Thinking about service design

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Introduction

The challenge of developing a new concept of Services Science (or Service Science, Management and Engineering – SSME), articulated by Jim Spohrer of IBM, has triggered a wide range of thinking by both academics and practitioners alike. From an observer at the interface, it would seem to have gone through a number of phases. The first was to broadly define the scope of the field. This has been done, though as SSME begins to mature, this scope has been questioned and it can be argued that it is rather narrow and could be expanded. The second phase in which many including the lead author of this paper participated, was to argue that before a totally new field was developed it was important that the depth of existing knowledge be recognised and brought into the arena. It would now seem that this stage is well on the way and diverse and multi-disciplinary sets of knowledge from systems, operations, marketing and engineering are being brought together.

We believe that part of the next phase in the evolution of services science is to use it as a platform to hold up a mirror to this accumulated and diverse knowledge and to address some of the core areas both of services within the scope of SSME and the broader area of service management. Rather than just propose existing knowledge areas that should be addressed in the development of SSME, we propose to use it as a platform to critically examine one important area of service and services – service design.

Why Service Design needs Re-examining

In addressing this, the starting point is our own, non-computer systems, knowledge base of service design and product architecture. We identify number of drivers for the need to re-examine service design. Our first observation is the narrowness of much writing on service design, particularly from a marketing perspective. The prime focus in this area is the service concept and design of the interface between the service and the customer to maximise customer satisfaction, positive word of mouth and repeat business. The operations management literature tends to take the reverse and broader view with a focus on the design of the service delivery process to effectively deliver the service concept (Roth & Menor, 2003) See figure 1.

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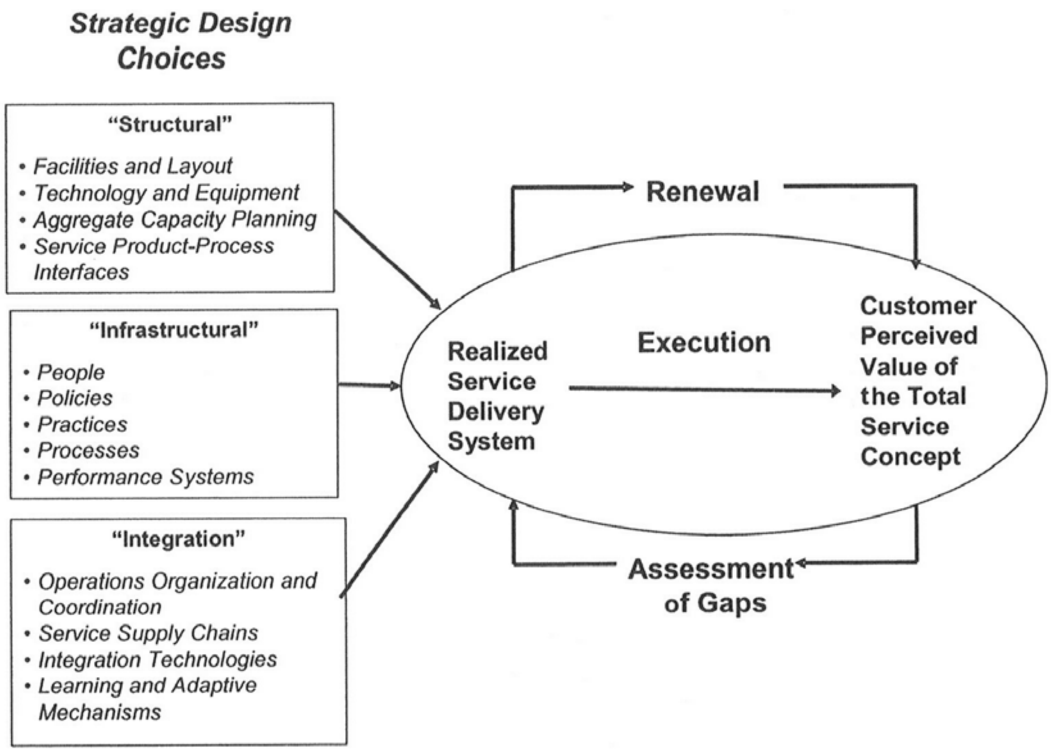


FIGURE 3. Architecture for Service Delivery Systems

Figure 1 – Service Delivery System Architecture – source Roth and Menor (2003)

One of the dilemmas of service design is whether it is a product or a process that is being designed? The dominant models in the service design literature implicitly treat the development of new services in a similar manner to that of a product and using frameworks drawn from product development (see for example (Bessant & Davies, 2007)). However as Voss & Zomerdijk, (2007) point out although there is much new product development in services, much is actually design and development of new service processes and/or systems. We therefore argue that for much of the area of service design a manufacturing-based, product development paradigm is inappropriate. Given that the process is the product in many services, we should still draw on our knowledge from products, but adapt it. A third issue that we identify is that the dominant literature on service design is based on B2C services. This raises the question as to whether the knowledge base of B2C service development is equally applicable for the design and development of B2B services. A final issue that follows on from this is the heterogeneity of services. This is a challenge both for defining the scope of Services Science and for developing knowledge and processes for service design more generally.

Service Architecture

We propose that one way forward that can potentially bring together the differing views on service design is through consideration of service architecture. Product Architecture can be considered as the arrangement of a product's functionality elements into a number of physical building blocks, including mapping of functional elements into physical components and the specification of interfaces between interacting physical components (Ulrich, 1995). Menor, Tatikonda, & Sampson, 2002 state that understanding the architecture of a physical product helps developers partition the development work content, and also helps developers understand the potential interactions between different parts (modules) of the product This helps development managers plan the coordination of different organizational functional groups and task teams associated with specific modules".

There has been growing study of product architecture, particularly in the context of modularity. Modularity refers to the scheme by which interfaces shared among components in a given product architecture are standardized and specified to allow for greater reusability and commonality sharing of components among product families. Modularity provides the basis for customization, provides economies of scale and scope, and can help structure products to facilitate outsourcing. However, there are also costs associated with modularity, in particular those associated with coordination (Mikkola (2006). Menor et al. (2002) argue that the product architecture serves as a means of making the product concept quite specific, and allows a shared understanding of the new product between multiple disciplines (marketing, design engineering, and operations). They see developing and applying the concepts of architecture and modularity to NSD projects and the NSD process as a major research opportunity and may be a useful tool to integrate the "front" and "back" ends of the NSD process. We first examine some of the possible areas on which to draw in developing a service architecture, then review the context of services and its implications.

An important way of looking at product architectures is to distinguish between modular and integral product architectures (Mikkola, 2006), see table 1.

Table 1. Characteristics of Modular and Integral Product Architectures[a]

	Modular Product Architecture	Integral Product Architecture
Design Criteria	Commonality sharing	Maximum performance
Component Boundaries	Easy identification	Difficult identification
Redesign to Architecture	Without modification	With modification
Interfaces	Decoupled	Coupled
Outcome	Economies of scale	Craftsmanship
Product Variants	High	Low
Nature of Components	Standardized/generic	Unique/dedicated
Component Outsourcing	Easy	Difficult
Learning	Localized/Dispersed	Interactive
Synergistic Specificity	Low	High
Component Substitutability	High	Low
Component Recombinability	High	Low
Component Separability	High	Low
Nature of Innovation	Autonomous	Systemic
System Design Strategy	Decomposition	Integration

Source Mikkola (2006)

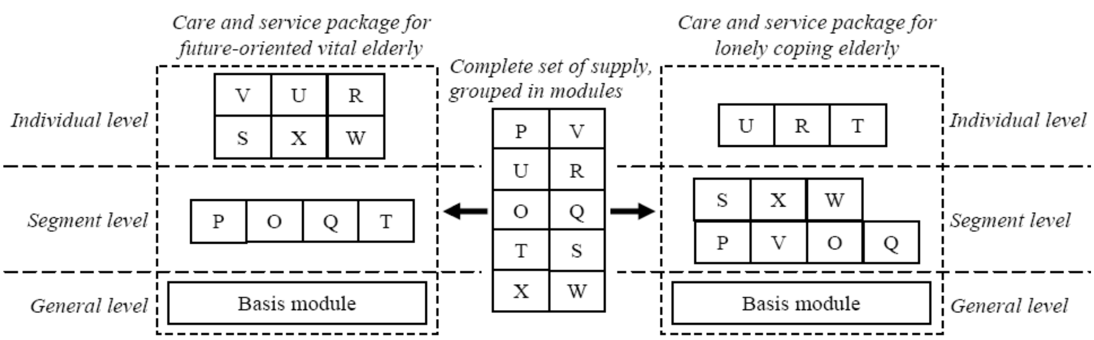
We see this categorization as potentially applying equally well to services, and in particular to B2B services. For example third party logistics (3PL) has providers with both modular and integral service architectures. A challenge in developing our ideas about modular service architecture is to understand the degree to which some of the important elements in product architecture translate into service architecture. These elements include the nature of the interfaces, the degree of coupling and substitutability, the degree of standardization and uniqueness, and the nature and number of components. Operationalising these dimensions is difficult in product design (Mikkola (2006), and we anticipate that the same to be true for services. Randall et al (2005) break down the use of modularity in web customization into combinatorial configuration; where different combinations on deign elements are put together to make a product and "Starting Points" where there is a choice of starting points, which can then be modified. This categorization would also seem to be applicable in services.

Platforms and Modular Process Architectures

A second area that we can draw on in developing a view on service architecture is platforms. The role of platforms in product design and modularity is well known, only recently has it become more widely considered in services. A platform as can be considered an evolving system made of interdependent pieces that can each be innovated upon (Gawer & Cusumano, 2002). A *platform* embodies an *architecture*–a design for products, services, and infrastructure facilitating network users' interactions– plus a set of *rules;* that is, the protocols, rights, and pricing terms that govern transactions (Eisenmann, Parker, & Alstyne, 2006). They argue that platforms can be both proprietary and shared (e.g. broad standards); and that product architecture — both the high-level platform design and the interface designs that determine how subsystems work together — can have a profound impact on the structure of an industry and on the nature of follow-on innovation. Product architecture can determine who does what type of innovation as well as how much investment in complementary products occurs outside the platform-leader company. Keeping control of the architecture is a powerful barrier against companies that might offer a competing architecture with different interfaces.

The literature on modular platform architectures argues that it is particularly useful when the interfaces are open — that is, when the platform leader specifies publicly show how to connect components to its platform (Eisenmann et al., 2006). However, we argue that modular platform architectures are more widely applicable. Meyer & DeTore, (2001) have examined how platform-based approaches could be used in the development of new services

One of the characteristics of services described earlier, that distinguishes them from products, is that they are produced and consumed at the same time. Thus the service product can also be the service process. The concept of modular processes was originally proposed by Starr (1965), and it has been seen as being equally applicable to service and manufacturing processes. Meyer, Jekowsky, & Crane (2007) review the application of modular design in patient care in US hospitals. They propose a platform of processes common to all patient care services, with modular sets of processes for individual services. They address a number of aspects of design; these include the importance of process and module standardization, the attention to interfaces, the flow of people (patients) between modules as one of the important interfaces in services and the importance of co-ordination. Part of this can come from parallel IT systems. de Blok, Meijboom, Luijkx, & Schols (2007) argue that modular production in services can give similar benefits to those proposed by Mikkola (2006) in modular products. As an example they put forward a case study of modular approach to designing service packages for the elderly. They propose a three level model. A basis module common to all services, a set of modules that can be configured for each segment, and a further set of modules that allows customization at an individual level. These are shown in figure 2.

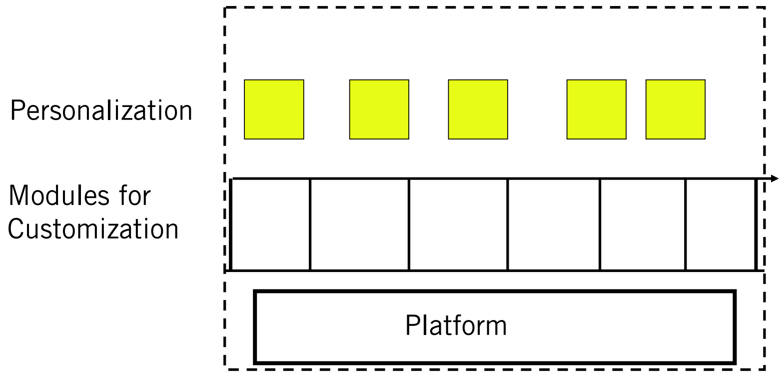


Source de Blok et al 2007

Figure 2 Modular architecture for care and service packages

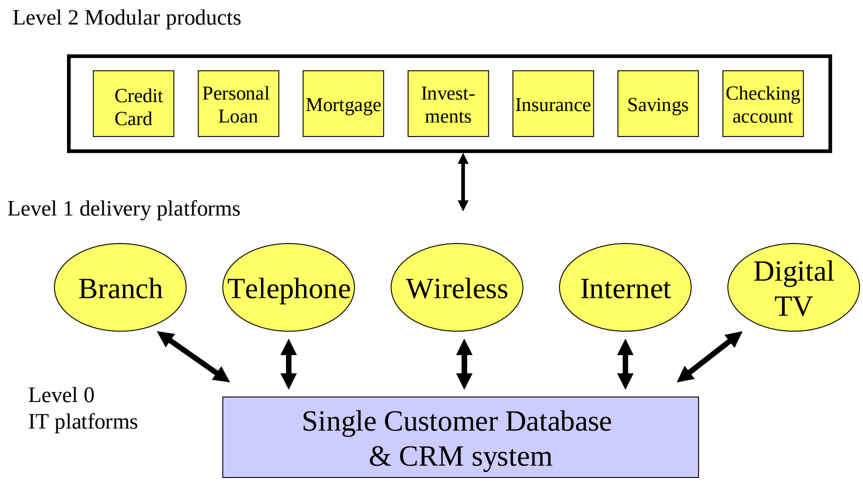
Drawing on this we can see a hierarchical architecture that can be used more broadly. The base level is the platform, equivalent to de Blok et al's (2007) basis module. This is composed of a number of standardized processes common to all the services. The next level is the customized level made up of a choice of product and process modules, and the top level is the personalization level where individual modules can be personalized or additional modules used for personalization. The interfaces between the modules can be information flow, process standards, people and material flow. This is represented in Figure 3.

Figure 3. Simple Platform-based, Hierarchical Service Architecture



An example of platform and module architecture is that of multi-channel retail banking. The platform is at two levels. First, an IT platform common across all channels and second a set of different channel platforms. These two platforms support the delivery of a wide variety of product modules each of which contains multiple products (see figure 4)

Figure 4, platform and module architecture – retail banking



Source: Done et al., (2001)

The product modules illustrate some of the characteristics of modular architecture described by Mikkola (2006). In the bank studied, there was careful attention to the interfaces between the products so that they could be bundled is such a way that the bundling added value to the customer, created uniqueness for the bank's products and led to higher customer retention benefits for the bank (Done et al., 2003).

As Voss and Zomerdijk (2007) have argued, many services should be seen, not as products, but as extended service journeys made up of a set of services and processes. An example they give is that of a cruise liner. The service is starts with the booking, continues over the week of the cruise and finishes when the guest eventually return home. Such services are made up of many individual services and a myriad of touchpoints. A modular design paradigm fits well in this context with the platform being the ship and its core services and the modules the wide variety of services available to the passengers during the cruise.

Design, modularity, outsourcing of services and learning from Systems

Outsourcing has become an increasingly important consideration for all businesses, and the links between product architecture and component outsourcing have been well explored (Mikkola, 2003). There has been an even stronger trend both to shared services and outsourced services. Effective service outsourcing requires both clear knowledge of the process architecture of services as well as the interfaces between them. As many services are IT based processes, there is a growing systems literature on service modularity and architecture that may be of benefit to the wider area of services.

Service Architecture and service agility

Service architectures can be seen by some as static. An important dimension in the design and management of any service is agility. Agility is the ability to respond rapidly and effectively to changing market demands and has been found to be an important capability in services (Menor, Roth, & Mason, 2001). We argue that an important enabler of agility will be the service architecture. Such an architecture should have two characteristics. First it should allow an organization to meet the challenge of new services with minimal cost and internal change. Carefully designed modular architectures can enable this. Second an architecture should be dynamic. That is it should be capable of change in response to external changes. In summary a service architecture must be designed with agility in mind rather than a static view of the present.

The Challenge of heterogeneity

Although there are substantial differences between products in areas such as complexity and technology, the implications of these differences for product design are relatively clear. This is not the case in services. Services are characterized by a high degree of heterogeneity. There have been many categorizations of services, often made to facilitate marketing, none of which is robust across different many applications One of the core concepts for design of services is the concept of the front office and back office, which is particularly powerful in B2C services. Another categorization is the nature of the interaction between customer, technology and service provider (see figure 4). This leads to two related challenges. The first is the development of design concepts and models that are robust and that are applicable in a very wide variety of services. The second is the development of categorizations that are broad enough, but at the same time capture the distinctive nature of different sorts of services. The development of SSME is a good example of where such a categorization may be required. There is parallel growth of study of new areas of service from the servitisation of manufacturing, product service systems to services of the sort offered by organizations such as IBM and HP. The development of definition of scope and of categorizations within this scope could be a major step forward in consideration of service design.

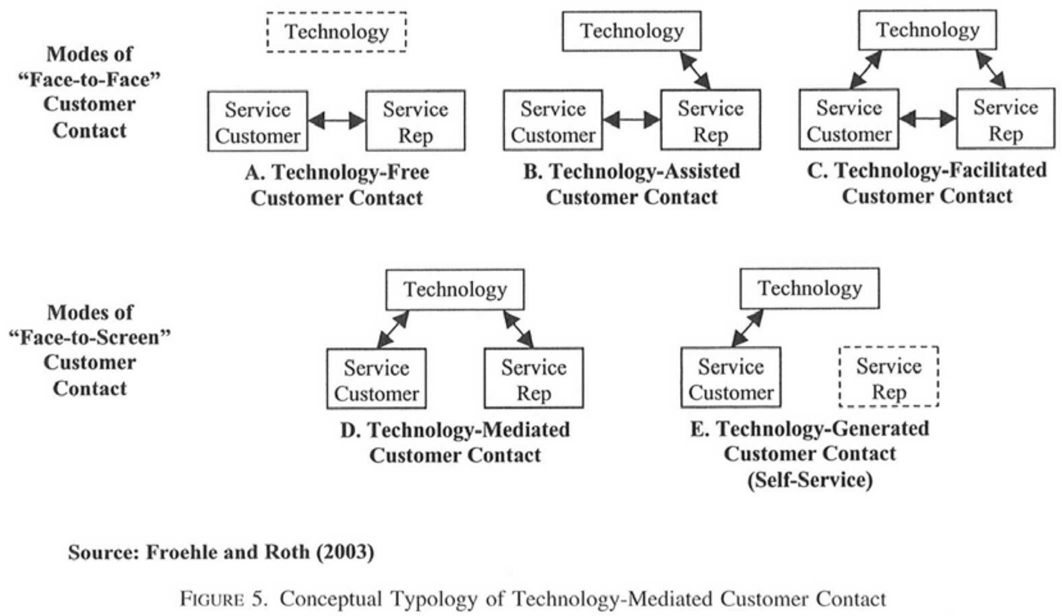


Figure 4 Service typology – technology mediated customer contact – source Roth and Menor (2003)

Towards a research agenda

We have argued that there are a number of reasons why we need to re-think what we know about new service design and development (NSD). We have argued that Services Science provides us with a mirror upon which to base this re-thinking. We have proposed that service product and process architecture, together with service platforms provide a basis for this. There are many unanswered questions. In particular, can the models of product architecture and modular products, be brought together with the models of modular processes and process platforms. In addition, can it successfully address both the systems view of architecture and the marketing and operations concepts of service design? If these concepts can be fully developed, operationalised and made measurable, we will make a major contribution to services science in a way that can be relevant to a wide range of services.

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