A Design Theory Approach to Building Strategic Network-Based Customer Service Systems*

M. Kathryn Brohman†
Queen’s School of Business, Queen’s University, Kingston, Ontario, Canada, K7L 3N6, e-mail: kbrohman@business.queensu.ca

Gabriele Piccoli
DEIR, Università di Sassari, Sassari, Italy, Grenoble Ecole de Management, Grenoble, France, e-mail: gabriele.piccoli@gmail.com

Patrick Martin
School of Computing, Queen’s University, Kingston, Ontario, Canada K7L 3N6, e-mail: martin@cs.queensu.ca

Farhana Zulkernine
School of Computing, Queen’s University, Kingston, Ontario, Canada K7L 3N6, e-mail: farhana@cs.queensu.ca

A. Parasuraman
Department of Marketing, University of Miami, P.O. Box 248147, Coral Gables, FL 33124-6554, e-mail: parsu@miami.edu

Richard T. Watson
Department of MIS, Terry College of Business, University of Georgia, Athens GA 30602-6273, e-mail: rwatson@terry.uga.edu

ABSTRACT

Customer service is a key component of a firm’s value proposition and a fundamental driver of differentiation and competitive advantage in nearly every industry. Moreover, the relentless coevolution of service opportunities with novel and more powerful information technologies has made this area exciting for academic researchers who can contribute to shaping the design and management of future customer service systems. We engage in interdisciplinary research—across information systems, marketing, and computer science—in order to contribute to the service design and service management literature. Grounded in the design-science perspective, our study leverages marketing theory on the service-dominant logic and recent findings pertaining to the evolution of customer service systems. Our theorizing culminates with the articulation of four design principles. These design principles underlie the emerging class of customer service systems that, we believe, will enable firms to better compete in an environment.

*This research was funded by the Social Sciences and Humanities Research Council of Canada.
†Corresponding author.
characterized by an increase in customer centricity and in customers’ ability to self-
serve and dynamically assemble the components of solutions that fit their needs. In
this environment, customers retain control over their transactional data, as well as the
timing and mode of their interactions with firms, as they increasingly gravitate toward
integrated complete customer solutions rather than single products or services. Guided
by these design principles, we iterated through, and evaluated, two instantiations of the
class of systems we propose, before outlining implications and directions for further
cross-disciplinary scholarly research.

**Subject Areas:** Co-Creation of Value, Customer Service Management, De-
sign Theory, E-Business, E-Services, Network Completeness, Service Broker,
Service-Dominant Logic, and Web Services.

**INTRODUCTION**

The stature and structure of the customer service function have changed dramati-
cally over the past decade, as customer service has become an essential ingredient
of product offerings in nearly every industry and has emerged as a critical source
of differentiation, competitive advantage (Sheehan, 2006), and even quality of life
(Bitner & Brown, 2008). The apparent received wisdom from reports in the popular
press is that a firm should use technology to help customers get “what they want, the
way they want it, when they want it” (Weil, 2007)—doing so, the argument goes,
will help firms maximize sales revenue. Along these lines, the academic literature
has documented the increasing attention to technology-enabled customer service
and customer-driven self-service (Pedersen & Paper, 2007). Attention to the role of
technology in customer service has a long tradition in information systems (IS), op-
erations, and marketing (Karimi, Somers, & Gupta, 2001; Meuter, Bitner, Ostrom,
& Brown, 2005; Froehle, 2006; Mithas, Ramasubbu, Krishnan, & Fornell, 2006;
Zhu, Nakata, Sivakumar, & Grewal, 2007; Kleijn, de Ruyter, & Wetzels, 2007;
Cenfetelli, Benbasat, & Al-Natour, 2008). Recent research has conceptualized the
notion of network-based customer service systems (NCSS)—defined as informa-
tion technology (IT)–enabled IS that deliver service to a customer either directly
(e.g., via a browser, personal digital assistant, or cell phone) or indirectly (e.g., via
a service representative or agent accessing the system) (Piccoli, Brohman, Watson,
& Parasuraman, 2004). This work is now coalescing into the cross-disciplinary
service science movement (Chesbrough & Spohrer, 2006).

While much of the current literature focuses on evaluating how to best fulfill
customer needs and on assessing IT-enabled service delivery, new technology is
constantly challenging assumptions about customer service and pushing the fron-
tier of what firms can do in order to positively differentiate their offerings through
superior service. The coevolution of service and IT is so pronounced that many
believe that a service-centered dominant logic in marketing has now supplanted the
traditional goods-centered premise of marketing theory (Day et al., 2004). In this
emergent perspective, service provision, rather than tangible products, represents
the fundamental unit of economic exchange (Vargo & Lusch, 2004). Consequently,
researchers need to continually push the frontiers of service innovation, investigate
novel customer service arrangements, understand how emerging IT enable innova-
tive forms and levels of customer service, and evaluate the viability of alternative
service-provision modes. In a world where service offerings represent the core of a firm’s value proposition (Vargo & Lusch, 2004) and electronic interfaces are central to effective service provision (Rayport & Jaworski, 2004; Lui & Piccoli, 2009), there is a critical need to understand how consumers discover and interact with a complete, integrated set of services to fulfill their needs. There is also a commensurate need to improve our understanding of how organizational decision making in the customer-service domain must evolve in this emerging environment in order to identify and exploit opportunities for customer value creation. In this article, we contribute to knowledge pertaining to both of the aforementioned critical research imperatives. We do so by adopting the design-science paradigm (Hevner, March, Park, & Ram, 2004) in order to conceive a class of NCSS that, we believe, will emerge as the infrastructure for service delivery in a world in which customers increasingly manage their own interactions with firms (Watson, Piccoli, Brohman, & Parasuraman, 2005).

The importance of this work stems from the fact that the proliferation of technology-intensive products and services, such as those delivered thorough NCSS, makes it suboptimal, if not impossible, to identify a set of customer needs and devise static technology solutions to fulfill them (Berthon, Hulbert, & Pitt, 2005). A better approach is one that recognizes the role of customers and value network partners as co-creators of value (Vargo & Lusch, 2004) and leverages information richness and technology-enabled possibilities to understand and capitalize on the emerging frontier of customer service.

The article is organized as follows. We first introduce the IS design theory approach, justify the need for NCSS design theory, and theoretically ground our work. We then review the relevant cross-disciplinary research on technology-enabled customer service in order to extrapolate the current trajectory of customer service expectations and improvements, which points toward an increase in customer centricity, and in the customers’ ability to self-serve and dynamically assemble the components of solutions that fit their needs. Invoking insights from our literature review, we identify the design principles that will guide our NCSS implementation. We then discuss the full design of the proposed class of NCSS, as well as the two prototypes that we built and evaluated. We conclude with a discussion of implications for research and practice.

THEORETICAL FRAMEWORK

In its general form, an IS design theory represents an integrated prescription consisting of three elements: a set of user requirements, a set of systems features, and a set of practices for guiding development (Walls, Widmeyer, & El Sawy, 1992). Its main objective is to extend the boundaries of human and organizational capabilities by creating new and innovative systems and in the process provide guidance to developers by reducing the uncertainty associated with developing a new class of, as yet untested, systems. As such, IS design theory is normative and prescriptive in nature, and its main contribution is problem solving in a novel domain (Hevner et al., 2004). Knowledge of the new problem domain and understanding of appropriate solutions are achieved in the design and building of the proposed system. In our case, for example, we propose an IS design theory for a new class of NCSS
in an effort to develop an understanding of service design and management in the emerging environment.

The development of an IS design theory requires that the research address a novel domain, where existing design theories are not applicable (Markus, Majchrzak, & Gasser, 2002) and that its development be grounded in a “kernel” theory (Walls et al., 1992; Hevner et al., 2004). A kernel theory, which may be an academic theory or a practitioner theory-in-use, is useful in framing the area of applicability of the system, as well as in evaluating the design theory and the final product. In short, the kernel theory grounds the IS design theory development process. Following the tenets of the kernel theory, the research team gathers data, directly or through prior literature, to develop a set of principles for the development of the proposed system. Next a viable artifact is produced, in the form of a model, construct, method, or instantiation, and evaluated (Hevner et al., 2004).

Traditionally, the design theory approach calls for development of both a design product (i.e., systems features, system instantiation) and a design process (i.e., guidelines for developers) (Wall et al., 1992). Recent work, however, separates the two and posits that a design theory can produce either the design process or the design product (Venable, 2006; Gregor & Jones, 2007). When focusing on the latter, the design theory contributes the architecture of the system (or class of systems), as well as the design and an instantiation of its components, as opposed to a methodology for developers (Gregor & Jones, 2007). Given the complexity and novelty of the domain we address, we concentrate on the design principles surrounding the design product (i.e., a class of novel NCSS) not the design process. In the remainder of this section, we establish the need for a new IS design theory pertaining to the NCSS domain and we introduce the kernel theory: service-dominant logic (SDL).

Why is a New Design Theory for NCSS Needed?

Disappointing results from many customer relationship management (CRM) implementations are well documented in both the academic and business press. Academics have attempted to explain CRM failures in terms of an unclear definition of CRM (Leigh & Tanner, 2004; Reinartz, Krafft, & Hoyer, 2004), poor implementation practices (Zablah, Bellenger, & Johnston, 2004; King & Burgess, 2008), and overly IT-centric approaches (Kumar & Reinartz, 2006; Coltman, 2007). The managerial literature echoes these findings, indicating that as low as 10% of business and IT executives confidently believe that their CRM initiatives deliver expected results (Bard, Harrington, Kinikin, & Regsdale, 2005).

Another explanation for disappointing results is that CRM is inherently firm-centric, and this view of the firm–customer relationship fails to recognize the role of customer co-production in the design of a value proposition (Vargo & Lusch, 2004; Chesbrough & Appleyard, 2007) and the inherent inability of the firm to obtain complete information, a prerequisite to the management of a satisfactory relationship (Watson, Piccoli, Brohman, & Parasuraman, 2004, 2005). Research in this area has proposed a number of paradigms in response: superior customer-relating capability (Day, 2003), customer-managed interactions (Watson
et al., 2005), and re-engagement of CRM with relationship marketing (Mitussis, O’Malley, & Patterson, 2006).

While the previously discussed emergent paradigms show that theorizing about service has evolved, the literature has yet to articulate an IS design theory for service systems that goes beyond the limitations of traditional CRM approaches—as they prevent organizations from appreciating the full extent of their potential impact on customers’ lives (Mitussis et al., 2006), thus creating a “solution gap” that remains unresolved (Piccoli, Brohman, Watson, & Parasuraman, 2009). Specifically, a new design theory is necessary to help firms frame a class of NCSS that do not view individuals solely in terms of their roles as discrete customers of each single firm, as is done conventionally. Based on the tenets of such a theory, firms would then be able to build new NCSS that are more appropriate to the emerging competitive environment. Moreover, a design theory that moves NCSS development beyond firm-centricity enables organizations to define customer value holistically. To date, the literature has defined and measured customer lifetime value based on the individual’s interaction with a single firm (Berger & Nasr, 1998; Blattberg, Getz, & Thomas, 2001; Rust, Lemon, & Zeithaml, 2004). Yet, customers interact with multiple firms within an industry (Brohman, Watson, Piccoli, & Parasuraman, 2003). Thus, we need a new design theory that enables the development of NCSS incorporating the transversal customer role in order to appropriately measure customer value and incorporate it in firms’ decision models. Finally, an IS design theory that enables the development of NCSS that is appropriate for the current competitive environment must address the increasing role of integrated customer solutions over individual products or services (Vargo & Lusch, 2004; Tuli, Kohli, & Bharadwaj, 2007), and the multiplicity of IT-enabled channels that customers can use to interact with firms (Froehle & Roth, 2004; Rayport & Jaworski, 2004).

**Service-Dominant Logic**

Recent marketing theory has questioned the notion that “goods” (i.e., manufactured products) represent the basic unit of economic exchange and value creation (Vargo & Lusch, 2004) and has proposed a new paradigm for marketing research called SDL. The SDL perspective represents the appropriate kernel theory for our IS design theory because it seeks to describe the environment in which we envision NCSS to increasingly operate.

Vargo and Lusch (2004) suggest that the new dominant logic that has been coalescing over the last few decades sees **service provision rather than tangible products as the fundamental unit of economic exchange**. Through service provision the firm seeks to orchestrate a value proposition that meets customer needs and therefore creates value (Gronroos, 2000). Note that such a value proposition is often built upon (around) tangible goods, but it is the value proposition as a whole that customers seek—not the product itself.

The defining constructs in the SDL perspective are intangible resources, co-creation of value, and relationships (Vargo & Lusch, 2004). Intangible resources, such as knowledge and skills, are the cornerstones of the firm’s ability to orchestrate a value proposition. That is, the firm uses its knowledge and skills to understand
Design Theory Approach to Building Strategic NCSS

and meet customer needs in a manner that is superior to competitors’ (Dickson, 1992). In order for this process to take place, customers must be involved, first because value only emerges when a customer’s need is satisfied (Woodruff, 1997) and second because a customer’s knowledge enables the superior satisfaction of such needs—as the recent trends toward open innovation attest (Chesbrough & Appleyard, 2007). Thus, value co-creation only occurs when customers volunteer information and the firm incorporates it into the value proposition it offers. Finally, the SDL paradigm posits the role of relationship as essential. The centrality of relationships stems from the prominence of participatory mechanisms—such as co-creation of value—and the dynamic nature of the interactions between the firm, its partners, and customers over time. It follows that knowledge creation and learning are maximized through iterative and mutually reinforcing interaction processes (i.e., relationships) between the actors that partake in the value co-creation process (Vargo & Lusch, 2004).

The tenets of the SDL perspective lead to the conclusion that a firm, to be successful in the emerging environment, must be adept at “collaborating with and learning from customers and being adaptive to their individual and dynamic needs” (Vargo & Lusch, 2004, p. 6). In other words, this perspective is both customer-centric (Sheth, Sisodia, & Sharma, 2000) and market-driven (Day, 1999). Moreover, while not fully developing it, the proponents of SDL also introduce the notion of interorganizational cooperation in the orchestration of value propositions. Channel intermediaries and network partners, and their organization within the firm’s own value network, represent core competencies (Prahalad & Hamel, 1990) that the firm must leverage as it seeks to meet customer needs and outperform its competitors. In other words, “firms can have long-term viability only if they learn in conjunction with and are coordinated with other channel and network partners” (Vargo & Lusch, 2004, p. 6).

While emerging from the marketing tradition, the SDL perspective is consistent with the service science movement (Chesbrough & Spohrer, 2006) that captures a similar convergence toward the centrality of service and value-proposition orchestration in IS and operations management. Based on the SDL perspective as our kernel theory, we produce a set of design principles guiding our IS design theory and the development of the prototypes.

**DESIGN PRINCIPLES DEVELOPMENT**

In this section, we describe the emerging cross-disciplinary NCSS research from which we draw the design principles that guide our NCSS design and prototypes. As we discussed above, firms are under relentless pressure to offer customers “what they want, the way they want it, when they want it.” However, in response to these pressures, firms are not simply “giving away the store” and giving up control. Rather, they exercise control by deciding what products/services to make available for purchase, through what channels, at what price, and with what timing. For example, a hotel company offers its product, the hotel room per night, through a variety of distribution channels (e.g., traditional and online travel agencies, call center, Web sites), so as to be available to prospective guests no matter how they prefer to transact business. The firm retains control by loading product availability,
restrictions, and rate information on the various distribution systems to which it subscribes (Global Distribution Systems, Central Reservations System, Web site), according to its product placement and revenue management policies (O’Connor & Piccoli, 2003; Piccoli, Dev, & Applegate, 2008). In the remainder of this section, we address the pressures around the traditional firm-centric control model.

Customer-Managed Interactions

The SDL perspective points to the centrality of the firm’s intangible resources and the role of the customer in value co-creation, indicating how customer knowledge is instrumental to the orchestration of the firm’s value propositions (Dickson, 1992; Vargo & Lusch, 2004). Along these lines, recent work demonstrates that firms working with incomplete customer data and imprecise metrics for evaluating them run the risk of alienating, rather than satisfying, customers (Boulding, Staelin, Ehret, & Johnston, 2005) and, as consequence, experiencing lower profitability (Ryals, 2005).

The literature on customer-managed interactions (Watson et al., 2004) demonstrates the inherent data-collection limitations of firm-centric approaches and theorizes the development of customer data warehouses in response. A customer data warehouse is an organized, domain-specific, exhaustive set of related data about the customer and her transactions that is organized for analysis (Watson et al., 2005). A customer data warehouse represents the only viable alternative to achieve data completeness—defined as “a state where customers have access to all data they deem important to the information-based service in which they are involved” (Brohman et al., 2003, p. 48).

While the actual structure these data warehouses will assume in the future and the manner in which they will be populated are not yet clear, early evidence suggests that in most cases customers do not manage the customer data warehouse directly. Rather we have witnessed the emergence of information intermediaries (e.g., purveyors of cloud-computing services), whose value proposition consists in building, securing, and protecting the personal data in the individual’s warehouses. Early examples of such intermediaries focus on a specific domain of the customer’s life (e.g., travel, finance) and seek to produce a value-added service, rather than simply build and manage the customer’s personal data repository. TripIt, a startup based in San Francisco, is one such example (Piccoli, Applegate, & Brohman, 2009). TripIt seeks to simplify the life of frequent travelers who have to juggle a multiplicity of reservation confirmation e-mails and documents from the various suppliers of different components of their travel itineraries (e.g., airline, lodging, ground transportation). TripIt’s customers simply forward confirmation e-mails to the firm, which automatically sorts and organizes them, enabling travelers to access complete and coherent itineraries via the Web or through a smart phone. Accumulating all of a customer’s itineraries enables TripIt to gain a complete view of each traveler’s behavior in the travel domain, something that none of the travel suppliers would ever be able to accomplish on its own. Moreover, as TripIt’s Chief Executive Officer Gregg Brockway recognizes, TripIt is “building an information asset which reflects the collective travel experience of the TripIt community” (Piccoli, Applegate et al., 2009, p. 9). There are a number of other
early examples of information intermediaries managing customer data warehouses, such as Google Health, Mint, and Shoeboxed. While TripIt users must proactively feed their customer data warehouse, by forwarding confirmation e-mails, Mint—a personal financial management firm—automatically imports customer data from over 7,500 North American financial institutions using existing data standards.

The actual form that customer data warehouses will take may vary, and the dominant design that will emerge for populating them remains uncertain. What appears certain however is that customers will increasingly be able to retain control over their transactional data, as well as the timing and mode of their interactions with organizations (Hagel & Rayport, 2000; Watson et al., 2004). Thus, as the widespread adoption of customer data warehouses increases, firms will be challenged to decide how to best compete in markets where it is possible to achieve data completeness, subject to the customers’ control. We posit that, in such an environment, being able to dynamically incorporate complete customer data in product, pricing, and strategic positioning decision models will be a precondition for a firm’s participation in the market. The ability to incorporate customer preferences to differentiate products in this environment is in fact critical to a firm’s success (Shaffer & Zhang, 2000) and enables it to counter the increasing customer power brought about by widespread access to Internet technologies (Grover & Ramanlal, 1999; Rust & Chung, 2006). The foregoing discussion leads to our first design principle:

**Data-completeness principle:** Design for the co-creation of value by enabling customers to share, under their control, relevant data from their customer data warehouses.

**Process Completeness**

The SDL perspective points to the role of relationships with customers and with value network partners to enable the orchestration of comprehensive value propositions (Day et al., 2004; Vargo & Lusch, 2004). As IT capabilities continue to progress, e-service, defined as the provision of service over the Internet (Rust & Chung, 2006), has emerged as a lever for improving organizations’ interactions with customers. The e-service literature has a long tradition spanning topics that range from adoption and use (Parasuraman, 2000; Walker, Craig-Lees, Hecker, & Francis, 2002), to self-service (Bitner, Ostrom, & Meuter, 2002; Meuter et al., 2005), to customization and personalization (Srinivasan, Anderson, & Ponnavolu, 2002; Murthi & Sarkar, 2003), to the role of technology in creating customer value (Wu & Padgett, 2004). Yet, for the most part, work in this area has focused on interactions between a single firm and its customers that occur through a Web site.

We believe, however, that a narrow focus on the Internet limits the span and impact of the IT-enabled customer service research, particularly when considering the portfolio of coordinated service channels available today (Lui & Piccoli, 2009). Increasingly, customers seek integrated solutions that fulfill their needs, rather than individual products or services (Vargo & Lusch, 2004; Tuli et al., 2007), and transact through a multiplicity of IT-enabled channels beyond the firm’s online store (Froehle & Roth, 2004; Rayport & Jaworski, 2004). When it comes to service provisioning, therefore, today’s organizations must cooperate with those entities that
complement the delivery of their own service (i.e., their service networks) (Ghosh & Craig, 1986), and proactively with complementors as well (Brandeburger & Nalebuff, 1995). Complementors are firms whose offerings synergistically augment the customer value generated by the focal firm’s own product or service—particularly when they integrate seamlessly. Consider the example of luxury cruise lines that offer luggage valet services—sometimes bundled with the cruise itself. The service consists of picking up the (typically substantial) customers’ luggage from their home prior to departure, delivering it to the guest’s cabin on the day of departure, and reversing the process once the cruise is over. The service creates customer value by simplifying both the acquisition and retirement phases of the customer service life cycle (Piccoli, Spalding, & Ives, 2001), by coordinating and integrating a number of complementary services (e.g., local pickup, air transport, customs formalities, luggage insurance). As the number of complementors increases, identifying and integrating the appropriate ones becomes exponentially more difficult, and it is particularly challenging for the firm providing the central service (e.g., the cruise line) to architect a manageable set of options for the customer, as they rarely know enough about individual preferences.

Parallel to the growing focus on solutions and value propositions, rather than individual products, marketing theory now recognizes that “high-quality service means customizing as much as possible to what the individual customer desires” (Rust & Chung, 2006, p. 568). Other disciplines, including management science (Murthi & Sarkar, 2003) and IS (Bakos, 1998), also recognize this push for personalization. Thus, on the one hand customers increasingly expect firms to provide them with integrated solutions even when they are spanning organizational boundaries; on the other hand the imperative of service customization continues to grow stronger. At the intersection of these two trends exists an opportunity for cross-disciplinary academic research to inform practice and the future design of advanced customer service systems, thus aiding firms in improving decision making for their customer service delivery processes in the emerging customer-centric markets.

Recent work has theorized the notion of process completeness to describe the degree to which a firm’s service delivery workflow matches customers’ full range of needs (Piccoli, Brohman et al., 2009). A firm achieves process completeness when it is able to match the manner in which it serves customers to their expectation about what they consider to be a seamless, comprehensive service. For example, expectations for a business trip might include the ability to seamlessly combine air travel, airport parking, local transportation and car rental, lodging, insurance, food service, and entertainment. A firm that is able to orchestrate the fulfillment of such global expectations cutting across service boundaries achieves process completeness.

Thus, the decision problem confronting the firm consists of identifying and implementing the optimal process-completeness state that takes into account (i) the need to eliminate service gaps that lead to customer dissatisfaction and (ii) the need to avoid overinvesting in functionalities that customers do not need or expect and that therefore needlessly drain the firm’s limited resources (Piccoli, Brohman et al., 2009). Extant research identifies four process-completeness strategies that vary in scope and complexity (see Table 1).
Table 1: Process completeness strategies (Piccoli, Brohman et al., 2009).

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction</td>
<td>Customers receive basic transaction support from one of the firm’s functions or departments</td>
</tr>
<tr>
<td>Process</td>
<td>Customers receive service that spans multiple firm functions or divisions</td>
</tr>
<tr>
<td>Alliance</td>
<td>Customers are able to access cross-organizational service solutions based prearranged agreements between the firm and its partners</td>
</tr>
<tr>
<td>Agility</td>
<td>Customers are able to access cross-organizational service solutions that offer unlimited choice dynamically. In other words, an agility strategy represents the highest level of customer flexibility, unconstrained by the need for prearranged partnerships among the service providers.</td>
</tr>
</tbody>
</table>

The growing demand for integrated, customized solutions implies that firms will need to increasingly integrate their offerings with those of complementors (i.e., they need to gravitate toward alliance and agility strategies and develop capabilities for implementing them). However, the extant cross-disciplinary literature in marketing, operations, and IS is silent on how firms can do so and compete effectively in the increasingly demanding and complex business environment. As such we propose the following as our second design principle:

**Process-completeness principle:** Design to enable a customer to create a customized solution from a (potentially unlimited) choice of products and services relevant to the customer’s specific overall need.

**Discovery Completeness and Brokering**

While seeking to cater to customers, firms have traditionally retained control by managing product, placement, and pricing/timing decisions—as exemplified by the recent trends of dynamic bundling and the emerging trend of dynamic packaging in the travel industry. With dynamic bundling a customer specifies a location and a range of travel dates through an intermediary’s (e.g., Orbitz) or supplier’s (e.g., Hilton Hotels) Web site or by calling the provider’s reservation center. A bundle of air and lodging services is presented and priced collectively. Subsequently, the customer can add a number of other products such as insurance, transportation, or entertainment to the basic package. The bundle is then priced and delivered as one consolidated offering. Dynamic bundling differs from traditional bundling (i.e., static travel packages from tour operators) in that the matching and pricing of the package is done on the fly when customers inquire, by drawing on needed data about availability and rates from a fairly static database. As availability and prices in the database change, so do the bundles proposed to the customer.

One of the limitations of dynamic bundling stems from the difficulty customers encounter in managing the purchase process. A customer needs to evaluate competing basic bundles, which therefore need to be kept small (e.g., air and lodging only), and then add other services one by one. Such difficulty tends to reduce NCSS interaction value (Piccoli et al., 2004) and, as a consequence, hampers
the viability of these novel customer service approaches. Moreover, while in this arrangement the matching of complementors is dynamic from the customer standpoint, the process is static on the supplier side. In other words, the manner in which a firm controls its marketing mix in this environment is static—the firm either makes available or restricts a given product and sets prices a priori rather than dynamically.

Dynamic packaging differs in that it encompasses the automated recombination of complementors depending on marketing mix rules (e.g., conditional pricing rules, channels of distribution) and general business rules (e.g., complementary brands, overall trip characteristics, terms of sale). Such a packaging is dynamic on the customer side and somewhat dynamic on the suppliers’ side. In other words, a supplier’s product is not bundled just because it is available, but only when appropriate—as defined by the firm’s codified marketing mix and business rules (Kohavi & Bar-David, 2000). As with dynamic bundling, dynamic packaging is constrained by the business rules that must be explicitly codified into the bundling system—hosted and governed by the firm that is choreographing the service experience (e.g., the travel intermediary, the travel supplier). Such a restriction requires an alliance strategy and, as a consequence, the firm does not offer the consumer the flexibility that they are increasingly coming to expect.

In order to execute an agility strategy, it is necessary instead to decouple the search and evaluation systems that perform the identification of suitable offers to be bundled. Such decoupling allows every firm that offers products or services in the domain to publish its offers and its restrictions and enable the separate bundling system to dynamically find a match satisfying both customer restrictions and firms’ business rules. Another limitation of dynamic packaging, as currently conceptualized, is that the firm’s decision-making and product-matching processes fail to dynamically incorporate customer data as instantiated in the individual’s customer data warehouse. That is, the evaluation system simply takes into account a customer’s transaction requests (e.g., location, type of trip), without the ability to incorporate complete customer data and learn from the customer’s transaction history.

The need for academic work in this area has been recently recognized along with the necessity for systematically studying the role of IS agents in the service process (Rust & Chung, 2006), but empirical work is just beginning. Early theorizing in computer science and IS offers some insights regarding the technology requirements of NCSS that enable an agility strategy (Van der Aalst & Kumar, 2003; Zulkernine & Martin, 2007). Grounded in this preliminary work we propose the notion of discovery completeness—defined as a state where the optimal value proposition (including a complete bundle of products/services) can be identified and produced from among all the available options in the service domain. A jointly optimal solution is the one that simultaneously satisfies the customer’s requirements and preferences (as instantiated in their customer data warehouse) as well as service providers’ constraints (as instantiated in their marketing mix and business rules). A broker is the engine that engages in the service discovery and service architecting processes, identifying and evaluating available offers on the basis of customers’ and participating firms’ constraints, then bundling them
into cohesive value propositions. Based on the preceding discussion our final two
design principles are as follows:

- **Discovery-completeness principle**: Design for the dynamic discovery of both
  service options made available by participating firms and customer constraints.
  Such a design can be achieved through a service discovery mechanism.

- **Agility principle**: Design for the dynamic evaluation of available options,
  based on each firm’s business rules and data drawn from the customer’s data
  warehouse, and the creation of a complete, customized, value proposition for
  the customer.

**NCSS DESIGN**

Based on the four design principles that emerged from our theorizing, we designed
the architecture that defines the proposed class of NCSS. This architecture identifies
the components of NCSS and the relationships among them. Moreover, our design
identifies the actors involved: multiple customers, multiple firms, and a service
broker. A key feature of our design, as theorized earlier, is the decoupling of the
search and evaluation components that perform the identification, assemblage, and
presentation of suitable value propositions.

We reached the proposed design through an iterative process, with the results
of efforts to build and evaluate earlier prototypes of some of the system components
feeding back into our theorizing. The final design integrates novel constructs,
stemming directly from the four principles, with components that have already
been proposed and evaluated in the literature, such as domain ontologies, rule
bases, and broker interfaces. Consistent with Simon’s (1996) argument with regard
to the value of models in scientific research, we submit that this design will aid
problem solving and solution understanding for the class of NCSS that best fits
the environment described by an SDL (Vargo & Lusch, 2004), as well as stimulate
further research aimed at shaping the future design and management of services.

**System Actors**

Both the data-completeness and process-completeness principles in our design
theory imply the centrality of value co-creation among customers and multiple
service providers. As illustrated in Figure 1, the role of the customer and service
providers is to register inputs into the system. The customer must also accept
or deny ranked proposals—the system’s output. The broker is a separate entity
in the logical design (although service providers or customers could also play
the brokering role) and serves as the engine of the value-proposition-architecting
process theorized earlier. We next describe and discuss each actor in detail.

**Customer**

Customers define their specific transaction requirements as an input to the system.
For example, a customer may want to travel from Toronto, Canada to Milan, Italy
for a business trip on certain dates. This customer can explicitly state transaction-
specific criteria such as type of travel, preferred departure/arrival time, or spending
limits. Some of these restrictions may be automatically imported from corporate
travel policies in a business-to-business context, but for simplicity we do not address this variation. According to the data-completeness design principle, the customer also allows access to his customer data warehouse storing the profile, preferences, and past behavior relevant to the specific context (in this case the travel space). These data are used by the broker to contextualize and refine the transaction-specific criteria indicated by the customer. Moreover, the data are used to perform computations of interest to the firm based on its business rules. The design presented here represents a situation where the broker also manages the customer’s data warehouse. A design with an external data warehouse, perhaps managed directly by the customer, would not be tangibly different.

**Service provider**

The role of service providers in the proposed NCSS design, according to the process-completeness and discovery-completeness design principles, consists of creating service offers and specifying the business rules to create customized offerings for specific customers. In other words, while in a traditional customer service system the firm will simply publish some offers, as governed by marketing mix (including pricing) decisions, our NCSS design requires the focal firm to also design business rules that guide the NCSS in customizing such offers based on customer information and various other contingencies. Note that, while innovative for NCSS, this design is akin to the labor-intensive sales process for a complex product (e.g., IT infrastructure components or high-end server). In such an environment, the sales professional has the autonomy and latitude to adjust product, placement,
and pricing/timing offerings based on two sources of information: (i) the firm’s own strategy, targets, and contingencies (e.g., end-of-quarter quotas) and (ii) the sales professional’s knowledge of the customer with whom she is negotiating.

Within the NCSS design, the rule base is articulated around the logic that different service providers employ to evaluate and make adjustments to their basic offers. In other words, the rule base contains codified knowledge about each firm’s heuristics for offering adjustment and customization based on their own strategy, targets, and contingencies. Note that such information is not accessible directly to customer and competitors, just like the customer data warehouse is kept private and only used within the broker for computations and offer adjustment. Discussion of the manner in which such privacy is ensured is beyond the scope of this article however. The manner in which the rule base is constructed and the exact computations are performed depends on the specific instantiation of the NCSS design. In the design discussed next, we propose a rule base centered on each provider’s specific service options set and the provider’s definition of customer lifetime value (CLV).

The service options set is the machine-interpretable version of the firm’s sales strategy, codified for use by the NCSS in the form of business rules that are stored in the rule base. The service options set enables the service providers to register their strategy with the broker, thus enabling it to make appropriate modifications to the basic firm’s offers while it is in the process of architecting the full value proposition for the customer. The CLV definition is instrumental in leveraging the information received from customer data warehouses in order to dynamically alter basic offers (Haenlein, Kaplan, & Schoder, 2006). The proposed NCSS design is innovative in this regard because it solves the current limitations of firm-centric approaches to CLV measurement. In other words, in our design the firm-specific CLV rules are populated with complete customer data in the given context (e.g., the travel space), drawn from customers’ data warehouses, rather than a partial view of the customer preferences and behavioral data that the firm might collect when transacting directly with the customer. By using complete customer data, service providers can be more precise in their evaluation of the customer’s needs and value. For example, an airline might learn that an apparently low-value customer, based on previous purchases with that airline, is indeed a high-potential-value customer who travels extensively every year with other carriers and is relatively price insensitive.

Note that the CLV definitions are created by the service providers. Thus, while all providers may use the same input data, results will differ, reflecting the priorities and contingencies of each competitor. The same customer may be deemed highly valuable by one provider and moderately valuable by another. Moreover, the manner in which the CLV metric is employed also varies from provider to provider. Thus, the adjustment to basic offers will differ depending on the different computations of CLV and each firm’s own business rules concerning the use of the CLV metric—likely leading to significant variation across firms in their offers to the same customer.

To clarify the form that business rules take, and the purpose of the service options set, consider as an example a lodging firm that has a sales strategy designed to maximize revenues using optimization techniques. In order to register this
strategy with the broker, the firm would specify a set of business rules to take effect once a transaction is initiated by a potential customer (note that a provision to make higher or lower rates available based on expected demand and occupancy targets, a standard revenue management consideration, would affect the basic offers, not the service options set because the latter is only concerned with business rules activated when a transaction is initiated by a specific customer). Such rules may include the following: on days of expected 100% occupancy of the hotel and its set of competitors (e.g., the day the city is hosting the Superbowl), when only high rates are made available as basic service offers: (i) produce a standard corporate rate quote for a business customer with high potential CLV and (ii) subject to the previous rule produce an upgrade to the concierge floor for 75% of the standard upgrade cost, if the customer is flying using a partner airline.

**Broker interface**

In the computer science literature, a broker is a common mechanism for handling the matching of appropriate resources or services to fulfill a client’s requirements. Brokers, for example, are a popular method for resource allocation in a complex Web-service environment (Venugopal, Buyya, & Winton, 2004). In this case, a broker typically transforms user requirements into a set of jobs that are scheduled for processing by the appropriate resources, manages the related computing jobs, and then collects the results, or outputs, of these jobs. Brokers are also heavily used in service-oriented architecture to provide key functions such as service discovery (Zulkernine & Martin, 2007), service level agreement (SLA) negotiation (Zulkernine, Martin, Craddock, & Wilson, 2008), and process management (Dan et al., 2004).

In the design of the class of NCSS systems we propose, the broker plays a central role. The broker is a logical entity that may be managed by a service provider or may be independent (i.e., an information intermediary). According to the discovery completeness and the agility design principles, the broker shelters the customers and service providers from the complexity of the discovery of offers and the creation of the interorganizational value proposition. The broker accesses the specifications of both customers and service providers and transforms these specifications, managing the ensuing set of tasks that are scheduled for execution by the various components of the system. In other words, the broker oversees the service discovery and proposal-generation processes, enabling the decoupling of the search and evaluations processes. Consistent with our theorizing and the design principles introduced earlier, it is this decoupling that enables an agility strategy.

**NCSS System Constructs**

The system components outlined in our NCSS design (Figure 1) are a blend of established and novel constructs. Table 2 provides a brief description of each of the established system constructs utilized in the design. Novel constructs are the defining components in the design of our proposed class of NCSS systems. These novel constructs are represented by circles, and we describe them in depth in this section. They include service discovery, proposal generation, and proposal ranking.
Table 2: Description established system constructs.

<table>
<thead>
<tr>
<th>Description and Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service offerings</strong></td>
</tr>
<tr>
<td><strong>Domain ontology</strong></td>
</tr>
<tr>
<td><strong>Customer data warehouse</strong></td>
</tr>
<tr>
<td><strong>Rule base</strong></td>
</tr>
</tbody>
</table>

The need to decouple the search and evaluation constructs, as discussed in the theoretical framework, leads to the separation of the discovery completeness and agility design principles in our design theory. Both principles relate to the dynamic evaluation of offers to be included in the full value proposition for the customer; however, the discovery-completeness principle guides the identification of viable offers based on customer needs and profiles, while the agility principle guides the alteration of offerings based on the service providers’ business rules and the customer’s history.

Service discovery

The service discovery component matches the customer transaction requirements, contextualized using information from the customer data warehouse and the domain ontology, to service providers’ offerings stored in the basic offers database. The domain ontology plays a crucial role because it reduces uncertainty and confusion, enabling the service discovery component to identify relevant service offers given the customer’s specifications and preferences. It provides contextual information that enables the service discovery component to explicitly determine what combinations of offerings are appropriate in a given context. Compared to a syntactic approach (i.e., the use of standards), ontologies provide a higher degree of expressiveness that is more consistent with the degree of customer control in existing dynamic bundling systems. This is important because the open specifications messages based on XML standards are not sufficiently expressive to guarantee an automatic exchange and processing of information to develop dynamic applications (Cardoso, 2006). A domain ontology instead enables “the shift from a purely syntactic to semantic interoperability” (Cardoso, 2006, p. 731)—a degree of interoperability that is necessary to the proper functioning of NCSS that enable service provision in the environment described by the SDL.
Proposal generation

Once viable offerings are elicited by the service discovery component, the proposal-generation component is responsible for creating customized value propositions based on the business rules drawn from the NCSS rule base. Following the process-completeness and agility principles, the NCSS design enables the system to dynamically adjust the initial offerings according to the rules set by each service provider. While the proposal-generation construct varies significantly in different instantiations, our implementation uses two general criteria to guide the proposal-generation process: customization and alteration.

Customization criteria define the rules for deciding whether the current transaction initiated by the current customer should be granted the right to an alteration of the basic offers or not. Alteration criteria define how the offer will be modified if the customization criteria are fulfilled. Alteration criteria are explicitly stated in the service options set codified by each service provider. Thus, these criteria are either transaction-oriented if they are explicitly stated as part of the service options set or customer-oriented if they are based on the CLV metric, or both. For example, a rule to discount the unit flight price by 10% if the transaction includes more than five travelers is transaction oriented. Conversely, the rule to up-sell a traveler to the concierge floor, bundling telecommunication services, and the use of the business center might be triggered for a conference traveler who exceeds a set threshold on the firm’s CLV metric.

The proposal-generation process, run against the rule base for all viable service providers given the initial customer need, produces a set of interorganizational value propositions (e.g., complete itineraries) that are submitted to the customer following a ranking process.

Proposal ranking

Proposal ranking follows the data-completeness design principle. That is, when multiple proposals are generated, the proposal ranking component positions the resulting value propositions according to the customer’s preferences as stated in their customer data warehouse. The ranked list is returned to the customer through the broker interface.

Evaluation

The NCSS design was developed using an iterative process leveraging the building and evaluation of earlier prototypes of various system components discussed in the NCSS design (Figure 1). The first prototype system was a broker to support service discovery (Xu, Martin, Powley, & Zulkernine, 2007). The system enabled the discovery of services that, in addition to the basic offerings, sought to match the customer requirements to service offerings by registered providers. The principle of data completeness was operationalized by including the service providers’ operational properties, such as levels of service and reputation, in the database of service offerings. An experimental evaluation of the performance of the service discovery component showed improvements in the quality of the service discovery (i.e., quality of matches) when the service provider operational properties were
included in the search criteria and provide preliminary empirical validation for the data-completeness and discovery-completeness design principles.

The second prototype we incrementally developed was a broker to support proposal generation (Zulkernine et al., 2008). This system facilitated the development of adjusted offerings, in the form of SLAs, between a service consumer and a service provider. The proposal-generation system incorporated the process-completeness design principle by including mechanisms to accept constraints, preferences, and negotiation strategies from multiple providers to create integrated, customized value propositions to the customer. It also incorporated the agility principle, because the system was designed to arrive at a negotiated SLA based on the information provided by the multiple negotiating parties. An evaluation of our proposal-generation prototype, using a series of experiments set in the travel context, showed that the broker arrived at an SLA that achieved a higher combined utility value (i.e., both parties were more satisfied) than basic offers.

Building two prototypes has facilitated the joint maturing of our understanding of the connection between the frontiers of customer-service thinking and the possibilities created by emerging information technologies. This maturation process is not complete, and might never be, but it has enabled us to identify the potential for novel NCSS designs and avenues for future exploration.

**IMPLICATIONS AND FUTURE RESEARCH**

The design theory approach of this article and the resulting framework for designing NCSS offer an expansive agenda for further research. In this section, we offer several directions for future scholarly work in each of the disciplines we represent, and consistent with the cross-disciplinary nature of this project, we recognize that many of the avenues we describe are best pursued through interdisciplinary work.

Recent computer science literature recognizes that, in order for computer applications to become more customer driven, there is a need to examine the translation of specifications from the business domain to the service, or system, level (Agrawal, Lee, & Lobo, 2005). As we show in the theoretical development, as the general population (i.e., customers) becomes increasingly tech-savvy and tech-expectant (i.e., expecting technological solutions for service encounters), service providers are under increasing pressure to develop service systems that offer the capability to create individualized technology-mediated service processes. That is, alliance and agility strategies (Piccoli, Brohman et al., 2009) are increasingly becoming a prerequisite for acceptable customer service standards. Thus, computer scientists must be able to resolve the problem of how such agility-enabling systems should be created. Our work takes a step in this direction by developing a conceptual framework that shows how a customer-service system can accept specifications from both the service provider and the customer at the business-model level and automatically translate those specifications into appropriate actions at the system level. The development of complex instantiations of the class of NCSS we propose, particularly in a business-to-consumer context, represents a significant opportunity for future investigation. Moreover, much uncertainty remains with respect to how to handle a wider variety of properties and conditions for evaluation and how to rank results according to the multiattribute criteria provided by individual customers.
Specifically, the instantiation of complex proposal-generation constructs represents an opportunity for future interdisciplinary work involving marketing scholars, who can create realistic and effective rule base structures that will help service providers to perform effectively in increasingly competitive electronic markets. Finally, operationalizing the idea that a service broker could carry out automatic negotiation on behalf of an unlimited number of parties represents a challenging computer science problem that is still unresolved and hence worthy of scholarly research.

For marketing scholars the class of NCSS discussed in this article, once developed and operational, can serve as laboratories for significantly enhancing our understanding of consumer behavior in electronic environments. Knowledge about customer behavior to date is dominated by customer reactions to various marketing strategies and tactics and various factors (individual, situational, environmental, etc.) that influence those reactions. The dynamic interactions between customers and service providers in the electronic context of NCSS—involving co-creation of value propositions in real time—offer opportunities for observing and understanding novel aspects of customer behavior in emerging technology-intensive marketplaces. A recent study made a significant contribution by examining how firms can effectively identify customer segments on the basis of their use of online infomediaries (Viswanathan, Kuruzovich, Gosain, & Agarwal, 2007). Along the same lines, a need and opportunity exists for a more robust understanding of customers and the choices they make in NCSS environments. Because the NCSS design principles include the capability for customers to choose tailored, organizational value propositions that offer potentially unlimited choice, it should be possible for the NCSS to serve as mechanisms to help firms better understand their customers and their preferences—as theorized in the co-creation paradigm. A related opportunity exists for interdisciplinary work in marketing, IS, and computer science that explores avenues for elaborating the design of NCSS to generate customer intelligence that can help in understanding how the service-value propositions and customers’ responses to them fluctuate with changes in the base rules, pricing policies, number of service providers, and variations in the options that are feasible. The ethical and privacy implications of this approach also offer fertile ground for further exploration.

The proposed NCSS design theory can also serve as the foundation for enhancing our understanding of the nature and extent of use of recommendation agents and e-customization by customers. While some work in this regard is available (e.g., Asim, Essegaier, & Kohli, 2000; Asim & Mela, 2003), there is a need to incorporate the dynamic and co-creation aspects of the class of NCSS we discuss.

Another stream of future research grounded in marketing relates to the role of traditional service intermediaries (e.g., travel agents, financial consultants). For example, what is the impact on traditional service distribution channels when customers have access to an electronic broker? More generally, we suggest that brokering services could be performed by any of the three actors: the customer, the service providers, or an intermediary. An important implication for interdisciplinary research in this regard is to investigate how and to what extent the effectiveness of NCSS varies depending on the type of entity that acts as the broker.
As we noted earlier, early instantiations of the brokering service and the customer data warehouse service are being offered by emerging intermediaries (e.g., TripIt, Mint.com). Are there situations where service providers or customers would be better positioned to handle the brokering task? Is it possible for the brokering service to be implemented in distributed fashion whereby different actors manage different components of the service broker and standards govern their interactions? Under what conditions should one of the service providers take the leadership in developing broker functionalities?

Effective performance measures and feedback mechanisms are essential features for IS-based environments such as Web-service electronic marketplaces (Bauer, Hammerschmidt, & Falk, 2005). As our work is a cross-disciplinary research initiative, an effective definition of performance should include both a technical and business perspective. The efficiency and effectiveness of NCSS from the customer’s and firm’s perspectives need to be examined as well. There is an opportunity to integrate technical measures of service performance such as Web-service reputation (Maximilien & Singh, 2002) and quality and performance of Web services (Liu, Jin, & Xi, 2005) with quality and performance measures of e-services (Wolfinbarger & Gilly, 2003; Collier & Bienstock, 2003; Parasuraman, Zeithaml, & Malhotra, 2005) to develop a robust, comprehensive protocol for assessing the performance of NCSS. Further, scholars with an interest in strategic IS should explore the potential for coopetition engendered by the proposed NCSS design. For example, to what extent can information about business rules of the different service providers be shared among a set of competitors in order to improve the bargaining power of the group as a whole? Is it possible to envision a set of metabusiness rules that will inform the circumstances under which basic service offers should or should not be modified, depending on the aggregate behavior of all service providers?

STRIVING FOR COMPLETENESS

Customers and firms live in a world of incomplete information. This lack of completeness becomes more evident, and more trying, as business and society as a whole become increasingly information intensive and ubiquitous networks abound (Watson, Pitt, Berthon, & Zinkhan, 2002). Technology shapes our modern world and changes our expectations for the future. In particular, advances in IS are leading us to expect that firms know much about us, even though we might dislike this, and that there should be higher levels of synchronization and integration between elements of our personal and organizational lives (e.g., our contact list is consistent across our desktop, laptop, and cell phone, and enterprise resource planning systems coordinate activities within and between enterprises). The notion of completeness, which is the driving concept of this article, and its various forms (e.g., data completeness) provides us a set of design principles for directing theory and performing research and development aimed at enhancing our understanding of how customer value is created in the information-intense networked world. The value of completeness as a concept mainly consists in helping us to bound value creation on the customer side with the concept of data completeness, and on the firm side with the concepts of process and discovery completeness. Knowing one’s
limits is an important step toward recognizing one’s potential. The completeness
design principles help us to recognize the potential of NCSS to create a new frontier
for creating customer value and fostering firm success. [Received: January 2008.
Accepted: May 2009.]

REFERENCES
computing services. *IEEE Communications Magazine, 43*(10), 69–75.
*Journal of Marketing Research, 37*(3), 363–375.
40*(2), 131–146.
*Communications of the ACM, 41*(8), 35–42.
top enterprise CRM software vendors across 177 criteria. Cambridge, MA: For-
rester Research.
175.
American*, (May), 35–43.
keters sometimes get it wrong. *California Management Review, 48*(1), 110–
129.
51*(1), 39–46.
self-service technologies. *Academy of Management Executive, 16*(4), 96–
108.
Blattberg, R. C., Getz, G., & Thomas, J. S. (2001). *Customer equity: Building and
managing relationships as valuable assets*. Boston, MA: Harvard Business
School Press.
ship management roadmap: What is known, potential pitfalls, and where to
completeness: A key to effective net-based customer service systems. *Com-
munications of the ACM, 46*(6), 47–51.


Design Theory Approach to Building Strategic NCSS


**M. Kathryn Brohman** is an assistant professor of information systems at the Queen’s School of Business, Queen’s University in Canada. She completed her PhD at the University of Western Ontario and spent four years at the Terry College of Business, University of Georgia, before joining the faculty at Queen’s. Kathryn focuses her research on the customer service systems and information systems development, specifically the management of agile software development projects. She has published refereed articles related to these topics in academic journals including *MIS Q Executive, Harvard Business Review, Communications of the
ACM, and others as well as leading conferences in the management information systems field.

Gabriele Piccoli is associate professor of information systems at the University of Sassari (Italy) and holds a research appointment at the Grenoble Ecole de Management in Grenoble (France). He held positions as associate professor at Cornell University, adjunct professor at Tulane University, and instructor at Louisiana State University. His research, teaching, and consulting expertise is in strategic information systems and the use of information systems to enable customer service. He is a former associate editor of the MIS Quarterly and his research has appeared in MIS Quarterly, MIS Quarterly Executive, Communications of the ACM, Harvard Business Review, The DATABASE for Advances in Information Systems, The Cornell Hospitality Quarterly, and other academic and applied journals. He has recently authored the book Information Systems for Managers: Text and Cases, published by Wiley and serves on the editorial board of the Cornell Hospitality Administration Quarterly.

Patrick Martin is a professor of the School of Computing at Queen’s University. He holds a BSc from the University of Toronto, MSc from Queen’s University, and a PhD from the University of Toronto. He is also a visiting scientist with IBM’s Centre for Advanced Studies. His research interests include database system performance, Web services, and autonomic computing systems.

Farhana Zulkernine obtained her PhD from the School of Computing, Queen’s University and her BSc and MSc degrees in computer science and engineering from Bangladesh University of Engineering and Technology. She has 10 years of experience in software systems development in national and international organizations like UNICEF and the World Bank. Her main research interests are in the areas of middleware, service oriented architecture, autonomic service management, intelligent agents, business process management, and negotiation.

A. Parasuraman (“Parsu”) is a professor and holder of the James W. McLamore Chair in Marketing and vice dean of faculty at the School of Business, University of Miami. He has received many distinguished teaching and research awards and has published over one hundred scholarly articles in journals such as Journal of Marketing, Journal of Marketing Research, Marketing Science, Journal of the Academy of Marketing Science, Journal of Service Research, Journal of Retailing, and Sloan Management Review. He has also authored or coauthored several books. He has served as editor of the Journal of the Academy of Marketing Science (1997–2000) and the Journal of Service Research (2005–2009).

Richard T. Watson is the J. Rex Fuqua Distinguished Chair for Internet Strategy in the Terry College of Business at the University of Georgia. He has published over 100 refereed journal articles, written books on electronic commerce and data management, and given invited presentations in more than 30 countries. His most recent research focuses on information systems leadership and the role
of information systems in creating ecologically sustainable practices. He is a consulting editor for John Wiley & Sons, a former president of the Association for Information Systems, a visiting professor at the University of Agder in Norway, international coordinator for the PhD program in Information Systems at Addis Ababa University, research director for the Advanced Practices Council of the Society for Information Management, and co-leads the Global Text Project.