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Kellogg on Integrated Marketing

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CHAPTER 10

DECISION-GUIDANCE SYSTEMS

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TODAY'S DECISION-MAKING ENVIRONMENT

Whether it's a new product launch, a new advertising campaign, a regional promotion, or the allocation of resources across various functions in a customer service organization, managers are constantly faced with a multitude of decisions. Sometimes, the choice is between yes and no; other times, the number of choices seems infinite. The route to the decision differs from decision to decision, manager to manager, organization to organization, and time period to time period, with some approaches being highly calculated and others appearing close to random. In a situation in which shareholders' assets are at stake, a random approach to decision making would hardly be favored, and rationally, managers seek to eliminate as much uncertainty as possible from the probable outcome of their decisions.

DECISION CALCULUS: THE EARLY VISION

John D. C. Little's early (1970)¹ "decision calculus" philosophy proposed an approach to methodically reduce the uncertainty associated with managerial decision making by structuring and supporting the decision process with data, models, and simulation and optimization analytics. Central to the decision-calculus philosophy is the creation of mathematical models that explicitly represent phenomena in the manager's business environment, such as models of customers' responses to price, advertising, and promotion activities; models of the perceptual positioning of competing products; models of customer brand preference; and so on. These models are created and updated using timely and relevant data from the business environment.

They are then subjected to rigorous simulation and optimization questions that allow the manager to evaluate a number of explicit alternatives and pick an optimal solution from a range of possibilities.

ALAS, ADOPTION HAS BEEN SCANT

As appealing as Little's approach was, today's practices rarely resemble that vision. Data are often collected and assembled in great swaths with little, if any, distillation; and managers are left to wade through the enormous, intricate, and usually unimportant detail of its raw form, often throwing their hands up in frustration and resorting to a heuristic, "gut-feel" approach to decision making (in many cases, these intuitions differ only nominally from a random choice). Business managers clearly appreciate that data should be used in the guidance of decision making. However, the best way to do it eludes many—even those charged with delivering technologies, products, and services aimed at serving this need. Before we look at what has made the adoption of a seemingly logical and elegant approach to guiding decision making so slow and difficult, we revisit the needs of the decision maker.

NEEDS OF THE CONTEMPORARY DECISION MAKER: NOT MUCH HAS CHANGED

While the last two or three decades have seen incredible change in the speed at which business operates and change occurs, the basic needs of the decision maker remain essentially unaltered. If anything, those needs have been amplified by a world that is now more informed, more competitive, and moving much faster. These are some of the basic needs of the decision maker expressed in terms of the properties decision-guidance information must embody:

1. *Timely.* Decision-guidance must be timely, happening interactively, in real time. Typical lead times on traditional market research projects, for example, can run anywhere from four weeks to six months. Rarely in today's environment does a manager have the luxury of prolonging decision making until "all the data arrive." This fast pace calls for speeding up the cycle time through, for example, Web-based data collection and continuous real-time data analysis.

2. *Specific.* Unless the data and subsequent analyses address specific, tangible aspects of the business, the results are unlikely to be actionable. Consider the difference between these two statements from the standpoint of actionability: "Product quality must be improved to retain customers" versus "The reliability of the system software must be improved by two points to reach our goal of 80 percent customer retention in six months." In operationalizing issues for measurement, or simply storing secondary data, managers should always be aware of exactly how the information will be used. Stating the goal before collecting and analyzing the data increases the chance that the goal will be achieved.

3. *Prescriptive.* Decision-guidance must be prescriptive. That is, instead of focusing on a description of the state of the business, decision-guidance should focus on what a manager might or should do next and the likely outcomes. Decision-guidance should be a "state of mind," necessitating the employment of different, often more complex, approaches in the analysis of data. Before any prescription for decision can be delivered, there must be an orientation to the future, an ability to predict, and an ability to evaluate alternative actions. That, in turn, would imply the presence of a predictive model and a mechanism or framework capable of presenting alternative scenarios to such a model for evaluation.

4. *Parsimonious.* Decision-guidance must be easy to understand and communicate. Today's manager has a complex multidimensional environment to contend with and cannot become expert as a statistician or management scientist. Traditionally, an understanding of technical concepts such as external validity, confidence, and variance has been a prerequisite to developing an understanding of information presented for decision-guidance. Task specialization, as well as organizational hierarchical structures, can impede information transfer. These barriers to adoption are unnecessary and can easily be replaced with more natural and user-friendly approaches to presenting information.

5. *Valid and reliable.* To be useful, decision-guidance also has to be valid and reliable. If a manager is advised that a 10 percent (± 2 percent) increase in customer satisfaction will arise from a \$200,000 investment in a new service and support telephone system, a 10 percent (± 2 percent) increase in customer satisfaction should result when \$200,000 is spent on a new telephone system. Many factors contribute to achievement of this result: reliable data, valid models, timeliness of the underlying data, effective integration of these pieces, and so on. Valid and reliable guidance is a function of the quality of each of the components creating the solution and the quality of overall governance joining them.

6. *Financially anchored.* Decision-guidance must be delivered in a financial framework. For example, in conjunction with return-on-investment analyses, it is generally not enough to say "product concept X is more attractive to the target audience than product concept Y," especially when product Y would be cheaper to manufacture. The explicit inclusion of financial considerations in the creation of prescriptive guidance is imperative if it is to have meaning and usefulness in an organization with a bottom-line, financial focus.

7. *Scalable.* To be really useful, decision-guidance solutions should be scalable, which usually means leveraging technology in deployment. For example, in a large organization where thousands of new products are tested every year, a solution for pretest market sales forecasting should not be dependent on the talents of a single analyst and his or her capabilities with a statistical analysis program. It should be codified into processes and systems so that it may be used consistently organization-wide at a reasonable cost and in a fashion that allows for direct comparison of competing opportunities.

It would be difficult not to agree that these seven properties, if delivered, would dramatically change the nature of business decision making forever. The question is: Why don't today's systems already embody them?

Most organizations and managers implicitly know the potential of the data they possess, but various factors make it difficult to extract that value. In the next section, we discuss some of the factors that have impacted the satisfaction of these needs.

BARRIERS TO THE ADOPTION OF EFFECTIVE DECISION-GUIDANCE

A number of factors have hindered the adoption of systems that provide effective decision-guidance. Perhaps one of the most visible of these is the explosion in the amount of data available to managers in recent years, which has left little time to focus on anything but storing and organizing what is coming through the door (see the next section, The Distraction of the Data Sirens). Sometimes the data sources need better integration (see the Let's Get It Together section). Another factor in many organizations is the tradition of rote behavior, or process inertia. That is, certain kinds of data are collected and certain methods of analysis are conducted because "This is the way we've always done it" (see section titled The Tail Wagging the Dog). Another barrier to adopting more effective decision-guidance systems is

the misperception that they are costly and complex (a problem we discuss in the *Deer in the Headlights* section). Decision-guidance systems are sometimes not adopted merely because marketing managers may be ignorant of their value—they do not know the kinds of questions these systems can address. We discuss this issue in the section titled *Head in the Sand*.

Distraction of the Data Sirens

Following the instinct that a business run by “databased decision making” has a competitive advantage, many firms have fallen into the trap of focusing strictly on the first part of that strategy. That is, “databased.” In doing so, they have mounted and promoted many substantial and expensive initiatives around the collection, storage, and dissemination of data in the firm in the hope that it somehow translates into better decision making. Unfortunately, the entire value of databased decision making lies in the very detail of that translation—a fact brushed over by most. Owning or having domain over “data” does not make you a better decision maker. Yet, it is ever so tempting to continue to add to your databases and management information systems when data are “available.” And “available” it will be: Recent headlines² read, “More original data will be created in the next two years than in all of human history.” For anyone with a data problem (read: habit), this does not bode well.

At one time or another, all firms have been lured by the *data sirens*. And indeed, many companies in several industries, including consumer banking, retailing, and financial services point to successes they derive through the effective leverage of a portion of the vast repositories they have amassed:³

- Ritz-Carlton hotels have long recorded and stored guest preferences to drive the delivery of services tailored to individual customer needs.⁴
- Hyundai supplements its own data with census information to locate growing towns that share the same demographic profile as its current customer base. The identified towns become prime candidates for new dealerships.⁵

Surprisingly, while there are many stories like these, they are the exception rather than the rule: The potential of available data goes largely untapped. The landscape is littered with data-oriented technologies, systems, and solutions that have delivered less guidance for decision makers

than was originally expected. For example, we can all think of public instances in which customer relationship management (CRM) and enterprise resource planning (ERP) systems, loyalty programs, customer satisfaction and feedback programs, syndicated and industry information sources, survey data, and so on have fallen flat in terms of the guidance they provide to decision makers.

So, what’s the solution? Firms need to realize that the volume and number of data sources they have access to is unlikely to correlate with their success as decision makers. It’s how that data (and they won’t require all of it) is translated into decision-guidance for decision makers that is most important. Therefore, instead of focusing and obsessing on the “databased” portion of “databased decision making,” it is appropriate for the firm to turn its attention to the “decision making” component. That is, what decisions require databased guidance? What analytical methods are appropriate for producing that guidance and transforming the raw data? Subsequently, what data is required to support these methods? In essence, the firm needs to shift its focus from “data” to one of “decision” and work backwards. Whether it’s determining how to segment a market or determining how to allocate resources, unless the correct data has been collected and assembled, decision-guidance will be suboptimal. We referred to this previously as *specificity*. The firm must become specific around the decisions it is interested in guiding before it can resist the lure of the *data sirens*.

Let’s Get It Together

Another factor impacting the delivery of effective decision-guidance is the fact that supporting data derive from multiple sources that tend to coexist in distinct, discrete locations, rather than as an integrated unit. We now examine the need to integrate data sources across internal storage units, channels and countries, and even competitors.

Marketers are savvy enough to advocate holistic views of customers—analyzing customer demographics, attitudes, historical behaviors, perceptions about competitors, and their estimated economic value, such as lifetime customer value assessments.⁶ Yet, again, reality falls short of advocacy. How could the ideal integration be achieved? The integration of data is a means to an end—that is, there is no point in integrating or bringing together the data sources unless it is clearly understood what is and is not important to building a “commercially useful” model of the customer—so

that the model can be applied by the marketing manager user. The kinds of necessary integrations follow:

1. The data sources need to be accessible on one common platform so that they can be used simultaneously in modeling efforts.⁷ Analytical software and data transfer protocols have become versatile enough that they allow simultaneous access to data stored on different machines in different locations.⁸ Historical purchase data might exist in a spreadsheet on a desktop in the sales department, while customer demographics and credit information may exist on a Unix server in the finance department. Front-line service transaction information might exist on multiple, small-capacity machines at the points of service. Integrating these sources allows for a full profiling of customers.

2. Data need to be coordinated *across channels* and *internationally*. Businesses are multichannel today, having retail presences as well as customer access online.⁹ Customers value complementary channels; for example, at Victoria's Secret, customers can order apparel online because they know their sizes, but they may visit the retailer to try out a more experiential good, such as the scent of a new perfume offering.¹⁰ Other customers conduct research online but buy at stores. Still others buy online but pick up at local stores to avoid shipping and handling costs and to obtain the merchandise more quickly. As data capture and integration technologies become more prevalent and accessible, a company could capture and capitalize on these patterns by integrating multiple sources of data, that is, syndicated data, perceptual surveys, qualitative interview responses, behavioral choices (obtained via interactive retail kiosks), and e-commerce data collected through online tracking.¹¹ Data coordination across channels allows the marketing manager to take advantage of synergies and cross-pollination, so a holistic picture of the customers can be formed and a more complete model of customer behavior developed. Rarely is our consumption limited to one venue; thus, data extracted from only one channel present the marketer with a biased, incomplete view of the customer.

3. Data need to be *integrated across competitors*. There is an "organization-centric" bias in many industries, whereby managers seek to obtain answers from analyzing "our data only." This proposal may appear controversial, and surely there would be some limits as to which databases would be shared industrywide, but consider the advantages gained from integrated data sources provided by AC Nielsen and IRI for manufacturers and distributors of consumer packaged goods, or the benefits accrued to

automobile manufacturers and dealerships from data provided by J. D. Powers. Industry-level promotional campaigns could be shared (e.g., Got Milk; Eat Beef). If managers could share some standard data across the industry, the impacts of marketing efforts could be measured better and market share estimates refined. Financial and marketing strategic planning would be more reality-based than wishful thinking. Furthermore, environmental and competitive indicators are obtained only in this data-share manner—they cannot be inferred from single provider information. The model of customers in the marketplace could not possibly be complete if competition were left out or assumed away. If we were to call for companies to "share your data with one another," we might be labeled naïve, but it could happen in one of several ways: through multiclient programs or syndicated research from which it is too expensive to be "left out," or through a firm whose purpose is to collect explicit data about competition.

Process Inertia or "The Tail Wagging the Dog" Problem

Organizations and marketplaces are dynamic entities in a constant state of flux. A system designed to guide decision making at one time may be rendered irrelevant and useless at a later time because of a changing organizational structure, changing market dynamics, a changing customer population, and so on. Combine this phenomenon with various other human traits such as risk averseness, inertia, a tendency to stick with what is known, and a need to conform, and it is hardly surprising that we often see obsolete systems continuing to "chug along." In effect, these systems are still being implemented because "this is the way it has always been done." When the relevance of the system to the decisions it is supposed to guide has dissipated, the system is no longer serving the decision maker. In fact, it is often the case that the only thing being served in this situation is the system. That is, while the system fails to provide meaningful guidance, the firm is still burdened by its ongoing operation. The tail now wags the dog, so to speak. This situation represents a significant opportunity cost for the firm: A sizable portion of the effort required to provide relevant decision-guidance is being expended on a system that doesn't deliver.

In particular, data collection and analysis are expensive undertakings; therefore, a business-as-usual approach and a lack of understanding around the applicability of results seem wasteful. The exercises of data collection and analysis should pay for themselves in benefits if they are better planned

so as to address relevant, real, and timely marketing issues and imminent decision-making tasks.¹²

In reality, this situation is very common. Most companies would have little difficulty in identifying a system or process originally designed to guide decision making that categorically fails to provide meaningful decision-guidance. However, more often than not and even with a visibly "marginal" deliverable, these systems continue unchallenged in the organization. Organizations mostly lack the mechanisms to adequately evaluate and deal with underperforming systems to be used in guiding decision making.

A firm wishing to avoid being wagged by this tail of obsolescence needs to maintain a vigilant watch. This can be achieved by frequently exposing all existing systems, whether "tried and proven" or "new," to rigorous critical evaluation. This includes evaluations of systems, solutions, and processes in relation to the decisions they are supposed to be supporting: Is the system guiding any decision making? Is the system still relevant? How are the decision parameters changing? What are the needs of the decision maker this system is supposed to support and how do the attributes of this solution correspond? How often is the system used and could the decision maker do without it? Without this evaluation on an ongoing basis, a system has no incentive to remain relevant and is unaccountable.

Misperceptions That Decision-Guidance Systems Are Too Complicated or Costly; a.k.a. "The Deer in the Headlights"

Providing quality decision-guidance is a complex task requiring knowledge of data collection methods, database technologies, statistical analysis, simulation technologies, user interface design methods, the decision sciences, and so on. When faced with this reality and the burgeoning supply of data, the firm is often frozen in indecision between inaction and electing to "do what it takes" to create real guidance for decision makers in the organization—usually defaulting to inaction. The expense and complexity of designing and implementing "fully blown" systems for decision-guidance is usually substantial; and combined with the pressures of needing a solution "now," the decision to not do anything "because there's no time" is often the convenient choice. This is unfortunate as more often than not, a well-designed blueprint for decision-guidance can be implemented in a phased fashion, providing value from the very beginning and building to extremely high levels of value over time.

Choosing and implementing new analytical systems can seem intimidating; however, this barrier can be removed in several ways. In particular, ensuring that the system will provide actionable information from the outset by having specific marketing goals that drive development is a useful device.¹³ For example, if you have a tactical orientation, it is less useful to know a general index of overall customer satisfaction at McDonald's or Hilton than to know performance on specific attributes such as satisfaction with the temperature of McDonald's fries or the scent of Hilton's linens. If indices are poor in the former case, there is no diagnostic information regarding how to improve features that matter to customers. If indices in the latter case show poor performance, it would be up to McDonald's or Hilton to determine whether an improvement on this dimension would be cost effective in enhancing satisfaction and loyalty. In terms of both the implementation of a decision-guidance system and the content and decision area that the system addresses, specific narrower goals are more readily measured, hence, eventually, more readily achieved.

We have touched several times on the enormous supply of data (e.g., sales call data, customer service center data, actual purchase data), which is obviously a major contributor to the feeling of bewilderment in the planning and implementation of systems for decision-guidance even though it is "supposedly yielding greater insight into customer behavior."¹⁴ The situation would be far less overwhelming if there were some organizing schema, bringing it all together to help the firm pose specific and relevant questions to investigate (provide "specificity"). For example, a metric addressing the "number of calls processed by a call center" is probably less actionable than a metric that addresses the "average time to resolve the customer service call," and so on.

Consider the following list of far-too-general marketing and management goals that have been cited in popular business media as motives for a company's marketing information (e.g., database) efforts. Note that these goals are all relevant and worthwhile, yet the means to their achievement is more often than not hopelessly vague. It is unclear how the firm is supposed to get from its database marketing efforts to "adding customer value," for example. Companies say they are engaging in database marketing to:

- Attract new customers who are profitable.
- Increase customer satisfaction.
- Decrease expenses.
- Achieve mass customization.

- Add customer value.
- Form long-term relationships with their customers.

... admirable, but inactionable (it lacks “specificity”).

Consider alternatives that may sound less impressive in their ambitions, yet were actually effective in providing specificity to the problem and, subsequently, delivering at least some decision-guidance value:

- Maximize profitability of ongoing promotional campaigns: AFC Enterprises (operator and franchiser of 3,300 Church’s, Popeye’s Chickens, Seattle Coffee companies, and Cinnabons) used modeling techniques to maximize the profitability of a recent promotional campaign and the sales level of a new menu item.¹⁵
- Identify new customer prospects: A cell phone company mapped the communication networks of its existing market to identify potential new customers geographically.¹⁶
- Maximize the effectiveness of Web-banner advertising: An advertising researcher precisely measured and modeled short-term effects of advertising via click-through and conversion rates on banner ads to produce a tool to guide future decision making.¹⁷

These examples are well defined; and while they may sound narrow in comparison to the loftier marketing goals stated previously, they at least pose situations for which decision-guidance can be developed.

The trick to avoiding getting caught in the headlights is to understand upfront that these things take time and these processes are iterative. While the entirety of the system may look overwhelming, it is usually possible to decompose the problem into manageable stand-alone tasks.

What Can We Do with These Data?: “Head in the Sand”

One of the biggest issues working against the design and implementation of effective decision-guidance systems is simply an ignorance of what is possible. The old adage that “you won’t know what it’s like until you try it” applies here. Without having experienced “quality” decision-guidance, most managers and firms are simply unaware of the possibilities. Similarly, a large proportion of those charged with providing solutions and services to firms to assist in guiding decision makers are also unaware of what

is possible. Databases are not goals in themselves; they are the means to achieving marketing goals. Enthusiasm about customer databases has led some proponents to claim that “information about my customers” is my “company’s most valuable asset.”¹⁸ Not quite. Information about your customers is of little value in itself if the company does not invoke it when formulating strategy.

For example, many firms are unaware of the simple difference between “descriptive” and “prescriptive” information. A manager armed with descriptive information has to make inferences on the fly (and often incorrectly) about what this means to the firm and how it relates to the decision or decisions he or she is about to make. On the other hand, a manager possessing prescriptive information is usually faced with making choices between various courses of action whose likely outcomes have been preevaluated (i.e., the inferences have already been made). To produce prescriptive information, which largely is more useful than descriptive information in guiding decision making, managers need to create predictive models. Models are another concept poorly understood in practice. In many cases, the confusion or ignorance stems from multiple uses of the term in several different lexicons. For example, there are database models, financial models, business models, and so on. Say the term *model* at a meeting composed of the CEO, CFO, and CTO, and you can imagine the corresponding images. A “predictive” model (used in prescription) is usually derived mathematically from a set of data and relates aspects of the business that the manager can control (e.g., sales effort) to aspects of the business the manager would like to influence (e.g., sales). The resulting mathematical form explicitly quantifies the relationships contained in the data. With a limited understanding of these distinctions, a firm has little hope in successfully implementing quality decision-guidance.

Perhaps one of the best ways to counter the head-in-the-sand problem is to lead by example. Until firms and managers have experienced or witnessed the potential of systems designed to provide prescriptive decision-guidance, it is very difficult to get outside the “rear-view mirror” orientation of a majority of today’s solutions aimed at guiding decisions. In the following section, we briefly outline a decision-guidance system that might be employed in the quick service food industry to demonstrate the power of leading by example. We highlight some of the principles that have been discussed in the chapter in a system that could be used to provide prescriptive decision-guidance industrywide at all levels of the organization.

A LOOK AT DECISION-GUIDANCE SYSTEMS AS APPLIED IN THE QUICK SERVICE FOOD INDUSTRY

We could use any industry to illustrate our recommendations around decision-guidance, but we select quick service food (fast food) for its prevalence and familiarity. This industry experiences some 56 million transactions in the United States every day (\$100 billion in revenues per annum). Nearly half of the average household's outsourced meals consist of fast food. The market is highly competitive, and each provider is struggling with issues of customer satisfaction and profitability.

In this competitive business, where change occurs quickly and product and service delivery problems can have detrimental and long-lasting effects on the performance of the independently owned store and the franchise or business system as a whole, *timeliness* (the first attribute of an effective decision-guidance system) in issue detection and decision making is imperative. Thus, a useful decision-guidance system for the quick service food industry might involve providing close to real-time guidance around maintaining customer satisfaction to maintain and maximize within-store sales. The data collection opportunities at point-of-sale are staggering. There is a continuous flow of customers and, of course, "potential respondents." In such a system, every *n*th customer could be invited to share his or her experience with the company (across the industry). As depicted in Figure 10.1, the transaction receipt may be the invitation to take the survey.

Respondents would complete the instrument, ideally, onsite or, at least, electronically. This would allow for close to real-time analysis of the responses. Technologies facilitating this kind of collection might involve responses onsite in the store at an interactive kiosk or over the telephone via an interactive voice response system or online via a Web survey (see Figure 10.2).

Ideally, information from all stores in a franchise system and all franchises in the industry would flow into a central data repository managed by a third party. Operating on this data repository would be a decision-guidance information system designed to:

1. Create and update predictive models that relate performance to success measures.
2. Store, track, and report performance data.

Figure 10.1
The Invitation



3. Maintain the integrity of the proprietary, competitive-privacy, and industry-level data pooling aspects of the system.
4. Provide an access point for managers at all levels of these organizations to enter and evaluate ways in which the performance of their respective businesses and business domains can be enhanced.

Figure 10.2
Data Collection: Multi-Mode

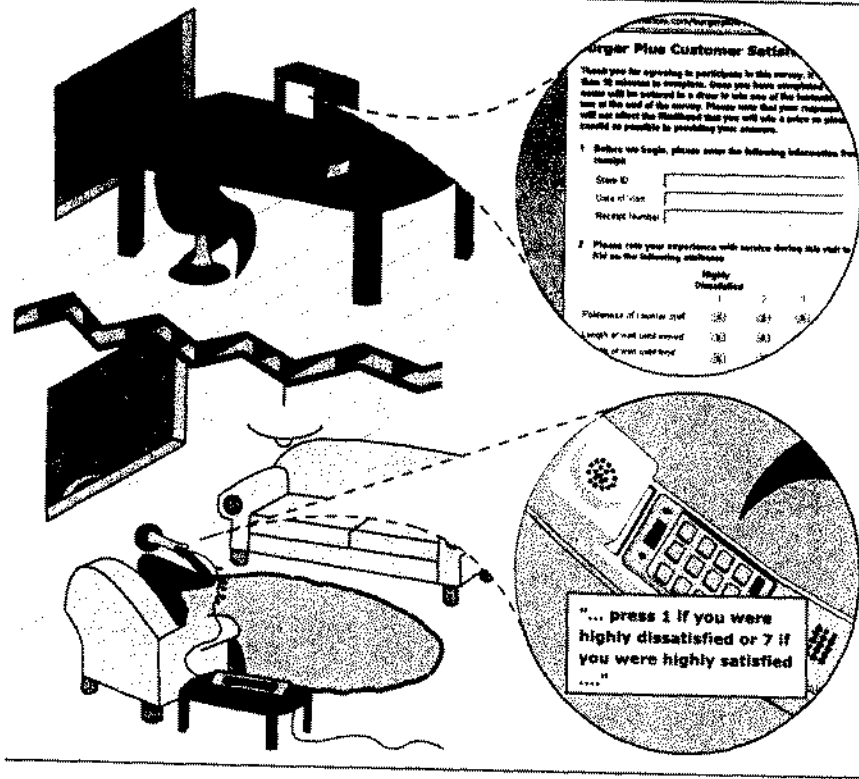
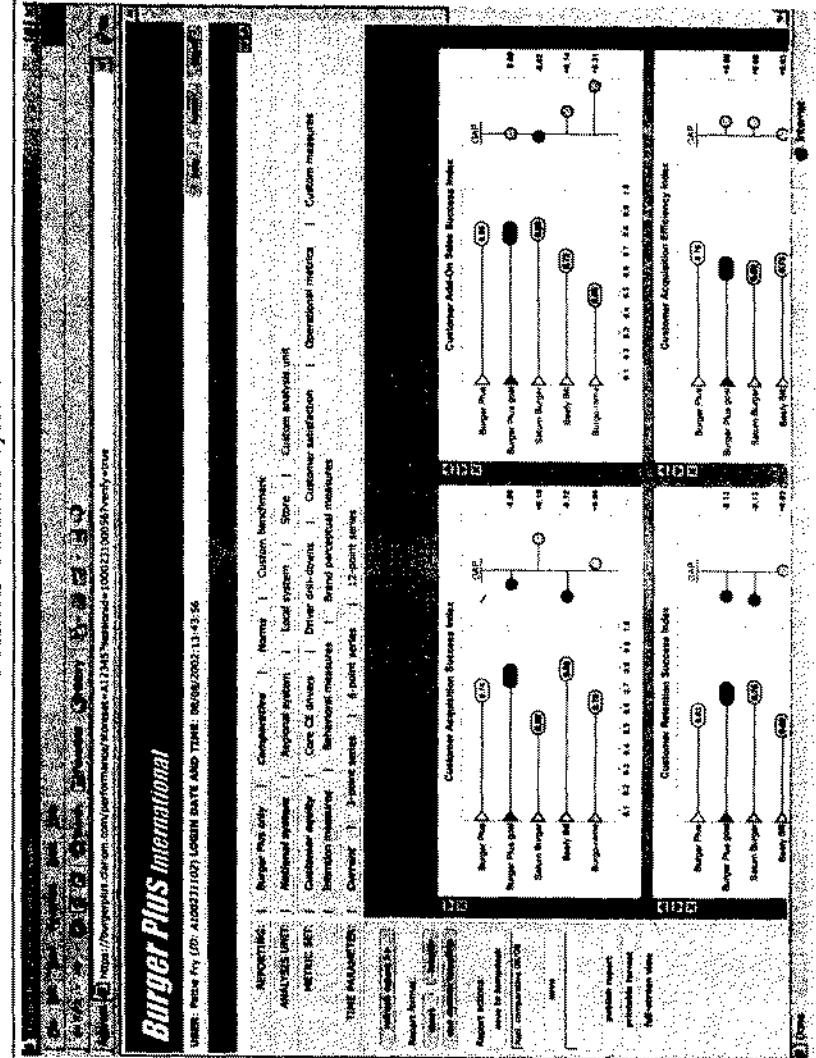


Figure 10.3 offers a view of a portion of a possible user interface for such a system. The example demonstrates options for looking at information in a number of different ways:

1. A focus on your own franchise outlet, the entire franchise chain, or the industry.
2. Examination of indices for customer satisfaction, their drivers, or broader equity scores.
3. Time frames in which any of these indices might have been expected to vary, given marketplace or environmental shifts or company marketing efforts.

Figure 10.3
Decision-Guidance System



4. Locations defining narrow or broader sampling frames, such as the focal fast food outlet, its metropolitan neighbors, or a broader swatch across the country, and so on.

Depending on the user's role and perspective, these options would allow them to very quickly customize their view to access information that is more *specific* and subsequently actionable (the second criterion of the ideal decision-guidance system). For example, a store owner might be interested in the service delivery issues most heavily impacting retention of their local market share so that they can guide their managers' behaviors individually, whereas corporate decision makers might be interested in the roll-up of this information nationally to perhaps help guide improvements in training programs, and so on.

Attributes three and four of an ideal decision-guidance system were that the results should be *prescriptive* and that the guidance system itself, and the output it produces, should *offer parsimony* (i.e., be simple to understand). In the solution illustrated in Figure 10.3, all modeling that would power the prescriptive aspects of the system would occur behind the scenes, according to agreed-on principles. It does not have to be "black-box" to the corporation, but to a certain extent, it would be to the user. The interface would allow the user to very quickly and simply ask questions such as "What would happen to customer retention if we improved the rating we're getting on food temperature by one point?" "What top three changes could I make at my five stores to maximally increase customer retention?" Without going into detail, the mechanisms delivering these answers to the user would be simulation and optimization technologies, respectively (behind the scenes, of course). The conceptual work and an understanding of the data collection (methods, sampling) would help enhance the *validity and reliability* of the guidance system, and an in-house knowledge of cost structures and profitability factors would help *tie the decisions to financials*, the fifth and sixth of the ideal decision-guidance system's qualities.

Finally, if the system were indeed accessible by all employees in the organization (as implied by the Web-based delivery mechanism depicted in Figure 10.3.), the final ideal of *scalability* would have also been achieved.

In this chapter, we have attempted to outline some of the issues that face companies seeking to effectively leverage data in decision making. There are many barriers and obstacles to overcome. There is no off-the-shelf

solution. Systems need to be constructed with a firm view of the decisions they will be guiding, with a view of exactly how that guidance will be derived and, consequently, what kinds of data need to be collected, when, and how.

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