

Why e-Service Development is Different: A Literature Review

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Abstract

As the importance of services in our society increases, so does the importance of systematic approaches to develop these services – commonly termed New Service Development (NSD). An increasing proportion of services are now electronic services delivered over the Internet. The purpose of this article is to derive a set of key attributes that distinguish electronic from non-electronic services and their potential influence on NSD. These key attributes are then used as a framework for analyzing NSD literature with regards to their applicability for the development of electronic services. This analysis reveals several gaps in NSD research. In particular, current NSD methods are not well equipped to address the rapidly changing nature and specific cost structure found in electronic services. Current NSD methods are also not well suited to fully exploit the various advantages that electronic services offer over non-electronic counterparts, in particular, the transparent feedback generated by service usage and potentials for continuous improvement and rapid deployment of service changes.

Why e-Service Development is Different: A Literature Review

INTRODUCTION

With the increasing importance of the service sector, the management of new service development (NSD) is becoming a key competitive concern for many companies (Menor, Tatikonda and Sampson, 2002; Johnson, Menor, Roth and Chase, 2000; Fitzsimmons and Fitzsimmons, 2000; Johne and Storey, 1998; Gallouj and Weinstein, 1997). Despite its importance, it is still not a very well understood topic and ranks behind the research on new product development (Menor et al., 2002).

An increasing proportion of services are now electronic services delivered over the Internet. However, the systematic design of these services is not dealt with sufficiently in NSD literature even though the importance and relevance of designing electronic services has been demonstrated by examples of market success of services such as Google, Amazon Web-services, or Salesforce. Further, there is now a concerted research effort emerging to address fields such as “Internet of Services” and “Service Ecosystems” (Janiesch, Ruggaber and Sure, 2008; Riedl, Böhm, Leimeister and Krcmar 2009; Riedl, Böhm, Rosemann and Krcmar, 2009). Additionally, more general approaches of establishing Service Oriented Architectures are being developed, and thus expose coarse-grained business components to simplify the assembly and deployment of business solutions built as networks of services (Beisiegel, Blohm, Booz, Dubray, Colyer, Edwards et al., 2005).

The purpose of this article is to derive a set of key attributes that distinguish electronic from non-electronic services and their potential influence on NSD. These key attributes are then used as a framework for analyzing NSD literature with regards to their applicability to inform the development of electronic services.

To frame the object of interest, a definition of electronic service (e-service) is mandatory. Rust and Kannan (2003) define e-service as “the provision of service over electronic networks.” Electronic networks include, but are not limited to, the Internet, that is, other electronic environments such as mobile networks, ATMs, and self-service kiosks are also included by this definition. In business science literature the term e-service usually refers to an Internet-based version of traditional services (Baida, Gordijn and Omelayenko, 2004). This includes both services that use only the Internet as a user-interface but also situations where actual service fulfillment might include non-electronic channels (e.g., online shopping), as well as services that are entirely delivered electronically (e.g., music download). The notion of e-services is not limited to the business-to-consumer domain, but also encompasses the domains of business-to-business, government-to-public, and intra-organizational entities (Rust and Kannan, 2003). Web-service is a term used in computer science and is usually not found in business science. When used in business science, it refers either to the computer science definition or to services delivered over the Web in the meaning of e-service (Baida et al., 2004). In the computer science context, a Web-service is defined by Haas and Brown (2004) as a “software system designed to support interoperable machine-to-machine interaction over a network.” Web-services have an interface described in a machine-processable format, and other systems interact with the Web-service in the manner of its description using standardized messages.

For the purpose of this work, an e-service will be defined as a business activity of value exchange that is accessible through an electronic interface. In this sense an e-service, as it will be understood within the context of this work, lies at the intersection of the business definition of a service (i.e., business activity of value exchange) and the technical implementation of a Web-service. Such a service is more than the pure technical implementation of a Web-service or

another software implementation. The service has to implement a business activity that a user attributes value to. However, services delivered in a non-electronic fashion, such as services offered by hospitality, are not within the scope of this work. Such an e-service may be provided through a single implementation of a Web-service or through a collection of Web-services that together form a new value added service which is then delivered through an electronic interface.

WHAT MAKES E-SERVICES DIFFERENT?

We argue that certain distinct characteristics of electronic services mandate a customized service development approach for these e-services, as opposed to traditional NSD. Through an analysis of existing research related to electronic services, we identified five key areas of difference: (1) the cost structure of services, (2) the high degree of outsourcing, (3) the rapid development of new services, (4) the availability of transparent service feedback, and (5) the continuous improvement of services. The following sections discuss each area of difference.

Low Marginal Costs of Service Delivery

The economics of information have been recognized as being dramatically different from the economics of physical items (Evans and Wurster, 2000). This leads to a unique cost structure both in comparison to physical products as well as to other non-electronic services.

The typical cost structure of an information technology supplier involves high fixed costs for developing the infrastructure and applications, and very low, sometimes near zero, marginal costs for actual service provision (Whinston, Choi and Stahl, 1997; Bakos, 1998). Once an e-service has been developed and the infrastructure is in place, they are almost infinitely scalable with minimal effort (Menor et al., 2002). Further, through the use of electronic intermediaries, the search and transaction costs of e-services are reduced (Bakos, 1998). This further reduces

variable costs of service provisioning and service use. Contrary to non-electronic services that are sometimes very labor intensive (e.g., hospitality services), the costs for e-service delivery is marginal, and the main costs accrue during service design, as opposed to service delivery. This difference should explicitly be addressed during service development.

High Degree of Outsourcing

Outsourcing is a standard concept that is being considered through make or buy decisions both in manufacturing and in services (Dibbern, J., Goles, T., Hirschheim, R. and Jayatilaka, B., 2004). In electronic services, outsourcing plays a particularly important role. First, since service provisioning occurs in the back office and electronic services can easily be delivered from remote locations, there is no need to collocate service production with the service consumption (Miles, 2005). Traditional services do not enjoy this opportunity, e.g., through the need of attractive locations (think of a down-town café). Second, the high degree of technical standardization achieved through various Web-service standards (Champion, Ferris, Newcomer and Orchard, 2002) and efforts to standardize Service Oriented Architectures (Beisiegel et al., 2005), this high degree of outsourcing is accompanied by the necessary technical framework to make outsourcing of individual service components feasible. This is additionally fostered through the increased availability of high-speed networks. The technical standardization allows for the easy integration of other providers' components and services. This can result in a network of actors that combine several service components to create composite service offerings (e.g., travel services integrating flight, hotel, local transportation, and other reservation services). Once these services are integrated through the development of appropriate interfaces, infinite re-use of existing components with no further integration or assembly costs is possible. However, this can result in complex value networks with different actors working together in a federated service

environment. This leads to complex value constellation in distributed networks which are harder to manage with the increased number of involved actors (Vanhaverbeke and Cloudt, 2006).

Rapid Development of New Services

A differentiation strategy is difficult to attain, as services can be copied easily and are not applicable to patent protection (Porter, 2001; Hipp and Grupp 2005). Consequently, only continuous innovation can lead to economic success. However, these effects, common to all services, are magnified in the area of electronic services. Advances in electronic services are particularly rapid, and low barriers of entry have been attributed to electronic services (cf., Porter, 2001; Menor et al., 2002; Evans and Wurster, 2000). Reasons for the lower barriers of entry are, for instance, the increased scalability of e-services, global markets due to the global availability of information and accessibility of services, and difficulties in regulating global communication networks (Menor et al., 2002). This rapid development is further fueled by extremely fast technological progress and the rapid emergence of new technologies. This fast technological progress not only creates opportunities for new service concepts, but also affects customers' expectations and preferences, which require constant innovations to meet them (e.g., all the electronic services offered on the Apple iPhone store which was only just created through the advances in mobile phone technology). Furthermore, the very nature of electronic services benefits radical innovation through major innovations and start-up businesses (Menor et al., 2002; Johnson et al., 2000).

Transparent Service Feedback

Through the electronic nature of service delivery, the interaction between a service consumer and the service itself becomes very transparent. A simple example of this effect is the monitoring of click-through-rates in online shops. This generates a nearly complete picture of

customer interactions which a traditional shopping mall operator would dream of. This creates various opportunities for service design and innovation where interactions between users and the service can be recorded and replayed. Thus, a service itself can gather information about what else users might want or need (Riedl, Böhmman, Rosemann and Krcmar, 2008).

The transparent nature of service feedback is also an option for new business models based on new licensing schemas. As the usage information is transparent to providers, billing is possible, based not only on the actual use but on the value generated for the customer. For example, instead of charging for a CRM service based on concurrent users, charging based on the actual revenue generated through the CRM service would be possible.

Continuous Improvement and Deployment

Unlike software being sold over the counter, electronic services are no longer restricted to a scheduled release cycle where changes, improvements, and bug fixes require months to be integrated into the service (termed “perpetual beta” by some authors, cf. O’Reilly, 2007; Morris, 2006). Rather, services are developed in the open with tight integration of service users or even by the users themselves. For example, services like the Google search and many of the online applications are constantly updated. There are no distinct releases with version numbers assigned to the service instance currently offered; rather, improvements slip into the market almost unnoticed. The innovation process is also full of small cycles that allow a service to be improved almost instantly. Additionally, as services are delivered through a global delivery system, as there are no local differences in the services offered, and the new version is instantly available to all users. This would be very hard to implement for non-electronic services where physical facilities need to be upgraded and personnel need to be trained.

This has two fundamental effects on the development of new electronic services. First, the benefits of perpetual beta and continuous improvements can be used to upgrade services with the improvements instantly visible to all users. Second, service providers have to make sure that improvements are visible to users and are valued as such.

STATE OF THE ART REVIEW OF DEVELOPING ELECTRONIC SERVICES

Analyzed Aspects

Based on the key differences between electronic and non-electronic services elaborated above and their impact on the new service development process, we have developed an analysis framework. This framework has been used to review existing literature on their suitability for guiding the development of new electronic services. The following list presents our analysis framework.

- Are there defined methods and processes to guide the development of new e-services?
- Are electronic services explicitly covered by the method?
- Are all phases of the innovation process included in the method or just selected aspects such as idea generation or implementation?
- Does the approach pay special attention to IT service specific cost structure?
- Is a high degree of outsourcing and modularization supported?
- Does the method provide support for very fast cycles and immediate deployment?
- Does the method integrate aspects of continuous improvement through transparent feedback?
- Does the method includes a step to look for existing components to re-use in order to take advantage of low search costs and standardization to shorten time to market and reduce fixed costs?

- Is special attention paid to complex value constellation in distributed networks (based on outsourcing)?

The following sections review the literature in the area of NSD with regards to their prescriptive support for designing and developing electronic services. Special attention is paid to those aspects distilled above that are unique to electronic services, compared to non-electronic services.

Analyzed Literature

A systematic literature review was performed with the initial search using the key words “new service development” or “NSD” on the online databases ScienceDirect and EBSCOhost which covered a broad range of high-quality, peer reviewed publications. The review time period was from 1997 to 2008, as NSD research received significant attention during this time (Zhou and Tan, 2008). The initial search returned over 300 articles. Accounting for duplicate results and after a preliminary scan of the article abstracts, the number of articles to be included was substantially reduced. Reasons for excluding articles were, among others, a different understanding of e-service that related more to information system adoption, or articles that simply referred to NSD literature or used NSD methods but did not contribute to the extension of NSD research itself. Moreover, several cross-referenced articles and books not found in those databases were included and further extended by a comprehensive review of relevant academic journals that we expected would have published articles on NSD. Finally, 63 relevant journal and conference articles, as well as books and book chapters, were included in the review. The literature on NSD focused mainly on success factors and the development of (process) models (Zhou and Tan, 2008), as well as a large set of summary and review based articles. The topics covered in the analysis and the number of articles that predominantly deal with this topic is

shown in Table 1. A similar distribution of main themes covered in NSD research has also been reported by Zhou and Tan (2008) and in an earlier review by Menor et al. (2002). Table 2 gives an overview of the publications by year.

Table 1. Overview of topics covered in the analyzed articles

NSD Research Theme	Frequency
Types of service innovation	10
Antecedents of success	24
Process models	11
Generic and organization related issues (including literature reviews)	18

Table 2. Publications by year

Year	Frequency	Year	Frequency
1997	5	2003	6
1998	2	2004	5
1999	0	2005	5
2000	10	2006	6
2001	4	2007	8
2002	5	2008	7

Table 3. Top journals included in analyzed literature

Journal	Frequency
Journal of Operations Management	6
Research Policy	6
Journal of Product Innovation Management	4
European Management Journal	3
e-Service Journal	3
European Journal of Marketing	3
International Journal of Service Industry Management	3

Table 3 gives a summary of the top journals included in this review. In addition to these journals, there were also 11 books/book chapters, and four conference papers included in the

review. The remaining 18 articles were from other journals that had only one or two papers on NSD.

The analyzed literature spans across varied sectors of activity. Table 4 provides an overview of the distribution across service sectors. In particular, many of the process model papers have been developed in a sector neutral way or through multi sector research.

Table 4. Sector distribution of analyzed literature

Sector	Frequency
Sector neutral	21
Multi-sector	20
Financial	7
Healthcare	4
Telecommunication	3
Hospitality	2
Retail	2
Other	4

New Service Development

NSD involves the development of service offerings such as financial services, health care, telecommunications services, leisure and hospitality services, information services, legal and educational services, and many more (Johne and Storey, 1998). Contrary to new product development which is regarded as a base for much research in this area, NSD stresses core differences between products and services: intangibility, heterogeneity, and simultaneity (Fitzsimmons and Fitzsimmons, 2001). Despite a growing body of knowledge, our understanding of NSD processes, especially for electronic services, is still limited (Menor et al., 2002).

The following sections analyze NSD literature with regards to the five key areas of differences and the analysis framework presented above. The analysis sections are structured along the four main topics areas identified in NSD literature: (1) types of service innovation, (2)

antecedents of success, (3) process models, and (4) generic and organizational aspects. Research objectives (RO) with regards to gaps in existing NSD literature are offered in each section.

Types of Service Innovation

The first set of articles tries to bring structure to the types of innovations found in services by proposing typologies of service innovation. Edvardsson and Olson (1996) suggest that service innovation includes the development of (1) a service concept (which customer needs are satisfied), (2) a service system (the resources necessary to deliver a service), and (3) a service process. These three areas make service innovation a complex and multidimensional undertaking (Essen and Conrick, 2008).

Table 5. A typology of new services (adapted from Johnson et al. 2000).

New Service Category	
Radical innovations	
Major innovation	New services for markets as yet undefined; innovations usually driven by information and computer-based technologies
Start-up business	New services in a market that is already served by existing services
New service for the market presently served	New service offerings to existing customers of an organization (although the services may be available from other companies)
Incremental innovation	
Service line extensions	Augmentations of the existing service line such as adding new menu items, new routes, and new courses
Service improvements	Changes in features of services that are currently offered
Style changes	Modest forms of visible changes that have an impact on customer perceptions, emotions, and attitudes, with style changes that do not change the service fundamentally, only its appearance

Johnson et al. (2000) suggest six categories to structure service innovation (Table 5).

Other types of service innovation noted are, for example, the new combinations of existing services or the combination of customer coproduction with new service characteristics or

competencies (Aa and Elfring, 2002; Gallouj and Weinstein, 1997). It has been noted that many e-services are new versions of existing services (e.g., online procurement). Thus, external newness of e-services is sometimes low (Menor et al., 2002). Hipp and Grupp (2005) identify four patterns of key factors influencing service innovation: knowledge intensity, network basis, scale intensity, and supplier dominance. Especially the network-based innovations seem to match most electronic services due to their reliance on technological systems for information and communication processing. Menor et al. (2002), moreover, argue that the nature of electronic services especially benefit radical innovations (major innovations and start-up businesses).

While there is agreement in the literature that different types of new services exist, there is little agreement as to what these types are. In particular, new types of e-services have not been studied systematically. Hence, a first research objective (RO) for extending NSD research is as follows.

***ROI:** Developing a better understanding of the types of new e-services and their appearance in the marketplace*

Barras (1990) argues that IT-based service innovation follows a pattern that is different from that found in manufacturing. He claims that in the early life cycle phase of a service “technology push” is the main driving force, whereas in the following phases incremental process innovation through “demand pull” is the driving force. In the latter phase, pressure by users increasingly forces service providers to distinguish themselves, leading to differentiated products and product innovation. To account for this fact and the specifics of service industries, Barras proposes a reverse product life cycle (RPC) model for services. The reverse product life cycle model suggests that innovation takes place in three phases: improved efficiency, improved quality, and new services phase (Barras, 1990). This model could help in explaining e-service

innovations, as these are obviously largely IT-based and often follow new technical innovations. Other articles also discuss the specific influence of IT innovations on service innovation. The process innovation aspects achieved through the use of IT in back-end service provisioning and automation potentials are especially notable (Miles, 2005). However, these types of innovation are not specific to e-services, as IT is a technology to be applied to the generic information-processing activities of services (Miles, 2005). Miles concludes that a study of IT influence does not reveal much about the dynamics and processes of innovation.

None of the studies cited above, taken from diverse industries, explicitly addresses electronic services. There is also an established hypothesis that innovation patterns in services are less sector-dependent, and that every type of innovation can be found within each individual service industry. In particular, there is no specific industry or service sector to offer electronic services per se. As IT plays an important role in most industries, and computing concepts such as service-oriented architectures are increasingly adopted, e-services cannot be attributed to a specific industry. Moreover, knowledge insensitivity does not necessarily imply that the service is delivered electronically. For example, many financial services, though highly IT-based, are not electronic. Yet an electronic ticket reservation service offered by an airline is. As Miles (2005) notes, “some online information services originated from in-house data management services, e.g., from publishing firms.” This makes studying e-services more difficult, as they occur in all industries and service sectors.

***RO2:** Establishing a common understanding about e-services across the diverse industries and service sectors*

Antecedents of Success

Related to the different types of innovation, a substantial part of the literature addresses the question of what are NSD antecedents of success (de Jong and Vermeulen, 2003). Two classes of success factors can be distinguished: NSD outcome factors (how successful is the new service – the outcome of the NSD process) and performance measures of the NSD process itself (Voss et al, 1992). Table 6 summarizes a sample of these metrics.

Table 6. Measures of NSD outcome and process performance (adapted from Voss et al. 1992)

NSD outcomes	NSD process
<p>Financial measures Achieving higher overall profitability Substantially lowering costs for the firm Performing below expected costs Achieving important cost efficiencies for the firm</p>	<p>Criterion cost Average development cost per service product Development cost of individual service product Percentage of turnover spent on developing new services, products and process</p>
<p>Competitive measures Exceeding market share objectives Exceeding sales/customer use level objectives Achieving high relative market share Having a strong positive impact on company image/reputation Giving the company important competitive advantage</p>	<p>Effectiveness How many new services developed annually Percentage new services that are successful</p>
<p>Quality measures Resulting in service “outcome” superior to competitors Resulting in service “experience” superior to competitors Having unique benefits perceived as superior to competitors Great reliability More user friendly</p>	<p>Speed Concept to service launch time Concept to prototype time Prototype to launch time Time to adopt new concept from outside the firm</p>

Generic antecedents include strategic fit, skilled front-line employees, high involvement teams, clear project structure, formal processes, top management support, and product champions (de Brentani, 2001; Vermeulen and van der Aa, 2003; de Jong and Vermeulen, 2003).

Stevens and Dimitriadis (2005) report that NSD is especially successful when learning occurs during the development process. Further, two evolutionary stages of “manage key activities” and “create a climate for continuous innovation” have been identified (de Jong and Vermeulen, 2003). In an analysis of the antecedents of NSD success, IT systems and process structure have been shown to have a positive impact on the speed of NSD processes (Froehle et al., 2000). As NSD speed is of particular importance for e-services, this is a valuable contribution. Another notable contribution can be found in Menor et al. (2002) who did not study e-service antecedents of success but proposed that the aspect of external newness is especially salient, as electronic services are often replications of services already known to customers but are now offered in an electronic way. Although none of the studies explicitly addressed electronic services, it can be assumed that these antecedents are generic enough to play an important role for electronic services as well.

Analyzing the specifics of e-services, some individual studies can be found. These studies are, however, very sector specific at times and do not address the development of e-services at a broader level. For example, Vassilakis et al. (2005) studied barriers to e-service development of e-government services. They found legislative, administrative, technological, user-culture, and social barriers to hinder the development and introduction of e-services in the e-government domain. Similar studies of success factors have, for example, been performed for e-services in retailing (e.g., Rose and Straub, 2001) or e-health (e.g., Lankton and Wilson, 2007). In a study analyzing the development of one online retailing and one online information service related to sports, Ozer (2008) finds task structuring and expertise sharing two important predictors of service success. A quite established field is the measurement of service quality of Web site-based

e-services, such as online shopping (e.g., Parasuraman et al. 2005). Here, various quality metrics can be found that can guide the development of new e-services.

While some generic antecedents of success are known and seem applicable to the field of e-services, the antecedents particular to the development of new electronic services are scattered.

We propose to address this issue in another research objective:

RO3: *Investigating in greater detail the antecedents of NSD performance that are particularly important to NSD of e-services (in particular speed of development)*

The electronic nature of e-services has specific influences on the NSD process, as noted above. Related to antecedents of success, the introduction of new service versions that are continuously released to customers is likely to have a major influence. Only if the increased service quality is perceived as such by service consumers, has the development process been successful. This leads to the question of how the continuously improved service can be successfully marketed to customers so that they are aware of the increased service quality.

RO4: *Understanding how continuous improvements can be marketed*

Process Models

With regards to traditional services, NSD can be seen as a rather complete method covering all phases of the service life cycle. There are, in particular, a wide set of process models defined for the development of new services. In a comparative study of existing NSD literature, Johnson and Menor (1997) propose a basic model of four phases: design, analysis, development, and launch. Although models included in the literature review did not match precisely and different phases were more detailed in some models and more succinct in others, these four phases were found in all.

More recently, Johnson et al. (2000) have developed a new NSD process based on four broad stages and 13 detailed tasks to produce and launch a new service. The model emphasizes the nonlinearity of the NSD process through a continuous cycle, as well as the importance of enabling factors: teams, tools, and organizational culture (see Figure 1).

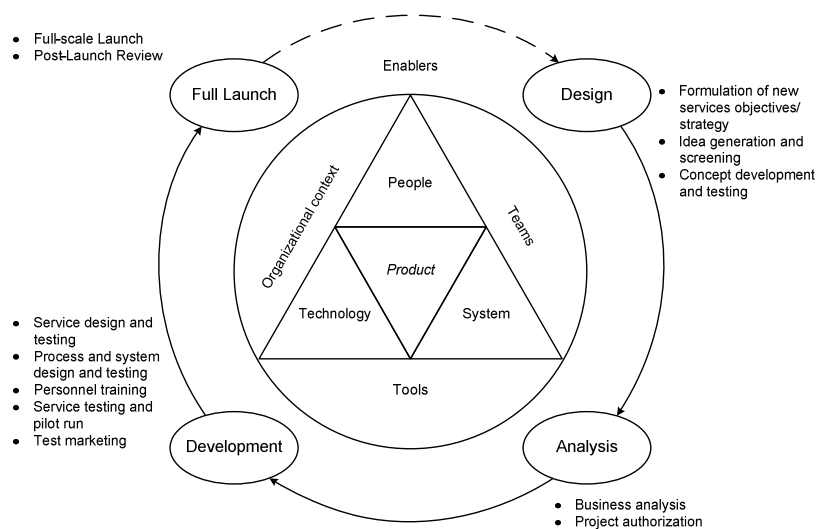


Figure 1. NSD process cycle (source: adapted from Johnson et al., 2000).

On a very generic level, Bessant and Davies (2007) suggest that organizations have to manage four phases in the innovation process: search and scan their environment to pick up signals for potential innovation, strategically select those ideas that the organization will commit resources to, implement the innovation, and finally reflect on the previous phases to achieve organizational learning. What is not covered in these process models are the increased options for modularization, re-use, and outsourcing available for e-services. This should be addressed through additional research:

RO5: *Exploring the ways outsourcing and the integration of existing service components modifies the NSD process*

In new product development literature, designing products in such a way that they can easily be manufactured (i.e., contain fewer parts and have minimal complexity) has been addressed (Swink, 1998). A similar issue has also been addressed in NSD as “design for delivery” hoping to reduce the costs of service delivery (Bullinger, Fähnrich and Meiren, 2003). As many services are highly labor intensive (e.g., hospitality services), the motivation to optimize new services for efficient delivery is high. As electronic services follow a reversed cost structure as explained above, these approaches are not suitable for e-service development. On the contrary, it would be necessary to further analyze how the costs of developing new e-services can be reduced. As the early phases of the development process, specifically the design and analysis phase, are particularly expensive (Bullinger, 2008), they offer potential for improvement.

***RO6:** Understanding how the reversed cost structure influences the NSD process and how costs during the development can be kept low*

A related issue is the common distinction in service development between a “front-office” and “back-office” (e.g., Metters and Vargas, 2000). Yet, sole focus on “back-office” operational efficiency is not enough and has been neglected with many e-services. As argued by Riedl et al. (2008), perceived quality measures have to be taken into account to address satisfaction issues commonly addressed in “front-office” design. Moreover, Johnson et al. (2000) note that different NSD processes are necessary for different types of innovation. In particular, they identify incremental service innovations, radical service innovations, and technology-driven services as key differences that should be used to choose the appropriate NSD process; the authors propose this as an avenue for future research. With regards to the perpetual beta aspect of

electronic services, this result might be useful in guiding the selection of a specific process that is designed especially for incremental innovations (de Brentani, 2001).

Froehle and Roth (2007) propose a framework for NSD that integrates both process- and resource-oriented approaches. The resource-oriented practices focus on cultivating and developing the intellectual, organizational, and physical resources that support NSD capabilities. The process-oriented practices focus on planning, defining, and executing the actual stages of the service development (see Figure 2). Their belief and motivation for this integrated view is that both resource and process capabilities are required for successful service development.

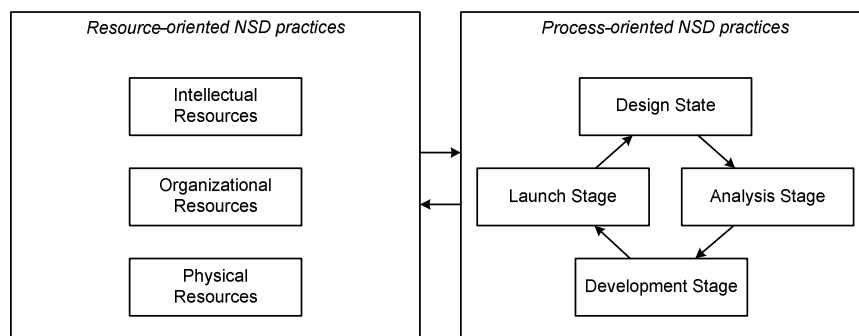


Figure 2. The Resource-Process framework of (source: adapted from Froehle and Roth, 2007).

Pavitt (2005) acknowledges the fact that services have to be continuously improved and that a continuous mapping of service artifacts to market needs and demands is necessary. However, there is no consideration for the vast transparent feedback available in e-services and the very fast cycle times. Concepts such as systematic and large scale customer integration (e.g., through open innovation), as well as and customer co-design, offer opportunities for the design and customization of e-services.

RO7: *Investigating more closely how approaches like agile software development, mash-ups, open innovation, and participatory Web 2.0 concepts can be integrated into the NSD process*

Addressing this research objective could serve two purposes. First, it could leverage on the electronic nature of e-services that make them particularly suitable for customer co-designs, as they are largely information based. Second, the integration of customers could help in reducing design and development costs, thus addressing the reversed cost structure found in e-services.

Generic and Organization Related Issues

The last topic area that has been identified analyzes how NSD is performed within an organization. NSD has been addressed on different organizational levels, including project teams, business units, complete organizations, and networks of organizations. In this research, issues such as the role of managers and the influence of external factors (i.e., those of a creative environment) have been addressed.

Syson and Perks (2004) address network issues in NSD. They conclude that interactions are critical for NSD and that the incorporation of disparate perspectives is beneficial (i.e., they increase creative potential) and that the network perspective helps incorporate relevant resources and actors. However, the very nature of services (intangibility, heterogeneity, and inseparability) brings considerable complexities to the exchange processes of NSD. As services are copied easily, the development of a network approach to NSD could provide firms with a source of competitive advantage. They do not, however, address the management of the resulting complex value networks. Given the positive impact that organizational learning has on NSD success (Stevens and Dimitriadis, 2005) and the increased network character of e-services due to their suitability for re-use and outsourcing, studying organizational aspects and the management of joint NSD in value networks should receive more attention.

RO8 : Investigating more organizational aspects and how the network character of e-services influences the NSD process and success factors

CONCLUSION

NSD is a rather complete method describing key processes and tasks. Moreover, it covers all phases of the life cycle from design, analysis, and development to launch, as is apparent from the wide collection of process models that have been reported. Especially noteworthy is the cyclic model of Johnson et al. (2000). However, the design of electronic services is not explicitly covered except in articles offering basic definitions of e-services. A notable exception is the article by Menor et al. (2002) that shows gaps that exist and points to research challenges.

While several research results indicate successful development of new e-services, there are certain gaps in NSD research with regards to key attributes of electronic services and their influence on NSD. In particular, current NSD methods are not well equipped to address the rapid nature and specific cost structure found in electronic services. Moreover, current NSD methods are not well suited to fully exploit the various advantages offered by electronic services over non-electronic services. These are, in particular, the transparent feedback generated by service usage, and the potential for continuous improvement and rapid deployment of service changes.

This research focuses only on core NSD literature. However, there are other streams of research that might be suitable to target some of the key issues. For example, rapid prototyping and agile software development methods could be used to address some of the issues in NSD related to speed and continuous improvement. Furthermore, some systematic approaches proposed in the area of service engineering might also be applicable to complement the methods from NSD. Future research should address how the research gaps identified in this analysis of NSD literature can be addressed by other streams of research. To address the potentials of

increased outsourcing and also increase the speed of development, NSD processes for electronic services could also be extended to include a specific step of searching for existing service components that can be re-used. Literature on mash-ups could serve as initial guidance in this area. Further, there is the potential of participatory development of new e-services and open innovation (e.g., Riedl et al. 2009a; Leimeister, Huber, Bretschneider and Krcmar, 2009) that could be useful for fast and successful development of new e-services.

This review of the literature shows that e-service specific aspects have no isolated effects on NSD. The effects are all interlinked and have implications for the types of innovation, success factors, processes, and organizational aspects alike. Thus, existing NSD practices should be adapted and tailored to meet e-service specific aspects in a general way. Table 7 puts the e-service characteristics in relationship to the mayor NSD research areas. Some of the key characteristics of e-services that pose the main challenges for NSD also contain parts of the answer. For example, the need for increased speed of development can be addressed through e-service capabilities for continuous development and the availability of transparent user feedback. This implies, however, that only if the new opportunities provided by the electronic nature of e-services are harnessed, can the challenges be successfully overcome. This hints at the possible necessity of integrating developments in diverse areas (software engineering, process management, open innovation, Web 2.0 and participatory development or information management) into the NSD process for e-services in a more systematic way. The research objectives proposed throughout the paper provide first hints at what seem promising avenues for future research.

Table 7. Relationship of key e-service characteristics with major NSD research areas

		Key characteristics of e-services				
		Low marginal costs of service delivery	High degree of outsourcing	Rapid development of new services	Transparent service feedback	Continuous improvement and deployment
Areas of NSD research	Types of service innovation	New types of service innovations emerge: Bundling and composite services, as well as mass-customized services.	Aggregator services and service bundles as well as service customization through re-use are new types of service innovations.	Depending on the type of innovation the development process needs to be customized towards speed or quality.	Transparent service feedback benefits incremental service innovations.	As minor improvements are easy to deploy, customer benefits of these improvements needs to be communicated through marketing.
	Antecedents of success	Process success is important as costs accrue during design not delivery. Services for small markets can be successful if they can be developed and launched efficiently (long-tail).	Joint development and partner integration is likely to play a bigger role as value networks and service ecosystems form.	Quickly changing customer expectations need to be met through rapid development of new services.	Customer integration is key to success - through the transparent service feedback this is even easier.	Minor service improvements need to be made visible to customer to ensure the success of the improved service.
	Process models	Efficient service development becomes even more critical for success.	Outsourcing and re-use should be explicitly be integrated into the development process.	Process models need to be tuned for speedy development of new services.	Integration of feedback into process is becoming easier as feedback is readily available.	Process models need to be cyclical and support the continuous improvement and deployment of new services.
	Generic and organization related issues	NSD competency, organizational learning and organizational resources become more important as differentiation through service delivery is limited.	Network management and the management of organizational learning across partners and NSD projects becomes more important.	Organizations need to adapt to, and be able to deliver on the shorter service life cycles and the increased speed of development.	Customer feedback, both implicit and explicit, needs to be incorporated into organizational learning.	The continuous development character needs to be reflected by continuous improvement and learning of the developing organization.

In summary, the research on electronic services in general and the development of these services in particular, despite its increasing importance, is still limited. This research provides an initial basis by elaborating upon the key aspects that distinguish non-electronic from electronic services, and points to gaps in the literature that could be addressed by future research. Table 8 provides a summary of the research opportunities presented throughout the paper and offers some actionable suggestions for future research in the area of e-service development.

Table 8. Summary of research opportunities and related questions for future research

Research opportunity	Possible research questions to be addressed
RO1: Developing a better understanding of the types of new e-services and their appearance in the marketplace	<p>What are types of e-service innovations? How can e-service innovations be classified? Are the types of e-service innovation different from those of traditional services? What requirements with regards to success factors and development process can be derived from the types of e-service innovations?</p>
RO2: Establishing a common understanding about e-services across the diverse industries and service sectors	<p>How can NSD for e-services be addressed on a generic, sector independent way?</p>
RO3: Investigating in greater detail the antecedents of NSD performance that are particularly important to NSD of e-services (in particular speed of development)	<p>What antecedents of success are particularly important for the development of new e-services? What influences speed of development?</p>
RO4: Understanding how continuous improvements can be marketed	<p>How can the continuously improved service be successfully marketed to customers so that they are aware of the increased service quality? What are successful business models to market continuously changing service products?</p>
RO5: Exploring the ways outsourcing and the integration of existing service components modifies the NSD process	<p>How can outsourcing be systematically be integrated into the development process? How can existing components be re-used during the design phase to shorten development and time to market? How can information about the availability of existing service components be used for decision making during the analysis phase?</p>
RO6: Understanding how the reversed cost structure influences the NSD process and how costs during the development can be kept low	<p>What impact does the reversed cost structure have on the successful development of e-services? How can new e-services be developed efficiently? How can customer integration and customer co-design help to reduce the costs of e-service development?</p>
RO7: Investigating more closely how	<p>How can approaches like open innovation be applied to the development of e-services?</p>

approaches like agile software development, mash-ups, open innovation, and participatory Web 2.0 concepts can be integrated into the NSD process

How can agile development approaches be used to speed up development of new e-services?

RO8: Investigating more organizational aspects and how the network character of e-services influences the NSD process and success factors

How can organizations achieve learning across the development process?

How can organizations achieve learning across development projects?

How can networks of organizations collaborate to develop joint e-services?

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References

van der Aa, W. and Elfring, T. "Realizing innovation in services," *Scandinavian Journal of Management* (18:2), 2002, pp. 155-171.

Baida, Z., Gordijn, J. and Omelayenko, B. "A shared service terminology for online service provisioning," in *Proceedings of the 6th international conference on electronic commerce (ICEC '04)*, ACM Press, 2004, pp. 1-10.

Bakos, Y. "The emerging role of electronic marketplaces on the Internet," *Communications of the ACM* (41:8), 1998, pp. 35-42.

Barras, R. "Interactive innovation in financial and business services: the vanguard of the service revolution," *Research Policy* (19:3), 1990, pp. 215-37.

Beisiegel, M., Blohm, H., Booz, D., Dubray, J., Colyer, A., Edwards, M., Ferguson, D., Flood, B., Greenberg, M., Kearns, D. and others *Building Systems using a Service Oriented Architecture*, Whitepaper, SCA Consortium, 2005.

Bessant, J. and Davies, A. "Managing service innovation," in Bessant, J., Davies, A., Tether, B., Howells, J., Voss, C., Zomerdijk, L. and Massini, S. (Eds.) *Innovation in Services*, Department of Trade and Industry, UK, 2007, pp. 61-95.

de Brentani, U. "Innovative versus incremental new business services: different keys for achieving success," *Journal of Product Innovation Management* (18:3), 2001, pp. 169-187.

Bullinger, A. *Innovation and Ontologies: Structuring the Early Stages of Innovation Management*, Gabler, Wiesbaden, 2008.

Bullinger, H., Fähnrich, K. and Meiren, T. "Service engineering – methodical development of new service products," *International Journal of Production Economics* (85:3), 2003, pp. 275-287.

Champion, M., Ferris, C., Newcomer, E. and Orchard, D. "Web Services Architecture," W3C Working Draft 14 November 2002, <http://www.w3.org/TR/2002/WD-ws-arch-20021114/>, accessed 2009-08-01.

Dibbern, J., Goles, T., Hirschheim, R. and Jayatilaka, B. "Information systems outsourcing: a survey and analysis of the literature," *ACM SIGMIS Database* (35:4), 2004, pp. 6-102.

Edvardsson, B. and Olsson, J. "Key concepts for new service development," *Service Industry Journal* (16:2), 1996, pp. 140-164.

Essen, A. and Conrick, M. "New e-service development in the homecare sector: Beyond implementing a radical technology," *International Journal of Medical Informatics* (77:10), 2008, pp. 679-688.

Evans, P. and Wurster, T. *Blown to Bits: How the New Economics of Information Transforms Strategy*, Harvard Business School Press, Boston, MA, USA, 2000.

Fitzsimmons, J. and Fitzsimmons, M. *New Service Development: Creating Memorable Experiences*, Sage Publications, Thousand Oaks, CA, USA, 2000.

Fitzsimmons, J. and Fitzsimmons, M. *Service management: operations, strategy, and information technology*, McGraw-Hill, New York, NY, USA, 2006.

Froehle, C. and Roth, A. "A Resource-Process Framework of New Service Development," *Production and Operations Management* (16:2), 2007, pp. 169-188.

Froehle, C., Roth, A., Chase, R. and Voss, C. "Antecedents of New Service Development Effectiveness: An Exploratory Examination of Strategic Operations Choices," *Journal of Service Research* (3:1), 2000, pp. 3-17.

Gallouj, F. and Weinstein, O. "Innovation in services," *Research Policy* (26:4), 1997, pp. 537-556.

Haas, H. and Brown, A. "Web Services Glossary," W3C Working Group Note 11 February 2004, <http://www.w3.org/TR/ws-gloss/>, accessed 2009-08-01.

Hipp, C. and Grupp, H. "Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies," *Research Policy* (34:4), 2005, pp. 517-535.

Janiesch, C., Ruggaber, R. and Sure, Y. „Eine Infrastruktur für das Internet der Dienste,“ *HMD*, 261, 2008, pp. 71-79 (in German).

de Jong, J. and Vermeulen, P. "Organizing successful new service development: a literature review," *Management Decision* (41:9), 2003, pp. 844-858.

Johne, A. and Storey, C. "New service development: a review of the literature and annotated bibliography," *European Journal of Marketing* (32:3/4), 1998, pp. 184-251.

Johnson, S. and Menor, L. "Integrating service design and delivery: A proposed model of the new service development process, paper presented at the annual meeting of the Decision Sciences Institute, San Diego, 1997, cited after: Johnson, S., Menor, L., Roth, A. and Chase, R. "A Critical Evaluation of the New Service Development Process: Integrating Service Innovation and Service Design," in: Fitzsimmons, J. and Fitzsimmons, M. (Eds.) *New Service Development: Creating Memorable Experiences*, Sage Publications, Thousand Oaks, CA, USA, 2000, pp. 1-32.

Johnson, S., Menor, L., Roth, A. and Chase, R. "A Critical Evaluation of the New Service Development Process: Integrating Service Innovation and Service Design," in: Fitzsimmons, J. and Fitzsimmons, M. (Eds.) *New Service Development: Creating Memorable Experiences*, Sage Publications, Thousand Oaks, CA, USA, 2000, pp. 1-32.

Lankton, N. K. and Wilson, E. V. "Factors Influencing Expectations of e-Health Services within a Direct-Effects Model of User Satisfaction," *e-Service Journal* (5:2), 2007, pp. 85-111.

Leimeister, J. M., Huber, M., Bretschneider, U. and Krcmar, H. "Leveraging Crowdsourcing - Theory-driven Design, Implementation and Evaluation of Activation-Supporting Components for IT-based Idea Competitions," *Journal of Management Information Systems* (26:1), 2009. .

Menor, L., Tatikonda, M. and Sampson, S. "New service development: areas for exploitation and exploration," *Journal of Operations Management* (20:2), 2002, pp. 135-157.

Metters, R. and Vargas, V. "A typology of de-coupling strategies in mixed services," *Journal of Operations Management* (18:6), 2000, pp. 663 – 682.

Miles, I. "Innovation in Services," in: Fagerberg, J., Nelson, R. and Mowery, D. (Eds.), *The Oxford Handbook of Innovation*, Oxford University Press, New York, NY, USA, 2005, pp. 433-458.

Morris, J. "Software Product Management and the Endless Beta," http://jimmorris.blogspot.com/2006_08_01_jimmorris_archive.html, 2006-08-30, accessed 2009-08-01.

Ozer, M. "Improving the accuracy of expert predictions of the future success of new internet services," *European Journal of Operational Research* (184:3), 2008, pp. 1085-1099.

Parasuraman, A.; Zeithaml, V. A. and Malhotra, A. "E-S-QUAL – A Multiple-Item Scale for Assessing Electronic Service Quality," *Journal of Service Research* (7:3), 2005, pp. 213-233.

Pavitt, K. "Innovation Processes," in Fagerberg, J., Nelson, R. and Mowery, D. (Eds.) *The Oxford Handbook of Innovation*, Oxford University Press, New York, NY, USA, 2005, pp. 86-114.

O'Reilly, T. "What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software," *Communications & Strategies* (First Quarter), 2007, pp. 17-37.

Rose, G. M. and Straub, D. W. "The Effect of Download Time on Consumer Attitude Toward the e-Service Retailer." *e-Service Journal* (1:1), 2001, pp. 55-76.

Riedl, C., Böhmman, T., Rosemann, M. and Krcmar, H. "Quality Aspects in Service Ecosystems: Areas for Exploitation and Exploration," in *Proceedings of International Conference on Electronic Commerce (ICEC '08)*, ACM Press, 2008, pp. 1-7.

Riedl, C., Böhmman, T., Leimeister, J. M. and Krcmar, H. "A Framework for Analysing Service Ecosystem Capabilities to Innovate," in *Proceedings of 17th European Conference on Information Systems (ECIS'09)*, Verona, Italy, 2009.

Riedl, C., Böhmman, T., Rosemann, M. and Krcmar, H. "Quality Management in Service Ecosystems," *Information Systems and e-Business Management (ISeB)* (7:2), 2009, pp. 199-221.

Rust, R. T. and Kannan, P. "E-service: A new paradigm for business in the electronic environment," *Communications of the ACM* (46:6), 2003, 36-42.

Stevens, E. and Dimitriadis, S. "Managing the new service development process: towards a systemic model," *European Journal of Marketing* (39:1), 2005, pp. 175-198.

Swink, M. L. "A tutorial on implementing concurrent engineering in new product development programs," *Journal of Operations Management* (16:1), 1998, 101-116.

Syson, F. and Perks, H. "New service development: a network perspective," *Journal of Services Marketing* (18:4), 2004, pp. 255-266.

Porter, M. E. "Strategy and the Internet," *Harvard Business Review* (79:3), 2001, pp. 62-78.

Vanhaverbeke, W. and Cloudt, M. "Open Innovation in Value Networks," in: Chesbrough, H., Vanhaverbeke, W. and West, J. (Eds.) *Open innovation: researching a new paradigm*, Oxford University Press, New York, NY, USA, 2006, pp. 258-281.

Vassilakis, C., Lepouras, G., Fraser, J., Haston, S. and Georgiadis, P. "Barriers to Electronic Service Development," *e-Service Journal* (4:1) 2005, 2006, pp. 41-63.

Vermeulen, P. and van der Aa, W. "Organizing Innovation in Services" in: Tidd, J. and Hull, F. M. (Eds.) *Service Innovation*, Imperial College Press, London, UK, 2003, pp. 35-53.

Whinston, A., Choi, S. and Stahl, D. *The Economics of Electronic Commerce*, Macmillan Technical Publishing, Indianapolis, IN, USA, 1997.

Zhou, Q. and Tan, K. C. "A Bibliographic Analysis of the Literature on New Service Development," in *Proceedings of the Int. Conf. on Management of Innovation and Technology (ICMIT'08)*, IEEE, 2008, pp. 872-877.

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