

Dashboards as a Service

Why, What, How, and What Research Is Needed?

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Recent years have seen the introduction of a “marketing dashboard” that brings the firm’s key marketing metrics into a single display. Service firms across industries have created such dashboards either by themselves or together with a dashboard service provider. This article examines the reasons for this development and explains what dashboards are, how to develop them, what drives their adoption, and which academic research is needed to fully exploit their potential. Overcoming the challenges faced in dashboard development and operation provides many opportunities for marketing to exercise a stronger influence on top management decisions. The article outlines five stages of dashboard development and discusses the relationships among demand for dashboards, supply of dashboards, and the implementation process in driving adoption and use of dashboard systems. Key topics for future research include metrics selection, relationships among metrics, and the ultimate question of whether dashboards provide sufficient benefits to justify their adoption.

Keywords: *metrics; dashboards; accountability; decision support*

Data is prolific but usually poorly digested, often irrelevant and some issues entirely lack the illumination of measurement.

—Little (1970, p. B466)

Still relevant decades later, Little accentuates the tension between the abundance of marketing data at our disposal and the lack of actionable insights that derive from it. Understanding how to use and model data in a service framework is a burgeoning area in the marketing

literature (Rust and Chung 2006). Moreover, systems and process support has been identified as a key area in helping service firms become more customer-centric (Schneider et al. 2005; Shah et al. 2006). A “marketing dashboard,” or simply “dashboard,” brings the firm’s key marketing metrics into a single display (LaPointe 2005). The terminology is borrowed from a vehicle dashboard,

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which reports the few metrics the driver needs to know. As many as 40% of large U.S.-U.K. companies report substantial efforts in this area (Clark, Abela, and Ambler 2006; Reibstein et al. 2005). Many services firms use such dashboards to track marketing effectiveness and guide decision making, in industries such as business communication (e.g., Avaya), pay-TV broadcasting (e.g., British Sky), consumer credit (e.g., Capital One), online services (e.g., Google), gaming (e.g., Harrah's), hospitality (e.g., Hilton), investment banking (e.g., Morgan Stanley), systems integration (e.g., Unisys), and mutual funds (e.g., Vanguard). Moreover, dashboard providers and advisers themselves are offering a service, whether within their company (e.g., to their CMO or CEO) or to the client company. Their offer focuses on knowledge and skills to improve marketing decision making, which represent operant resources in the service-centered dominant logic view (Vargo and Lusch 2004).

Vanguard provides a well-documented case study on the benefits and the currently unfulfilled opportunities presented by dashboards in service firms (LaPointe 2008a, 2008b). Their dashboard measures outcomes important to each business, intermediate funnel metrics, their marketing campaigns, and other activities that drive them. As a result, marketing has moved from an expense to an investment in the future. CMO Sean Hagerty acknowledges,

What is missing is the connection between the individual activities and those outcomes. The next question is: how do you link the long-term measures to the short-term measures? So does awareness and image attributes translate to sales? And I don't know how to answer the question. That I think is the Holy Grail. We have not really solved that.

This article examines the reasons behind the interest in dashboards, what they are, how to develop them, what drives their adoption, and the academic research needed to exploit their potential. This integration of managerial and academic perspectives is our unique contribution to this service area: Business press and books have discussed commercial applications while the handful of academic papers and presentations on this subject have touched upon specific areas such as the motivation for dashboards (e.g., Wind 2005), case studies of specific companies' dashboards (e.g., Miller and Cioffi 2004), the stages of dashboard development (e.g., Reibstein et al. 2005), and dashboard adoption and success (e.g., Clark, Abela, and Ambler 2006).

What is missing is a clear roadmap for further research in the light of mixed results on their current usefulness to marketing decision makers (Reibstein et al. 2005).

Specific gaps in current literature include (1) agreement on a definition of dashboards as a service, (2) investigation on how different starting points of dashboards lead to the same end result, (3) how managers do, and how they should select dashboard metrics, (4) how to model the causal relationships among these metrics, (5) whether the benefits of dashboards outweigh their costs, (6) what drives the adoption of dashboards, and (7) how service industry dashboards differ from goods industry dashboards. Therefore, we believe it is useful to define the area, organize what is known and what is not yet known, and provide a blueprint for scientific answers to these questions. Leading and mastering the development and use of dashboards provides many opportunities for marketing to exercise a stronger influence on top management decisions. In this article, we focus on the development of dashboards in marketing but recognize the value and applicability of dashboards in all areas of firm decision making.

The Purposes of Dashboards

Dashboards respond to the increasing complexity and diversity of market data faced by senior management in the information age. Managers mention at least four factors driving the need for dashboards (LaPointe 2005):

1. poor organization of the many pieces of potentially decision-relevant data
2. managerial biases in information processing and decision making
3. the increasing demands for marketing accountability, given the dual objective of companies to grow the top-line while keeping down costs for a healthy bottom-line
4. the need for cross-departmental integration in performance reporting practices and for resource allocation

Data overload is exacerbated by the fragmentation of media, multi-channel management, and the proliferation of product lines and services (Hyde, Landry, and Tipping 2004). Furthermore, information technology makes it possible for firms to collect and analyze data on customer activities across touchpoints and channels (e.g., Rust and Chung 2006). Unisys, for instance, gathers tens of metrics (MarketingNPV 2004; Miller and Cioffi 2004) generated by brand tracking, Customer Relationship Management (CRM) programs, trade-shows, media reports, satisfaction studies, and Web logs. Unlike the selling of physical goods through distributor, services firms such as banks, telephony, and brokerage,

all keep their data and interpret customer behavior at the individual customer level. This proliferation requires greater data organization as indicated in the successful examples of the “information-based strategy” at Capital One or “information-based customer management” at Barclays Bank (Davenport 2006).

Human processing capacities remain limited (Simon 1957), and research has demonstrated the presence and danger of managerial biases arising from shortcuts in information processing and decision making (Wierenga and Van Bruggen 2000). Firms that see analytic capabilities as a key element of their strategy outperform their peers since they know what products their customers want, what prices those customers will pay, how many items each will buy, and what triggers will make people buy more (Davenport 2006).

CEOs, CFOs, and CMOs demand more accountability from the marketing department (Rust et al. 2004; Webster, Malter, and Ganesan 2005). Marketing is challenged both to drive growth (Landry, Tipping, and Kumar 2006) and to keep costs under control (Ambler 2003), with the immediate focus on either objective swinging with the business cycle. Broad surveys of marketing and non-marketing professionals consistently reveal increased expectations regarding marketing accountability (Hyde, Landry, and Tipping 2004) as well as its effect on the marketing department’s influence within a company (Verhoef and Leeflang 2008). For instance, service managers are asked about the effect of changes on customer perceptions of service quality, customer satisfaction, and customer retention (e.g., Zeithaml 2000) but also about how service improvements affect measures such as customer lifetime value or customer equity (e.g., Gupta et al. 2006) and how this is linked to overall firm performance (e.g., Berger et al. 2006). Overall, a deeper understanding of the customer provides new levers for future growth (e.g., Gulati and Oldroyd 2005).

The goals of the typical marketing department have been revealed as disconnected from companies’ leadership agendas (Hyde, Landry, and Tipping 2004; Landry, Tipping, and Kumar 2006). As a result, CMOs are advised to agree on a “marketing contract” with the CEO that specifies exactly which metrics marketing is supposed to improve. In this regard, a dashboard helps ensure that everyone is “on the same page” to detect and discuss marketing successes and failures.

Finally, the ability of marketing to reach across functions to accomplish company goals is an increasingly important determinant of its success (Bolton 2006; Hyde, Landry, and Tipping 2004). Many firms have integrated marketing, innovation, and strategic growth leadership into a single corporate function (Landry, Tipping, and

Kumar 2006). Integration is especially needed by companies facing disruptive cross-national mergers and global expansion. This brings together marketing departments with different values, performance metrics, and reporting practices. Standardized tools and processes for efficiency are key characteristics of “growth champions,” that is, marketing departments in the upper performance decile (Landry, Tipping, and Kumar 2006).

Dashboard Uses and Purposes

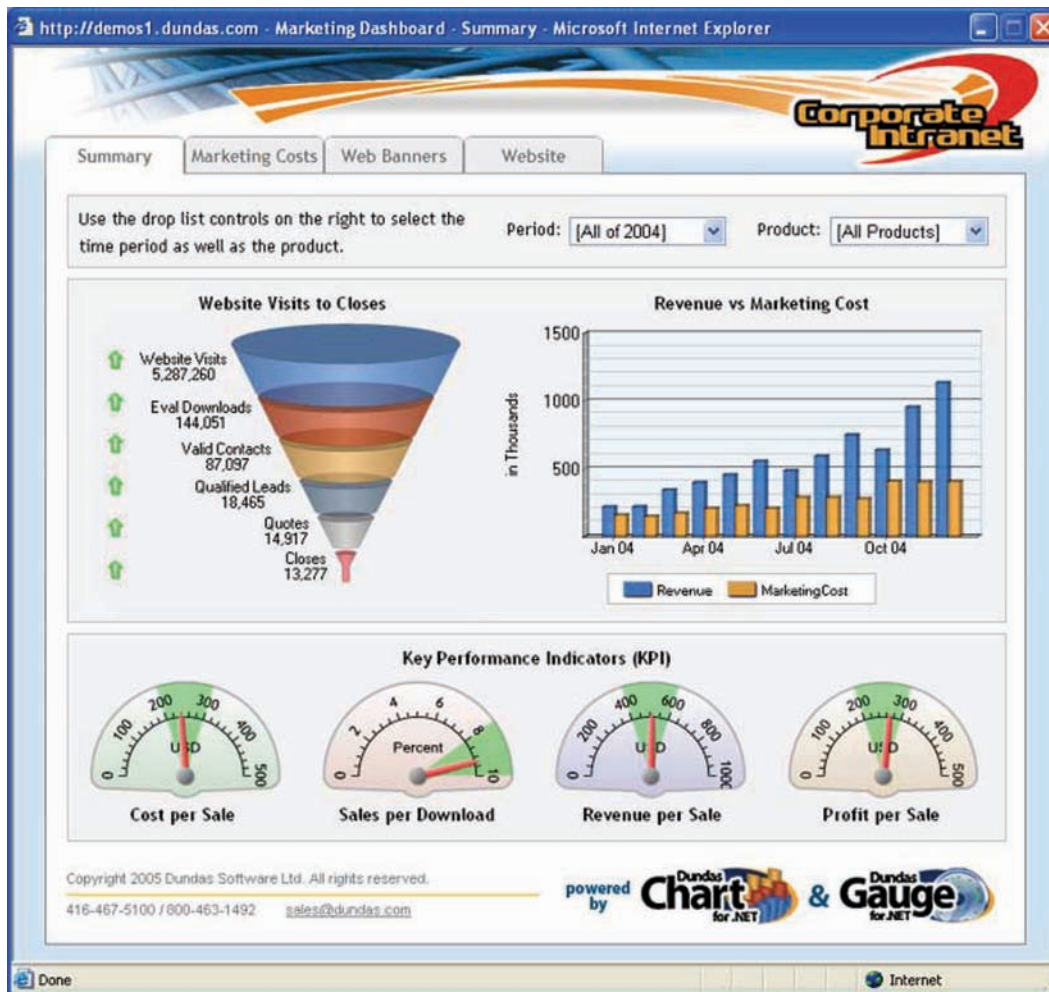
As defined by Clark, Abela, and Ambler (2006, p. 19); O’Sullivan and Abela (2007, p. 81); Wind (2005, p. 869); and Lehmann and Reibstein (2006, pp. 7-8), the key elements of a dashboard include the summarization and integration of key performance metrics with underlying drivers to communicate performance throughout the organization. We define a dashboard as a relatively small collection of interconnected key performance metrics and underlying performance drivers that reflects both short- and long-term interests to be viewed in common throughout the organization.

Figure 1 is an example of the type of dashboards commercially available, in this case by Dundas Software (see <http://dashboardspy.wordpress.com>).

The notion that a company should have a system for tracking key performance metrics or indicators is not new. Corporate performance measurement and “business intelligence” systems have aimed to do so for some years now (e.g., Dover 2004; Few 2004). Dashboards inherit that evolution with the need for (a) integration of diverse business activities, some of them qualitative, with performance outcomes, (b) measuring both the short-term results of marketing and the long-term health of the marketing asset, and (c) isolating the effects of marketing actions from the other influences on corporate performance (Ambler 2003; Rust et al. 2004).

For an encyclopedia salesman, the original dashboard was probably a single measure such as a chart of sales, which may accurately describe the performance of the self-employed selling a single durable product on commission while facing little local competition. However, the trend towards services in overall economy as well as towards scientific tools (e.g., Rust and Chung 2006) has made the task more complex. In such contexts, no single measure can adequately summarize performance (Ambler and Roberts 2006; Lehmann and Reibstein 2006; Pauwels and Joshi 2008). In particular, the claims for “Net Promoter Score” as being the only marketing metric needed by top management are not supported by empirical evidence (e.g., Keiningham et al. 2007). Moreover, the

Figure 1
Example of user interface of a dashboard



professionalization of different functional areas, such as finance and marketing, has generated different, often poorly integrated, performance metrics and drivers of future firm value.

Integration is an important characteristic of dashboards in three ways:

- *Data.* Understanding the firm's market and its position within the market requires information and data from diverse sources at different levels of aggregation and covering different time periods. The dashboard provides a common organizing framework.
- *Processes.* The dashboard helps management relate inputs, such as marketing expenditures, to market performance measures and ultimately to financial

performance, such as profits, cash flows, and shareholder value, thus building a bridge between internal and external reporting.

- *Viewpoints.* Whether assessing the market, performance, or planning, a dashboard allows different executives, in different departments and locations, to share the same, equally measured input, that is, to view the firm's market situation in the same light.

As discussed in the next sections, the integration of data proves easier than integrating processes and viewpoints. Performance information needs context, such as benchmarking, previous results, plan, or competition (Ambler, Kokkinaki, and Puntoni 2004). For multiservice or multi-unit companies, performance is commonly across different services, market segments, or units. Visually, dashboards

do this through devices such as gauges, charts, and tables, often color-coded for easy summarization (Bauer 2004; Lehmann and Reibstein 2006).

Users and Purposes

A dashboard enforces *consistency* in measures and measurement procedures across department and business units. For instance, Avaya operates in over 50 countries and diverse markets, with varying marketing tactics. Before the dashboard project, the company had no commonality of systems around the globe (limiting data gathering), different definitions of what constitutes a qualified lead (a key performance metric in the handoff from marketing to sales), and a lack of regional interest in gathering metrics.

Second, a dashboard helps to *monitor* performance. Monitoring in turn may be both evaluative (who or what performed well?) and developmental (what have we learned?). Google provides a good example: Dashboard metrics are early indicators of performance, and if a dip occurs in, for example, the “trust and privacy” metric, the company takes corrective action.

Third, a dashboard may be used to *plan* (what should our goals and strategies be for the future given where we are now?). For instance, Ameritrade started with corporate scorecards from the strategic planning department to develop a dashboard that plugs in to the planning cycle and is tied to quarterly bonuses.

Fourth, a dashboard may be used to *communicate* to important stakeholders. In particular, it communicates not only what the performance is but also what an organization values as performance by the choice of metrics on the dashboard. Vanguard is a good example in communicating dashboard metrics to the Board and also in translating their business focus on customer loyalty, feedback, and word-of-mouth into their measurement on the dashboard.

Relationship With Decision Support Systems and Balanced Scorecards

Dashboards are related to decision support systems that provide managers with guidance on decisions such as promotion activities and sales force allocation. As such, dashboards might be viewed as a combination of individual decision support systems that concentrate on integration and alignment at firm level rather than on individual activity level. In a widely cited passage, Little (1979) defines a marketing decision support system as

a coordinated collection of data, systems, tools, and techniques with supporting software and hardware by which an organization gathers and interprets relevant information from business and environment and turns it into a basis for marketing action. (p. 11)

The dashboard *display* is the output of a larger dashboard *system*. Both Wind (2005) and Reibstein et al. (2005) argue that this integration of performance metrics with underlying drivers and processes makes the dashboard such a powerful management tool. By making the business model explicit and linking data to the model, Wind (2005) asserts that “properly created dashboards provide the mechanism to drive effective management and resource allocation decisions” (p. 870). By making key information available throughout the organization, dashboards should enable improved decisions (and, ultimately, financial performance).

The dashboard also owes a great deal to the earlier development of the Balanced Scorecard (Kaplan and Norton 1992), which similarly recognizes that any single performance measure is inadequate in its combination of key financial and non-financial measures (p. 71). Moreover, one of the four Balanced Scorecard perspectives is that of the Customer.

Important differences arise in perspective. The Balanced Scorecard is primarily internally focused whereas the dashboard primarily considers the context (the market) within which the company operates. Indeed, the Balanced Scorecard uses operational or service metrics derived from the company’s internal data. Although they include customer satisfaction, Kaplan and Norton (1992) are reluctant to go beyond the company’s internal systems: “But certain other measures forced the company to get data from outside” (p. 73). Not only is the Scorecard weak on consumer perceptions, but very little attention is given to competition. Furthermore, a Balanced Scorecard puts less emphasis on empirically measuring the links between its different variables. Indeed, a Balanced Scorecard indicates how a firm currently is performing and where it stands, whereas the dashboard, as the name implies, provides the way forward.

Even though they take different perspectives (internal versus external market), the Scorecard and the dashboard are not competitors. Companies could start with the firm’s Scorecard experience and build outwards into the market to correct its weaknesses. Alternatively, one could start with a conceptual dashboard and then modify it to incorporate the Scorecard’s strengths. An interesting research question is whether these different starting points would lead to the same ultimate outcome.

Developing Effective Dashboards

The effectiveness of dashboards can be assessed by five potential benefits that they generate for the organization:

- The sharing of metrics is a key part of establishing the culture of the organization (e.g., customer orientation; Dover 2004; Gulati and Oldroyd 2005). Wind (2005) shows that the inter-disciplinary construction of dashboards is positive for developing creative, holistic solutions to business problems.
- A framework for recognizing excellent performance, diagnosing poor performance, and evaluating different options for remedial action (Reibstein et al. 2005). The marketing and/or business plan should show the expected consequences of implementing the plan and the dashboard should show the current position and, perhaps, forecasts. If the dashboard is developed to Stage IV (see below), then “what-if” iterations should identify the preferred remedial action.
- A source of organizational learning (Clark, Abela, and Ambler 2006). Clark and colleagues found no direct correlation between metrics usage and current performance but indirect causality as metrics usage enhanced learning, which in turn enhanced future performance.
- A tool for increased profitability (Eckerson 2005). To the extent that increased profitability is a primary goal, then the above implies that the dashboard will indirectly enhance future profitability.
- Decision making (Reibstein et al. 2005). Traditional reporting systems may induce the recognition of performance shortfall, but managers will typically have differing solutions. Again, the cross-disciplinary nature of the dashboard and the supporting research should enable transparency and consensus building.

Currently, we lack empirical knowledge about dashboards’ success in delivering these overlapping benefits. A recent two-wave survey by Clark, Abela, and Ambler (2006) found that “dashboard use was associated with a greater ability to calculate productivity (often called ‘ROI’) for the marketing budget and less perceived waste in the marketing budget” (p. 19). As a result, the use of dashboards is associated with positive changes in revenue and the efficiency of marketing spending. However, the research question remains whether and under which circumstances dashboards also improve profits and, more generally, long-term firm performance.

Dashboard Development Stages

Three papers delineate developmental stages (Gulati and Oldroyd 2005; Reibstein et al. 2005; Wyner 2008), which we synthesize as the following five:

Stage I: Selecting the Key Metrics

Ambler (2003) distinguishes two main approaches to metrics selection: general and tailored. The general approach keeps the number of metrics down to the few that can be applied to virtually all settings and has the advantage of comparability, allowing benchmarking across business units, firms, industries, and time periods. Ambler’s suggested metrics include three P&L measures (revenue, profit, marketing expenditure) and seven “brand equity” types of measure (awareness, preference, customer thoughts and feelings, brand loyalty, market share, availability, and relative price). Wiesel, Skiera, and Villanueva (2008) recommend five customer metrics as key performance indicators for firms with contractual customer relationships: three on the revenue side—number of customers, customer cash flow, and retention rates—and two on the expenditure side—acquisition as well as retention expenditures. In their review of areas of research in service and relationships, Rust and Chung (2006) outline several important metrics (e.g., customer-oriented metrics such as customer expectations, satisfaction, and complaints as well as employee-oriented metrics such as employee satisfaction and productivity) that, therefore, should be part of a dashboard for service companies.

In contrast, the tailored approach argues that each business unit/company has its own strategy and positioning and requires differentiated metrics to track progress towards its specific objectives. This approach invites high-level communication throughout the organization of what is important to the business, which is seen as highly beneficial by several companies (MarketingNPV 2005). Paine (2004) recommends that those who will (a) use the system, (b) be measured by it, and (c) make decisions based on it should be involved. This approach fits with the dashboard development benefits of cross-functional collaboration and research. However, the tailored approach is demanding and may take up so much time that organizations get stranded at this stage, or generate too many metrics, with little hope of reducing them as each set is favored by a department or senior executive. Different departments and senior managers argue for “their metrics” and obstruct the necessary simplification, which decreases both satisfaction with and usage of the dashboard (Clark, Abela, and Ambler 2006). Pruning to

a manageable number requires top management leadership and researching the leading indicators of performance (Pauwels and Joshi 2008).

Stage II: Populating the Dashboard With Data

Using currently available metrics speeds up the process at a minimal cost, typically by finding useful proxies and/or combining existing measures. Holding out for better metrics may be worthwhile in the long run. For instance, in the early 2000s, a U.K. bank, Abbey National, moved away from using financial valuation of the brand in favor of a consumer-based measure based on “cognitive tracking” (Ambler 2003, p. 74). While the financial measure was more readily calculable, management found it to be flawed and that the consumer-based measures produced more actionable insight. Likewise, Unisys found that dashboard use transformed marketing from reporting only efficiency metrics (e.g., we sent out X more brochures than last period with the same staff) to business effectiveness measures (MarketingNPV 2004; Miller and Cioffi 2004).

Populating the dashboard with data is anything but trivial. As noted above, service firms have enormous quantities of data from many sources. Perhaps the biggest problem is the periodicity of the data. Some of the data may be collected daily from sales reports, whereas other data are collected annually, or even less frequently, such as brand equity measures. Some metrics will be more important than others and consideration should be given to priorities (DeBusk, Brown, and Killough 2003).

Stage III: Establishing Relationships Between the Dashboard Items

Stage III involves determining the underlying relationships between the metrics. This step moves the dashboard from a simple presentation of information (what we consider a minimum requirement for a dashboard) to a deeper understanding of the business and a decision support system. Metrics alone do not address cause-and-effect relationships for clear attribution of performance change or the capabilities to generate and test alternative mix allocations (Wyner 2008). Rust, Lemon, and Zeithaml (2004) developed a framework that enables competing marketing strategy options to be traded off on the basis of projected financial return (operationalized as the change in a firm’s customer equity relative to the incremental expenditure necessary to produce the change). Thereby, they established relationships between the customer equity drivers (e.g., frequency of category purchases, average quantity of purchase, brand-switching

patterns, and firm’s contribution margin) by estimating a brand-switching matrix using a logit choice model. Other methods to establish metric relations include structural equation models and linkage analysis (Kamakura et al. 2002; Schneider et al. 2005).

The relationships between marketing actions, dashboard metrics, and performance are likely characterized by indirect effects, dual causality, and performance feedback (Dekimpe and Hanssens 1999). A dynamic system approach therefore appears to be a logical, albeit difficult, choice for estimating these relationships, as applied by Srinivasan et al. (2008) and Pauwels and Joshi (2008).¹ Alternatively, managerial judgments via decision calculus can be used to estimate many of the relationships (Little, 1970). At a minimum, the net result is to clarify and help reconcile the variety of assumptions under which managers have been operating.

As data become available, it will be possible to test the assumptions that have been driving some of the business decisions. Great uncertainty about the judgments or disagreement among the management team may provide incentives to initiate research, in the form of data collection, or experimentation, to better understand the relationships. For example, a company in telecommunication services carries out market experiments to examine the effect of different pricing schemes (Danaher 2002). Suppliers of credit cards can use experiments to determine the effects of different loyalty reward programs (Wirtz, Mattila, and Lwin 2007). Because the dashboard promotes the transparency and repeatability of such experiments, it is easier to get management commitment to subsequently incorporate them in full-size marketing plans. Once such relationships are understood, it would be possible to leave this dashboard and its underlying relationships as a legacy of those newly moving into their positions, rather than leaving the responsibility of building an entire system or mental model from scratch. A “strategy map” (Kaplan and Norton 2000) may be useful.

Stage IV: Forecasting and Scenarios

Stage IV applies the dashboard’s underlying model to scenario planning and budget setting (Wierenga and Van Bruggen 2000; Wind 2005). For instance, if the firm improves forecast service demand accuracy (e.g., by using data about past sales patterns), it should enhance revenues (e.g., Radas and Shugan 1998). Furthermore, using what-if analysis provides managers with a tool for evaluating marketing productivity (Rust et al. 2004). Zeithaml et al. (2006) suggest that this promise is unrealized in most current dashboards, which focus more on reporting current operations.

Stage V: Connecting to Financial Consequences

Stage V connects marketing expenditure all the way through the interim marketing metrics onto sales and to the financial consequences for the firm, including the link to shareholder value and thus market capitalization (Lehmann and Reibstein 2006), and thus aligns marketing with corporate goals and the investor's perspective (McGovern et al. 2004). Research supports that brand equity, customer satisfaction, customer equity, and marketing activities such as the firm's advertising are all linked to firm value (see Srinivasan and Hanssens 2009 for a recent review). For example, papers have assessed the effect of new-product announcements and introductions, customer satisfaction, advertising, and adding new channels (e.g., Fornell et al. 2006; Joshi and Hanssens 2008; Pauwels and Neslin 2008; Pauwels et al. 2004).

This five-step development process is not the only route towards the ideal stage where management objectives, strategies, and business models are fully reflected in a working dashboard. See Wyner (2008) and Gulati and Oldroyd (2005) for alternatives. The main difference is that our Stage V is primarily concerned with including financial managers, whereas Gulati and Oldroyd are focused on customers. Because customers are the key generators of company cash flow, the customer and shareholder value perspectives are naturally linked.

The blueprint outlined in these development stages is promising, but, as Reibstein et al. (2005) acknowledge, most firms have problems even completing Stage II. The many challenges on the road towards successful dashboard adoption are considered next.

The Adoption and Success of Dashboards

As discussed above, a dashboard that moves beyond the first two stages shares key features with a marketing decision support system. Therefore, we can build on the substantial literature on decision support systems (DSS) and information systems (IS) (e.g., Lilien and Rangaswamy 2003; Little 1979; Wierenga, Van Bruggen, and Staelin 1999). In this section, we adapt and extend the DSS framework in Wierenga, Van Bruggen, and Staelin (1999) to provide a framework for the adoption and success of dashboards. The purpose of the framework is twofold. First, it is a starting point for research questions about the adoption and use of dashboards. Second, it should help companies who want to design and implement dashboards with a systematic inventory of relevant issues.

Our framework in Figure 2 proposes that the adoption and success of dashboards is driven by five main factors: demand, supply (e.g., metrics availability), the fit between demand and supply, implementation process, and the predisposition of users.

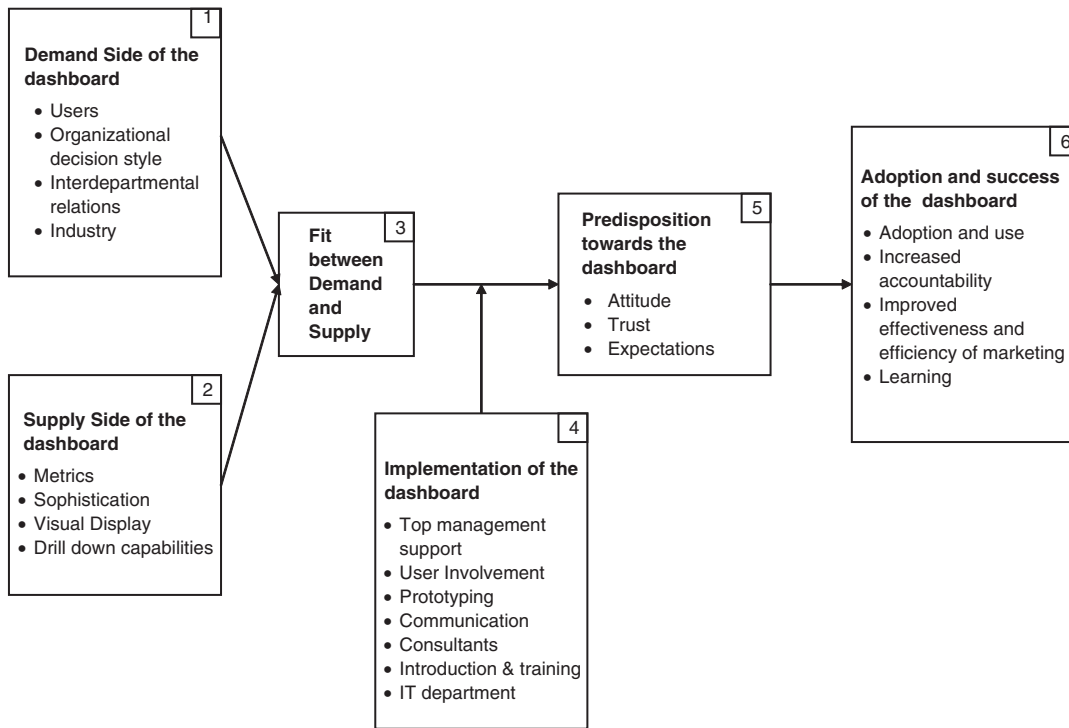
The most important factors of demand (Figure 2, Box 1) are the following:

- *Users* of the dashboard include, in theory, all senior management but those most enthusiastic about its use may be top executives, marketing specialists, representatives of non-marketing areas such as finance, R&D, and production, or some combination of the above.
- *Organizational decision style*. An organization has a prevailing attitude and a certain standard approach to doing things and making decisions (Pettigrew 1979). A dashboard that is successful in a company with an analytical decision style is not automatically also successful in a company with a more intuitive decision style.
- *Interdepartmental relations*. If relations between departments are cooperative, goal congruency is easier to achieve and the dashboard will be used for that purpose. However, in a situation of rivalry and mistrust among departments, the dashboard runs the risk of being (mis)used for the interests of individual departments at the cost of the goals of the organization (Markus 1983). Also, departments may try to prioritize those metrics in the dashboards that give a favorable picture of their own activities.
- *Industry*. As Ambler's (2003) tailored approach to metrics suggests, different industries have different requirements for dashboards. For service industries, examples of key metrics are customer satisfaction scores, customer retention rates, and employee performance measures. In contrast, for the packaged goods industry, metrics about market shares and response to sales promotions are important. We note that, while customer satisfaction and retention rates may also be important to manufacturers, their primary data suppliers, AC Nielsen and IRI, do not collect such information. The typical presence of individual level data in service industries offers a key opportunity for research and practice.

Box 2 shows the supply side of dashboards, driven by the following factors:

- *Metrics*. The availability of particular measures has driven dashboard content just as IRI and Nielsen spearheaded the development of marketing

Figure 2
Framework for the adoption and success of dashboards



Source: Adapted from Wierenga, Van Bruggen, and Staelin (1999).

mix models based on the scanner data they were providing.

- *Sophistication*. Little (1979) speaks of systems with “status reporting” (Stage III above) capabilities and systems with “response reporting” capabilities (Stage IV). At present, most dashboards just perform status reporting, and development of what-if capability would strongly enhance their value.
- *Visual display*. Information can be presented in many different ways, for example, numbers, graphs, and bars. Colors and motion can be used. Intuitive comfort with the dashboard display is important, but there is a limit to the ability of people to absorb the meaning of complex charts (LaPointe, 2005, chapter 9). Organizational information processing research suggests that information that is summarized, uses vivid, concrete presentation, and is easily accessible is more likely to be used (O’Reilly 1983; Peyrot et al. 2002).
- *Drill down capabilities*. Drilling-down means that one goes from a more general to a more detailed level of the information. This capability is especially important for variance analysis and for different managerial levels.

The fit between demand and supply (Box 3) is critical for dashboard success (Goodhue and Thompson 1995; Lim and Benbasat 2000). The type of information provided should match with the decision responsibilities of the users and the metrics in the dashboard should be those that are crucial for the industry or the company. For example, Citrin, Lee, and McCullough (2007) find that information use must be congruent with a firm’s strategic orientation for innovation success. Also, the format and level of sophistication should be such that the information is absorbable, given the decision style of the organization.

Implementation (Box 4) involves many people and processes, with errors along the way. Key success factors range from top management support for the dashboard to a cooperative attitude of the IT department. A supply-driven approach with functionality determining the layout may not give proper attention to the user perspective. Instead of one-shot implementation, users should begin with a prototype or model and test usage and intuitive comfort. Time as well as budget should be reserved for the implementation of consequential user-induced suggestions. More than one prototype cycle may be needed. As a side effect, this will create enhanced collaboration

between marketing and IS/IT and create involvement from the side of the users. Ensuring such buy-in while building a dashboard can help to get the dashboard accepted and to remove possible organizational resistance. On the other hand, it might extend implementation from months to years. The middle ground is to begin with a simple, easy-to-use, and easy-to-populate Version 0.

A dashboard with a good fit between demand and supply, carefully implemented, should generate a positive predisposition among its (potential) users, with the following key elements (Box 5):

- *Attitude.* The Technology Acceptance Model (Avlonitis and Panagopoulos 2005; Davis, Bagozzi, and Warshaw 1989) asserts that one of the main drivers of the attitude towards an information system is its perceived usefulness. Decision makers need to be convinced that they will perform better with the dashboard.
- *Trust.* Decision makers need to trust that the numbers are reliable and not manipulated. The dashboard should be seen not as an attempt to monitor or control them or as an infringement on their professional autonomy (Speier and Venkatesh 2002).
- *Expectations management.* Low expectations reduce acceptance. High expectations help generate initial use but backfire when the experience does not (immediately) live up to those expectations. In particular, users should be prepared for bugs and initial problems when a dashboard is just installed.

Finally, we come to the dependent variable of the framework. The adoption and success of a dashboard may be measured on four dimensions (Box 6):

- *Adoption and use.* The dashboard should not only be used by marketing and sales management but also by other departments such as operations, finance, accounting, and top management. Extended trials are needed to get beyond rejection because of unrealistic expectations or because they feel, initially, that there is insufficient fit with their job (Speier and Venkatesh 2002).
- *Increased accountability.* Improving the accountability of marketing efforts and marketing investments is one of the key purposes of a dashboard (LaPointe 2005).
- *Improved effectiveness and efficiency of marketing efforts.* Marketing efforts and investments should not only be better monitored but also better deployed, leading to gains in effectiveness and efficiency.

- *Learning.* Dashboards not only are made for immediate decisions but should also help decision makers to get a better understanding of the marketing processes that are relevant for their business. Learning can be explicit (i.e., when managers develop better shared models about marketing processes) and also implicit as the stream of dashboard metrics trains and develops management intuition.

Based on a survey of nearly 100 executives, Reibstein et al. (2005) found adoption reports to be mixed. While most respondents reported that their firms were working on the development of a dashboard, almost none consider the dashboard complete or of high quality. Yet, the desire for dashboards remains strong. The gap between theory and practice (LaPointe 2005; Lehmann 2005; Reibstein et al. 2005) calls for the increased capability that can be provided by systematic research, as we now discuss.

A Research Agenda for Dashboards

Dealing with complexity, for example, reducing the number of metrics to a single visual display, is a key benefit from a dashboard. Most previous research focuses on helping companies cover all important aspects, such as perception, attitude, behavior, and financial (Zeithaml et al. 2006). However, this typically long list of potential metrics needs to be reduced (Clark, Abela, and Ambler 2006), as executive attention is “brief, fragmented and varying” (Mintzberg 1973).

The key question is separating the more from the less important drivers and metrics for a given firm. As an example for service firms that focus on customer lifetime value, Bolton, Lemon, and Verhoef (2004) lay out a comprehensive theoretical framework illustrating how various marketing instruments drive customer perceptions, behaviors, and financial outcomes in the context of managing the customer asset.

Identifying a comprehensive set of metrics is a separate problem from reducing them to a manageable number. Empirically, Ambler (2003) recommends deleting metrics that show little variation over time, that are too volatile to be reliable, that add little in explanatory power to existing metrics, or that are not leading indicators of financial results. These criteria suggest the need for time series analysis of each metric separately, in its relation with other metrics (data reduction techniques) and in its relation with firm outcome measures (e.g., Granger Causality tests).

As argued in the development steps, dashboard systems should move from the “what happened?” question

to answering why it happened, what will happen following alternative marketing actions, and what should be done (Lehmann 2005; Wierenga and Van Bruggen 2000). Such causal chains are context dependent (Rothschild and Gaidis 1981; Smith and Swinyard 1982;). Empirical modeling is needed to demonstrate and estimate causal relations between metrics in different situations.

Modeling the dashboard data is complicated by the likely endogeneity among its metrics, the dynamic nature of their relations, and the desire to predict, if only to provide a baseline for what-if analyses.² A detailed comparison of different modeling approaches may take the form of a competition similar to the one on predicting customer churn reported in Neslin et al. (2006). Also, complicating the modeling aspect is the different periodicity of the data. Some measures are daily, such as the number of customers or the number of complaints, while others may be only episodic, such as brand equity.

A contingency approach appears appropriate, distinguishing the characteristics of the competitive landscape, the company's customers and the company employees (users), and design and implementation characteristics of the dashboard (Wierenga, Van Bruggen, and Staelin 1999). Empirical evidence can be drawn from field experiments with control groups (e.g., subsidiaries with and without the dashboards) or periods (before/after).

Given the expressed interest in dashboards through seminars and surveys (Lenskold 2006), development would be enhanced by knowing the numbers of companies at each stage of the adoption process and the blockages to further progress. Analysis by industry sector and country could be informative. Dashboards can be seen as new service and those considering their introduction should be more aware of the historical experience of dashboard installation, the reasons, and especially the role of external agents, for example, consultancies and security analysts. Abrahamson (1996) refers to consultants as part of the population of management fashion setters who help diffuse new ideas through the business community but also assist with their implementation.

More specifically, using the framework of Figure 2, research issues include (1) the most common discrepancies between the demand and supply side of dashboards and (2) how the key implementation variables by context; (3) how the measurement of mindset variables and their relationship with the success of a dashboard; (4) how the different dimensions of success; and (5) how the empirical data needed analytically to study the relationship between success dimensions and their antecedents.

Managing services differs from managing goods (Parasuraman, Zeithaml, and Berry 1985). Notable

characteristics of service such as (1) intangibility, (2) heterogeneity, (3) simultaneity of production and consumption, and (4) perishability make managing service different. Even though the line separating goods and service is increasingly becoming blurred (e.g., Rust and Chung 2006) and dashboards are usually more senior management oriented, dashboards include a drill-down feature (as discussed earlier) that might change the above research questions for service industry dashboards versus goods industry dashboards fundamentally. For example, Bolton (2006) suggests that modeling cross-functional processes is particularly important for services. Research needs to show how a dashboard can adequately map the four areas of service, that is, managing service, customizing service, customer satisfaction and relationships, and financial impact, and its linkages as classified by Rust and Chung (2006).

At the level of the boardroom, we need to understand the extent to which dashboards help marketing receive more top management interest and support and reduce the threats to marketing from perceived lack of accountability (Rust et al. 2004). Dashboards should help align marketing with corporate goals and the investor's perspective (McGovern et al. 2004). Thereby, firms are faced with the problem of how much and which critical marketing information should be made available to investors (e.g., Ambler 2003; Quelch and McGovern 2006; Srinivasan and Hanssens 2009; Wiesel, Skiera, and Villanueva 2008; see also MSI's Call for Research on "Marketing Strategy Meets Wall Street"). If information is important for the directors of a business, it also must be important to investors (PricewaterhouseCoopers 2005).

Conclusions

This article set out to explain what dashboards are, their development, the drivers and obstacles to their adoption, and where academic research is needed fully to exploit their potential. Their development is triggered by their rapid growth in large companies and the attention they are attracting from CMOs and CEOs. Essentially, they are a tool for integration and alignment at firm level and therefore have a potentially crucial role in helping the firm navigate its trading market in much the same way that a plane's dashboard helps the pilot. Dashboards display the key metrics and facilitate the standardization of metrics across departments and business units. Additionally, they highlight inconsistencies across the organization and levels so that goals can be integrated. By doing so, dashboards should assist within and across three major firm processes: understanding its market,

planning, and performance assessment. We hope that our contribution will increase awareness and understanding of dashboards and will trigger more research. So far, the dashboard has been driven by practice and software providers. Academic marketing research can help make dashboards more attractive and valuable to use and more effective in their decision supporting role.

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Notes

1. Pauwels and Joshi (2008) provide evidence that a dynamic system approach (forecast variance error decomposition derived from vector autoregressive models) yields dashboard metrics that forecast performance better than the metrics obtained with competing methods (stepwise regression and reduced rank regression).

2. These criteria fit well with the vector-autoregressive or vector error correction models, which allow for a flexible estimation of dynamic effects through impulse response functions (Dekimpe and Hanssens 1999) and have recently been adapted for restricted simulations to disentangle these effects (Pauwels 2004). However, such models require relatively long time series for all key metrics, easily run into degrees-of-freedom problems, and currently lack the capability to efficiently vary parameters based on incoming data. Alternatively, one can use less econometrically sophisticated approaches, such as estimating several single equations to be combined later, or have the relationships "informed" by data and incorporated with management judgment, in a decision calculus form (Blattberg and Hoch 1990; Little 1970).

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