Dashboards for Management

Werner Beuschel
Brandenburg University of Applied Sciences, Germany

INTRODUCTION

Dashboard system applications have been known in companies for several years. As the growing body of references shows, dashboards are now about to become more widespread, not only in numbers but also in terms of application areas (e.g., Eckerson, 2006; Few, 2006; Malik, 2005). The fact that almost every company is equipped with a great number of information systems, their infrastructure being largely dependent on software, supports the interest in high-level and condensed information representation. Originally, user interfaces and data representations of operational and administrative systems are not always designed for management-level use, so a need to bridge this gap develops.

Based on information technology infrastructure and forced to act in a complex and contingent environment, most organizations feel the need to create high-level overviews for managing tasks. The idea of dashboards is aimed at helping to visualize large amounts of data in a condensed representation, providing a quick overview of organizational processes and supporting managers in their decision-making tasks.

Dashboards started out to play a growing role not only in making data available in appropriate and concentrated formats, but also in representing these data in an easy-to-read display that makes reactions quick and easy. So, dashboards are increasingly used to act as mediating systems between the infrastructure technology and the need for information on decision-making levels. As an additional driver, the availability of vendor software and free software for graphical representations may contribute to growing dashboard diffusion. Finally, the ubiquity of complex systems on our own desks as day-to-day users may make us yearn for simpler representations. So, there is clearly a thrust to introduce more of these systems that deserves attention.

The article provides an introduction on dashboards and their position in the history of decision-making systems, not without pointing out the inherent problems the term as a metaphorical label for systems carries. Development issues and use factors are described and some examples are given to represent the multitude of practical solutions.

DASHBOARDS AS DECISION SUPPORT SYSTEMS FOR MANAGEMENT

Management information systems (MISs), executive information systems (EISs), and decision support systems (DSSs) were the academic fields that laid the foundations for dashboard functionalities in the 1970s (Laudon & Laudon, 2004; Marcus, 2006). The field of DSS introduced the idea that computer technology could help managers to make decisions. Increasing availability of data from all branches within an organization and use of enterprise-wide information systems provided the need as well as the base for easy-to-read information.

All functional areas in an enterprise, from manufacturing and production, finance and accounting to sales and marketing are now making use of decision support by computers. They all provide access to internal data sources that originate from the variety of systems in a company. MISs summarize and report on basic operations, while DSSs address decision problems where the solution-finding process may not be completely structured. DSSs may also incorporate external data sources, for example, from competitors or important institutions.

It is not quite clear when labeling decision support systems as dashboards started. It seems that about the mid-1990s, the term was applied to software systems (Few, 2006). It may also be a matter of definition if a decision support system is called a reporting system or a dashboard. Two examples may be quoted. The introduction of SAP/R3 in 1997 by the Nissan car manufacturing company in its Australian branch is quoted as an early success story of an EIS. Management had requests for profit analysis reports at that time. So the system was accompanied by a reporting facility that included "profit-and-loss reports, gross margin analysis, balance sheets, and wholesale and retail vehicles" (Laudon &

Laudon, 2004, p. 368). Another example of an early adopter (since 1998) and long-time user is General Electric, "where executives use dashboards to run their day-to-day operations, monitoring profits per product line and fill rates for orders" (Ante, 2006, p. 50).

Originally, a dashboard denoted a control panel of a vehicle, located below the windshield, where instruments and dials show basic functions of the engine to the driver (cf. "Digital Dashboard," n.d.). It is interesting to notice that from a current perspective, dashboards in cars and for management support are not so different as both now contain lots of software with a similar purpose: the quick overview of system-relevant data.

Characteristics of Dashboards

The literature on dashboards generally agrees on the following features:

- **Visualization:** Graphical representation of selected data
- **Selection of relevant data areas:** Information derived from and providing for key processing (or performance) indicators (KPI), their selection being dependent on specific contexts and objectives of an enterprise (or organizational unit)
- **Monitoring and interaction:** Interactive accessibility via the monitor of a computer system ("Digital Dashboards," n.d.; Eckerson, 2004; Few, 2006; Malik, 2005)

Stephen Few (2004, p. 1) provides a definition incorporating these characteristics:

A dashboard is a visual display of the most important information needed to achieve one or more objectives, consolidated and arranged on a single screen so the information can be monitored at a glance.

Visualization

All kinds of visual representations can be used as long as managers can interpret them from their task environment: alerts, summaries, bar charts, pie charts, gauges, and so forth (cf. "Digital Dashboards," n.d.). A frequently quoted example of visualization is the traffic light since it makes use of an easily understandable icon of day-to-day life that can be grasped with one glimpse. A red, yellow, or green light indicates the state of a certain area, like production numbers. This element of visualization could be compared to a minimalized version of an exception-reporting feature, known from controlling (Few, 2006). The main task is to signal positive or negative exceptions, caused by a deviance of data from given values. The goal of the visual signal is to indicate a potential need for action.

Selecting Relevant Data Areas (KPI)

Information systems for management support derive their value from representations of otherwise complex data that are permanently generated by a host of infrastructure systems in an enterprise. So a system must provide relevant data for the current state of an organization in its various units and situations. The selection of key indicators and their interpretation depends on the organizational context.

A dashboard basically follows the same intention by compressing informational complexity into simpler representations. The presentation of every detail is not important, but an appropriate condensation and visual representation so that structural properties and connections of organizational situations become visible.

From this perspective, dashboards are not systems in their own right but rather a front-end for all those complex systems an organization needs to store, process, and analyze data. On the other hand, it can be necessary for a user to reconstruct the data before interpreting a condensed representation. Thus, an important function in connection with KPIs is the drill-down capability, comparable to a looking glass allowing one to go back to a level of detail that is often buried deep in an enterprise.

Monitoring and Interaction

A dashboard can visualize large amounts of data, which were originally distributed among various software and even hardware systems, in a condensed representation. The granularity of the data and the visual form are dependent on managerial and business objectives and preferences. The reduction from mass data to comprehensive visual representation is executed by built-in algorithms. This requires quantifying and qualifying available data during the system development phases, a selection process that is highly sensitive and depending on the end user.