9-4-2008

# Service Packaging: Key to Successful Production of Complex ICT Business Services

Mika HyÃ¶tylÃ¤inen
*TeliaSonera*, mika.hyotylainen@teliasonera.com

Kristian MÃ¶ller
*Helsinki School of Economics*, kristian.moller@hse.fi

芽|Sprouts Working Papers on Information Systems ISSN 1535-6078

# Service Packaging: Key to Successful Production of Complex ICT Business Services

Mika Hyötyläinen
TeliaSonera, Finland

Kristian Möller
Helsinki School of Economics, Finland

**Abstract**
Demand for ICT services is increasing at the same time as the services are becoming more complex and customer requests more unique. The resulting complexity creates severe problems for service providers. This paper introduces three service design and development methods - service industrialization, tangibilization, and service blueprinting - and describes how they can be used to reduce the complexity of ICT services through a case study of an ICT service provider. The results offer significant theoretical and managerial implications for the design and production of complex business services.

**Keywords:** ICT services, Service management, Service tangibilization, Service blueprinting, Service industrialization, Service complexity

**Permanent URL:** http://sprouts.aisnet.org/6-23



**Reference:** Hyötyläinen, M., Möller, K. (2006). "Service Packaging: Key to Successful Production of Complex ICT Business Services," Helsinki School of Economics, Finland . *Sprouts: Working Papers on Information Systems*, 6(23). http://sprouts.aisnet.org/6-23


Mika Hyötyläinen – Kristian Möller

# SERVICE PACKAGING: KEY TO SUCCESSFUL PRODUCTION OF COMPLEX ICT BUSINESS SERVICES

HELSINKI SCHOOL OF ECONOMICS
WORKING PAPERS
W-397

#|Sprouts

Mika Hyötyläinen – Kristian Möller

# SERVICE PACKAGING: KEY TO SUCCESSFUL PRODUCTION OF COMPLEX ICT BUSINESS SERVICES

Marketing

February
2006



HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS
WORKING PAPERS
W-397

HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS
PL 1210
FI-00101 HELSINKI
FINLAND

Corresponding author: Kristian Möller, Helsinki School of Economics, PO Box 1210, 00101 Helsinki, Finland; Email: kristian.moller@hse.fi



ISSN 1235-5674
ISBN 952-488-003-2 (Electronic working paper)

Helsinki School of Economics -
HSE Print 2006

#|Sprouts

**Service Packaging:**

**Key to Successful Production of Complex ICT Business Services**


## Abstract

*Demand for ICT services is increasing at the same time as the services are becoming more complex and customer requests more unique. The resulting complexity creates severe problems for service providers. This paper introduces three service design and development methods – service industrialization, tangibilization, and service blueprinting – and describes how they can be used to reduce the complexity of ICT services through a case study of an ICT service provider. The results offer significant theoretical and managerial implications for the design and production of complex business services.*



## Keywords

ICT services, service management, service tangibilization, service blueprinting, service industrialization, service complexity


## INTRODUCTION

The importance of business services based on information and communication technology (ICT) has been increasing dramatically since the commercialization of internet and mobile technologies. Successful operation of companies in almost all industries is becoming highly dependent on their ability to harness the breakthroughs in ERP (enterprise resource planning) systems, SCM (supply chain management) systems, and CRM (customer relationship management) systems; all these systems are either based on ICT technologies or utilize them extensively. For example, the exceptional growth and cost reduction in airline services could not have been achieved without comprehensive application of ICT services (Buhalis, 2004). In other words, ICT services play a strategic role in the business processes of most firms. This observation is reflected in the steady increase of the demand for ICT services (IDC, 2003a; IDC, 2003b; IDC, 2003c; Meta Data 2003).

Considering the relevance of business-to-business ICT services we have only scant knowledge of their development and marketing as most research has been technologically

oriented. The production and marketing aspects of ICT services are, however, becoming increasingly important and challenging due two major trends. First, rapid technological innovation has led to a significant increase in the complexity of ICT services (Kallinikos, 2005) influencing the design and production processes, and customer interface of the services (Chapman and Hyland, 2004). Second, because of the strategic character of services, the customer expectations have become more demanding. Reliability is taken for granted and customization is needed to differentiate from competitors (Johnson and Ettlie, 2001).

From an ICT service provider's point of view, this creates many challenges concerning service development, marketing, and implementation. Development becomes more difficult, as the variety of different software technologies concerning the actual service increases, and marketing and selling become more challenging, as the customers' requirements are more and more unique. If a service provider cannot manage this complexity it will lead to increasing production costs, systems failures resulting to serious problems in customers' business processes, and to customer dissatisfaction and defection. We argue that service design is a critical phase in addressing the described complexity as design influences service production, implementation, and customer perceptions and satisfaction.

The purpose of this study is to present three service design and development methods – service industrialization, tangibilization and service blueprinting – and to describe how they can be used to reduce the complexity of ICT business services. The study draws on an action research oriented case study of a large Finnish ICT company and comprises five sections. In the next section, we will discuss the characteristics of business services and outline the methods suggested for reducing the complexity through service "packaging". This develops the conceptual basis for the empirical part. The third section focuses on the adopted methodology providing a description of the case study concerning TeliaSonera, Finland, a major ICT company. The fourth section describes and discusses how service packaging

methods were employed in reducing the complexity of the ICT services provided by TeliaSonera. A discussion on the theoretical and managerial implications concludes the study.

## COMPLEXITY OF ICT SERVICES AND SERVICE PACKAGING

### Characteristics of ICT Services

One of the central themes in the study of services has been their complexity compared to products (Brown et al., 1994). Since the early writings of Judd (1964), who defined services as market transactions where the object of the exchange is not a physical commodity, key authors in services, for instance, Rathmell, Shostack, Levitt, Lovelock, Parasuraman, and Zeithaml, have addressed the characteristics of services and reflected their consequences. Services are generally seen to be characterized by 1) intangibility, 2) diversity, 3) perishableness, and 4) inseparability of production and consumption (Grönroos 1990; Parasuraman 1985; Zeithaml et al., 1985). Services are also seen as composed of activities or performances rather than things or objects.

While contrasting of products and services has been useful for identification of the unique characteristics of each category a more important notion is that most products and services often share some of the mentioned characteristics. This view lead to the proposition of product-service continuum, where pure products are at one end and pure services at the other; the key differentiator being the share of tangible versus intangible characteristics (Rathmell, 1966; Shostack, 1977). Related to this continuum perspective Thomas (1978) divided services into two categories, those that are equipment based (e.g. automatic telephone exchanges) and those that are people based (e.g. consulting services). This view was emphasized by Levitt (1981) who considered the difficulty of pre-assessment of the quality and value of service as the most important outcome of the relative intangibility. Another

aspect is that the competence of the customer influences the performance of service and the utility the customer can derive from the service.

The discussed general service characteristics are also relevant in the ICT business services. The key aspect in the ICT services is their complexity. ICT services are composed of large number of service categories (United Nations, 2004):

- IT technical consulting – expert opinion on technical matters related to the use of IT.
- IT design and development services – design and development of IT solutions such as custom applications, networks and computer systems.
- Hosting and IT infrastructure provisioning services – access to IT infrastructure (hardware, software and networks) enabling the hosting of applications and the processing of information.
- IT infrastructure and network management services – management and monitoring of a client's IT infrastructure.
- IT technical support services – technical expertise to solve IT related problems.
- Information and document transformation – technical expertise and equipment to transform information from one format or media to another.
- Internet access and backbone services – connection to, and carriage of traffic on, the Internet.
- Published software – software developed for wide distribution and produced for multiple sale or licensing.

Most strategic business applications like CRM and SCM services are actually combinations of interrelated equipment and service packages involving several technological and software solutions (April, 2003). This makes their design, production and provisioning highly complex. It is very difficult for the customer to evaluate and compare different service providers and to try to assess the performance and return-on-invest aspects of major ICT service contracts in advance (Kallinikos, 2005). These problems are intensified by the rapid development in different software languages and other ICT technologies causing further uncertainty (Hyytinen and Pajarinen, 2005). Customers fear of getting locked-in into non-winning technological solutions. The long-term commitment inherent in strategic ICT investments makes customers very risk aversive Miyazaki and Kijima (2000). Another aspect

increasing the challenge of successful ICT service production is the customized character of major ICT services. In order to achieve best support for their business processes large corporations are requesting at least partly customized system solutions (Johnson and Ettlie, 2001). This complicates further the design and provisioning of the services and managing the customer interface.

How to try to manage this technological and commercial complexity raising the production costs of services and increasing the risk of service failures and customer dissatisfaction? One solution is reducing the complexity through service packaging.

**Managing the Complexity of Services – Service Packaging**

One of the central themes in developing service marketing and management theory has been the issue of trying to control and manage the problems caused by the characteristics of services for their efficient production and marketing. In the following we present three key propositions or methods for service packaging: service industrialization, service tangibilization, and service blueprinting.

***Industrialization of Services***

Levitt (1972) argued that there is no such thing as service industry. Instead, there are only industries whose service components are more or less than those of other industries. He saw the humanistic emphasis as a profound weakness of services discussion. In his opinion services should be "industrialized" by applying techniques found from manufacturing. Levitt (1972) suggested that industrialization should be done by focusing more on the activities that are required in producing the service - and how they could be re-engineered - than on the performer of those activities.

In a case of human-intensive activities, hard, soft and hybrid technologies should be used to systematically industrialize services (Levitt 1976). Hard technology means replacing

human activities by technology-based processes (as in the ATM and internet banking services), soft technology refers to rationalizing and specialization of the human activities involved in services, as well as repacking or modularizing them (as in the modularized service and maintenance packages offered by the ICT providers for, e.g., corporate telephony services), and hybrid is a combination of hard and soft technologies. Leavitt mainly applied the principles of limited discretionary action of personnel, division of labour, substitution of technology for people, and service standardization in his industrialization efforts. Also Johnston (1994) and Bowen & Youngdahl (1998) argued that service management has a lot to learn from operations management in manufacturing.

***Tangibilization of Services***

Levitt (1981) also discusses the role of tangibility in the processes of winning new service customers and retaining the existing ones. He points out that in order to make prospective customers confident and comfortable about intangibles that cannot be pre-tested, organizations should go beyond the literal promises of specifications, advertisements, and labels to provide reassurance. Intangible promises have to be 'tangibilized' in their presentation; making intangible tangible should be done as a matter of routine on a systematic basis (Levitt, 1981). Reddy et al. (1993) and Buttle (1993) have applied Levitt's ideas of tangibilization in the service mix and in relation to the corporate image. According to them in order to remain competitive a service firm must tangibilize or concretize its services. Buttle (1993) provides helpful examples how hotels have tangibilized their services offering by developing different kinds of printed material (e.g. floor plans, area maps, meeting room set-up's), property tours, photographic material of the property, newsletters, conference books, videos etc., for both business and customers. For a broader discussion on service tangibilization, see Sempels (2002).

### *Service Blueprinting*

Shostack (1987) emphasized the process perspective of services and stated that process manifests the fundamental nature of services. She suggested that the service process should be first described as steps and sequences and by the complexity and divergence of those steps and sequences. Shostack (1987) defined process complexity as the number and intricacy of the steps required carrying out the process. Divergence was defined as the degrees of freedom allowed performing a process step or sequence.

Based on the process perspective Shostack (1984) presented a service development method called service blueprinting. Blueprinting comprised four steps. First, the service process should identified and broken down into steps and sequences. Second, the potential failure points (where the performer is seen to have too much discretion) should be isolated. Third, a suitable timeframe for service should be established. Fourth, the service should be analyzed to identify possible changes of unprofitable sequences or timeframes. Shostack (1987) argued further that service blueprinting could be used to re-engineer the service structure to gain strategic advantage.

## METHODOLOGY - A CASE STUDY OF PACKAGING ICT SERVICES

This section discusses first the selection of research approach and describes then the chosen case company and its service packaging project, and concludes with the data collection methods.

### Research Approach

Packaging ICT services is a complex process generally involving several organisational units and their personnel. In order to achieve the necessary understanding of this complex process an action research oriented case study was chosen. Case study is a suitable method

for studying complex organisational processes in their real life context (Yin 1984). Action research (AR) refers to such qualitative research where the researcher participates actively in organisational problem solving or change programs. In AR theory is developed bivalently, theoretical understanding is sought of the object to be constructed or tested and of the change process associated with the process of constructing or testing (Checkland and Holwell, 1998; Stowell et al., 1997; Susman and Evered, 1978). In this sense the main difference between ordinary case study and AR is the interventionist action of the researcher.

Action research was chosen in this study as the lead author was responsible for a project aiming at restructuring the ICT service production of the case company. This project matched well Susman and Evered's (1978) view of action research as a cyclical process with five phases:

*(i)* *diagnosing,* identifying or defining a problem;

*(ii)* *action planning,* considering alternative courses of action for solving a problem;

*(iii)* *action taking,* selecting a course of action;

*(iv)* *evaluating,* studying the consequences of an action;

*(v)* *specifying learning,* identifying general findings.

In brief, action research was seen to provide both in depth conceptual understanding of the ICT services packaging process and relevant managerial implications and know-how (Baskerville, 1999; Baskerville and Wood-Harper, 1998; Klein and Myers, 1999).

**Case Company**

The selection of the case company, TeliaSonera Finland, was heavily influenced by the access aspect. The lead author has been working in the company since 2000 and was the owner of the ICT service packaging project that forms the empirical object of this study. We argue, however, that TeliaSonera Finland (TSF) is in fact a highly suitable case company for

studying the management of ICT services in business-to-business context. TSF operates in the field of telecommunication services being the largest telecom operator in Finland. Its annual revenue is around 2 billion € (2004), and the share of ICT business (b-to-b) is around 70 M€ (2004) depending on the classification of ICT (70M€ does not include any traffic charges). TSF currently employs around 6000 people.

TeliaSonera Finland has quite a wide ICT offering. The offering covers everything from data and voice networks, to workstation and server management all the way to horizontal application platforms. To use the categorization of Market Visio (2003c) TeliaSonera Finland offers four types of ICT services: 1) hardware and software support services, 2) consulting services, 3) integration and implementation services in a relatively small scale, as well as 4) managed services, which form the core of offering. The last group forms the focus of this study and contains the following kind of services "Fieldwork" (brings the information from SAP to mobile devices), "eCenter" (integrates companies' internal as well as external business and support systems with each other with formats such as EDI, xml etc), "Cstream" (provides means for multichannel messaging, for example enables sending emails as faxes or sms's), "Security services" (firewall services, anti-virus protections, encryptions etc), "Alerta" (burglar alarm systems, building automation, automatic metering systems etc.).

TSF service offering is targeted to the whole business-to-business segment from SMEs to large corporations. Relationships with customers in this business area are generally long term in nature. Length of the contracts is usually a minimum of two years and they often comprehend several individual ICT services. As the relationship with the customer grows and develops in time, usually more complex and sophisticated services are adopted by the customer. This makes the customer generally more profitable for the service provider but

also complicates the successful management of the service provisioning, maintenance, and up-grading.

**ICT Service Project**

In the early 2004 the management of the TeliaSonera business services started to recognize that their key business services – the "managed services" group (containing among others the briefly described "Fieldwork services", "eCenter services", "Cstream services", "Security services", and "Alerta services") were becoming very difficult to manage. These services originated from earlier subsidiaries of the company and had been created by various organizational units serving special customer needs. Because of this history the services utilized many different software technologies, provided different functionalities, had different processes, and used different kinds of backend systems. Some of the challenges concerning development, production, and selling of these services were originated from the incorporation of most subsidiaries back to the mother company (TeliaSonera Finland) in the summer of 2002. The extent of different types of services and their technological variation led to increased complexity, which manifested in problems concerning service quality and increased production costs. In other words there was too much everything.

In diagnosing the situation (*diagnosis phase of Action Research*) complexity was identified as the core problem. As a result a project labelled SARDIN (Service Architecture Redesign), targeted at reducing the service offering complexity, was launched in the beginning of 2004. The project concentrated on Business Process Networking (BPN) services in the managed services portfolio. An example of these services is a BPN User Integration service that enables a company to mobilize their SAP system, in a way that all data traffic between the SAP and a mobile device is secured and guaranteed.

When the core problem was examined further it was identified that the large variety in every aspect of the services led to increased complexity (Miyazaki and Kijima, 2000), which in turn led to challenges concerning service quality, cost structure, and customizability. As alternative actions were identified (*action planning phase*) to reduce the variety, it was recognised that the complexity challenge could be approached from various perspectives – customer need, technology, process, system etc. In the end it was decided that the project would concentrate on developing a framework that encompasses both the customer need perspective as well as the technology perspective (*action taking phase*). Industrialization, Service Blueprinting and Tangibilization were identified as suitable methods to do this. From the customers point of view, it was seen that the about ten services under the old BPN concept should be integrated and regrouped into one BPN service.

The SARDIN Project was concluded in February 2005. As a result (*consequences phase*) of the project, a new Service Architecture framework was developed that will enable significant reduction in the number of different software technologies as well as functionalities used and offered by the BPN services. The framework also contains rules and standardized ways of working for processes that involve service design, development and production. These processes themselves will be also significantly simplified. The implementation efforts of the framework were started during late fall of 2005.

**Data Collection**

The case material was collected during the Project in on-to-one interviews, project meetings, and methodology meetings which Mika Hyötyläinen, the lead author participated being in charge of the Project. In three one-to-one interviews (October, 2004) the pursued service architecture model and working methods were discussed with the Business Services Vice President. Project meetings focused mainly on the content of the project. Altogether three project meetings were held (September – December, 2004) involving nine managers

representing directors of the various business services and their business development and technical managers. In eleven methodology meetings (August 2004 – January 2005) the methods (industrialization, tangibilization and service blueprinting) and their application were discussed together with the interim results of the Project with the Project Manager. All meetings were documented through memos containing information of the decisions, activities, and frameworks. This rich material base was further supported by Email logs.

## PACKAGING OF COMPLEX ICT BUSINESS SERVICES

At the start of the project available methods for reducing service complexity were looked for and examined. Based on the authors' experience and knowledge from the field of service marketing and management and involvement in the project, service industrialization (Levitt, 1972), tangibilization (Levitt, 1981) and service blueprinting (Shostack, 1984) were chosen as the appropriate methods. This section describes how these three methods were employed in practise and how the analysis resulted in the construction of a new Service Architecture framework.

### Applying Service Industrialization: Building a Modular Service Architecture

Service Industrialization means using hard, soft or hybrid technologies, borrowed from manufacturing, in service design and development (Levitt, 1972). In the SARDIN Project mainly soft technologies were used because of the critical design phase of the ICT services were highly people-dependant, being carried out by various groups of experts. Applying soft technologies in this context means systemizing something that has been done uniquely every time and/or pre-planning something that has been done in an ad-hoc manner (Levitt, 1976).

When reflecting the potential principles of complexity reduction, it was identified that we should minimize idiosyncratic, one-time performances and that as much as possible of the service design work or actions should be reusable. This in mind, modularisation from manufacturing industry was selected as a cornerstone principle (Peters and Saidin, 2000; Jiao et al, 2003). Modularisation in general aims at packaging individual functionalities in a way that functionalities in one module would have as much in common as possible and that those modules would be as reusable as possible (Tsai and Wang, 1999).

When analysing the modularisation of TSF's BPN services, it was discovered that modularisation could be used at two levels: technical and functional. At the technical level modularisation involved an ability to create a limited set of product platforms to produce the targeted functionalities, instead of using about ten different individual products to produce the same functionalities. The targeted product platforms were based on a handful of selected software technologies, leading further to a considerable reduction in the software complexity. The original products had each been based on a separate software technology.

At functional level, modularisation led to splitting original service products into functionalities. Because the existing BPN services were not structured in a similar manner, the very first task in the modularisation was to examine the current architectural situation. When the current situation was unfolded, it was realised that the reusability of modules could be further enhanced if the functionalities were further divided into two sets: peripheral functionalities and core functionalities.

The core functionalities (e.g. message conversion, reliable message routing, triggering chain of events etc.) were crucial in addressing actual customer needs so greater variability existed among them. The peripheral functionalities in turn, were ones that were more involved with service management issues or of the service aspect per se (e.g. billing of the service, service desk operation, service delivery, service reporting etc). These peripheral

functionalities had more commonalities among the 10 different BPN services, or at least it was seen that these could have more in common, which meant greater reusability in practise.

The impact of modularization on the service production architecture is illustrated in figure 1. It should be noted that the functional product elements (FPE's) or technology elements (TE's) of the different services were not so clearly known nor structured before the SARDIN project. Here similar structure is used to illustrate the before and after the project situation so that they could be more easily compared. As an example of the acronyms in the left side of the figure 1, Service 1 stands for Cstream" (providing means for multichannel messaging), Product 1 would be "Topcall" and Technology 1 would be "WM Ware". TEs in this context would be "Link Server", "Archive Server" and "Voice Server". FPE 1 in turn is "office messaging", FPE 2 "message archiving" and FP3 "business critical messaging."

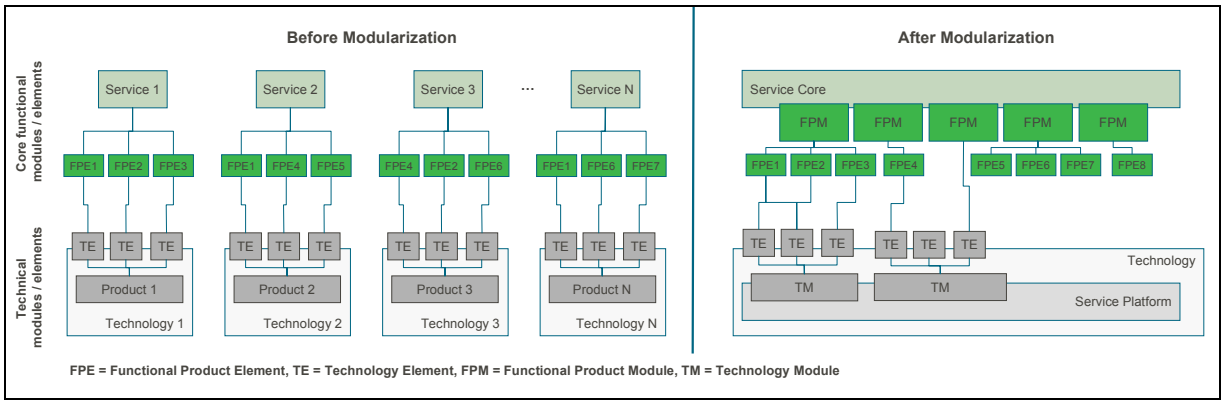


Figure 1: Influence of Modularization on the Architecture of Complex ICT Services.

The modular service architecture comprised now of three levels: technical modularity (shown in the left hand side of figure 1 as technical modules / elements), core functional modularity (shown in the left hand side of figure 1 as core functional modules / elements) and peripheral functional modularity (shown later in figure 2 in left hand side as peripheral functional modules / elements). After this basic high-level structure of the service architecture was developed, the actual existing set of functionalities provided by BPN services were examined. This was done by using a kind of tree methodology to break down each

functionality into its smallest possible elements. After this basic step, the individual functionalities were examined in order to find ones that were fulfilling the same customer need. When this was done, those functionalities that were used in several services were all grouped into one module called CORE. The CORE module would then be made usable for other modules. At this point it was not yet selected which software technologies would be used to produce the functionalities in the CORE module and which ones were to be abandoned.

When the lowest functionality level (those that were not part of the CORE module) was further examined, functionalities that had the most synergies between each other (Tsai and Wang, 1999) were grouped together into three modules (M2M, B2B and UI). In the end the about ten services were reassembled into a one BPN service that consisted of four basic and one extra modules: CORE, B2B (business transactions), M2M (machine initiated transaction), and UI (user initiated transaction). In addition there is a fifth module (Integrated Network Services) for integrating other services to the BPN. These are shown in figure 2 as the five FPM's (Functional Product Modules).

**Applying Principles of Tangibilization: Creating Service Manuals**

The main philosophy of tangibilization is to transform intangible activities, acts or doings into an as concrete form as possible (Levitt, 1981). In the case of BPN services, very often the different functions are in fact outcomes of certain processes performed by different units in the organization. For example, price rating or billing functions in a BPN service are only the intangible outputs of the billing process performed by TeliasSonera's billing organization. In a similar matter, also service design and delivery functions are intangible outputs of design and delivery processes. The challenges with these intangible outputs are that they are often quite hard for people to grasp and the variance in the outputs is high, because the output itself is not usually defined in a clear and consistent manner.

By applying tangibilization, the number of outputs will be limited and clear boundaries are set for those outputs. In other words, some choices are made in advance for controlling which actions and things are allowed and which are not during the service production. As a result there will be a limited number of e.g. billing structures that can be used in a billing function or a limited number of attributes (e.g. duration, man-days etc) in design function that are allowed to be changed. Second stage in tangibilization is to concretise the outputs to make them more tangible for people to handle.

In the SARDIN Project, the original variety in rating and billing functions alone was quite large. So first the number of allowed outputs was limited and then some design attributes were set as fixed. The second stage of tangibilization in the project was done by establishing the idea of service design manuals for different internal organizational units that were producing the functions. In practise this meant that instead of making rating structures uniquely for every product, the rating and billing organization would have a ready service manual containing the possible rating structures (=service elements) that they are allowed to produce. The manual would also indicate the cost levels of different service elements, so that the designer developing a new ICT service would appreciate the implications to the overall costs his/her decisions concerning billing, delivery, and help-desk opening hours etc., would have.

By utilizing this form of tangibilization helped to limit the number of the outputs and by defining the content of service outcomes clearly in the service manuals reduced further the perceived complexity of service design and production. The overall variance in both the outputs and in their production was significantly reduced. All this makes the outputs, which are functions in the overall ICT service, easier for people to handle.

**Applying Service Blueprinting: Defining Interfaces**

Service blueprinting (SB) looks at a service from its process point of view. Its aim is to find points in the process that cause unnecessary variance for the overall output or which could be carried out more efficiently Shostack (1987). After it was clear that the different functions of the overall ICT service were to be tangibilized as service elements in the service manuals, the next thing was to concentrate to the interfaces in the processes between the development organization and the internal units that were producing the service elements. The interface term here refers to methods, tools, and the actual processes used.

As the processes were broken into smaller peaces became clear that especially those parts of the processes which involved two different organizational parties (one was the performer and other was the internal customer of the process) were more or less performed by ad-hoc manner. This meant that the performer had quite a lot of discretion in many process phases, which often lead to quite long lead-times. After this diagnosis the main service blueprinting activities were targeted to those parts of the processes which involved interfaces with different organizational parties.

This turned out to be probably one of the easiest parts in the SARDIN Project. All that needed to be done, was to develop simple rules and guidelines to the interfaces for the people to use, to significantly reduce the need for performers' discretion as well as to remove phases that were not producing any real value for the service elements. This process redesign shortened the design and service production times considerably.

**Service Architecture Framework**

Based on the analyses and outcomes of the adopted three methods of service design and production (industrialization, tangibilization and service blueprinting) a new Service

Architecture Framework was constructed, summarizing the key results of the SARDIN Project. The framework is illustrated in figure 2. Applying industrialization tools resulted in developing overall modularization architecture for the Business Process Networking (BPN) services. In the figure 2 this is shown as the usage of modules and elements. Tangibilization in turn was used to transform the intangible process outputs into more tangible product elements that were listed in service manuals. This is shown as common product modules and elements instead of process outputs in the figure 3. Finally, service blueprinting was used to standardize the interfaces between the organizational units that were producing functions to the services. In the figure 2 this is illustrated as systemized interfaces between the internal service providers.

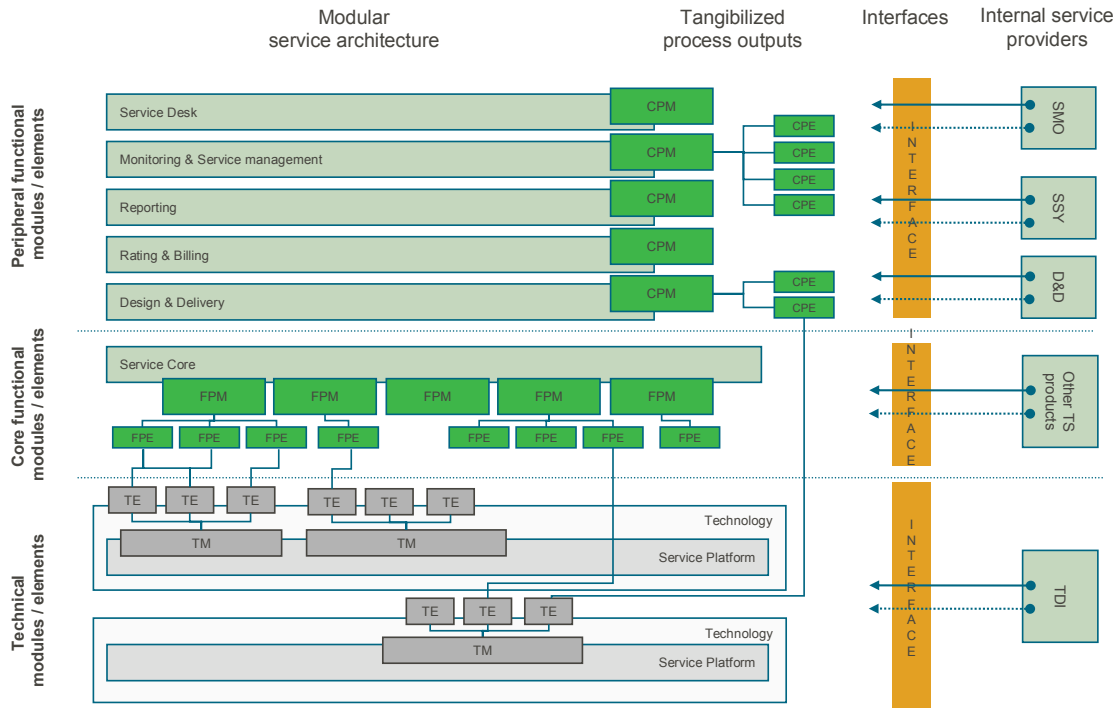


Figure 2. The Service Architecture Framework of the SARDIN Project.

Although the implementation work of the SARDIN project has just been started, some effects can already be reported here. When only the basic principles of the modular service architecture (cross use of modules between different services) were discussed in the development organization, the results were immediately shown in the new development projects: Functionalities from different services (e.g. Alerta) were planned to be reused in new services (new versions of e.g. Cstream). Also old hardware (e.g. of eCenter) has been utilized more efficiently in new development projects (e.g. in new versions of Alerta). While at this point it is too early to report any quantitative results, the goals for the implementation are high. In the hardware level it is expected that the amount of servers can be reduces by 30-40%.

## CONCLUSIONS

The importance of ICT business services has been increasing dramatically. Company performance is becoming highly dependent on their ability to harness the breakthroughs in the ICT services in business processes. ICT services are, however, becoming increasingly complex due to the continuous development in their underlying technologies. Together with more unique customer needs, driven by the raise in the strategic importance of the ICT services, this creates great challenges for ICT service providers. If a service provider cannot manage this complexity it will lead to increasing production costs, systems failures, and customer dissatisfaction and defection.

We have argued that service design is a critical phase in addressing the described complexity as design influences service production, implementation, and customer satisfaction. Based on this suggestion the paper reports results from a major case study illustrating how complex ICT services can be redesigned through methods – industrialization, tangibilization, blueprinting - tailored from service marketing literature. These results contain several theoretical and managerial contributions.

First, the study shows how the service industrialization, tangibilization, and blueprinting methods can be utilized in an integrated manner; resulting in a new framework model of complex ICT services  This is a major contribution as the majority of practical applications of these methods have involved only one method at a time. Our analysis shows that industrialization, in terms of creating a modular architecture, should be carried out first, followed by tangibilization and blueprinting.

Second, the created Service Architecture Framework is a significant contribution providing increased understanding and guidance for design and production of highly complex ICT services. An important aspect is the simultaneous application of the customer need perspective and the technology perspective in constructing the service architecture. This was much more difficult than expected, as the first viewpoint is aiming at finding new ways to respond to customer needs, and the second at reducing existing technologies and overlapping functionalities, seemingly contradicting aims.

Third, the analytical descriptions of the SARDIN Project specify how each abstract service production method - industrialization, tangibilization, blueprinting – can be applied within the context of ICT services.

Besides theoretical breakthroughs the study provides significant implications for the management of ICT services.  ICT field, especially the design and production of ICT services, has been almost entirely dominated by forms of software and hardware technologies and their experts. This technological emphasis has lead to great complexity and endangered the efficient production of ICT services, thus risking also customer satisfaction.  This study shows that ICT service providers can gain significant benefits by applying the packaging methods developed within services management literature.  The SARDIN Project with its Service Architecture Framework and detailed process descriptions provides concrete guidelines how to restructure a complex service portfolio.

Our suggestions and propositions must be considered together with the limitations of the study. The conclusions are based on a single longitudinal case study involving only one company. More empirical evidence is needed to support the validity of the Service Architecture Framework and to gain more knowledge about the applicability of the service design methods across different types of business services. An important extension would be to study also the perceptions and activities of customers as their competence and practices influence greatly the total benefits they can derive from the ICT services. In sum, we hope that the results of this study will pave the way for further empirical research on the management of complex business services.

**REFERENCES**


April, D. (2004), Towards a classification of ICT services, *Voorburg Group of Services Statistics*; Science, Innovation and Electronic Information Division, Canada.

Baskerville, R. and Wood-Harper A.T. (1998) Diversity in information systems action research methods, *European Journal of Information Systems,* 7, 90-107.

Baskerville, R.L. (1999) Investigating information systems with action research. *Communications of the Association for Information Systems,* 2, http://www.cis.gsu.edu/~rbaskerv\CAIS_2_19/CAIS_2_19.html, accessed August 31st, 2000.

Bowen, D.E., Youngdahl, W.E. (1998) Lean service: in defense of a production-line Approach, *International Journal of Service Industry Management,* 9, 207-225.

Brown, S.W., Fisk, R.P. and Bitner, M.J., (1994) The Development and Emergence of Services Marketing Thought, *International Journal of Service Industry Management*, 5, 21-48.

Buhalis, D. (2004) eAirlines: strategic and tactical use of ICTs in the airline industry, *Information & Management*, 41, 805-825.

Buttle, F.A. (1993) Selling services: a contingency model, *Journal of Services Marketing,* 7, 36- 48.

Chapman, R. and Hyland, P. (2004) Complexity and learning behaviors in product innovation, *Technovation*, 24, 553-561

Chase, R.B. (1978) here Does the Customer Fit in a Service Operation, *Harvard Business Review,* November-December, 137-142.

Checkland, P. and Holwell, S. (1998) *Information, Systems and Information Systems making sense of the field.* John Wiley & Sons, Lancaster University, UK.

Grönroos, C. (1990a) Relationship Approach to Marketing in Service Contexts: The Marketingand Organizational Behaviour Interface, *Journal of Business Research*, 20, 3-11.

Hyytinen, A. and Pajarinen, M. (2005) Financing of technology-intensive small businesses: some evidence on the uniqueness of the ICT sector, *Information Economics and Policy*, 17, 115-132.

IDC (2003a) *Nordic Quarterly Executive Service: Market Analysis,* IDC, Market Analysis August, Copenhagen.

IDC – Per-Arne Sandegren (2003b) *Nordic Enterprise Survey: Outsourcing - What Does it Takes,* IDC, Market Analysis September, Copenhagen.

IDC – Esa Peltonen (2003c) *Finland IT Services Marker Forecast and Analysis*, IDC, Market Analysis September, Copenhagen.

Jiao, J., Ma, Q. and Tseng, M.M. (2003) Towards high value-added products and services: mass customization and beyond, *Technovation*, 23, 809-821.

Johnson, M.D. and Ettlie, J.E. (2001) Technology, customization, and reliability, *Journal of Quality Management*, 6, 193-210.

Johnston, R. (1994) Operations: from factory to service management, *International Journal of Service Industry Management,* 5, 49-63.

Judd, R.C. (1964) The Case for Redefining Services, *Journal of Marketing,* 28, 58-59.

Kallinikos, J. (2005) The order of technology: Complexity and control in a connected world, *Information and Organization*, In Press, Corrected Proof, Available online 14 March.

Kasanen, E., Lukka, K., and Siitonen, A. (1993) The constructive approach in management accounting research, *Journal of Management Accounting Research,* 5.

Klein, H.K. and Myers, M.D. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems, *MIS Quarterly,* 23, 67-94.

Kock, N.F., Jr., McQueen, R.J., and Scott, J.L. (1997) Can AR be made more rigorous in a positivist sense? The contribution of an iterative approach, *Journal of Systems and Information Technology*, 1, 1-24.

Levitt, T. (1981) Marketing intangible products and product intangibles, *Harvard Business Review,* 59, 94-102.

Levitt, T. (1972) A production-line approach to service, *Harvard Business Review,* 50, 41-52.

Levitt, T. (1976) The industrialization of service, *Harvard Business Review,* 54, 63-74.

Lovelock, C.H (1983) Classifying Services to Gain Strategic Marketing Insights*, Journal of Marketing*, 47, 9-20.

Meta Data – Stratos Sarissamlis (2003) *European IT Outsourcing Market: What to Expect in 2003 Service Management Strategies, Outsourcing & Service Provider Strategies,* Meta Data.

Miyazaki, K. and Kijima, K. (2000) Complexity in Technology Management: Theoretical Analysis and Case Study of Automobile Sector in Japan, *Technological Forecasting and Social Change*, 64, 39-54

Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1985) Conseptual Model of Service Quality and Its Implications for Future Research, *Journal of Marketing*, 49, 33-46.

Peters, L. and Saidin, H. (2000) IT and the mass customization of services: the challenge of implementation, *International Journal of Information Management*, 20, 103-119.

Quinn, J.B. and Paquette, P.C. (1990) Technology in Services: Creating Organizational Revolutions, *Sloan Management Revie*w, Winter, 67-78.

Quinn, J.B., Doorley, T.L. and Paquette P.C. (1990) Beyond Products: Services-Based Strategy, *Harvard Business Revie*w, 68, 58-68.

Rathmell, J.M. (1966) What Is Meant By Services?, *Journal of Marketing*, 30, 32-6.

Reddy, A.C., Buskirk, B.D., Kaicker, A. (1993) Tangibilizing the intangibles: some strategies for services marketing, *Journal of Services Marketing,* 7, 13-17.

Sempels, C. (2002) The possible contribution of the brand in the process of service tangibilisation, *Proceedings of the 7th International Research Seminar in Service Management,* France, May.

Shostack, G.L., (1977) Breaking Free form Product Marketing, *Journal of Marketing*, April, 73-80.

Shostack, G.L. (1984) Designing Services That Deliver, *Harvard Business Review,* January-February, 133-39.

Shostack, G.L., (1987) Service Positioning Through Structural Change, *Journal of Marketing*, 51, 34-43.

Stowell, F., West, D., and Stansfield, M. (1997) Action research as a framework for IS research. In *Information Systems: An Emerging Discipline?* eds. Mingers, J. and Stowell, F., pp. 159-200, Information System Series, The McGraw- Hill Companies, University Press, Cambridge.

Susman, G.I. and Evered, R.D. (1978) An assessment of the scientific merits of action research, *Administrative Science Quarterly,* 23, 582-603.

Thomas, D.R.E. (1978) Strategy is Different in Service Business, *Harvard Business Review,* 56, 158-165.

Tsai, Y. and Wang, K. (1999) The development of modular-based design in considering technology complexity, *European Journal of Operational Research*, 119, 692-703

Yin, R. K. (1984) *Case Study Research: Design and Methods,* Sage Publications, Thousand Oaks, CA.

United Nations (2004) "Classifying information and communications technology (ICT) Services," *Report DSTI/ICCP/IIS(2004)2*, Department Of Economic and Social Affairs, Statistics Division, New York.

Zeithaml, V.A., Parasuraman A. and Berry, L.L. (1985) Problem and Strategies in Services Marketing, *Journal of Marketing*, 49, 33-46.

Zeithaml, V.A., Berry, L.L. and Parasuraman A. (1988) Communication and Control Process in the Delivery of Service Quality, *Journal of Marketing*, 52,

芽|Sprouts

Working Papers on Information Systems | ISSN 1535-6078



*Office*:
Sprouts
University of Amsterdam
Roetersstraat 11, Room E 2.74
1018 WB Amsterdam, Netherlands
Email: admin@sprouts.aisnet.org

芽|Sprouts