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Designing for Service Systems

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Abstract

The services sector was initially defined as a tertiary and residual economic category after agriculture and manufacturing. As many disciplines struggled to define, model and design for services, it became clear that the foundational emphasis was on person-to-person interactions like those between customer and hairdresser, mechanic or accountant. But in recent years, the category of services has grown to encompass self-service technologies and web-based services, mandating a broader analysis of this field. Rather than add new categories to the classification of services, we must rethink the basic concepts and introduce new ones that more richly capture the complexity of services design and delivery, regardless of the actors, be it people, information or technology. Every "moment of truth" between service provider and consumer is a result of a value chain of services, divided between the front- and back-stages, where information plays a crucial role from start to finish. Understanding the service system in which this value chain exists, the actors, and how information flows through its structure is the new foundation for effectively applying a service design methodology. This paper proposes a holistic approach to services design intended for the renovation of existing, information-intensive services. The methodology considers the often competing interests of the front-stage, consumer experience of services, with the back-stage, processes and information technology driven services that are invisible to the service consumer.

Contents

1. Introduction

As the services industry has solidified its position as the dominant force in developed nations' economies, the activities considered *services* has broadened to include an unusually large set of interactions between people, information and technology. Shostack (1984) recognized that service providers do not need to be human, but if they are, "they are only part of the process" (p. 134). No longer is it sufficient to view a service as an experience for the consumer, and a result of only the moment of co-production between the service provider and consumer. Services are now seen as a result of a series of services, an orchestration of many processes, some known to the service consumer, and some beyond the consumer's horizon.

An inclusive definition of services has proven elusive. Some definitions focus on the person-to-person model, while others include person-to-computer. When definitions do not work, classification systems may be useful. Teboul (2006) divides services into front- and back-stage, where classification is based on which stage contributes most to the service consumer's value (p. 11). While this distinction is useful, the demand is for a definition that can capture the different stages in addition to the person-to-person, person-to-computer and computer-to-computer relationships that can compose a services interface.

In addition to representing these different relationships, it is also important to understand the role of information in enhancing the total service delivery process. Services span a spectrum from pure automation to pure experiences. Traditional models of person-to-person and experience-based services do not capture the information components that exist in the majority of services today; likewise, models of automated services lack the notion of experience from the consumer's perspective. In information-intensive services, information and experience are integrated; the primary question for designers is "What part of the service delivery process can be enhanced by information?"

Many disciplines have tried to tackle the service design problem from their individual perspectives. Unfortunately, one discipline cannot cover the entire design space; services design needs new sets of skills and a comprehensive approach. Some call this emerging discipline Service Engineering, a field "concerned with the systematic development and design of services using suitable procedures, methods, and tools" (Bullinger et al., 2003, p. 276). Others call this Service Science, Management and Engineering (SSME), which is the "application of scientific, management, and engineering disciplines" to services (Spohrer et al., 2007, p. 71). Both definitions cover the need for a systematic and systemic approach to services design which proposes a formal methodology, with service-appropriate models and tools, and an integration of service experience components.

We are answering this call for an end-to-end, holistic methodology that is rich enough to accommodate the many different types of services in a service system. The goal for the service design methodology proposed here is to use an integrated approach to

developing a rich understanding of the service domain and the role information plays within it.

2. Propositions for Design

There are several propositions that are the foundation of the design methodology proposed in this paper:

(1) The *service system* must replace the traditional - person-to-person - view of a service in order to capture the many different actors, relationships and services that compose the entire end-to-end service delivery process.

(2) The distinction between the back-stage and front-stage, and the line of visibility that separates them, is only an incremental improvement on the traditional view of services.

(3) A service system embodies many possible service value chains, each of which is defined by the point-of-view, or ultimate consumer.

(4) This richer view of a service system implies a similar enlargement of the line of visibility to a zone of visibility, which takes into account the multi-channel nature of service offerings and the information drivers within a service system.

The importance of these propositions is to define common terminology, develop mental models and come to an agreed upon perspective to anchor the discussions for multidisciplinary design teams. With this view, teams will need to pay equal attention to the multichannel nature of services in the front- and back-stages and to the information drivers that will determine the final outcome of the service.

2.1 Service System

A service outcome is never the result of a single moment of co-production between service provider and consumer; it is a result of a series of interactions and operations that have contributed to the final service interface. Akin to the network in a supply chain, these interactions are part of a greater eco-system of actors and the services they simultaneously consume and provide called a *service system*. Some have referred to the service system as a value-net (Crawford et al.). The provider's value proposition can be experience, simplification – as in simplifying some situation for the consumer – and transformation – changing the consumer's state. The "net" adds an imagery cue to highlight that a service system is a set of actors intertwined by many different relationships. Modeling service systems is difficult because there are not only actors – people, technology and shared information – but knowledge, activities and intentions to take into consideration (Spohrer et al., 2007, p. 72; Maglio al., 2006, p. 81).

To illustrate this notion of a service system, Spohrer et al. (2007) use the example of a university, pointing out that there are a multitude of providers and consumers creating more services than just that of educating students. While the university is supplying a

certain set of services to the faculty, the faculty is simultaneously providing services to the students, and the students, in turn, may be providing services to each other and others outside of the university (p. 72). To relate back to traditional views of a supply chain, the service system exists within and across organizational boundaries. As a service system expands to capture increasingly more interactions and actors, it becomes harder to renovate an existing service offering; it can seem as if there are no finite boundaries to the service system as it can extend into many different domains. Since there may be infinite amount of interactions to map within a service system, it will be important to pare it down in order to lay the foundation for a focused design project.

The designers' role is to understand the ways in which the service system affects quality. Service quality is perceived by the consumer, and is measured by the gap between her expectation of the service and her actual experience. It is not evaluated only at the moment of co-production, but is a product of the entire process of service delivery across all channels (Oliva & Sterman, 2001, p. 894). The expectation of a service begins with the brand, or reputation, of the service provider, and is affected by every interaction, or *touch point*, that the consumer has with the provider. Tate et al. (2006) believe that understanding service branding is crucial to organizations that deliver services across many channels; they claim that it is consistency across the many touch points that will influence quality perception (p. 3). A service provider, in the broadest sense, can be an organization, such as a multinational bank. The provider can deliver services across multiple channels, which in turn can create multiple reputations, or sub-brands. Each of these service channels creates the *service system context*. As an example, the bank may have a positive brand image for its in-branch banking experience, but a negative brand image for its automated teller machines. These sub-brands decide the type of consumers the bank will attract, and will help design teams identify those parts of the service system that contribute to negative consumer perceptions and are inconsistent with organizational goals. It may be that a service provider would like to manage different brands based on the various service offerings and consumer markets, but there is an expectation that information traded with the consumer is consistent.

Defining the service system and its context provides the foundation for starting a services design project. This foundation will help the team focus and guide the design process. Still, this foundation must be pared down into the service system scope.

2.2 The Front- and Back-Stages of Services

As mentioned previously, the service consumer is not concerned with all the actors and services beyond the information horizon. Most often, she is only concerned with the interaction between her and the frontline provider. This interaction is the *front-stage,* where the frontline provider is the last in the service chain. The *back-stage* is then the set of all other services with which the consumer does not interact with because they are invisible from their perspective.

This front- and back-stage distinction is a binary and over-simplified view of the service system, but it proves useful in highlighting the types of people that need to formulate an effective services design team. The *back-stage* encompasses services that consist of

people, information and technology, so it will be useful to distinguish between back-stage services involving people and those back-stage services involving technology. The latter is traditionally referred to as the *backend*, and it can involve databases, web-services and other information technology applications. While it is often said that experience designers propose services that the backend cannot support, it is important to understand that the reverse is also true. Often the backend can offer flexibility and functionality that front-stage designers fail to exploit. The concept of the service systems shows that both front- and back-stage services contribute to the entire service delivery.

While the front- and back-stage designers have different concerns with the service delivery process, these concerns are not wholly different. The front-stage designer is concerned with that "moment of truth" between service provider and consumer (Teboul, 2006, p. 15, 20). They are also concerned with ensuring an appropriate and convenient proximity of service to the consumer, and with a goal of having zero customer defections. The back-stage designs for division of labor, or specialization and standardization of processes. Whether it is manufacturing production or a database running complex computations, there is concern for control of product and process, and for having zero defects for each product or computation.

It's clear that the interests of both front- and back-stage intersect. Unfortunately, there can be ideological gaps throughout organizations when the front-stage designers are concerned only with the consumer and the back-stage designer focus exclusively on technology, business strategy and performance. Creating an interdisciplinary design team will help to reveal the gaps of understanding in both the front-stage's model of the back end and the back-stage's model of the consumer experience. Within these teams, designers must play these roles as marketers, information architects, user-centered designers and document engineers in order to maximize the perspectives of the service system. The team becomes more efficient by covering all the bases and is primarily concerned with providing a seamless integration of all parts of the service chain to meet consumer and organizational requirements.

2.3 Service System Scope

Service systems are a complex network consisting of many different perspectives, and there are a multitude of potential perspectives depending on which node serves as the final consumer. The scope defines the context of the design project, and is comprised of two parts, the *service chain* and the *point-of-view*. The process of scoping begins with two simple questions: Who is asking for the service, and who is providing the services? These answers, along with the service system context, will help frame the service design project.

The *service interface*, **Figure** 1a, is the touch point between service provider and consumer, and has always been viewed as the crucial moment where the consumer judges service quality and the service value is revealed. This important interaction is the result of a long chain of services, where this series of services is called the *service chain*. Identifying the service chain allows designers to treat all other parts of the service

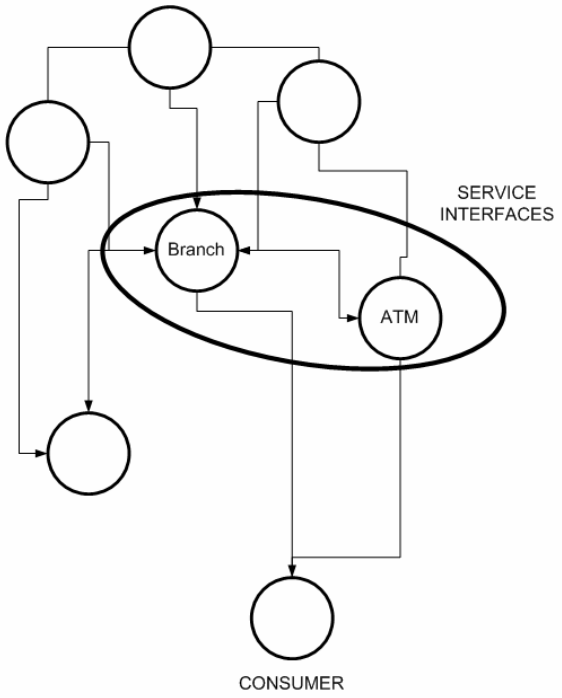

Figure 1a: Touch Points or Service Interfaces between the Consumer and Provider; in this case the provider is a bank that offers services within the branch and at the automated-teller machine.

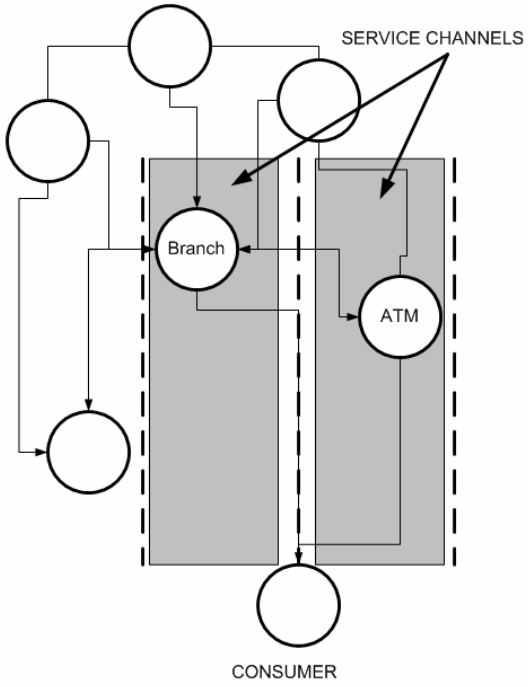

Figure 1b: When a Service Provider manages more than 1 touch point with the consumer, they are said to offer services across multiple channels. The consumer expects information to flow smoothly between these channels; this information is part of their zone of visbility

system as exogenous to the design project. Since, by definition, there are multiple consumers in a service, there can be multiple service chains within a system. Observe in **Figure 2**, the example of a teaching hospital. In a teaching hospital, the residents and interns can simultaneously provide services to the patient, but from the perspective of the intern, the resident is also providing a service to him. Thus, the scope also depends on the consumer.

The *point-of-view* is the primary consumer and is the last consumer in the services chain. A service from the consumer's point-of-view consists of one interaction, exchange of information, or point-of-sale. In **Figure 2a** the point-of-view is the intern, and in **Figure 2b** it is the patient. The consumer does not care or need to care about all the services in the service chain. The parts that are not relevant to the consumer are beyond the horizon, or in a "black box", from the consumer's perspective. The location of this *information horizon* depends on where the design team decides information and processes become invisible to the consumer. Usually the last service provider in the service chain is the moderator of this information horizon.

An example will help illustrate the concepts described above. An airline wants to improve the experience for their business customers flying from Philadelphia to Chicago; they have found that their brand is known for being difficult in the airport. There are many different ways to scope the service system to yield better outcomes for their customers. If the airline has their services design team attempt to improve the entire service system, from curb-to-plane, the designers would be entrenched and overwhelmed

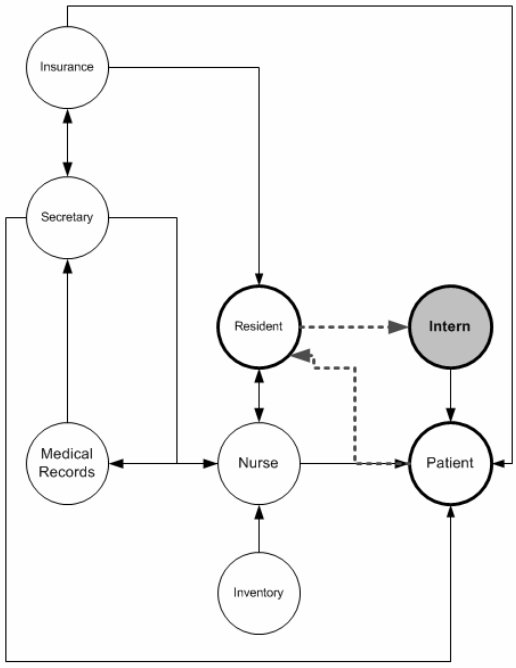

Figure 2a: The service chain highlighted for the service provided when an intern is instructed about a surgery by the resident. The intern is the point-of-view and the chain includes the resident and the patient.

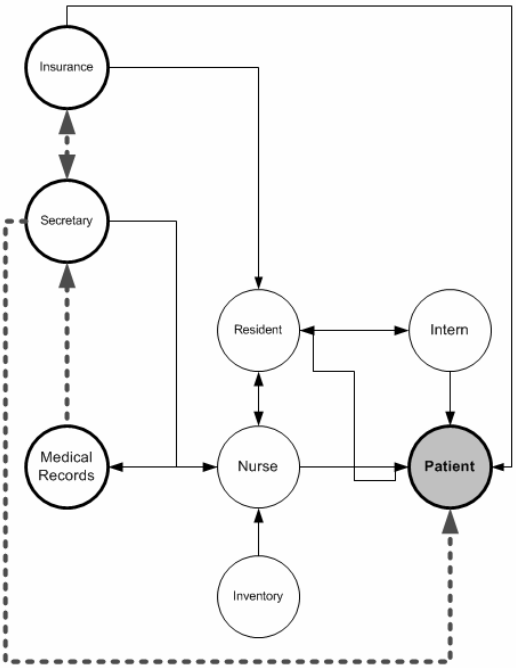

Figure 2b: The service chain highlighted for the service provided when a patient inquires about a previous visit's insurance payments. The patient is the point-of-view, the front-stage service provider is the office secretary, and medical records and the insurance company provide back-stage services.

by the project scope. The team must understand the service system, but they need to narrow the service system scope into something more manageable. They can determine first that the context is the airport and the point-of-view is the business customer. The team can then identify factors of the service experience that affect the traveler and are controlled by the airline, effectively narrowing the scope of the project. The service chain begins at the point when the business customer arrives at the airport and ends at the point in which they receive their boarding pass and head to security.

2.4 The Zone of Visibility and the Information Drivers

Interactions and operations within a service system can range from web-services to the information exchange between two people. At the right level of abstraction, the important part of these activities is the information not the type of actor. Often thought as only an enabler, information technology can no longer take a secondary role in services delivery. Information determines the success of the service, it helps tailor services to the individual, and it increases the ability of the service provider to offer better services to other consumers.

Every business process owned by an organization is traceable by an information trail or artifact, it is how that information is captured, structured and used that will create the advantage for the firm. Traditionally, the focus of services design has been on the interaction between the frontline employee and consumer. Now, organizations should be

using information technologies to help the frontline service provider tailor the consumer experience to her preferences. For example, the way in which we do our grocery shopping has changed since the advent of customer-care cards. With the ability to track customer shopping patterns, grocery stores can now customize the types of coupons customers receive based on the products that they purchase. For some, this is a great example of how information can create value-added services. For others, privacy concerns arise. In building the information model of a service, there should be some notion of the type of information that is required to deliver a service and the type of information that is optional and only needed for customization.

Since experience designers and information architects, and others of the like, do not traditionally collaborate on service design projects, information systems in the back-stage are not always built to support the types of services that front-stage designers hope to create. Problems with these backend systems can seriously damage the consumer's perception of service quality. This is not just the result of poor collaboration within the organization, but also due to the lack of formal designs and trained service engineers (Shostack, 1984, p. 133). For example, a man reserves a hotel room online through a 3rd-party booking site. When he arrives at the check-in counter at the hotel, the employee takes his name, pulls up his reservation, and asks if he would like a smoking or non-smoking room, indicating that they have no non-smoking rooms available. The guest, who wanted a non-smoking room, becomes agitated that this information, which he supplied for the online reservation system, had not been sent to the hotel. Most likely, the guest is disappointed in both the online system and the hotel; both are different channels of service delivery, and should be complementary rather than seemingly disparate. It is the extent of the consumer's disappointment that should concern both companies the most. The information-intensive applications within the service system can make or break the service delivery process and the future relationship with the consumer.

The consumer has a model, or system conceptualization, of the type of information that is flowing through the service system, even if they are not providing or interacting with that information directly. A common term for distinguishing between information relevant to the consumer and that relevant to the organization is the *line of visibility*; it is the line between customer and supplier, or consumer and provider (Tate et al., 2006, p. 1). For every touch point a provider has with a consumer, be it through the internet, self-service technologies or face-to-face communication, there is a line of visibility. Information supplied by the consumer and directly relevant to her experience is part of this line and is flowing through the service chain; it becomes visible to the consumer at some horizon, usually where backend automation ends. But this analogy of a line does not take into consideration a provider's access to other consumers' information and complimentary services. Often, organizations can use other consumers' information to inform the type of service other consumers may need or desire. This information is part of the consumer's *zone of visibility*, **Figure 1b,** a region of relevant data flowing throughout the entire service system. To distinguish between the line and the zone of visibility, let's look again at our hotel guest. He can see that his inability to have a non-smoking room now is in part due to information about other guests and the capacity of the hotel coming

from the zone of visibility, and in part due to the incomplete information about his preferences coming through from the line of visibility. The *zone of visibility* captures other consumers in the service system as well as handles the multi-channel nature of most service offerings today.

Hypothetically, designers can choose to reduce the variation in information consistency by removing any human involvement. Even though almost every service can be performed by an information technology, in some places, it is the preferences of consumers that have mandated that humans remain involved. Airport check-in, grocery check-out and banking all have self-service technology alternatives, but continue to use people to deliver the service because of demand. When there is a need for human involvement, two questions arise: How do we design and choreograph the information flowing through the interaction, and how can we collect information about the consumer and when?

These information drivers lay an important foundation for the argument that owners of the backend systems and designers of the consumer experience must collaborate to design better services. The strength of bringing these disciplines together will be in creating a more customizable experience for the consumer.

3. A Design Methodology for Service Systems

Several arguments in the previous section call for a multidisciplinary approach to developing a robust service design methodology. As mentioned previously, traditional front- and back-stage designer roles - because of either organizational or ideological reasons - do not typically collaborate on the entire, end-to-end service design process. This has caused gaps between the front- and back-stages, and backend information systems. Additionally, because service systems inherently involve many different actors, a design methodology will have to involve the disciplines that study those actors. For instance, system and information architects can use document engineering, relational data modeling, the agile/evolutionary approach, and other modeling tools such as UML diagrams to model the information flows in a service system. At the same time, those designers specializing in people are using tools from the fields of anthropology, sociology and human-computer interaction such as ethnographic research and the user-centered design approach to model the appropriate experience for the consumer and the influences that people have on the service system.

Now that information-intensive services are increasingly important the market, the ability of the service delivery process to pull information from all parts of the system to that moment of co-production will most influence the service quality. This information follow-through will only be realized if a service design methodology integrates the many different stakeholders' perspectives on the service system.
This design methodology seeks to fill the need in the industry for a more effective approach to designing services. Just as there have been many less than successful attempts to define services with respect to products, there have been equally as many

attempts to apply the new product development (NPD) process to services design. While NPD does highlight the importance of tailoring the development process to the type of product - the approach to designing complex systems is very different than the approach for quick-build products (Ulrich & Eppinger, 2004, p. 21) - NPD does not necessarily consider information systems nor include enough iteration to cater to service consumers. There have been much fewer attempts at developing a service design methodology than there has been a call to service researchers to develop one (Stevenson & Dimitriadis, 2005; Maglio et al., 2006; Spohrer et al. 2007). In Dolfsma's (2004) intensive review of the new services development process, the author found that few firms use or have developed their own methods for a service design approach, and that this lack of formal methodology caused them difficulties in managing their service offering over time (p. 4). Without a rigorous approach to service design, service providers will find it hard to increase their competitiveness and find opportunities to enter new markets.

The following design methodology is at its nascent stages of development. In the past, service design teams have been part of marketing, but it is clear that operations and information systems need to be equally involved. Therefore, this methodology draws primarily from a synthesis of document engineering (Glushko & McGrath, 2004) and user-centered design, with some consideration for the new product development process, the foundations for a service-oriented architecture and recent services literature. The methodology is composed of five stages, where each stage is defined by its high level goals, the roles of each design interest, and the decision making process. Finally, there are several major assumptions made here. First, the map of the service system has been developed by upper management within a firm, second, the design team operates within an overall service strategy program, and third, the service design project operates in the same fashion as other projects within an organization.

4 The 5-Stage Approach

4.1 *Stage 1: Develop a Service Strategy*

The objective of Stage One is to align the business strategy with the internal requirements and consumer needs in order to develop a project charter. Inputs for this stage include the service offering strategy, including quality, marketing and operational goals, the map of the service system and any policy drivers for the services within the system. The design team will first have to determine the scope of the project by determining the point-of-view and the service chain influencing that consumer's service delivery process. Since the service chain identifies those services relevant to the project, the backend designers can analyze policy drivers and collect additional internal requirements from more senior managers and the IT department. At the same time, experience designers can gather consumer requirements through internal and external sources, holding workshops and interviews with consumers and frontline service providers; most likely, surveys of service quality have been conducted by marketing, so initial problems with the service delivery process will be easily discoverable. Requirements should be

shared amongst the team members and any conflicts between internal and external requirements should be resolved.
The major output of this first stage is the project charter, which includes the service system scope, new service strategy, project time-line, problem description, and goals the team expects to meet. The project charter is meant to create a shared vision among the varying stakeholders and design interests, and to guide the following four stages of the design process.

4.2 Stage 2: Analyze Current Conditions

The objective of Stage Two is to build a better picture of the service delivery process and the existing problems through As-Is models, consumer personas and use cases. Inputs not only include the project charter but any information collected through interviews, surveys and workshops held with the services' stakeholders. Existing data can be gleaned off of quality of service measurements and consumer satisfaction surveys, but further research should be done. These As-Is models are depictions of the current state of the system, and are also referred to as activity, process or interaction diagrams in other disciplines. Designers should agree on a level of abstraction for these models so that the varying design perspectives are able to communicate over a common set of processes.

Designers should be encouraged to work in the field in order to increase the design team's understanding of customer expectations (Heskett et al., 1994, p. 11). Both front- and back-stage perspectives can collaborate to develop personas in order to reveal system requirements. It's important to recognize that traditional design methodologies from both perspectives have developed some notion of requirement gathering based on hypothesizing the characteristics of consumers. Where user-centered designers develop personas based on interviews with current users, back-stage designers hypothesize users' characteristics, preferences and capabilities in order to build requirements (Glushko & McGrath, 2004, p. 251). This coherence of design approaches reveals that designers should be working with actors throughout the service system, as well as observing the final moment of co-production and working with consumer-facing service providers. These providers have been accommodating consumer-introduced variance on-demand and are more intimately involved with the consumers to help develop the personas. In handling this variance, they often have to innovate within the constraints of the service offering, which produces new ideas for services using existing assets. Barring any organizational and knowledge management roadblocks, this information should be shared with the service designers. Front-stage models should be annotated with consumer experiences and unexpected variability.

Additional research should also be conducted into the IT infrastructure and business processes that support any services in the service chain. Members of the design team should collect documentation of these processes to understand the types of information needed to deploy the service successfully. Here is where information architects can discover new capabilities that IT can bring to the front-stage experience. Identifying these backend services is important because "changing them may alter the way consumers perceived the [front-stage of] the service" (Shostack, 1984, p. 135). The As-Is

models of the backend should be annotated with information requirements and should answer the question: How are the information and technologies driving or hindering the current service delivery process?
The design team should present the various models in order to identify the strengths and weaknesses of the current service chain. Shostack (1984) calls this process of identifying weaknesses "Isolating fail points", which can also be referred to as modeling service failures (p. 135). The team should be able to answer the question: How is each process enhancing or handicapping the service delivery process? Information from this collaboration will add to the requirements collected in Stage One. The final output of Stage Two includes As-Is models, use cases, consumer personas and an updated list of requirements. Additionally useful outputs include a definition of the service chain actors with their activities, roles, and relationships with each other, and a list of available resources.

4.3 Stage 3: Research Best Practices

The objective of Stage 3 is to compare the existing system with comparable systems from competitors or from similar organizations in order to identify potential solutions and finalize service requirements. Inputs include internal business process patterns, the As-Is models from the previous stage and existing quality of service measures.

Business patterns have traditionally been used in the domain of business process re-engineering, but they become relevant in services design as we incorporate business processes, backend systems and the total back-stage with the front-stage experience. Using patterns saves designers time, so as not to reinvent the wheel (Dolfsma, 2005, p. 5), and they encourage best practices, expose existing inefficiencies and help to remove redundancy within the service system (Glushko & McGrath, 2004, p. 318-319). First, when using existing patterns, it is important to understand the context in which the pattern is being used. For example, McDonald's has over 30,000 stores in about 120 countries (McDougall, 2006); it could not replicate the same pattern for each country without requirement justification because it would have missed new opportunities and necessary adaptations. Case in point, in Israel, the company does not offer dairy and meat combinations because of Jewish kosher law and in India, the company offers vegetarian burgers because of the high demand. By understanding the context of new markets and stores, including the local culture and religious behaviors, designers not only reveal new business opportunities but adapt the pattern appropriately and optimally (Glushko & McGrath, 2004, p. 334).

Competitive research is also at the foundation of identifying and using business process patterns. Patterns can be taken from direct competitors, but also from organizations with similar service profiles; that is, firms that offer services based on comparable intensity levels of information, people and technology (Sims, 2007). Patterns can be used irrespective of the types of products and services exchanged within a service system; RosettaNet's partner-interfaced patterns are useful to a wide-range of industries and companies, ranging from General Electric's Information Services to electronic chip manufacture Linear Technology Corporation (Cover, 1999; Burgert, 2001).

It is also necessary to find patterns for front-stage processes in order to analyze competitors' strengths and weaknesses, identify new business opportunities, begin building a library of possible ways to enhance the experience part of the encounter. While service experience patterns have not become industry standard, examples of their use exist. In the quick-service industry, Dunkin' Donuts is known for applying Starbuck's front-stage product and presentation to a different context and market segment; particularly the new opportunity for Dunkin' Donuts' Coffee Coolatta was taken from Starbuck's own version, the Frappucino (Arner, 2003).

The design team should reconvene to create a list of possible service changes and enhancements. They should discuss competitive research from the perspective of the final consumer in order to produce an accurate picture of perceived service quality and success (Luczak et al., 2007, p. 53). Particularly important is for each design perspective to pay attention to the other in order to assess feasibility; the design questions are: How much will it take to transform the current service chain to offer the service in "this way"?, and Do we have the resources to implement this idea? The output of this stage includes additions to the service requirements and the list of service improvements; these will lay the foundation for brainstorming activities around the service design solution in the following stage.

4.4 Stage 4: Develop To-Be Processes

The objective of Stage 4 is to iterate through the standard design process of prototype and test until a final, agreed-upon prototype is developed. The primary input into this stage is the entire learning process from the past four stages; the physical inputs are the sets of service requirements and improvements. In this stage, the designers should be using the inputs to inform the concept generation process. They should begin as technology and actor neutral as possible, focusing on the follow-through of information first, deciding later whether the individual services in the value chain should be carried out by technology or person. This process should be run systematically, piecing idea fragments - solutions that address individual requirements - together in ways that make sense and use resources effectively (Ulrich &Eppinger 2004, p. 5).
Part of the prototyping phase in this design methodology that differs from the traditional user-centered design approach is the development of the information model. Recall that information drives the success and, ultimately, the quality perception of the service delivery process as a whole. Therefore, it will be important for the information and experience models to be developed simultaneously, feeding the information requirements into the experience design, and allowing the experience designers the degrees of freedom to decide how and when that information will be collected. The design team should understand the consumers' tolerance levels concerning their information and its role in the enhancement of the service. For instance, a standard supermarket could ask customers to fill out a lengthy survey about their shopping preferences when they obtain their customer-care card, or the supermarket can figure out ways to determine these preferences without bothering the customer or using their time; at some point, a design team had to decide which method would be more effective for the supermarket, and more comfortable for the customer.

As the team re-enters the prototyping phase each time, designers should be meeting to share the different service conceptions, compare To-Be models, discuss the system's tolerance for customer variability, and consider touch point placement. The models of the service chain can be detailed with information and experiential artifacts, along with service-level agreements, policy drivers, failure points, time frames, and quality of service metrics. In reconciling the various perspectives, the team should consider the resources available, the developed requirements, and the ability of the solution to plug back into the service system without harmfully affecting the exogenous services to the service chain. Within each iteration, they should discuss the ways in which the consumer's role is transformed for the better, and look into what organizational gains come from the new service design (Frei, 2006, p. 7-8). Moving into developing the next prototype, the team should be fine-tuning the actors, their roles, and their level of intensity, or involvement, in the service chain. At the same time, if the project is too large, gradually introduce requirements and constraints on the system (such as policy drivers) for each iteration.

While outputs will ebb and flow based on prototyping, the final output of this stage should be feedback from small testing groups. Dolfsma (2004) notes that "Even when [new service development] is more formalized, the final stage of testing a new service is often done by simply bringing it to the market" (p. 5). This is very similar to the way in which software-as-a-service businesses conduct their prototyping and testing. The idea is that parts of the solution are released to small samples of the consumer base, keeping the team continuously in the beta-testing phase.

4.5 Stage 5: Deploying the Service

The service design is never final, only deployed. As mentioned in Stage 4, part of testing services includes introducing parts of the service to the market to gauge consumer reaction. This feedback becomes very valuable as the service strategy program embarks on new design projects. Vargo & Lusch (2004) write "Outcomes are not something to be maximized but something to learn from as firms try to serve customers better and improve their performance" (p. 6). In order to receive this feedback, the design team should establish channels of communication for customers and frontline service providers.

Lindholm (2007) suggests that the design team can offer new features as they are designed or they can slowly introduce features of a completely new design to the entire consumer base or to just a small subset. Either way will make it easier for the design team to identify and control for the strengths and weaknesses of new designs (p. 7-8).

The final outputs of this service design methodology include:

- Definition of actors, activities, their roles and relationships with each other.
- Necessary resources
- Document checklist for artifacts produced throughout the service chain
- Information Model

- To-Be Model from the overhead view looking at the entire service chain, and from the perspective of the point-of-view.
- A description of the accepted levels of variability

5. Conclusion

It is clear that a more comprehensive and robust approach to services design is necessary in order to formalize the management of service offerings. Traditional notions of services have served to be inadequate to this field, making it necessary to view services as existing within an eco-system consisting of many different actors and relationships among them. While this notion of a service system is informative, it can be complex; it is important for design teams to reach a common understanding of the problem at hand by identifying the primary point-of-view and the service chain that is responsible for the end-to-end delivery process. Finally, information flowing throughout the service system directly affects the consumer's perception of quality, therefore promoting the demand for a focus on the information follow-through during the service delivery process.

Using a multidisciplinary approach as proposed here will allow for richer conversation of the total service system. Experience designers will better understand the information systems and business processes in order to model more realistic and successful interactions for the consumer. At the same time, backend designers will be able to customize applications for the front-stage experience while still focusing on modularity, extensibility and efficiency.

Future development of this methodology will need to take into account different service profiles in order to adjust the methods and models used appropriately. Research should include consumer-introduced variability and a more developed method for requirement analysis. These factors are particularly important in Stage Four, where they should be introduced gradually as the design team increases the fidelity of their prototype. Finally, it is also clear that there is a demand service prototyping and testing methods so that the market is not the only setting in which services can be tested.

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