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DEVELOPMENTS IN PRACTICE XX - DIGITAL DASHBOARDS: KEEP YOUR EYES ON THE ROAD!

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ABSTRACT

The authors convened a focus group of senior IT managers from a number of leading edge organizations to explore the topic of digital dashboards – defined as “electronic interfaces (typically portals) that provide employees with timely, personalized information to enable them to monitor and analyze the performance of the organization”.

Whereas earlier executive-based systems were not only “hand-tooled” exclusively for executives, they were also designed for (and based on the anticipation of) executives performing “what-if” analyses. In contrast, today’s digital dashboards appear to be much more focused on providing information (i.e., access) and much less focused on supporting the analysis of the information provided. While this difference appears nuanced, it represents a profound difference in terms of the how the management function is supported by information technology.

An analysis of the focus group’s dashboards found three different categories:

- *performance-based* to display the basic mix of financial and non-financial results broken out by current versus previous period, actual versus target,
- *project-based* which relate primarily to status reporting where the only comparative data is “actual to budget”, and
- *opportunity-based* where the goal is to guide employees towards new opportunities for enhancing the business.

While each category is for an express purpose, it is possible to group the benefits of all dashboards into the following four categories:

- alignment with strategy and accountabilities,
- enhanced decision making support and analysis,
- improved integrity and timeliness of data, and
- operational efficiencies.

Furthermore, these benefits are no longer only for the senior executives. The availability of digital dashboards changed Executive Information Systems so that they are everyone's information system.

The paper concludes with suggested strategies for implementing digital dashboards successfully to reap these benefits.

Keywords: dashboards, business intelligence, decision making, executive information systems, electronic interfaces, portals

I. INTRODUCTION

The notion of a dashboard conjures up visions of a cockpit festooned by instruments producing critical real-time information enabling a pilot, in control of immensely powerful technology, to perform superhuman feats. The business analogy is equally compelling: a manager, armed with a system to monitor the vital signs of the organization, taking appropriate actions when triggered to do so. Perhaps this vision explains the flurry of interest in digital dashboards in business. The question is ... why now?

From an historical perspective, the current interest in digital dashboards appears to be the result of the confluence of four major developments:

1. *Critical Success Factors:* The concept of critical success factors (CSF) is that managers should monitor a limited number of factors (perhaps four to six) on a continuing basis to stay in control [Rockart, 1979]. By extension, information systems focused on CSFs would guarantee the provision of mission critical information. Critical success factors are an early warning system. When signals appear, managers are called to action. The CSF methodology does not (nor does it purport to) identify what action to take. It is simply a minimalist approach to information overload.
2. *Executive Information Systems:* Executive information systems (EIS) introduced the notion that, to be useful, information needs to be tailored to managers. [Crockett, 1992; Nord and Nord, 1995; Paller, 1987; Sang and Chen, 1997; Watson et al, 1992]. EIS was instituted partially in revolt against the information overload of standardized reporting. For the first time, managers could pull together information from discrete systems and offer "drill down" capability. Given the expense of designing and building these systems tailored to the whims of specific executives, not to mention the ongoing maintenance required to provide "near real-time" feeds from disparate systems, it was no surprise that they were available for executives only and to very few of those.
3. *Balanced Scorecards:* Balanced scorecards [Kaplan and Norton, 1996]. articulate a comprehensive framework for corporate goals which cascade down the hierarchy via sub-goals and/or roll back up into corporate goals. It demonstrated how unit performance could be linked to high level initiatives within a framework to recognize and balance the financial, people, customer, and learning goals of the organization.
4. *Technology:* The combination of browser-based technology (e.g., portals, intranets) and technology enabling the integration of information and data (e.g., online analytical processing, query and reporting, ad-hoc analysis, data integration and application development tools) together facilitate the collection and dissemination of information to all members of the organization on a cost-effective basis. These developments changed EIS from executive information system to everyone's information system.

Taken together, these developments paved the way for digital dashboards whose promise is no less than the delivery of a robust, integrated system of accountability and performance that puts managers in the driving seat. To explore how organizations are developing and deploying these

dashboards, the authors convened a focus group of senior IT managers from a variety of different companies in several industries. These managers were asked to consider how their firms were addressing a number of issues in this area, including:

- what IT dashboards were built,
- what design criteria were being used,
- how effective these dashboards were proving to be,
- what challenges were encountered with the introduction of dashboard capabilities, and
- what lessons were learned so far.

We address these issues in this paper, beginning with some definitions in the next section.

II. WHAT IS A DASHBOARD?

Although many different definitions were presented by focus group members¹, for the purposes of this paper, we define a digital dashboard to be an

“electronic interface (typically a portal) that provides employees with timely personalized information to enable them to monitor and analyze the performance of the organization”.

An information component and a delivery component are inherent within this definition. While this definition is rooted in executive information systems [Lee and Chen, 1997; Van den Hoven, 1996], it differs in two key aspects:

- digital dashboards are not limited to “executives” (and in fact they are not even limited to managers as one member of the focus group pointed out) and
- they are not necessarily “interactive”.

As such, digital dashboards can be applied more broadly within organizations. Whereas earlier executive-based systems were not only “hand-tooled” exclusively for executives, they were also designed for (and based on the anticipation of) executives performing “what-if” analyses. In contrast, today’s digital dashboards appear to be much more focused on providing information (i.e., access) and much less focused on supporting the analysis of the information provided. While this difference may appear nuanced, it represents a profound difference in terms of the how the management function is supported by information technology. Members of the focus group provided many examples of digital dashboards which presented key information in a variety of graphical forms complete with drill-down capability. However, none presented dashboards with embedded analytical models for managers to explore different scenarios under different sets of assumptions. One member stated categorically that “the last thing we want our managers doing is sitting at their desks all day ‘noodling’ over the numbers”!

Members were also clear to differentiate dashboards from reports. Dashboards

“offer real-time or near-real-time access to data and are automated to the point of requiring little or no manual intervention to process and summarize information”.

A focus group member

¹ One member defined a dashboard as a “method of displaying results for key operating metrics aligned to overall business strategy for decision making purposes”. Another suggested that a dashboard “is a portal that aggregates information across the value chain turning information into knowledge and providing the user with the capabilities to make timely, relevant and actionable decisions”.

There was the sense that reports tended to be more standardized and institutionalized within the organization offering much less capability for customization. One manager pointed out the difference as “reports have names” while “dashboards are generic”. Drawing on the cockpit metaphor, dashboards should offer ALL of the critical information required for the task at hand. Group members felt that reports tended to be more specific without the expectation of being comprehensive.

Digital dashboards were also unique in terms of presentation media. Due to advances in technology, dashboards might appear on your workstation, laptop, PDA, or cell phone. One member cited an example of a wall-mounted electronic bulletin board used in a manufacturing facility to supply real-time information on performance against standard metrics and plant-level goals. The “user” of this dashboard is every employee within the plant. Why would an organization invest in this type of dashboard? Dover [2004] suggests that such dashboard usage may be instrumental in converting an organization into a “performance-accountable” organization.

The right technology can tell you how your business is performing at any moment. That technology produces dashboards, which can ultimately change the culture of your business by transforming it into a performance-accountable company. A company begins to become a performance-accountable organization when management commits to increasing each person's knowledge and understanding of what drives performance [Dover, 2004, p. 43].

III. HOW ARE DASHBOARDS BEING USED?

When asked about their use and deployment of digital dashboards, group members agreed that usage was definitely increasing, primarily focused on operational and/or financial data, and being used right across the business ... and at all levels. Furthermore, group members reported a significant pent-up demand for dashboards within their organizations. According to one manager, “today everyone wants a snapshot of their business ... like a one-stop shop”. An analysis of the various examples of dashboards found three different categories: performance-based, project-based, and opportunity-based.

Performance-Based. The most popular category, these dashboards display the basic mix of financial and non-financial results broken out by current versus last period, actual versus target, sometimes earmarking performance against competition. Content might include product sales, cash flow, inventory management, sales growth, market trends, and repeat versus new business. Most offer drill-down capability, and near real-time if not real-time information. Standard dashboarding formats were color-coded like traffic signals; that is, green indicates okay, yellow indicates a warning and red indicates a problem. Everything displayed relates to outcomes. The implicit intent of this category of dashboard is to alert employees of either an impending or existing problem requiring action.

Project-Based. Information presented by these dashboards relates primarily to status reporting where the only comparative data is actual to budget. These reports might reflect completion of key tasks and/or milestone events, assignment and availability of resources, modifications to plan, revision of estimates and progress tracking, and implementation forecasts. Traffic signaling can be used as can a number of typical project charts such as Gantt charts and critical path diagrams. As with all dashboards, while the form is at the discretion of the user, the content available to an individual is dictated by the person's overall responsibility. For example, a project leader would be given a dashboard specific to his/her project; a senior project manager's dashboard would report on the status of all of the projects for which he/she is assigned; and the VP in charge of business systems would see all major new development plus maintenance and enhancement broken out by lines of business.

Opportunity-Based. While project-based and performance-based dashboards allow monitoring the ongoing business, the goal of opportunity-based dashboards is to guide employees towards

new opportunities for enhancing the business. Although the focus group included fewer examples of this type of dashboard, the examples they did share were unique and, on the whole, highly successful. One example came from the sales division of a pharmaceutical company. Their dashboard targets and tracks the leading objections to certain drugs by prescribing physicians and provides research to counter/answer these questions to the sales force. Another example, broadcasts industry trends (again to the sales force dashboards) outlining how to position the company's products most effectively in this market. A third example simply presents "gaps" in the firm's operations; that is, interesting observations/trends in the market place that might allow the firm to expand. A manufacturing firm used its dashboards as a platform to share best practice among similar operating units. On a sporadic basis, unit managers discover a "light-bulb" icon on their dashboard which signals the existence of a best practice. When clicked, details are provided. According to this manager, the best part is that "it provides strong motivation to apply best practices and to create them" as recognition is granted to those who share.

Vandenbosch [1999] suggests four management information uses of executive support systems: score keeping, problem solving, focusing organizational attention and learning, and legitimizing decisions.

1. *Score keeping* is "usually a standardized process that evolves over long periods of time in an organization. It is characterized by consistency between time periods so that comparisons are easy to make" [Vandenbosch, 1999].
2. *Problem solving* consists of a sequence of steps including recognizing the existence and nature of a problem, outlining alternative possible corrective actions, and deciding on the best action and then implementing it.
3. *Focusing organizational attention and learning* must first obtain agreement on the targets of attention. Learning entails a feedback loop to link attention, action, and outcome.
4. *Legitimizing decisions* represents information collecting activity to justify past decision making rather than to guide future decision making.

When we examine the three types of digital dashboards and the examples provided by the focus group, we observe that the performance-based dashboards and the project-based dashboards predominantly represent score keeping and problem identification with little capability for problem solving and analysis (perhaps just reflecting the focus of today's dashboards on access as opposed to analysis). The opportunity-based dashboard, in contrast, works to focus organizational attention and facilitate learning. The missing usage is problem solving. Here, the operative rule seems to be "leave the problem solving to managers".

It can be argued that the ability to focus organizational attention and legitimize decisions is built into dashboard design; that is, the decision as to what is most important to monitor via the dashboard is a decision as to where organizational attention will be focused. This underscores the importance of dashboard design and explains much of the effectiveness of these initiatives. Vandenbosch's study of executive support systems confirms this as she discovered focusing organizational attention led to the strongest relationship to perceived organizational competitiveness. Further to this point, Houghton et al [2004] describe the successful deployment of "vigilant" dashboards at Western Digital. The primary advantage of these proactive "sense-respond" information systems is their ability to focus managerial attention within a highly turbulent marketplace on situations that require corrective action. The degree to which a dashboard monitors the competitive landscape dictates its vigilance.

IV. DESIGN AND DEVELOPMENT

The focus group was asked who was responsible for designing and developing dashboards within their organizations and whether best practices were emerging. The answer to the latter question was "yes, best practices are emerging" which defined the present state of the art. In terms of

responsibility for designing and developing dashboards, the group was in agreement that it was a shared responsibility between IT and the business.

“IT builds and implements our dashboards. Even though the tools to design the controls are simple, the logic and calculations to extract the data from the databases to feed the dashboard requires a higher level of skill”. A focus group member.

In addition to having the requisite skills for data extraction, other responsibilities that are expected to remain with IT include tool management, integration, and operations support. While recognizing specific areas where IT needs to retain responsibility, members of the focus group also were actively moving towards a self-service model where it made sense.

“IT builds the prototypes for various dashboards. The complexity of the task dictates that IT is involved. Building cubes, delivery mechanisms, and data-marts is a complex task which requires some level of expertise. That said, my company is committed to deploying a self-service reporting framework to empower the enterprise. We do not view IT as a ‘creator’ of reports/information. Rather, we view ourselves as building the ‘delivery vehicles’ and exposing the information to the end-user”. A focus group member explaining his company’s approach.

CONTENT AND DELIVERY ISSUES

Design and development issues primarily relate to content and delivery. While content issues focus on the information that is included within the dashboard, delivery issues focus on how that information is presented. Logically, the two are separate; in practice, they are closely related. For instance, the information that you can present depends on the device the manager is using. Delivering information to a cell phone is not the same as delivering the information to a desktop. For this reason, we highlight some of the key issues raised by the focus group about content/delivery in combination.

- *The balance between hot information and long-term baseline information. Some users of traffic light (i.e., red/yellow/green) dashboards ignore everything if their dashboard is green and attend to issues only when they heat up (i.e., turn yellow or red). Group members provided examples of when “green wasn’t always good” and “yellow/red wasn’t always bad”. The design of dashboards must be closely tied to the task, the decision maker, and the metrics used to monitor the organization.*
- *Tailoring the dashboard. Focus group members argued that, to be effective, dashboards must be tailored to a job, a task, and location and then personalized by the individual. To do this tailoring and personalization requires identity management capabilities. For example, as a salesperson, your access to information will depend on your current role (e.g., territory, product line), your current location (e.g., in the office or in the field) and your access device (e.g., PDA, cell phone, laptop) so that the information can be linked to appropriate business metrics.*
- *The granularity and timing of the information. How far you can drill down or whether you can see other comparable organization units’ performance relates to your entitlement as dictated by your identity. In addition, it is important to sync the dashboard information with the decision framework. One focus group member gave this example. At his company, JD Power is used to measure customer satisfaction and results are provided daily to dashboards. When new campaigns are launched, care must be taken to align the customer satisfaction data temporally with other information in order to assess the distinct impacts of the campaign. With targets set on a monthly basis, customer satisfaction linked directly to personal evaluations, and managers receiving real time feeds, significant angst can be caused by timing differences.*

- *Personalization. While group members argued that dashboards were most effective when managers were allowed to personalize them, they also recognized the need for setting limits on the degree of personalization. For instance, they clearly indicated a need for a common set of metrics so that managers could compare (and be compared) to other like units within the organization. One focus group member felt that dashboards needed to be “personalizable but not individualistic” which perhaps best captures the balance being sought. Most companies offered the ability to select from a set of widgets (i.e., standardized graphical components) to be included on their dashboards as well as the ability to rearrange their dashboards perhaps to “push key information to the top”. Most companies designed dashboards to be as flexible as possible so that they could react to (and reflect) key business imperatives as they arise.*

V. WHAT ARE THE BENEFITS?

Digital dashboards are a recent phenomenon. As such, the dashboard literature is premature, perhaps somewhat faddish. To remedy this lack, we augment the dashboard literature with a review of the literature that arguably pertains to digital dashboards (that is, executive support systems, executive information systems and decision making). The basis for the majority of this work is provided by Simon [1977] who delineated the stages of decision making and focused on the role of information in the process of decision making. Years later, Rockart and DeLong [1988] proposed four ways that executive support systems can create value. From most to least valuable, they are:

1. Enhancing the way executives think about the business.
2. Providing executives with better planning and control capabilities.
3. Leveraging the executives' time.
4. Educating executives about the use and potential of IT.

We would not likely argue much with these today and certainly not with the order of their importance. Like the executive support systems of the past, the intent of today's digital dashboards is to:

1. focus employees on the right issues by anchoring their dashboards on a critical set of metrics well aligned with the corporate goals,
2. alert decision makers to those situations needing attention, and
3. help users to understand what is happening by observing patterns all in the aid of making everyone's time count. No disagreement here.

Other benefits are attributable to dashboards:

1. An energy company attributed 2% of its \$1.3 million annual savings directly to its usage of its dashboard [Dover, 2004]. The dashboard played a pivotal role within a corporate-wide initiative targeted at improving operations, increasing sales, reducing expenses and improving repair call efficiency. The key role was in highlighting the need for employee skills, training, measurement and development as found by district performance comparisons. The benefits were attributable to an energized workforce who, perhaps for the first time, could link their contributions directly to corporate objectives.
2. Dover [2004] claims that dashboards can transform an organization's culture into a performance-accountable company. Similar to the previous example of the energy company, he suggests that dashboards alter culture by the straightforward mechanism of

“allowing individuals to see the big picture and, more importantly, understand the impact of their actions on the rest of the company ...this, in turn, drives a

culture of transparency throughout the organization because they monitor progress toward achieving corporate, department, or individual goals”.

3. Some benefits cited in the literature are actually side-benefits. In an article about business intelligence, Williams [2004] makes a strong argument for the need for dashboards (and all analytical reporting systems for that matter) to operate from the same set of facts: the so-called single view of the truth. The process of creating digital dashboards provides the incentive to agree on the specific metrics to be included and to agree on the definition and measurement of these specific metrics. To do anything less would be to undermine the value, credibility, and eventual impact of the dashboard. Thus, while dashboards do not produce data definitions, they do produce the context and impetus for management attention to data quality. In a similar vein, one focus group member recounted how the development of a digital dashboard spurred management to develop a methodology for aligning different functions within the business with overall corporate goals. Miller and Cioffi [2004] share a similar experience with marketing digital dashboard at Unisys.
4. Lee and Chen [1997] argue that a manager must engage in three types of thinking:
 - *retrospective*. Thinking back in time to review and interpret past events and experiences;
 - *introspective*. Reflecting and examining one’s own thoughts, beliefs, and assumptions; looking into ones’ own mental models; and
 - *prospective*. Thinking out into the future and envisioning the future state of the organizational environments.

The implicit argument is that digital dashboards would provide benefits to the extent that they could support all three types of management thinking.

We asked the focus group if they felt that their digital dashboards provided support for these different types of thinking. The overall response was that few individual dashboards would support the full range of thinking but dashboards are capable of supporting each specific type of thinking (e.g., retrospective). To an extent, it depends on when the data presented within a dashboard is anchored; for example, in the present, past, or future state. One focus company anchored most of its dashboards in the future. This choice was a conscious decision to “get away from simply meeting targets”. They wanted “all eyes to the future” and they wanted their managers focused on how best to get to this future state. Other firms used a blend of leading versus lagging indicators to extract trends and support more prospective thinking.

“from a retrospective view, dashboards can provide analysis of a particular time period and enable a manager to examine the effectiveness of a particular course of action. Forward looking dashboards (when interpreted appropriately) highlight trends in data which can provide the catalyst to propel new business opportunities. Good managers and effective leaders are continually looking to identify trends in information”. A member of the focus group.

Another manager commented that most dashboards provided historical information based on comparative metrics. But,

“these same dashboards support introspection as the heuristics/rules that trigger the event state changes are really just a reference to current beliefs”.

He felt that dashboards were also prospective

“since they provide an aggregate view of many data sources where such a view would otherwise not exist. Assuming a trend is a predictive model of future behavior, dashboards do provide prospective value”.

In contrast to the claims made by the energy company above [Dover, 2004], some claim that the most severe shortcoming of executive information systems (and dashboards by extension) is that they only help managers understand where the organization is today and do little to help them visualize where it can be in the future [Lee and Chen, 1997]. The focus group members were in partial agreement with this statement. All agreed that a major function of the majority of dashboards is to provide a status report but that enhanced reporting is certainly available for dashboards. According to one manager, the former is referred to as the dashboard as speedometer model. An enhanced dashboard would provide the ability to ascertain the appropriate speed given the context of traffic congestion, road condition, weather, and visibility.

The general point of agreement among focus group members is that they believe that dashboards are indeed providing realizable benefits to organizations. Demonstrating these benefits in hard numbers, however, is not so easy. For instance, none of the focus firms could provide effectiveness measures for their dashboards. Some had just started to solicit feedback from dashboard users. Group members cited the following benefits as being fully or partially attributable to dashboard development within their organizations. These benefits are grouped into the following four categories:

1. Alignment with strategy and accountabilities
 - They focus attention on critical issues for the business
 - They introduce clearly assigned accountability for key performance indicators. Managers now focus on those components that they directly control or influence which drives ownership of results.
2. Enhanced decision making support and analysis
 - They provide management with better insight from data
 - Management spends more time on value-added analysis which supports better decision making
 - Management focuses on a limited number of metrics that combine both operational and financial measures, as well as forward-looking indicators which provide input for proactive performance management.
3. Improved integrity and timeliness of data
 - They provide faster access to information, effort avoidance for information gathering and analysis. They enable an enterprise to disseminate information to any number of people very quickly and accurately.
 - They are directly or indirectly responsible for increasing the accuracy and consistency of the information being reported
 - Development of one database of operational and financial information drives improved integrity: one source of truth.
4. Operational efficiencies
 - Dashboards create a self-serve environment which reduces traditional centralized functions and the burden on other areas of the business (e.g., report writers)
 - Standardization of data definitions, reports, and associated processes reduces cycle time
 - Streamlined data aggregation and reporting process, supported by standard tools and processes
 - Increases in the degree of automation drives timely reporting of results and facilitates the reallocation of resources to more value-added activities

According to group members, these benefits “do not simply fall out of the sky and land on your head”. Instead, they must be engineered. Towards this end, we next present strategies suggested by members of the focus group to enhance the successful development of digital dashboards.

VI. STRATEGIES FOR SUCCESS

Based on their experiences, focus group members articulated the following strategies which they believe would contribute to the successful deployment of digital dashboards. Each are described briefly below.

MAKE A GOOD FIRST IMPRESSION

The old adage that “first impressions can be lasting” applies to the introduction of dashboards.

“The power of dashboards relies significantly on the success of user adoption. It comes down to how rapidly a critical mass of users will adopt the dashboard interface to perform their daily activities”. [Dover 2004]

And, according to the focus group, adoption can depend heavily on the initial dashboard launch. One company used a pilot approach to building and introducing its dashboards. Five dashboards were assembled within 6 weeks from start to launch. In hindsight, it could be seen that these rapid pilots delivered identifiable benefits by:

- creating a lot of excitement around dashboards;
- getting rapid executive buy-in;
- providing a great source for design requirements;
- generating a lot of goodwill; and,
- getting the development team moving quickly.

The only downside was to create unrealistic expectations in terms of how fast industry strength dashboards could actually be implemented.

However you introduce dashboard technology, it is important to get it right the first time as you seldom get a second chance surrounded by the same level of interest and excitement. In addition, focus group members felt that it was imperative to move ahead with a dashboard initiative fairly quickly in order to signal intent and commitment to the organization and perhaps ride the early interest created by the novelty of dashboards. This approach was preferred over what Dover [2004] refers to as “drip feeding” the technology over a period of time expecting usage to grow voluntarily. The other strategy outlined by Dover [2004] and the one preferred by the focus group was for the organization to require dashboards as the corporate standard tool for viewing business results.

METRICS FIRST ... DASHBOARDS SECOND

The advice provided by the focus group was “be careful what you measure”. The reason for this advice is that people will make every effort to perform well against these measures. Many examples were cited by the focus group where seemingly sound measures actually resulted in dysfunctional behavior. In one company, call centre metrics included time to respond to call, time to resolve problem, frequency of problems solved by first agent, duration of call, and frequency of call-backs. They soon discovered that agents would answer calls within the guaranteed minimum time and then park the caller. After a short elapsed time, the customer who was parked was transferred to another agent without recording the agent who parked the call originally. Agents would simply disconnect a call as the maximum time allowed for a call approached. Within months, the company modified its original metrics to reward agents who were able to resolve clients' requests satisfactorily even if it meant spending more time.

One focus group member saw dashboards are a “means to an end ... they are not the end”. Interest in dashboards should naturally arise from a larger corporate initiative to focus the organization's attention on key issues. To the focus group, the ideal situation is an organization with an established balanced scorecard [Kaplan and Norton, 1996] or some similar well-articulated measurement framework in place. In such organizations, dashboards can be based on

the set of specific metrics that are already established and accepted. These metrics dictate the information to be contained within the dashboards of the managers at each of the various levels within the organizational hierarchy with assurance that lower-level dashboard results can be rolled up into corporate level dashboards. Miller and Cioffi [2004] suggest that much of the success of the Unisys Marketing Dashboard was attributable to the methodology that was used to “provide direct connections between five key information categories: corporate goals, marketing goals, objectives, activities or tactics, and metrics”. This is the type of structure upon which successful dashboards should be built.

USE “DECISION-IMPELLING” DESIGNS FOR DASHBOARDS

The majority of the information provided by a car’s dashboard is essential for monitoring its operation. Furthermore everything is designed to be observed with a glance. Safe driving entails keeping one’s eyes on the road in order to react to situations which present themselves, sometimes with little warning. Information presentation for an automobile:

- tends to follow internationally accepted standards,
- uses a limited range of colors (e.g., yellow for warning gauges),
- uses a mix of analog, digital and graphical displays, and
- always displays information in the same spot. (Imagine if you had to search the dashboard to find the speedometer each time you glanced to check your speed!)

The focus group felt that similar design criteria should be adopted for digital dashboards. As Einstein is quoted as saying, “make it as simple as you can but no simpler”. The following guidelines were generally accepted by the group and follow this principle:

- Dashboards should adhere to standardized designs.
- Use common templates.
- Apply the “kiss” rule; i.e., keep it short and simple.
- Move critical information to the top.
- Use uniform colorization across dashboards (e.g., traffic lights)

One focus group member cited the example of trying to adopt common color standards within a global company. He experienced difficulties with project managers because red means different things within different cultures. In Canada, it means a project requires senior executive attention while in Mexico it means “yeah, we can fix it”.

ALIGN DASHBOARDS WITH PREVAILING ORGANIZATIONAL CULTURE

Dashboards are not for everyone. Numerous stories were shared about the adoption (also non-adoption and mis-adoption) of dashboards. What each story held in common was some level of friction between dashboard behavior and generally-accepted organizational norms and values. This finding led us to conclude that dashboard deployment should adhere to whatever culture is in place or risk dysfunctional behavior. It is easy to underestimate the impact of resident norms and values. A few examples will illustrate this point.

At one organization with strong business unit management, accepted practice dictates that “no information goes up the hierarchy without first being sanctioned (some used the term laundered) by unit management”. At this organization, a corporate level dashboard was demonstrated to the CEO by the CIO. During this demonstration, the CEO drilled down on some business units and observed certain results. Immediately following the demo, the CEO called the business unit head and asked specific questions about unit operations. The unit manager had no idea that the CEO could access this information and was understandably taken quite by surprise. He subsequently shared his views on this subject with the CIO!

Drill down capability is typically offered on a need-to-know basis. In the above story, the point was not that the CEO was not entitled to see this data. Rather, it was that no one was aware that the CEO could do so. Drill down capability makes it easy for management to view detailed results in their raw, un-sanitized form. Unless the organization is ready for this level of transparency, the focus group warned that providing data via dashboards should be carefully vetted with those who will be impacted.

Another focus group member reported that senior level executives at his organization are averse to viewing reports online. They sought the “comfort of having the reports in their hand particularly when heading into a meeting”. At another organization, there was “some resistance by lower-level executives because dashboards were seen as a top-down requirement pushed upon the business units”. At a third organization, “finance likes to control the communication of results” which are published on a monthly basis after being scrutinized by executives.

The lesson here is that just because direct information feeds are technically possible does not mean that they should be implemented. It is easy to innocently breach well-trodden communication patterns. According to one member, don’t confuse “access, availability and disclosure” when implementing digital dashboards.

DESIGN DASHBOARDS FOR ACTION ... NOT ANALYSIS

In Vandenbosch’s study [1999], she found that three uses of executive support systems (problem solving, focusing organizational attention and learning, and legitimizing decisions) were positively related to competitiveness but that the fourth use (score keeping) was negatively associated with competitiveness. We polled the focus group to find out how they were using their dashboards. Focusing attention was the highest ranking usage. All attested to the power of dashboards to get everyone on the same page.

None of the focus group members felt that their dashboards were focused on problem solving. Furthermore, they were adamant that dashboards should not be focused on problem solving,

“designing a system to suggest (or trial) solutions to problems is a waste of resources ... let people explore solutions ... let people do what they are good at doing ... use the numbers to discover trends and patterns and to help people understand what is going on ... then let them take corrective action”. A focus group member

Problem solving aside, everyone agreed that dashboards need to be action-oriented if they are to be effective. For example, one company made a conscious effort only to include actionable information on their dashboards. The member claimed that it is “too easy to blame the weather or blame the buyers” so they attempt to limit their dashboards to include only information that relates to decisions that can be legitimately carried out by managers. Furthermore, their design rule is that “real-time availability should be balanced against ability to act”. Otherwise it makes little sense. Dashboards can “create a panic if there is no solution set behind it”. To remedy the lack of a solution set, one company tied dashboards to actions by providing “action guides” for different dashboard outcomes. At this point, dashboards almost become a workflow tool. The ultimate goal for dashboards at this company was “to align their dashboards to objectives and compensation and to align their data to processes”.

VII. CONCLUSION

Nothing is new with digital dashboards. The idea of critical information at a glance is dated. Promises of the big picture based on comprehensive information have been used to justify IT projects for decades. Quite simply, digital dashboards are a data-delivery vehicle, no more, no less. However, when they are implemented successfully within a well-articulated measurement framework, they hold the promise of transforming organizations into performance-accountable entities. Like so many other IT-based initiatives, the key phrase is “when successfully

implemented". Inappropriate metrics, unaligned goals, non-standard data definitions, ambiguous interpretation of results, the absence of senior management support, and/or the lack of a unifying vision for the overall initiative will doom any dashboard initiative. Hopefully this paper, based on the insight and hard-won experiences of a group of senior IT managers from a variety of industries, provides some direction towards the successful implementation of digital dashboards. The rewards of getting it right are substantial. So, while nothing is new, everything is possible.

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ABBREVIATIONS

ESS (executive support systems) – flexible tools that provide broad and deep information support and analytic capability for a wide range of executive decisions [Vandenbosch, 1999]

EIS (executive information systems) – an information system which draws from multiple applications and multiple data sources, both internal and external to an organization, to provide executives and other decision makers with the necessary information to monitor and analyze the

performance of the organization [van den Hoven, 1996]. Van den Hoven sees EIS as a subclass of ESS where ESS includes analytic capabilities whereas EIS does not.

CSF (Critical Success Factors) – the idea of CSFs is that there exists a limited set of organizational factors that managers need to monitor on a continuing basis in order to stay in control [Rockart, 1979]. By extension, information systems focused on CSFs would guarantee the provision of mission critical information.

Digital Dashboards – electronic interfaces (typically portals) that provide employees with timely, personalized information to enable them to monitor and analyze the performance of the organization. Digital dashboards could be created to monitor an organization's critical success factors.

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