashboards align the organization through tailored delivery of information.**

2. **Monitor and Adjust the Execution of Strategy.** Once goals are established, dashboards and scorecards let executives and managers monitor the execution of the strategy and plans on an hourly, daily, weekly, or monthly basis depending on requirements. These performance management systems enable executives and managers to work proactively and identify and address critical problems undermining progress before it's too late to fix them.

3. **Deliver Insights and Information to All.** Dashboards and scorecards deliver critical information at a glance using graphical symbols, colors, and charts. The applications graphically highlight exception conditions and alerts and let users drill down into more detailed data to find the root cause of a problem. These tools conform to the way users work and don't force users to conform to the way BI tools work. This is a major reason dashboards and scorecards are so popular today.

**Performance dashboards transform BI from a departmental to enterprise resource.**

# What Are Dashboards and Scorecards?

The many different types of dashboards and scorecards can each look and function slightly differently, and often go by different names depending on the organizations implementing them. To dispel the confusion, here is a definition:

*Dashboards and scorecards are multilayered performance management systems, built on a business intelligence and data integration infrastructure, that enable organizations to measure, monitor, and manage business activity using both financial and non-financial measures.*

Dashboards and scorecards provide more than just a screen populated with fancy performance graphics: they are full-fledged business information systems designed to help organizations achieve strategic objectives. They help measure the past, monitor the present, and forecast the future, allowing an organization to adjust its strategy and tactics in real time to optimize performance.

## The Three Threes

Despite the variation among dashboards and scorecards, each shares three basic characteristics—the "three threes" as I call them. (And if they don't, they are impostors that won't deliver lasting business value.)

1. **Three Applications.** Each contains three applications woven together seamlessly: (1) a monitoring application, (2) an analysis and reporting application, and (3) a management application. Each application provides a specific set of functionality delivered through various means. Technically speaking, the applications are not necessarily distinct programs (although sometimes they are), but sets of related functionality built on an information infrastructure designed to fulfill user requirements to monitor, analyze, and manage performance. (See figure 1.)

**Three Applications**

| | Monitoring | Analysis | Management |
|---|---|---|---|
| Purpose | Convey information at a glance | Analyze exception conditions | Improve coordination and collaboration |
| Components | • Multi-paned screens with visual elements<br>• Graphs (i.e., dials, gauges, thermometers)<br>• Symbols, alerts<br>• Charts, tables with conditional formatting<br>• Alerts | • Analytics (i.e., dimensional, time-series, segmentation)<br>• Forecasting, modeling, and predictive statistics<br>• Visual analysis<br>• Reporting | • Annotations<br>• Threaded discussions<br>• Meetings<br>• Strategy maps<br>• Workflows |

*Figure 1. From* Performance Dashboards: Measuring, Monitoring, and Managing Your Business, *by Wayne Eckerson (John Wiley & Sons), 2005.*

2. **Three Layers.** Perhaps the most distinctive feature of a dashboard or scorecard is that it consists of three views or layers of information: (1) graphical, abstracted data to monitor key performance metrics; (2) summarized dimensional data to analyze the root cause of problems; and (3) detailed operational data that identifies what actions to take to resolve a problem.

Like peeling the layers of an onion, a performance management system lets users peel back layers of information to get to the root cause of a problem. Each successive layer provides additional details, views, and perspectives that enable users to understand a problem and identify the steps they must take to address it. (See figure 2.)

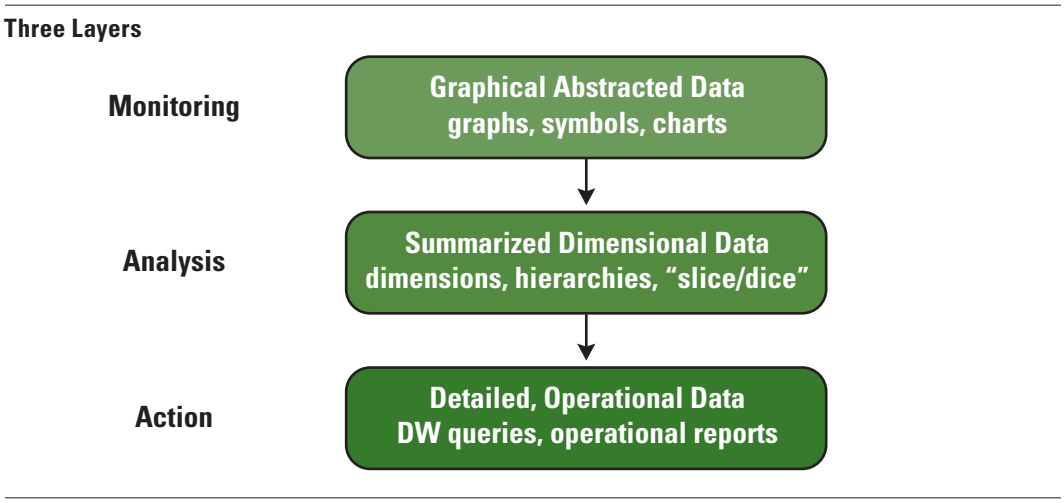



*Figure 2. A performance management system provides access to three layers of data.*

3. **Three Types.** The last thing to know about dashboards and scorecards is the three major types: operational, tactical, and strategic. Each type applies the three applications and layers, described previously, in slightly different ways.

   - *Operational dashboards* track core operational processes and often display more real-time data. Operational dashboards emphasize monitoring more than analysis or management.
   - *Tactical dashboards* track departmental processes and projects and emphasize analysis more than monitoring or management. They are often implemented using portals and run against data marts or warehouses where data is loaded periodically.
   - *Strategic dashboards* (or scorecards) monitor the execution of corporate strategic objectives at each level of the organization and emphasize management more than monitoring or analysis. Strategic dashboards are often implemented using the Balanced Scorecard methodology and referred to loosely as "scorecards."

**Staying Ahead of the Wave.** An organization can and should have multiple versions of each type of dashboard described earlier, each focused on different business problems or functional areas. Ideally, these dashboards are all built on a single data infrastructure and application platform to deliver consistent performance information throughout the enterprise.

In reality, few companies stay ahead of the wave of dashboard implementations. To avoid creating silos of information, organizations should coordinate these efforts using an enterprise program office, a BI competency center, and/or a governance program. Otherwise, they'll be forced to consolidate these diverse, non-integrated dashboards after the fact, which is challenging and costly.

**Few companies can stay ahead of the performance dashboard wave.**

Nonetheless, the "three threes" is a simple way to remember the key features of a dashboard or scorecard when you are evaluating commercial products or building your own.

## What a Dashboard is NOT

To some readers, a dashboard or scorecard that conforms to the "three threes" may sound too elaborate and expensive. They don't want to get the IT department involved or initiate a systems project that will cost hundreds of thousands of dollars and take months or years to complete. Most just want something quick, simple, and cheap to replace their Excel spreadsheet or the myriad of reports they must comb through to make a decision. What they really want is what I call a "quickie dashboard."

That's fine. But be careful. You get what you pay for. In the past two years, many new and existing vendors have begun promising to implement a departmental dashboard or scorecard in a few days or weeks for short money (usually under $50,000.) They'll automate your favorite Excel spreadsheet with graphical gizmos and doodads, pull data from multiple systems using new federated query technology, and display it using multi-paneled Web pages or compound reporting tools. These quickie dashboards can be quite visually attractive and potentially powerful, but there is often a long-term tradeoff for the short-term gain.

Most quickie dashboards commit the following sins:

**Too flat.** They offer limited capability for drilling down or interacting with underlying data. If you can't drill down to transaction-level detail or across dimensions to explore root causes of a problem, the dashboard or scorecard will only serve to alert you that a problem exists. It won't help you identify the source of the problem or how to fix it.

**Too manual.** Many dashboards and scorecards demo great, but require a lot of expertise and time to modify or change. The best systems let users add and modify metrics, targets, thresholds, alerts, charts, tables, layouts, and so on without developer intervention. They also automatically capture large data volumes from diverse source systems (not just local files) but allow manual data entry when necessary. Finally, bona fide performance management systems offer administrative tools for centrally managing security, access, versioning, metadata, usage monitoring, and so on. In short, dashboards and scorecards need to scale to support mission-critical requirements.

**Too isolated.** A big problem with quickie dashboards is that they may meet immediate business needs, but undermine the organization's ability to obtain a single, consistent view of information across units, products, customers, and so on. The quickie dashboard is almost always an information silo. Eventually, it will need to be integrated or consolidated with other performance dashboards or analytic systems to preserve business views and eliminate redundant operations.

**Too inaccurate.** Any time a quickie dashboard displays information from multiple systems, or worse yet, merges this information into a single table or chart, the likelihood of delivering inaccurate, incomplete, or inconsistent information is high. Merging data from multiple systems requires experts from both the business and IT to analyze source data and systems and create accurate SQL code that reflects the performance dashboard users' intentions. Quickie dashboards may claim to automate this step, but don't underestimate the task or assume technology can easily solve it.

**Too cool.** Many dashboards use visually attractive displays that are perceptually ineffective. Beware of 3-D look and feel, chrome plated gizmos, displays that make noise and move, and so on. The dashboard must show the data dimensions necessary to make a decision, clearly and accurately. Screen real estate should be utilized well in a format that is comfortable to the user.

## The Difference between Dashboards and Scorecards

Some people use the terms dashboard and scorecard interchangeably, while others use the terms to refer to different types of analytic applications for measuring performance. In my definition, dashboards and scorecards are simply different types of *visual display mechanisms*, within a performance management system, that convey critical performance information at a glance. In other words, they are the monitoring application, not the system itself!

A good performance management system should be able to deliver either a dashboard or scorecard interface, since both do the same thing: display the status and trends of key performance indicators. The primary difference is that dashboards tend to monitor the performance of operational processes whereas scorecards tend to chart the progress of tactical and strategic goals. Dashboards also tend to display charts and tables with conditional formatting, whereas scorecards use graphical symbols and icons to represent the status and trends of key metrics. (See figure 3.)

**Dashboards versus Scorecards**

| | Dashboard | Scorecard |
|---|---|---|
| Purpose | Measures performance | Charts progress |
| Users | Managers, staff | Executives, managers, staff |
| Updates | Real-time to right-time | Periodic snapshots |
| Data | Events | Summaries |
| Top-level Display | Charts and tables | Symbols and icons |

*Figure 3. Dashboards and scorecards are visual display mechanisms—the monitoring layer in a performance dashboard. A good performance dashboard should support both types of displays.*

# How Do You Architect Dashboards and Scorecards?

There are many ways to architect dashboards and scorecards. Since they are full-fledged information systems that require extracting and merging data from multiple systems to meet business needs, the technical architecture must map to the business to deliver the required functionality.

**Business Architecture.** A performance management system needs to align with an organization's business architecture, which consists of stakeholders (investors, board, executives, workers), strategy (mission, goals, objectives, vision, values), and tactics and resources (people, technology, capital, projects). (See figure 4.)

A business architecture is based on business semantics and metrics. Semantics are the terms, definitions, rules, and metadata that comprise an organization's vocabulary and govern how it communicates about performance. Metrics, on the other hand, translate an organization's strategy into measures that enable the organization to track its performance against goals.

**Metrics versus KPIs.** Metrics are often called key performance indicators (KPIs.) Dashboards and scorecards are comprised almost entirely of KPIs, which collectively embody the corporate strategy tailored to each individual in the organization by role and level. (At least, that's the ideal!)

**A KPI is a metric that embeds performance targets.**

A KPI is a metric that embeds performance targets so organizations can chart progress toward goals. The targets reflect desired end states (e.g., amount of revenue by end of year) as well as interim targets for reaching those end-state goals (e.g., monthly revenue targets that factor toward the overall goal.) Most KPIs have minimum and maximum targets or "thresholds" that define an acceptable range of performance for interim and end-state goals. When performance exceeds a threshold, the performance dashboard highlights the change in status using conditional formatting (e.g. stoplights change color) or by sending alerts.

**Architecture of Performance Management System**

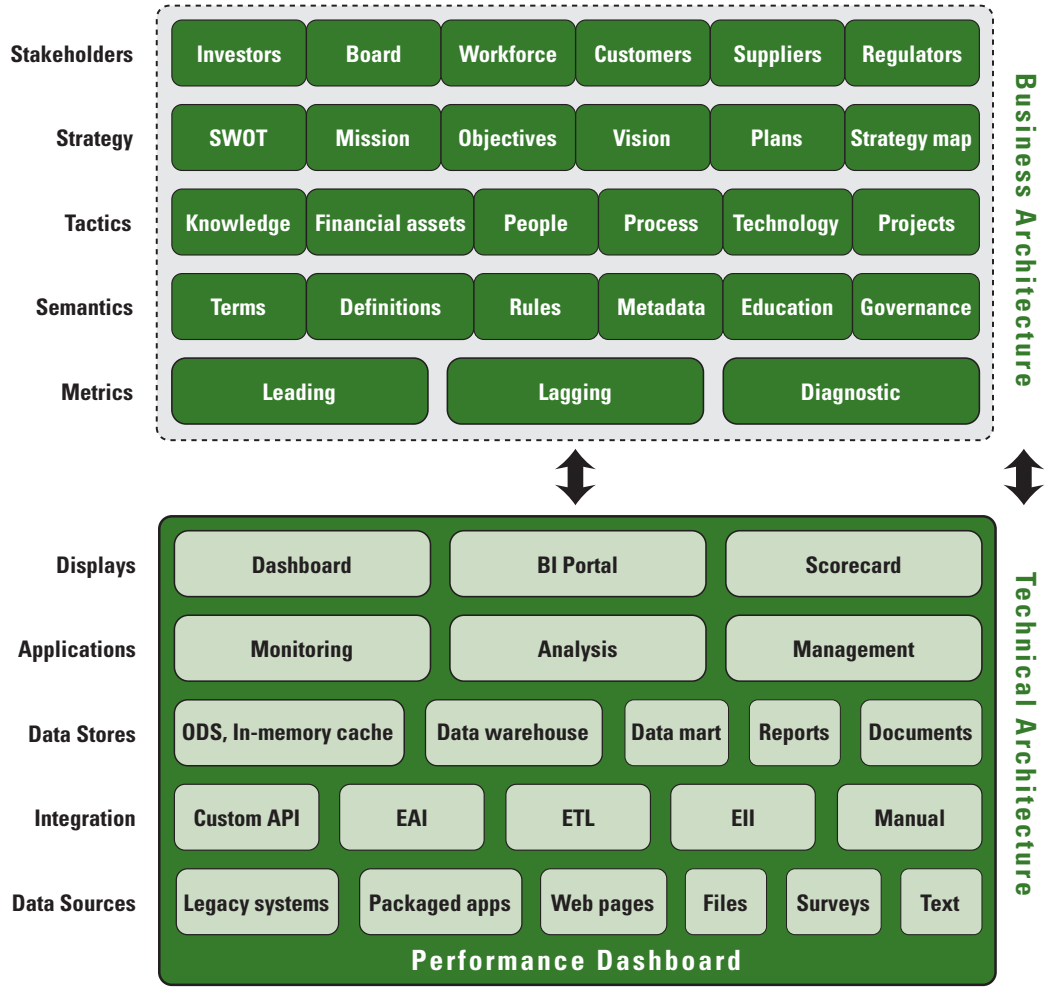



*Figure 4. From* Performance Dashboards: Measuring, Monitoring, and Managing Your Business *by Wayne Eckerson, (John Wiley & Sons) 2005.*

**Technical Architecture.** When architecting a performance management system, designers should select different components at each level of the architecture that best meet business needs. For instance, strategic dashboards use a scorecard interface that compiles both documents and data in a data mart that is frequently updated both automatically and manually from Excel files, Web pages,

and packaged applications. Operational dashboards, on the other hand, often use custom APIs, ETL, EII, and caching technologies to pull data from legacy and other transaction systems.

**Joining Business and Technical Architectures.** The key to joining the business and technical architectures together is metrics that accurately reflect and measure the business strategy and performance. Well designed metrics propel the organization down the path defined by the corporate strategy. But poorly designed metrics will accelerate moving the organization in the wrong direction! Metrics are therefore the linchpin that joins the business and technical elements of a dashboard or scorecard. We will address best practices in designing performance metrics later in this report.

**Metrics are the linchpin that joins the business and technical parts of a performance dashboard together.**

## Performance Dashboard Trends

Given the benefits, it's no surprise that executives and managers are rushing en masse to deploy dashboards and scorecards. "There is something in the air about dashboards," says Ripley Maddock, director of customer information management at Direct Energy. "People aren't wondering whether they should build a dashboard; they're discussing what it will look like."

**Status.** In 2005, TDWI published *Development Techniques for Creating Analytic Applications,* a report that explored dashboard and scorecard deployments. (See www.tdwi.org/Research/ReportSeries.) That study revealed that 31% of the 473 respondents used a dashboard or scorecard as their primary analytic application and another 28% had deployed a dashboard or scorecard elsewhere in the organization. Another 24% were in the process of building one. In other words, almost three-quarters of organizations (74%) either had deployed a dashboard or scorecard of some sort, or were in the process of doing so.

**Scope.** Our current study shows most organizations that deploy a performance management system do so on an enterprise basis, with scorecards having slightly more of an enterprise focus than dashboards.[1] (See Figure 5.) On average, organizations deploy dashboards to 5.4 departments and scorecards to 5.8 departments.

**Performance Dashboard Scope**

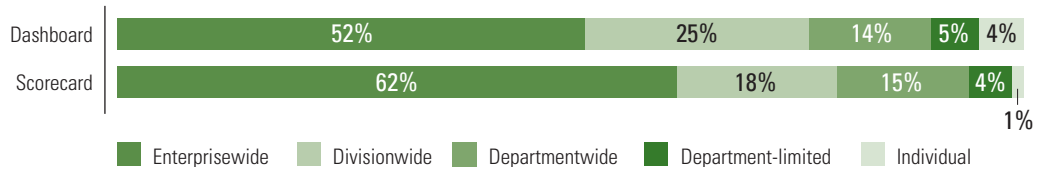



*Figure 5. Based on 299 respondents who have deployed or are about to deploy dashboards and 199 respondents who have deployed or are about to deploy scorecards.*

**Business Functions.** The department most likely to have a dashboard or a scorecard is operations. This is not surprising since organizations motivated by competition and new regulations are seeking greater transparency into business activities. After operations, organizations are likely to deploy performance management systems in finance, sales, and marketing. (See figure 6.)

[1] The survey used the following definitions: **Enterprisewide**: Most or all divisions and departments in the organization; **Divisionwide**: Most or all departments in one division or region of the organization; **Departmentwide**: One department on an enterprise basis; **Department-limited**: One department within a division or region; **Individual**: A handful of executives or managers only.

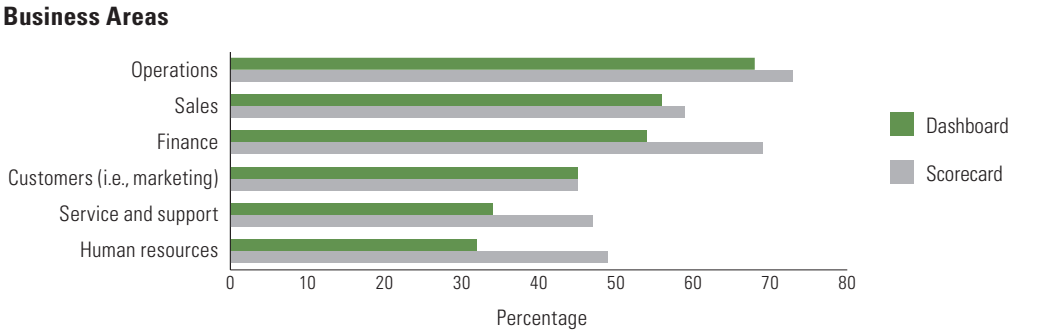



*Figure 6. Based on 299 and 199 respondents who have deployed or are about to deploy dashboards or scorecards, respectively.*

**Dual Deployments.** Given the similarity of deployment percentages among departments, it's not surprising that a majority of groups surveyed have deployed both a dashboard and a scorecard, often within the same application. (See figure 7.) For example, one government agency purchased commercial software several years ago that supports both scorecard and dashboard views for its 1,500 employees. The application currently supports 60 scorecards and numerous dashboards, both of which run against nine years of historical data.

"Whereas the top-level view of our scorecards display performance in green, red, and yellow symbols, our dashboards start in the analysis layer where users can slice and dice to their hearts' content," says the agency's information director. "Unlike our scorecards, users can customize the layout of the four-panel dashboard by selecting the metrics they want to view and the format for viewing them (type of chart, table, etc.) The dashboard also contains many metrics that don't make it into the scorecard, but which are still important to measure."

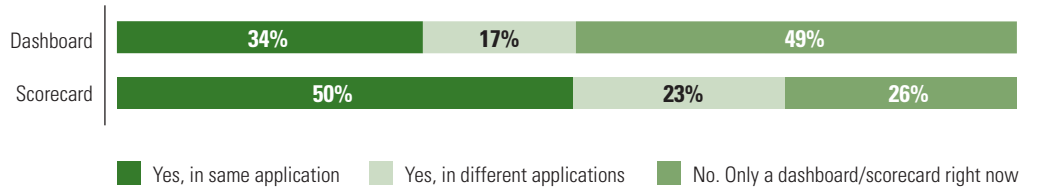



*Figure 7. Based on 299 and 199 respondents who have deployed or are about to deploy dashboards or scorecards, respectively.*

**Initiating and Funding Projects.** Many performance dashboard projects—scorecards in particular—are initiated and guided by energetic business leaders with a vision for managing their organizations or departments by the numbers. Our data suggests that dashboard and scorecard projects are overwhelmingly business-driven. (See figure 8.)

"We were fortunate that we had a leader who wanted to be personally involved and was a measures guy," said the information director at the government agency mentioned earlier. "He organized offsite sessions with executive leadership where they defined agency goals and objectives and ways to measure them."

**Who Led the Project?**

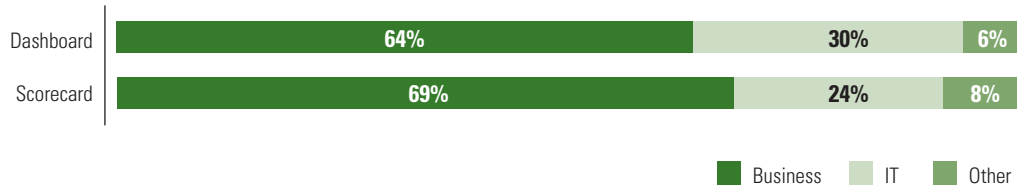



*Figure 8. Based on 299 and 199 respondents who have deployed or are about to deploy dashboards or scorecards, respectively.*

**Bootstrapping Performance Dashboards.** In most cases, the performance management visionaries empower a program manager to translate the vision into reality, fast! Program managers usually don't get much money to start, but find a way to beg, borrow, or steal developer and hardware resources to deliver an initial solution in two to three months. Until recently, most solutions were homegrown, but the spate of inexpensive dashboard and scorecard projects (total license fees under $50,000) will change that.

**Managers often need to beg, borrow, and steal to launch a performance dashboard project.**

Once the solution looks promising, the executive usually negotiates funds to turn the shoestring application into a more permanent solution by allocating full-time development staff to the project and purchasing hardware and software. However, eventually these quickie projects must be rearchitected and put on a more substantial data infrastructure, often at significant cost.

So the story with scorecards is. "First, deliver value, then we'll give you money, and eventually we'll let you create an appropriate infrastructure." As one program manager said, "I can't wait three years for IT to deliver something. Speed to market is my mantra."

**"I can't wait three years to deliver something. Speed to market is my mantra."**

**Users.** On average, dashboards support 315 users and scorecards 493 users. However, 72% of both dashboards and scorecards have fewer than 100 users. (See figure 9.) This means that while most performance dashboards support small user bases, a minority of implementations support extremely large numbers of users.

There is usually a direct correlation between years of deployment and number of users. That's because once one department has a dashboard, executives in every other department want one. Performance dashboards are very contagious. What manager wouldn't want a simple graphical interface that shows the status of key business processes with additional data a click away?

**Number of Users**

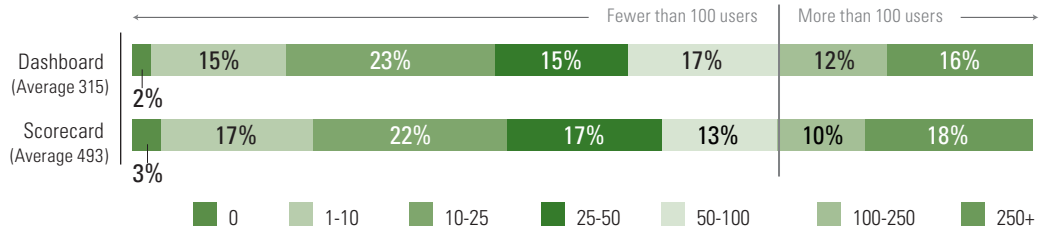



*Figure 9. Based on 299 and 199 respondents who have deployed or are about to deploy dashboards or scorecards, respectively.*

**Types of Users.** Not surprisingly, departmental managers are the biggest users of dashboards and scorecards, followed closely by top executives. (See figure 10.) However, corporate executives are usually served by financial analysts who are more or less dedicated to delivering data on demand, but mid-level managers are often left to fend for themselves by cobbling data into makeshift spreadsheet reports. Thus, mid-level managers are often the best place to drum up support for a performance dashboard initiative.

Users should be able to access the dashboards via multiple methods depending on their requirements. Most will want online access via the Web, but others will want offline versions to take with them while traveling (e.g., Excel or PDF), or wireless versions.

**Types of Users**

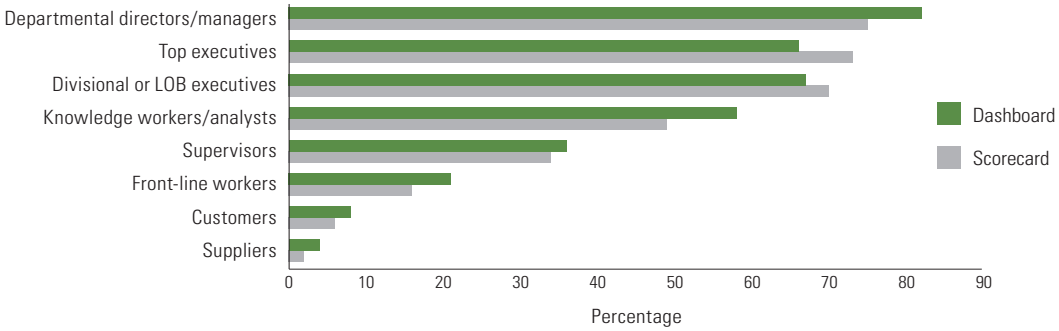



*Figure 10. Based on 299 and 199 respondents, respectively, who have deployed or are about to deploy either dashboards or scorecards.*

**Time to Deploy.** Once companies decide to implement a performance dashboard, most don't waste time. Approximately one-third of performance dashboard implementations are deployed within weeks, while a larger percentage takes months or longer. (See figure 11.)

Quick deployments can happen when there is already a consensus on what measures will go into the performance dashboard. Most industries and organizations already have a set of standard measures, which they reuse in a performance dashboard deployment. (Whether they have the right measures is a question we'll discuss in the next section.)

**Time to Deploy**

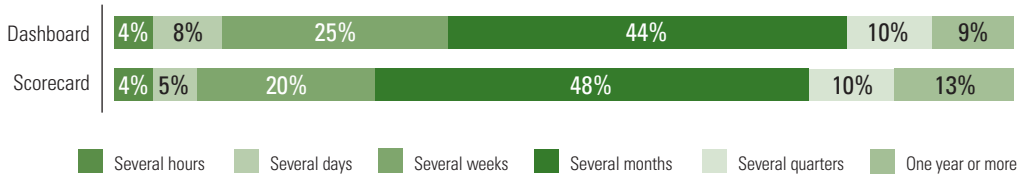



*Figure 11. Based on 299 and 199 respondents who have deployed or are about to deploy dashboards or scorecards, respectively.*

**Leveraging a BI Environment.** Quick deployments are also possible when an organization already has an established BI environment and data management infrastructure. These elements often shrink the time required to capture and deliver data at any level of detail within any time frame.

"Our dashboards are just another view of data in our data warehousing environment using our existing BI tools. Users get the graphical views they need, plus predefined drill paths to the underlying detailed data and reports they require. The incremental cost of supporting dashboards on top of our existing BI environment is negligible," says Thomas Tomlinson, director of BI for Bull Moose Tube, a steel manufacturer in Chesterfield, MO.

**"The incremental cost of supporting dashboards on top of our existing BI environment is negligible."**

**The Challenge of Creating New Metrics.** The real barrier to fast deployment is usually not technology. Problems typically arise when the business wants to measure things it has never measured before, such as individual and group performance or granular operational processes or value chains. It may take months or years to come to a consensus on a new set of measures. For instance, how do you measure customer satisfaction? Customer loyalty? The ROI of marketing campaigns?

The process of creating new measures often requires participants to re-examine organizational goals and strategies in a new light, which sometimes opens a Pandora's Box of long-suppressed strategic planning discussions. It goes without saying: Organizations have an easier time defining measures if they already have a clear mission, vision, and short- and long-term goals. Corporate strategy provides clear guidance on what to measure, if not how to measure.

**Types of Metrics.** The Balanced Scorecard methodology provides excellent recommendations on the types of measures organizations need to improve performance and achieve long-term goals: a healthy balance of financial and non-financial measures, leading and lagging indicators, pre-existing and new metrics, and strategic and diagnostic[2] metrics. (See figure 12.)

**Types of Metrics**

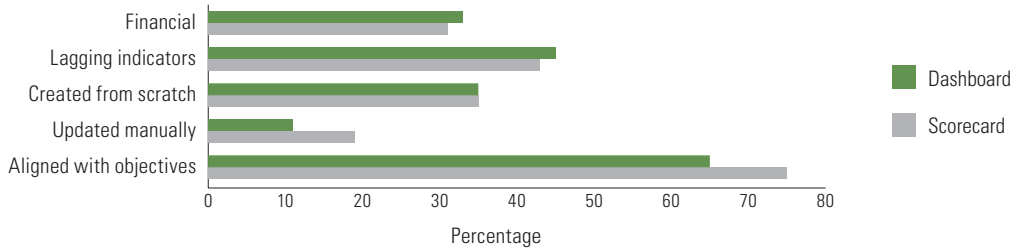



*Figure 12. The percentages above reflect respondents who selected "most" or "all" when asked what percentage of their metrics possess the characteristics listed. Based on 299 and 199 respondents, respectively.*

**Creating new metrics from scratch can be time consuming.**

**Time to Create a Metric.** Creating metrics is easy if you are simply customizing existing metrics (and presumably their visual display) to a new department or activity. In this case, some experts claim it should take about three days to create 10 metrics.

But creating new metrics entirely from scratch can be laborious. Scorecards, which are more strategic in nature, tend to create more unique metrics in new areas of the business than dashboards, which tend to measure established processes. This is why development times are higher on average for scorecards compared to dashboards. (See figure 13.)

A performance dashboard infrastructure can accelerate a lot of these steps, but quickie dashboards—whether built or bought—may not have the analytical horsepower or data management framework to support the creation of complex metrics.

[2] Diagnostic metrics don't measure or reflect a strategic objective or initiative, but are important to know; top 10 customers last month is an example. Diagnostic metrics help users understand how to fix problems.

**Time to Create a Metric**[3]

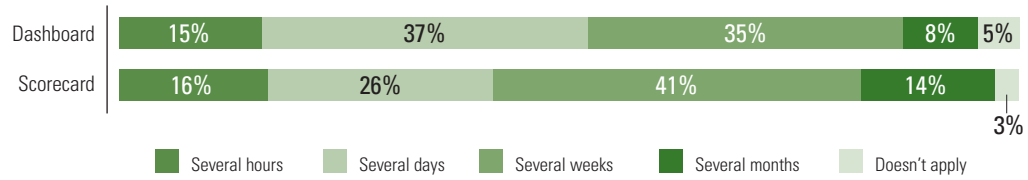



*Figure 13. Based on 299 and 199 respondents, respectively.*

**Organizational Levels.** One overlooked aspect of creating metrics is defining the organizational levels to which they apply. Ideally, metrics cascade down from the top of the organization to the bottom, while data rolls up from the bottom to the top. According to our study, dashboards and scorecards roll up data from approximately four organizational levels, with dashboards rolling up 3.8 levels, and scorecards rolling up 4.1 levels, on average.

**Metrics cascade down the organization and data rolls up.**

For some metrics, like sales revenue, this is fairly straightforward. The CEO can view sales for the entire organization, while managers and individuals at lower levels use this metric to view sales revenues for their business units, departments, or workgroups. A single metric deployed universally enables organizations to easily aggregate detailed data, provide a comprehensive view of organizational performance, and create drill paths from summary to detailed data. This provides the transparency and visibility that visionary executives desire and regulators now require!

In other cases, a corporate metric for increasing customer satisfaction may require each level of the organization to create different initiatives and processes, each with distinct measures, that will positively influence the corporate metric. Here, lower level metrics indirectly influence higher level metrics, and data can't be rolled up from one level to another. A strategy map application can help executives correlate objectives and their underlying metrics, even when they are measuring different things.

**Alerts.** When a dashboard or scorecard displays an alert, a majority of users drill down into the application to determine what actions to take. Between one-quarter and one-third also export to Excel, open a predefined report or analytical tool (i.e., OLAP tool), or contact a business analyst. (See figure 14.)

"Our executives will drill one or two levels down before they call someone who can fix the problem, while our managers will often drill three or four layers down before they make a call," says Tomlinson at Bull Moose Tube.

**User Actions in Response to an Alert**

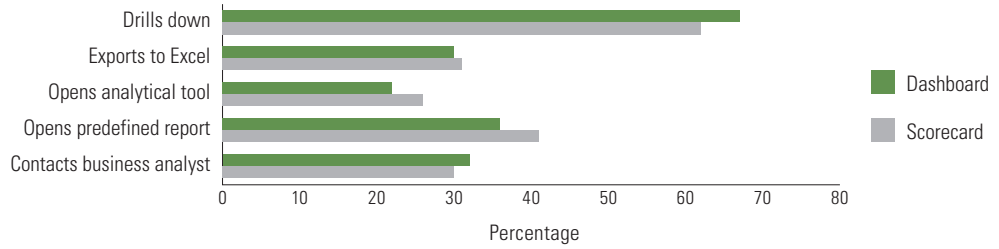



*Figure 14. Based on 299 and 199 respondents, respectively.*



[3] Our survey defined the following steps for creating new metrics: (1) Gathering user requirements; (2) identifying source data; (3) modeling, mapping, and loading the requisite data; (4) applying calculations (if not handled in the data model); (5) creating the views (charts, tables, symbols) that display the metrics; (6) testing; (7) training; and (8) deployment.

**Visual Elements.** Dashboards and scorecards use a variety of visual display elements, including visual icons, charts, tables, and alerts, that make it easy for users to ascertain performance at a glance. (See figure 15.)

**Visual elements**

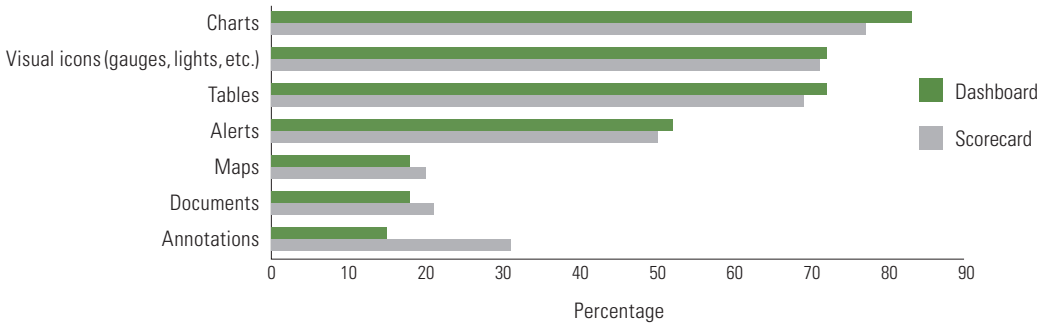



*Figure 15. Based on 299 and 199 respondents respectively.*

**BNSF Railway Co.** BNSF Railway Co. created its corporate dashboard four years ago at the request of its top executives who wanted a daily picture of the performance against plan across all parts of the business, says Janet Perry, a BI team leader at the company. The dashboard provides a "daily performance map" that graphically displays performance as a series of colored blocks that represent every business area in the company. The size of the block represents operational contribution (locomotive velocity) and its color signals performance versus plan. The dashboard displays 10 shades of color from bright red to bright green representing various levels of performance against plan. "If a manager sees a bright red block, they home in on it like a bird dog," says Perry.

**"If a manager sees a bright red block, they home in on it like a bird dog."**

Users can mouse over a block to display numeric data and click on a block to drill into more detail on that specific area. Each drill displays the same innovative "block" diagram for a more specific part of the business. Thanks to an underlying OLAP database, users can slice and dice the graphical views by various dimensions and hierarchies. At the lowest level of detail, users drill into the company's enterprise data warehouse to obtain a spreadsheet view of individual items or transactions.

Although top executives initiated the corporate dashboard, it quickly became a must-have tool for lower level managers once executives began asking them detailed questions based on information in the corporate dashboard, which is updated at least daily. "The corporate dashboard is changing our information culture. We hear from the business users if the dashboard isn't up and running by 7:00 a.m. sharp!"

**Data Sources.** Besides their visual display, dashboards and scorecards are appealing to business users because they pull together data from many different sources and present them in a coherent display on a single screen for easy consumption. On average, dashboards and scorecards pull data from eight different sources, with relational databases topping the list (84% and 87%, respectively), followed distantly by mainframes (44%, 54%), Excel spreadsheets (41%, 47%), and packaged applications (37%, 44%). (See figure 16.)

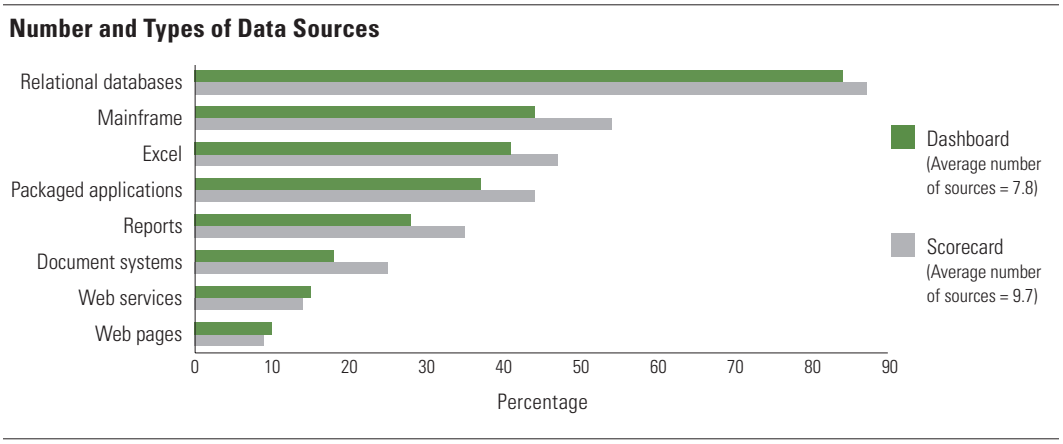



*Figure 16. Based on 299 and 199 respondents, respectively.*

**Amount of Data.** Despite the sizable number of sources, the amount of data managed by performance management systems is relatively small, at least compared to the average size of data warehouses. Approximately half of all performance dashboards contain less than 50 GB of data and three-quarters contain less than 250 GB. (See figure 17.)

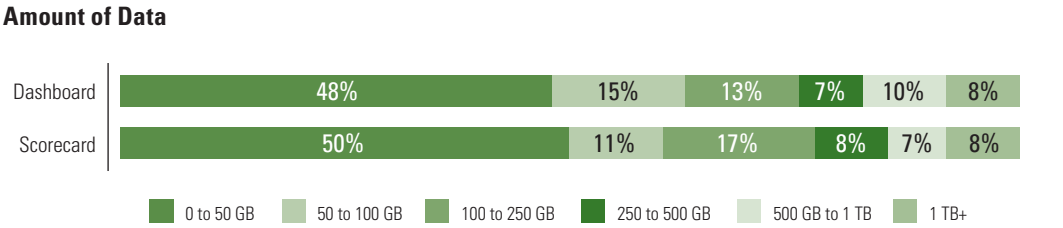



*Figure 17. Based on 299 and 199 respondents, respectively.*

**Organizations update half their metrics daily, about one-quarter more than once daily.**

**Data Freshness.** Our study shows that organizations update dashboard metrics more frequently than scorecard metrics, but not by much.

On average, organizations update approximately half (51%) of their dashboard metrics daily, and one-quarter (27%) several times a day or more often, while they update about one-third (36%) of scorecard metrics daily and 21% more frequently. In addition, organizations update a greater percentage of scorecard metrics monthly, quarterly, and annually than dashboard metrics. (See figure 18.)

**Data Freshness**

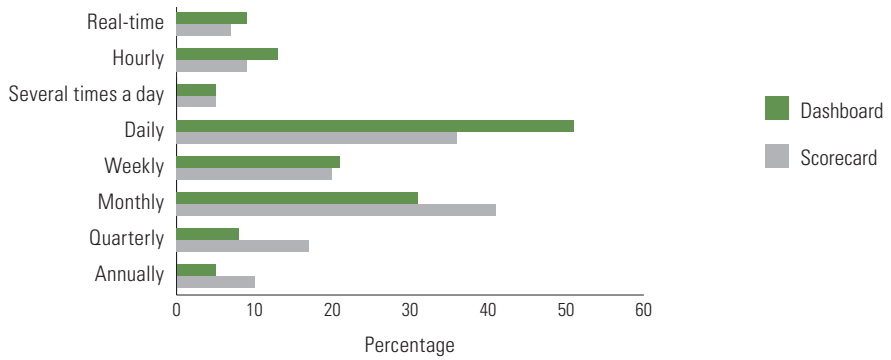



*Figure 18. The percentages refer to the number of metrics updated at different frequencies. Based on 299 respondents with dashboard and 199 respondents with scorecards.*

**Summary.** A majority of organizations have already deployed a dashboard or scorecard of some sort, usually on an enterprise basis to better manage operations, finance, sales, or marketing functions. Most companies offer both a scorecard and a dashboard and the projects are led by the business side of the house with help from IT. The biggest users are mid-level managers followed by corporate and divisional executives.

Many dashboards and scorecards initially don't cost much, either because the business is bootstrapping the project or because it is building dashboard and scorecard capabilities onto an existing BI environment. Dashboards and scorecards contain a wide range of metrics that are usually created within several weeks if not less, and are cascaded to four levels in the organization. The data populating the metrics comes from a wide range of sources, but overall data volumes are not high. Most metrics are refreshed on a daily basis.

# Best Practices in Deploying Dashboards and Scorecards

Much of the advice in this section can be applied to all IT projects, but you will also find targeted tips and techniques for deploying dashboards and scorecards.

## 1. You Get What You Pay For

You can't deploy a dashboard or scorecard that delivers real and lasting business value without spending money—unless of course, your company has already invested in a BI and data management infrastructure that can deliver the right information to the right user at the right time in the right format, and has already modeled and loaded a majority of data required in the dashboard or scorecard. Here, companies that have successfully deployed a data warehouse and BI tools have an edge. Those that haven't incur greater costs.

**The IT manager said it cost $400,000 to build the EVP's dashboard.**

One IT manager at a large manufacturing and distribution company garnered significant attention internally when his team created an effective (but decidedly low tech) dashboard for an executive vice president to monitor customer service operations. Soon, other business managers approached the IT manager to convert their Excel and Access databases into dashboards.

"They were decidedly uninterested when we told them how much it would cost," says the IT manager. "They don't understand the costs involved in cleaning, integrating, and modeling the data and building a bulletproof system that delivers sufficient right-time and detailed data so that they can make accurate and timely decisions." The IT manager said it cost $400,000 to build the dashboard and that it's been running for four years without any dedicated IT support.

Of course, you can deploy an inexpensive performance dashboard today, even without the requisite infrastructure. There are many commercial products that you can license for under $50,000 that provide some data integration capabilities. However, you will eventually need to replace these products as word spreads about the success of your solution and you need to scale it up to support more users, more sources, more detailed data, and more frequent updates without compromising performance and response times.

## 2. Plan for the Long Haul

**Always plan for success; the alternative is disaster.**

Always plan for success, because the alternative is disaster. Word about successful dashboard and scorecard solutions spreads like wildfire. If you've delivered a successful solution, you'll be bombarded with requests to deliver performance management systems for other departments and will need to rapidly expand the scope and scale of the existing system. Meanwhile, the number of users may grow rapidly, placing undue burden on processing power, networks, and databases. If you are not careful, response times will plummet and your hard-won reputation will suffer irreparable damage.

Chris Gentry, director of business intelligence at CCC Information Services, offers this sensible advice based on years of delivering BI solutions: "Unless you prepare for 20 percent growth in users, 15 percent growth in queries, and four to five new data sources every year, you will not meet customer expectations. The initial footprint of your solution should be 15 percent more than your most optimistic forecast."

## 3. Plan for Real Time[4]

The value of a dashboard or scorecard increases exponentially with the freshness of data. This is not to say that dashboards or scorecards that are updated monthly don't deliver business value—they can! Many successful Balanced Scorecards, for example, are only updated monthly. However, augmenting a dashboard or scorecard with more timely data increases its value even more. A performance management system populated with more timely data lets executives and managers keep their fingers on the pulse of the organization in ways they never could before. They work much more proactively to optimize performance.

So, even if your business people don't ask for more than daily updates, be prepared to deliver them. Build in hooks to messaging backbones, if they exist, to trickle feed data into your environment. Or select commercial dashboard solutions that support event-driven processing and can prove their scalability across users, sources, and data volumes.

**Even if business people don't ask for more than daily updates, be prepared to deliver them.**

## 4. Develop on a Single Platform

Because "dashboards are in the air" as one BI manager said, it is very easy for managers to build or buy their own solutions independent of each other. The dashboard silos eventually compete with each other for resources and, more importantly, undermine an organization's ability to get a single picture of what's going on in the enterprise.

This is what happened at IBM several years ago. The company had many different dashboard solutions serving different IBM executives in various departments. Each ran on a different platform, contained overlapping data, and duplicated resources, according to Julia Kennedy, senior manager of enterprise BI and reporting in the CIO's office of IBM. Eventually, IBM executives selected one dashboard among many to standardize on across the company. The winner, a solution called EDGE (Enabling Decisions for Global Execution), now supports 22,000 users throughout the enterprise.

**Dashboard Platforms.** To avoid the disruption of switching to a new platform, it's best to develop all dashboards and scorecards on a single platform that leverages a unified data integration infrastructure. The dashboard platform should support team-based development with check in/out and version control with seamless support for the deployment of development, testing, and production environments. The data infrastructure ensures the delivery of trusted business data using data integration, data quality, and metadata management tools. These technologies enable business users to examine the lineage of any data element before making critical decisions. Also, administrators can assess the impact of changes to source systems or applications on data integration workflows and reports.

While it's possible for a single development team to stay ahead of business requests for new performance management systems in a small company, it's likely that the organization may need to appoint a program office to manage deployment across multiple departments using parallel development teams. The program office needs to establish standards for usage, data, metrics, and functionality to avoid creating non-integrated silos.

[4] "Real time" is an ambiguous term that means different things to different people. Real time can refer to data that is refreshed instantaneously, every minute, or every hour, or every day, and so on. For this reason, many people prefer the term "right time" because it emphasizes that data only needs to be as fresh as the business process requires.

## 5. Develop Effective Metrics

Again, metrics are ultimately the key to the success of any dashboard or scorecard. They are the linchpin between the business and technical architectures. There are many techniques for developing effective metrics, but these are the most important ones:

**Get buy-in by involving workers in the process of defining metrics, targets, and thresholds.**

**A. Get Buy-In.** Metrics won't propel the organization in the right direction unless the people whose performance is being measured understand, accept, and endorse the metrics. The best way to gain this buy-in is to involve workers in the process of defining metrics, targets, and thresholds. Since workers are closer to the business processes, they will better understand whether metrics accurately capture the nuances of a process and whether targets are realistic or not. When you gather requirements from workers, get their feedback on proposed metrics and targets. You'll design more accurate metrics that have a greater impact on the business and are less likely to be manipulated by individuals who now have a vested interest in making them work.

**B. Simplify.** Humans can only absorb so much information at once. To avoid cluttering a dashboard or scorecard, display only a handful of metrics (four to seven is a good number) on a single screen at a time. If you have more metrics than this—which is not unreasonable if you are measuring an end-to-end business activity—you should create hierarchies of metrics using folders, tabs, or drill downs to preserve the clarity and simplicity of the dashboard display.

**C. Empower.** What's the point of displaying metrics if you don't empower users to affect the outcomes? When designing metrics, you need to examine the context in which they are used and give workers license to make decisions—even unorthodox ones—that will improve performance. This requires reengineering business processes and delegating responsibility to people closest to the customer or the process being measured.

Concomitantly, organizations need to hold workers accountable for the outcome of the measures. If no one is accountable, the metrics won't have any impact on the organization. It's also better to hold an individual accountable even if a team manages the process or task being measured.

**To avoid analysis paralysis, follow the 80 percent rule.**

**D. Avoid Perfectionism.** It's difficult to design new metrics in a vacuum. While it's important to gather comprehensive requirements and map business processes and information flows, you will never really know how well a metric works in practice until you deploy it and see what happens. To avoid analysis paralysis, adhere to the 80 percent rule: develop the metric to a point where you are 80 percent confident that it will have the desired effect, then deploy it, track the results, and refine it as needed.

**E. Monitor and Revise.** All metrics have a natural lifecycle. Over time, metrics lose their impact as workers streamline processes to the point where additional gains are not worth the effort. In addition, the business usually changes, forcing organizations to add new metrics that cause workers to expend their energies elsewhere.

To ensure the effectiveness of the metrics and the performance management system as a whole, you need to monitor the usage of the metrics on a continuous basis. Dashboard and scorecard teams should aggressively prune underused metrics (after first consulting with the business, of course), and they should monitor the uptake of newly deployed metrics to quickly identify problems that users may be having with the metrics or views.

F. **Incentives.** It's dangerous to attach incentives in the form of bonuses or compensation to metrics that have not been fully vetted and accepted by the organization. It's important to deploy metrics for a while to identify and close potential loopholes, change calculations to more accurately reflect reality, and provide sufficient training so users understand how to impact outcomes. Attaching incentives to metrics prematurely is a recipe for disaster and can catapult organizations into chaos.

G. **Involve Technical People.** One common mistake is to create metrics for which no data exists. To avoid this awkward situation, make sure you assign technical people to the team that gathers requirements and designs the metrics. During discussion, these people can evaluate the existence and condition of data needed to populate proposed metrics.

# Conclusion

The future of dashboards and scorecards looks bright. Today, many organizations have deployed performance management systems, but the size and scope of a majority of implementations is still small. This will change as user organizations gain more experience with these systems and vendors begin to offer robust commercial dashboard and scorecard solutions.

Growth is bound to happen because dashboards and scorecards provide business users with all the information they need to make effective decisions and achieve strategic objectives without being overwhelmed. These systems deliver data on demand as users need it—from visual displays that let users monitor KPIs at a glance to dimensional and operational data for conducting analysis and taking action.

Moreover, dashboards and scorecards are the key tools in a business performance management discipline that enables executives to communicate business strategies in a customized way to each employee and monitor the execution of those objectives to fine-tune the organization and keep it on track.

*As a complement to this report on dashboards and scorecards, TDWI Members will receive* Segmenting Dashboard and Scorecard Products *within the upcoming* TDWI Membership Quarterly. *Part of TDWI's Technology Market Report series, this report describes a community of vendors and products in a particular technology market to aid Members in researching products and making purchasing decisions.*

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