High-performing organizations need information that is timely, clearly presented, and support effective decision making to drive better performance. Dashboards satisfy this need by providing easy to understand, real time information on an organization’s key performance management parameters—often in graphical form. Dashboards help organizations improve operations by enhancing the way in which performance is measured and reported.

Asset management is about having the right asset, in the right place, at the right time, to support the mission of the organization. As such, asset management is a mission enabler that needs to be closely aligned with the four basic phases of organizational management. These are: developing strategy, developing policy, conducting operations, and conducting assessment. This alignment, when present, helps to advance organizational maturity and effectiveness. A key enabler to achieving effective asset management is the establishment of a state-of-the-art capability for monitoring, assessing and analyzing critical performance management parameters by developing an organization-wide asset management dashboard system. This paper provides an overview of dashboards and a perspective on how asset management organizations may approach the development of requirements specification for a dashboard.

Why Consider Dashboards?

Dashboards integrate and synthesize two key imperatives required by any evolving organization: performance management and business intelligence. When presented together, they form a synergistic whole that helps to propel an organization toward greater levels of maturity, effectiveness and efficiency.
Performance management is the process of measuring progress toward achieving key goals and objectives to optimize individual, group, or organizational performance. Performance management encompasses strategy setting, goal-setting, planning, budgeting, forecasting and modeling techniques. Business intelligence (BI), on the other hand, consists of the tools, techniques, 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 within an organization, and monitor and analyze organizational activity. This approach provides insights, explanations and shared understanding of critical organizational information which facilitates optimized performance.

When properly designed and deployed, dashboards provide several benefits to executives, managers, and staff. Some of the benefits are outlined below.

**Communicating and Managing Strategy**

Dashboards serve as agents of organizational change, enabling executives to get the entire organization marching in a coordinated fashion toward the same destination. Dashboards allow executives and managers to work proactively to keep the organization on track by enabling them to quickly identify and address critical problems undermining organizational progress.

**Monitoring and Oversight**

Dashboards provide each user group with information and analytical capability that is appropriate to their role and gets updated on a schedule that meets their needs. A strategic view can be provided to senior leaders in the organization to view how the asset management strategy is impacting fiscal management, profitability and compliance with statutory requirements. A tactical view can be structured for Asset Managers focused on analyzing how effectively the asset management strategy is being implemented. An operational view can be structured for Accountable Property Officers and Property Custodians to track the core asset management processes in real time or close to real time.

**Consistent View of the Organization**

Presenting performance results in a dashboard provides the organization with a single, concise, and common vision of the truth. This allows asset management decision making to be driven by the same vision of truth, aggregated appropriately for the particular level of decision maker.

**Root Cause Analysis**

Dashboards allow users to drill down into the details after spotting abnormal trends in the summary reports. This capability facilitates rapid identification of the source of the abnormality and enables the formulation of meaningful strategies to tackle and solve the issue. The ability to quickly analyze and identify the root cause of abnormal inventory results, for example, can potentially save organizations significant sums of money which will ultimately have a positive impact on the balance sheet.

**Integration of Data from Multiple Sources**

BI tools allow data from multiple data silos to be represented on a single dashboard. Executives and managers are finally able to get a comprehensive view of their organization from a single system. This is particularly important in large complex organizations aggregated from a number of previously independent organizations. Each prior independent organization typically had its own asset management system and the new aggregated organization finds itself with numerous disparate asset management systems. Pulling data from the multiple asset management sources into a data warehouse that supports a dashboard is a key strategy for providing executives and managers of this complex organization with a comprehensive asset management view from a single system.
Reduced Costs and Redundancy

BI capabilities help analysts to gain quick insights from large amounts of data in ways that would be otherwise impossible or cost prohibitive. An example of such a BI capability is the Pivot Table which easily and quickly provides multi-dimensional views and analyses of huge data files. Without a Pivot Table such analyses would be difficult, time consuming and expensive.

Timely Delivery of Actionable Information

Dashboards deliver the right information to the right users at the right time to optimize decisions, thereby enhancing operational efficiency and accelerating bottom-line results. “What’s best about the dashboard”, said Greg Kuechler, director of the Office of the Under Secretary of Defense, Comptroller’s Performance Measurement Team, “is that it’s made us high speed and low drag relative to the painful process we used to follow to generate performance information. What’s more, by making the metrics so easy to get to with just a few clicks of the mouse, the Dashboard has really helped us socialize and internalize our focus on performance.”

Advancing Organizational and Asset Management Maturity

Dashboards give a clear view of key data points that may be used to assess the organizations progress toward specific goals. Knowing what is going on in your organization is not merely good; it is a prerequisite to success. Being able to advance this knowledge to make reasonable forecasts about the organization’s asset management operations, and thus better decisions to guide the organization, is even better: it is what distinguishes the best from the merely good. Such an organization is able to keep a clear focus on its strategic goals and steer the organization effectively towards achieving those goals and the desired level of organizational and asset management maturity. In 2008, Government Fleet magazine recognized the City of Oxnard, California, as the #3 Public Sector Fleet in the country. In announcing this award, Government Fleet recognized the City’s improved fleet efficiency as being linked to its Dashboard program.

Dashboards Characteristics

Organizations are increasingly using Dashboards to provide at-a-glance views of current organizational performance and support timely decision making. In his treatise “Deploying Dashboard and Scorecards” published in The Data Warehouse Institute (TDWI) Best Practices Report of July 2006, Wayne Eckerson describes dashboards as:

“… 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 data.”

Dashboard at-a-glance views are supported by their three basic characteristics, which Eckerson calls “The three threes”. These characteristics are:

One: Three Applications

Every dashboard contains these three applications: monitoring, analysis and reporting, and management, Eckerson writes. These sets of related functionalities are woven seamlessly and built on information designed to fulfill the needs of the user.

Two: Three Layers

The most distinctive feature of a dashboard, Eckerson writes, is that it contains three layers of information. A performance management system lets users peel back layers of information to get to the root cause of a problem. Each layer provides additional details, views, and perspectives that enable users to understand a problem and identify the steps they must take to address it. These three layers are:

- Graphical abstracted data to monitor key performance metrics.
- Summarized dimensional data to analyze the root cause of problems.
- Detailed operational data that identifies what actions to take to resolve a problem.
Three: Three Types

Eckerson’s third dashboard characteristic consists of 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 and 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** monitor the execution of corporate strategic objectives at each level of the organization and emphasize management more than monitoring and analysis. They are often implemented to support a Balanced Scorecard methodology.

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**Figure 1:** Asset Management Dashboard Displays of Layered Information

**Figure 1** shows a number of Asset Management Dashboard displays that represent the various layers of information. The dial (upper right) is an example of graphical abstracted data. The pie graphs are examples of summarized dimensional data. The chart on the lower right represents detailed operational data. Some of the data in the chart has been redacted per request of source.
An organization can have all three types of dashboards, each focused on different functional areas. Further, these dashboards should all be built on a single data infrastructure and application platform to deliver consistent performance information throughout the organization.

Beware of “Quickie” Dashboards
Effective Dashboards require careful planning, design and implementation. Dashboard requirements should be determined by thoroughly assessing important organizational needs. When dashboard design and implementation are rushed the user can be left with severe operational challenges.

1. The dashboard may have limited drill-down capability or interactivity with source data which prevents execution of root cause analysis.
2. The dashboard may be difficult to use and maintain, requiring extensive IT expertise and time to maintain and modify.
3. The dashboard may constitute a data silo and not provide a single view of performance across the organization.
4. The dashboard may present fancy but functionally ineffective graphics that do not show the data dimensions necessary to make a decision clearly and accurately.

These challenges can be prevented by the development of thorough requirements specification which will guide the building of the dashboard.

Dashboard Deployment Leading Practices
The adoption of industry leading practices, operating tactics and winning strategies helps organizations chart courses to superior dashboard performance. The major source used in compiling these leading practices is The Data Warehouse Institute (TDWI). TDWI is a premier provider of in-depth, high quality education and research in the business intelligence (BI) and data warehousing (DW) industry.

Develop a Clear Strategy
Develop a clear strategy on what is expected from the Dashboard solution to make it live up to its purpose as an efficient and actionable BI tool. Keep in mind, however, that after deploying a new dashboard end users typically start to see and think about information in new ways. This new thinking about information may unlock some intellectual creativity and generate ideas that will enhance the system. This is a good thing as long as organizations remain true to the principle that anything presented on the Dashboard must have direct relevance to critical organizational activities and be actionable by the organizational user.

Develop Effective Metrics
Involve both functional and technical personnel in developing metrics. Ensure the people whose performance is being measured understand, accept, and endorse the metrics. Avoid cluttering the Dashboard with more metrics than a user can understand and act on. As a rule, plan to have no more than seven metrics for a single screen.

Additional leading practices related to metrics include:
- Develop data source mapping for each metric area.
- Ensure there is a direct link between the data sources and the metric table or graph. In this way changes to the data sources are automatically updated on the metric table or graph. This mapping also facilitates drill down to source data.
- Design, develop and populate initial metric charts with raw data and integrate, where necessary, information from various sources, to create a cohesive product.
- Develop analytic planning support that includes developing checks and balances on metric data submission.

Plan for Real Time
A performance management system populated with more timely data will allow executives and
managers keep their fingers on the pulse of the organization in ways they never could before. They will be able to work more proactively to optimize performance.

**Plan for the Long Haul**

Prepare for 20 percent growth in users, 15 percent growth in queries, and four to five new data sources each year. Design the initial footprint of your system to be 15 percent more than your most optimistic forecast and develop a plan to guide system enhancements after initial deployment of the dashboard. Without expansion planning, rapid growth in system use can place an undue burden on processing power, networks and databases.

**Develop on a Single Platform**

When managers build their own dashboard solutions, independent of each other, the resulting dashboard silos eventually compete with each other for resources, and undermine the organization’s ability to get a single picture of performance. Additionally, these independent dashboards can give different answers to the same question if the system assumptions and/or calculations differ.

**Dashboard Requirements Specification Process**

The requirements specification process provides a structured methodology for defining the full range of organizational and technological requirements that will align the Dashboard with an organization’s needs and expectations, and provide a clear road map for the IT developers. The Dashboard should be designed and adapted to support both the specific needs of the Asset/Property Management Division and the broader strategic needs of the organization. While being organizationally-driven, this Dashboard should also have the requisite technological muscle to generate critical information requirements.

The requirements specification process encompasses a cascading set of seven functions as shown in Figure 2. These are:

**Figure 2: Dashboard Requirement Specification Process**

- Define the need
- Define the user
- Define dashboard type
- Assemble stakeholders
- Fix system boundaries
- Elicit requirements
- Analyze, prioritize, specify
1. **Define the need.**
   The entire requirements specification process must be focused on a clearly defined need. The ultimate goal of the process is to satisfy the defined need.

2. **Define the primary users.**
   Typical primary asset management users might include roles such as Asset Management Officers, Accountable Property Officers and Property Custodians. As primary users are identified and defined think of their functional scope (Operational, Strategic, Tactical) and group them accordingly. Additionally, think of the non-typical user, e.g., the corporate finance officer who needs accurate and timely information on the acquisition and disposal of capital assets to maintain accurate Property Plant and Equipment (PP&E) data for the balance sheet. The dashboard could provide an excellent opportunity to provide data linkage between the physical asset flows and financial flows. The corporate finance officer could be a viable candidate as a primary user for the dashboard. The point here is that we may need to think out of the typical asset management box as we work to identify primary users, and indeed throughout all aspects of the requirements specification process.

3. **Define the type/types of dashboard to be developed.**
   The primary users will drive the decision for the types of dashboards to be developed i.e., whether Operational, Tactical or Strategic. While the need for tactical and operational dashboards seems intuitive, asset managers should use this opportunity to link their work to the strategic goals of the organization and thus be recognized as strategic-level players. Effective asset management, for example, positively impacts the organization’s balance sheet. Thus, goals should be established for metrics that have the power to strategically impact the organization's balance sheet and these metrics should be monitored on a strategic level dashboard.

4. **Assembling the stakeholders.**
   Your stakeholders are all the groups of people who will be impacted directly or indirectly by the dashboard. Ensure you have a representative from each impacted group. The first three steps are usually executed by a small team from the office of the “Champion” for the dashboard. This core team then enlarges when you assemble the stakeholders. The “Champion” is the stakeholder who has the most to gain from the dashboard and helps to drive the development of the dashboard forward. Additionally, from the inception of the process you should have a technical advisor to help you define the technological requirements and vet the technical feasibility of user requirements.

5. **Fixing system boundaries.**
   The operational components of the organization for which the dashboard will produce reports need to be clearly defined. These operational components fall within the system boundaries for the dashboard. Fixing system boundaries helps in clarifying how the dashboard will integrate with the business process, and what its scope and limitations will be.

6. **Elicit Requirements.**
   During requirements elicitation the lead for the requirements specification process draws from the stakeholders their requirements for the dashboard and what they expect it to accomplish. Based on the number of stakeholders, the initial list of requirements gathered could run into several pages and will include both functional and technical
requirements. Examples of functional requirements asset managers might desire for the dashboard include:

a. Summary and detailed listings of all assets
b. Location data on assets
c. Summary and detailed asset cost data
d. Inventory performance data – scheduled vs. actual
e. Inventory accuracy rates
f. Lost, damaged and destroyed assets - summary and detail data
g. Summary and detail data on asset disposals

Examples of technical requirements include issues such as system usability, reliability and supportability.

7. **Analysis, prioritization and specification of requirements.**

In this final step, the requirements are clarified, analyzed for feasibility, integrated where possible, and any conflicts resolved. The requirements are then prioritized and a decision made on the final set of requirements that will be provided to the dashboard developer. This final step is usually quite intense and is best conducted at an offsite location to facilitate focus and prevent work distractions.

**Summary**

High-performing organizations need information that is timely, clearly presented, and which supports effective decision making to drive better performance. Dashboards satisfy this need by integrating performance management and business intelligence to provide a powerful new way to communicate strategy within an organization, and monitor and analyze organizational activity. Well designed and developed Asset Management dashboards offer insight, explanations, and shared understanding of critical asset management information, and then allow the users to act upon this information when and where necessary. The requirements specification process is critical to the effective design of a dashboard. It provides a structured methodology for defining the full range of organizational and technological requirements that will align the dashboard with an organization’s asset management strategy, needs and expectations, and provide a clear road map for the IT developers.

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**ENDNOTES**

3. Ibid., p. 5