2009

The moderating role of utilitarian/hedonic user motivation on user behaviour towards web 2.0 applications

Lars Baekgaard
Aarhus University, lab@asb.dk

SERVICE SCENARIOS - A SOCIO-TECHNICAL APPROACH TO BUSINESS SERVICE MODELING

Lars Bækgaard, Aarhus School of Business, Aarhus University, Haslegårdsvej 10, DK-8210 Aarhus V, Denmark, lab@asb.dk

Abstract

The paper presents and discusses the notion of service scenarios. A service is work done by a service executor in interaction with a service consumer. A service scenario is a model of a service system and the roles that are played by the actors that participate and interact during the execution of a service. The model represents the roles and the interactions between the participants. Service scenarios can be used to model specific services and the roles played by human beings and IT systems in the execution of services. The use of service scenarios is demonstrated by means of a case study in a public library. The case study indicates that service systems should be understood as socio-technical systems in which service executors and service consumers co-create value in mutual interaction with each other and with a set of shared resources.

Keywords. Business services. Services scenarios. Activity systems. Interaction. Co-creation.

1 INTRODUCTION

The notion of a service is a business concept. Service-orientation represents an organizing principle in which everything that is offered by a business is thought of as a service. The inherent perspective of service-orientation is that a process is viewed as a set of services that is offered to consumers that interact with the services. Each service may itself be the consumer of other services. Thus, a process is viewed as a network of interacting services and consumers. Businesses engage in such networks of services.

Services have been studied in areas like, say, financial services (Dandapani 2004; Homann, Rill et al. 2004; Kumar and van Hilegersberg 2004; Mallat, Rossi et al. 2004; Pan and Vina 2004; Tas and Sunder 2004), health care services (Tan, Wen et al. 2005), and public services (Goldkuhl 2006; Janssen, Gortmaker et al. 2008). Across such diverse areas the service concepts share the common characteristic that a service is work done by one party for another party. Shared services are support processes from which many parties can benefit (Ulbrich 2006).

The purpose of the paper is to present the notion of service scenarios that can be used to model services as socio-technical systems in which service executors and service consumers co-create value. It is necessary to model services in order to design and deliver them in an effective, efficient, and flexible manner. As pointed out by Quartel et al. (2007) the service concept "[…] has so far not been used to its full potential due to the lack of a comprehensive conceptual framework.

Service scenarios support conceptual modeling of existing and envisioned business services and they facilitate analysis of and creative discussions about business services. They can be used to represent the internal structure of a service provider, a service executor, a service consumer, and their shared resources. And they can be used to represent the potential relations (including interactions) between provider, executor, consumer, and shared resources. A service scenario can be viewed as a model that represents a service as a socio-technical work system. The executor of a service can be composed of a combination of human beings and IT systems.

The use of service scenarios is illustrated by means of a case study at a library in which they have been used to model information search services. The case study indicates that service scenarios can be useful tools that can create insights into services and their strengths and weaknesses. Consequently,

service scenarios can support service design. Furthermore, the case study indicates that service scenarios highlight important aspects of services. For example, service scenarios can be used to highlight service systems as socio-technical systems in which service consumers and service executors collaborate to co-create value.

The paper's contribution is a modeling approach that can be used to model the architecture of services and their execution. Existing service modeling approaches like COSMO (Quartel, Steen et al. 2007) and process modeling approaches like role-activity diagrams (Aburub, Odeh et al. 2007) and BPMN (White 2004) can be used to model service processes. Service scenarios can be used to supplement such approaches in terms of models of structural and architectural aspects of services that highlight the human and material operants that participates in service executions.

Section 2 contains a discussion of business services and their characteristics. Section 3 presents and discusses the notion of service scenarios. Section 4 reports from a case study in which service scenarios are used to model information search services in a public library. Section 5 discusses our findings and some of their implications. Section 6 concludes the paper and suggests directions for future research.

2 BUSINESS SERVICES

The value propositions of businesses and their information systems can be viewed as services that offer support to consumers' creation of value (Cherbakov, Galambos et al. 2005; Maglio and Spohrer 2008). Such services can be viewed as systems in which actors act upon resources in interaction with service customers (Maglio, Srinivasan et al. 2006). In general, it is too simplistic to claim that a service creates value for its customer. Value cannot be created without active participation of the consumer. Service-orientation is inherently a consumer-oriented approach (Rust and Miu 2006) in which value is co-created (Maglio and Spohrer 2008; Payne, Storbacka et al. 2008; Vargo and Lusch 2008a; Vargo and Lusch 2008b). Services are about doing something together rather than merely producing output (Vargo and Lusch 2008a). Service science is the study of service systems, which are dynamic value co-creation configurations of resources, i.e., people, technology, organizations, and shared information. This implies that the client does much more than receive the result of a service in a passive manner. The client's actions contribute to the value-creation in a significant and active manner (Maglio and Spohrer 2008).

Service execution implies many types of interaction between service consumers, service executors and shared resources. Service execution is carried out in networks of interacting services in which actors dynamically switch roles and act as executors in some situations and consumers in other situations (Quartel, Steen et al. 2007). Every service system is both a provider and client of service that is connected to other services in value chains, value networks, or value-creating systems (Maglio and Spohrer 2008). A business can be viewed as a network of federated service—a network of interacting components (Cherbakov, Galambos et al. 2005).

Maglio et al. (2006) characterize a service in terms its provider, client, and target. The provider is comprised of an individual or organization and technology operated by or owned thereby. The client is an individual or organization. The target is a part of reality that must be transformed or operated on by the provider for the sake of the client. The target may be comprised of a combination of people, businesses, products, and information. This implies that the effect of a service should be explicitly understood in terms of the changes made to a target that is shared by the provider and the client.

Vargo and Lusch (2008a) focus on the competences of the involved operants, i.e., the actors that participate when a service is executed. This implies that the human and technological actors that act as operants must possess the knowledge and skills that are necessary for the execution of a service.

Mathiassen and Sørensen (2008) characterize services as socio-technical systems in which "… configurations of people and IT artefacts interact to support work, communication, and decision-

making". A service is executed by a combination of human beings and IT systems (Sheth, Verna et al. 2006; Vidgen and Wang 2006).

OASIS' reference model for service-oriented architecture defines a service as the performance of work by a service provider for a service customer (OASIS 2006). A service provider may be the consumer of other services. A service enables access to capabilities using a prescribed interface that comprises the specifics of how to access the underlying capabilities. There are no constraints on what constitutes the underlying capability or how the service provider implements the access mechanism. Thus, the service could carry out its described functionality through one or more automated and/or manual processes that could invoke other available services.

The implementation of a service is typically hidden from the service consumer except for information and behaviour that are visible through the service interface and information that is required by service consumers to decide whether a given service is relevant. This is known as service information hiding (Barros and ter Hofstede 1998). The effect of executing a service is a realization of one or more effects in terms of delivered information and/or changes to a shared state.

COSMO is a modeling framework that views a service as common interactions, the results of these, and their mutual dependencies (Quartel, Steen et al. 2007). Services are seen as units of composition and decomposition. This implies that services are executed in interaction with other services in networks in which the interactions are constrained by mutual dependencies. A service has a structure, a potential behaviour, and available information that influence its potential interaction.

Kaner and Karni (2007) characterize service systems in terms of the following nine aspects. (1) The customers that benefits from or are affected by the system. (2) The goals and meaning of the system. (3) Inputs to the system; (4) Outputs from and effects of the system. (5) Processes that are performed by the system. (6) Human enablers, i.e., human resources that own and/or operate the system. (7) Enablers, i.e., physical and technological resources which aid in operating the system. (8) Information and knowledge resources that support the system. (9) The system's environment.

3 SERVICE SCENARIOS

The following service characteristics can be derived from the preceding discussion of service concepts. (1) Service is delivered by means of provider-client interaction. (2) Humans and technology may act as operants. (3) Value is co-created when provider and client interacts. (4) Services are executed in networks of interacting services. (5) The provider and the client interacts with a shared service target. (6) Service execution is constrained and supported by the interaction structures of the involved services. (7) Service execution is constrained and supported by the operants skills, potential behaviour, and available information. (8) Service implementations are hidden for clients by means of service information hiding.

A service scenario is a model of a service system and the roles that are played by the actors that participate when a service is executed. Service scenarios can be used to model specific services and the roles played by human beings and IT systems in the execution of services. Service scenarios are based on characteristics (1)-(6) with the following modifications. The provider-client relation has been extended to a provider-executor-client relation. And the label "target" has been changed to "shared resources". Service scenarios do not focus on characteristics (7) and (8). Figure 1 illustrates the elements and their potential relations (including interactions) in our conceptual service scenario model.

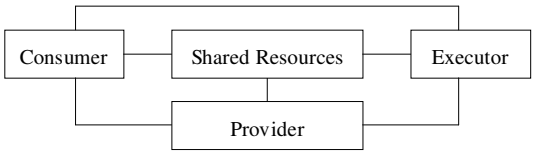

Figure 1. Conceptual service scenario model

Service scenarios distinguishes between service providers that offers services and service executors that executes services in order to emphasize that a given service can be executed in several different ways by different executors.

A provider possesses the right to offer the service and make it available to potential consumers. A provider and a consumer may negotiate conditions for access to services. This may include service-level agreements about price, payment, availability etc. The provider hires, rents, builds, buys and organizes executors. If the executor is a person the provider may hire him or her. If the executor is an IT system it may be bought, rented or constructed by the provider.

An executor may be a set of persons and/or IT systems that performs the work necessary to execute a service in interaction with a consumer that may be a set of persons and/or IT systems that uses the service.

Providers, executors and consumers may share and interact with a set of resources. The executor and the consumer perform a series of actions when a service is executed. The executor may interact with executors of other services relative to which it acts as a consumer. The effect of executing a service is a realization of a set of effects in terms of delivered resources and/or a change to a set of shared resources.

Example. A bank (provider) may offer a service like "withdraw money from account" to bank customers (consumers) that have accounts in the bank. The execution of the service may include actions like "check pin code" and "dispose money" and it may be performed in different ways with different executors. (1) The service may be executed by software (executor) that interacts with the customer through a web interface. (2) The service may be executed by a bank employee (executor) that interacts directly with customers (consumers) in one of the bank's departments. (3) The service may be executed by a combination of software (executor) and an ATM machine (executor) that interacts with bank customers through an interface through which the customers can insert bank cards and enter, say, pin codes and amounts. Bank customers share access to accounts (shared resources) with the bank and with the executors of withdrawal services. When a "withdrawal" service is executed the executor changes the balance of the involved account.

4 CASE STUDY

We have performed a case study at a Danish public library in which an information search service offered to library users was changed (Bækgaard, Jørgensen et al. 2007). The case study was carried out as a part of a change project at the library. The purpose of the change project was to identify and implement possible improvements of the library's mediation of library user's search for relevant information.

During the project a number of analysis and design activities were carried out. User simulations were used to establish understandings of the current activities. Models of current activities were used to capture aspects of these understandings. Formulation of future stories and brainstorms were used to create visions about changed activities and new ways of using IT systems. Modeling of future situations were used to capture aspects of the visions.

During the modeling process a variety of modeling approaches were used. Service scenarios were found useful because they highlight the socio-technical aspects of services and because they highlight the types of interactions that occur when services are executed. Service scenarios were used in the case

study to model interaction between consumer, executor and shared resources. The provider was not modeled in the case study.

4.1 Current service

The purpose of the service is to satisfy a library user's information needs. The service is based on communicative interaction between a library user and a librarian that engage in a dialogue about the library user's information needs, potential search terms, and the relevance of search results. The library user expresses needs for information and the librarian uses his understanding of these needs to search for information resources via library databases and Internet-based search engines.

The diagram in Figure 2 represents the current information search service in terms of a service scenario. The rectangles represent the roles that can be played by human actors, IT systems, and other resources that participate when the service is executed. Elements can be decomposed. For example, The executor is decomposed into a librarian and a set of search systems (database, Internet search engine, etc.). A star means that an element can occur as multiple instances simultaneously. For example, more than one search result can occur at a given point in time. The arrows represent potential interactions between the elements.

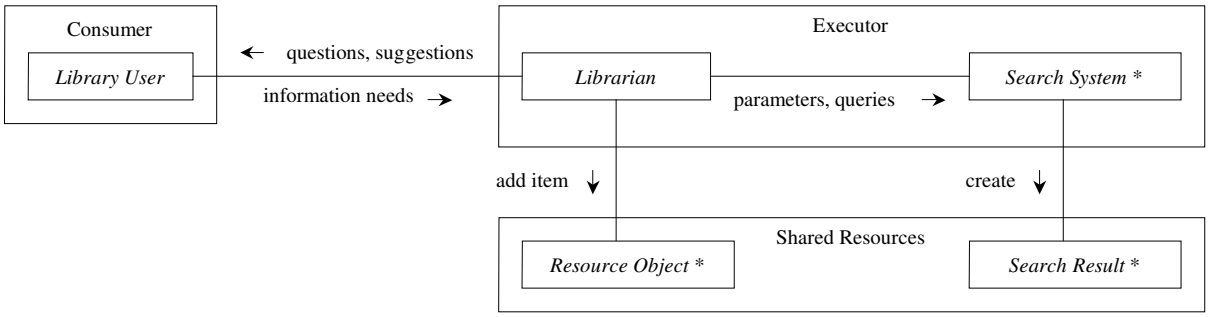

Figure 2. Service 1 – Current service

The current service is executed by a combination of a librarian and a set of search systems. A library user formulates information needs and the librarian asks questions in order to improve and verify his understanding of the information needs. There is an important element of cognitive activities in which the user and the librarian tries to understand the problem at hand and in which they consider possibilities and reflect upon formulations and search results.

The librarian uses his understanding to formulate parameters and queries to one or more search systems. The search results are available for both the librarian and the library user as shared resources. The library user and the librarian analyze and evaluate the search results. The librarian uses "cut & paste" to copy relevant resources from an answer to the resource collection—a text document in which the selected resources from search answers are stored. Near the end of service execution the librarian formats the resource object and enhances it with clarifying comments.

The effects of the service can be characterized as follows. The librarian adds information resources (URLs etc.) that are relevant for the library user to a resource object that contains the selected resources. For example, if an Internet search engine returns one or more relevant URLs these are added to a digital text document using cut-and-past, they are written on a piece of paper or the screen shots on which they appear are printed. This implies that a resource object is comprised of unrelated digital text documents and pieces of paper.

4.2 Future service

The current execution of the current service has a number of disadvantages. The librarian creates the resource object by means of cut-and-paste, handwriting, and printing operations. Consequently, the librarian creates the semantic integration of the search systems and the resource object. The IT systems

do not support the integration in any way. Also, the resource object itself is heterogeneous and it is not internally integrated because it is composed of hand-written notes, printed screen-shots, and digital text documents. Finally, it is very difficult to reuse past search results and share the information represented by these among librarians and library users.

The diagram in Figure 3 represents the future service in terms of a service scenario. The future service is based on the same interaction between library user and a librarian as the current service (Figure 2). However, the execution of the future service differs from the current service in the following ways.

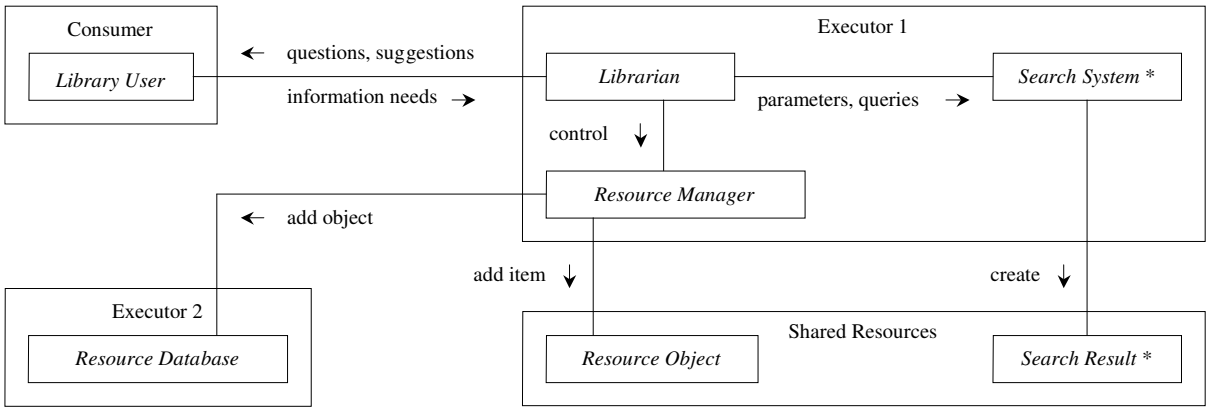

Figure 3. Service 2 – Future service

First, a piece of software called resource manager is added to the executor. The librarian uses the resource manager to select and modify resources from search results. This resource object is a structured and integrated digital document that contains structured resource items. When the librarian and the library user identify a relevant information resource (for example a URL) the librarian can use the resource manager to add selected resources to the resource object. Rather than using cut-and-paste or paper-and-pencil to maintain the resource object the librarian marks the relevant part of a search result and tells the resource manager to add the selection to the resource object that is now structured and fully digitalized.

Second, the resource manager stores the final version of the resource object in a resource database that can itself be used as a search system. Consequently, the librarian can use the resource database as a memory of past service executions that may be searched and reused in future executions of the service.

Apart from simplifying the recording of relevant resources the resource manager integrates the otherwise non-integrated search systems. The service has two effects. It produces a resource object with information resources and it records this object in a resource database that can itself be accessed as a search system.

From the librarian's point of view the service is improved because of the better integration of search systems and the resource object. From the library user's point of the view the service is improved because of the integrated, digital resource object that is delivered as the effect of the service.

4.3 Future service without librarian

It is possible to give library users remote access to the resource manager and thereby to offer a version of the service that is executed solely by IT systems. This implies that a library user interacts directly with search systems and with the resource manager. Consequently, the library users must perform the cognitive activities that are performed by a librarian in the previously discussed versions of the service.

The diagram in Figure 4 represents the future service without librarian in terms of a service scenario. The service scenario in Figure 4 differs from the service scenario in Figure 3 in one important way.

The library user interacts directly with search systems and with resource manager without the mediating help of a librarian.

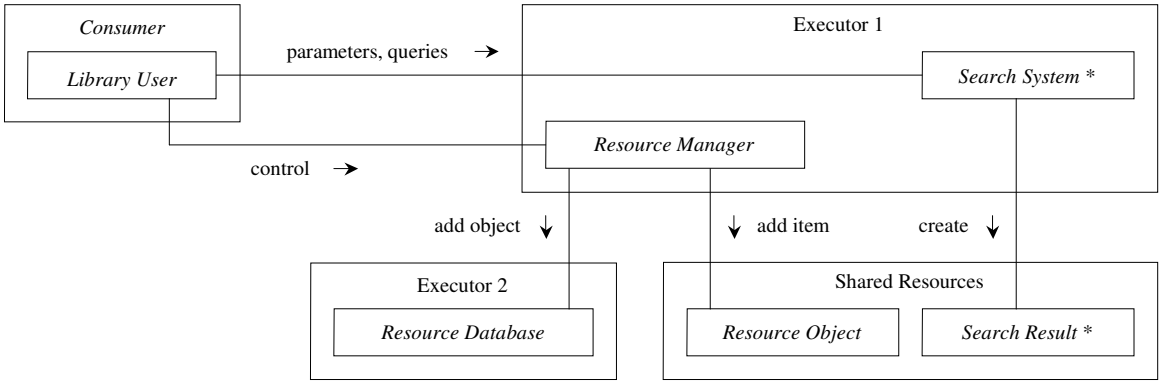

Figure 4. Service 3 – Future service without librarian

From the librarian's point of view the service frees him or her from serving all library users. This may give the librarian more time to other work activities. However, a potential disadvantage is that the resource database may be "polluted" by resource objects of low quality. From the library user's point of the view the service can be executed any time without the library user having to be present at the library. However, a potential disadvantage is that the library user cannot benefit from the knowledge and experience of librarians.

5 DISCUSSION

We have used the library case study to demonstrate how service scenarios can support modeling of important socio-technical aspects of business services. In this section we discuss some of the implications of the case study.

5.1 Implication #1 – Co-creation

Service scenarios can be viewed as media for experiments, reflections, and decisions about different levels of co-creation.

The future library service (Figure 3) cannot be understood solely in terms of value created by the librarian for the library user. The library user plays several active roles and participates in and contributes to the value-creating process. The library user interacts with the librarian by means of oral communication in which the user expresses information needs and the librarian suggests interpretations of the needs and asks clarifying questions. An isolated librarian cannot fully determine the value of an information search service. Only the library user can determine this value. And the librarian's ability to use search systems in relevant manners is fully dependent on input, guidance, and evaluation from the library user.

The librarian uses a software system called a resource manager to create and maintain a shared resource called resource object that is visible to the library user. The resource object contains the (partial) result of the librarian's search for information. During this search the librarian uses search systems like databases and Internet search engines. The results of these searches are visible to both the librarian and the user in terms of a shared resource called search result. The library user participates actively in the evaluation of search results and the resource object.

The level of co-creation is different in the two services that involve librarians in comparison to the service without the librarian. In the latter service the library user has to do all the cognitive work without any help from librarians.

5.2 Implication #2 – Interaction

Service scenarios can be viewed as media for experiments, reflections, and decisions about external and internal interactions in service executions.

The essence of a service is work performed in socio-technical networks in which human beings, technology, and other material objects interact.

COSMO is a framework that supports modeling of executors (COSMO uses the term provider) and consumers (COSMO uses the term user) in a manner that highlights interactions between the two parties (Quartel, Steen et al. 2007). Service scenarios and COSMO actor models are similar in the sense that they represent interactions between consumers and executors.

Service scenarios highlight the three interacting parts of a service system (executors, consumers, shared resources) as a socio-technical work system. Furthermore, service scenarios support modeling of internal interaction in executors. In the library case this corresponds to the internal interaction between librarians and search systems.

COSMO do not support modeling of interaction with shared resources and it does not support modeling of internal interaction in executors. Without the structural picture offered by service scenarios it is hard to use a COSMO model to communicate an overview of the totality of elements and interactions in a service system. In particular, it hard to identify the shared resources and their roles in interactions from a COSMO model.

5.3 Implication #3 – Shared resources

Service scenarios can be viewed as media for experiments, reflections, and decisions about the roles and use of shared resources during service execution.

All the three studied library services share the characteristic that the library user and the service share two important resources, i.e., the resource objects and the search results. A search result is an intermediate resource that is used by the librarian and the library user to evaluate potential information resources and their relevance for the library user. The resource objects contain the information resources that the library user finds relevant with respect to his information needs.

COSMO supports modeling of interaction between executor and consumer but it does not support modeling of shared resources. Use cases share this characteristic. Use cases are somewhat service-oriented in the sense that a use case is a part of a system that is supposed to create value for its user (Jacobson, Booch et al. 1999; Kruchten 2000). However, use cases are based on insufficient assumptions that does not support rich modeling of a consumer's interaction with resources, human actors, and technology.

5.4 Implication #4 – Mediated interaction

Service scenarios can be viewed as media for experiments, reflections, and decisions about the use of IT systems to mediate interaction.

Interaction can be mediated by IT tools. In the library case the new services are based on a software component called a resource manager that mediates interaction between human beings and the resource objects that contains the information resources that are created during service execution. In the future service (Figure 3) the librarian interacts with the resource object via the resource manager. In the future service without librarian (Figure 4) the library user uses the resource manager.

Service scenarios support modeling of different levels of direct or mediated interaction and hence they support decisions about how the elements of a service system should interact. For example, they can be used to answer questions like the following. Should communication between librarian and library

user be face-to-face as implied by the scenarios in Figure 3 and Figure 4? Should it be possible for librarians and library users to interact via an IT system?

Implication # 5 – Human beings versus IT systems

Service scenarios can be viewed as media for experiments, reflections, and decisions about the roles played by human beings and technology in service execution.

The library case study represents two types of services that are commonly used by businesses. The service without librarian (Figure 4) is executed solely by IT systems whereas the other service versions are executed by a combination of human beings and IT systems.

Service scenarios can be used to evaluate advantages and disadvantages of including human beings in service execution. The service scenario in Figure 3 indicates that the communication between librarian and library user has a value-creating potential in the sense that librarians can use their experience and broad access to search databases to improve the quality of the information search. The service that is modeled in Figure 4 does not have this potential but it offers a more flexible service access to library users that can operate without depending on the availability of librarians.

The future service without librarian can be called a self-service in the sense that no human beings particpate in the execution. The library user is the only human being that participates when the service is executed. This does not imply that the library user does all the work. The involved IT systems perform work as well and there is a significant amount of co-creation occurring during the interaction between the library user and the IT systems.

Implication #6 – Service networks

Service scenarios can be viewed as media for experiments, reflections, and decisions about the roles of services in broader service networks.

The future service (Figure 3) and the future service without librarian (Figure 4) contain two interacting service executors. In both cases the resource database acts as a service for the storing of information resources. Also, the search systems in all three services can be viewed as services even though they have not been modeled as such. In the future service from the library case (Figure 3) the librarian acts as an executor intending to serve the library user in some situations. And the librarian acts as a consumer that uses a service executed by a resource database.

Implication #7 – Processes and information

Service scenarios should be supplemented by tools for modeling of information structures and processes.

Service scenarios do not support modeling of information structures and processes. COSMO uses information models to represent the information that is used during service execution. A process model represents the dependencies and temporal organization of the actions. COSMO process models may be used to model the processes executors and consumers. COSMO use information models to express preconditions for the actions of consumers and executors.

6 CONCLUSION

We have presented and discussed the notion of service scenarios. A service scenario represents a business service and the participating actors and their shared resources as a socio-technical activity system. Three types of actors participate. A provider offers a service to a set of consumers. An executor performs the work that constitutes a service. A consumer benefits from a service and co-creates its value. When a service is executed a consumer interacts with an executor in the sense that they communicate and exchange resources. The consumer provides input that is necessary for the executor in order to perform the service. The effect of a service can be characterized by the delivered resources and changes made to shared resources.

The use of service scenarios have been demonstrated by means of a case study in which information search services have been modeled by means of service scenarios. The case study demonstrates that service scenarios highlights some of the essential characteristics of business services as socio-technical systems characterized by co-creation, interaction, shared resources, mediation, human participation, and networks.

Future work includes more case studies in which the notion of service scenarios is evaluated and improved. In particular, studies of more complex services than the studied library services are needed in order to evaluate the advantages and disadvantages of service scenarios. We are currently studying medical e-consultations in which patients can communicate with and seek advice from doctors through dedicated web sites. And we are planning a study of consultancy services in farming.

Also, future work includes analysis of process modeling languages and approaches and evaluation of their relevance for modeling the processes of consumers and executors. This includes analysis and evaluation of languages like BPMN (White 2004), EPC (Dehnert 2002; Lübke, Lüecke et al. 2006), action-oriented modeling (Ågerfalk and Eriksson 2004), action diagrams (Goldkuhl 1996), event-activity diagrams (Bækgaard 2004; Bækgaard 2007), action-oriented development (Rittgen 2006), role-activity diagrams (Odeh and Kamm 2003), resources-events-agents diagrams (Poels, Maes et al. 2007).

7 ACKNOWLEDGEMENTS

We would like to thank the anonymous referees for their valuable and constructive comments and we would like to thank The Danish Strategic Research Council (NABIIT) for support to the eGov+ project.

8 REFERENCES

Aburub, F., M. Odeh, et al. (2007). "Modelling Non-Functional Requirements of Business Processes." Information and Software Technology 49: 1162-1171.

Barros, A. P. and A. H. M. ter Hofstede (1998). "Towards the Construction of Workflow-Suitable Conceptual Modeling Techniques." Information Systems Journal.

Bækgaard, L. (2004). Event-Based Activity Modeling. Conference on Action in Language, Action in Language, Organisations and Information Systems (ALOIS'04). Linköping, Sweden.

Bækgaard, L. (2007). Event-Based Information System Models. 9th International Conference on Enterprise Information Systems (ICEIS'07). Funchal, Madeira, Portugal.

Bækgaard, L., J. B. Jørgensen, et al. (2007). On Industrial Use of Requirements Engineering Techniques. 2nd International Workshop on Enterprise Modelling and Information Systems Architectures (EMISA'07). St. Goar, Germany.

Cherbakov, L., G. Galambos, et al. (2005). "Impact of Service Orientation at the Business Level." IBM Systems Journal 44(4): 653-668.

Dandapani, K. (2004). "Success and Failure in Web-Based Financial Services." Communications of the ACM 47(5): 31-33.

Dehnert, J. (2002). Making EPCs Fit for Workflow Management. Geschäftsprozessmanagement mit Ereignisgesteuerten Prozessketten (EPK'02). Trier, Germany.

Goldkuhl, G. (1996). Generic Business Frameworks and Action Modeling. First International Workshop on Communication Modeling. Tilburg, The Netherlands.

Goldkuhl, G. (2006). What does it Mean to Serve the Citizen? - Towards a Practical Theory on Public E-Services Founded in Socio-Instrumental Pragmatism. International Workshop on E-Services in Public Administration (WESPA'06). Borås, Sweden.

Homann, U., M. Rill, et al. (2004). "Flexible Value Structures in Banking." Communications of the ACM 47(5): 34-36.

Jacobson, I., G. Booch, et al. (1999). The Unified Software Development Process, Addison-Wesley.

Janssen, M., J. Gortmaker, et al. (2008). "Web Service Orchestration in Public Administration: Challenges, Roles, and Growth Stages." Information Systems Management 23(2): 44-55.
Kaner, M. and R. Karni (2007). "Engineering Design of a Service System: An Empirical Study." Information Knowledge Systems Management 6: 235-263.
Kruchten, P. (2000). The Rational Unified Process - An Introduction, Addison-Wesley.
Kumar, K. and J. van Hilegersberg (2004). "New Architectures for Financial Services." Communications of the ACM 47(5): 27-30.
Lübke, D., T. Lüecke, et al. (2006). Using Event-Driven Process Chains for Model-Driven Development of Business Applications. XML Integration and Transformation for Business Process Management (GI-Workshop XML4BPM'06). Passau, Germany.
Maglio, P. P. and J. Spohrer (2008). "Fundamentals of Service Science." Journal of the Academy of Marketing Science 36: 18-20.
Maglio, P. P., S. Srinivasan, et al. (2006). "Service Systems, Service Scientists, SSME, and Innovation." Communications of the ACM 49(7): 81-85.
Mallat, N., M. Rossi, et al. (2004). "Mobile Banking Services." Communications of the ACM 47(5): 42-46.
Mathiassen, L. and C. Sørensen (2008). "Towards a Theory of Organizational Information Services." Journal of Information Technology 23:313-329.
OASIS (2006). Reference Model for Service Oriented Architecture 1.0, OASIS.
Odeh, M. and R. Kamm (2003). "Bridging the Gap Between Business Models and System Models." Information and Software Technology 45(15): 1053-1060.
Pan, A. and A. Vina (2004). "An Alternative Architecture for Financial Data Integration." Communications of the ACM 47(5): 37-40.
Payne, A. F., K. Storbacka, et al. (2008). "Managing the Co-Creation of Value." Journal of the Academy of Marketing Science 36: 83-96.
Poels, G., A. Maes, et al. (2007). "The Pragmatic Quality of Resources-Events-Agents Diagrams: An Experimental Evaluation." Information Systems Journal.
Quartel, D. A. C., M. W. A. Steen, et al. (2007). "COSMO: A Conceptual Framework for Service Modelling and Refinement." Information System Frontiers 9: 225-244.
Rittgen, P. (2006). "A Language-Mapping Approach to Action-Oriented Development of Information Systems." European Journal of Information Systems 15: 70-81.
Rust, R. T. and C. Miu (2006). "What Academic Research Tells us About Service." Communications of the ACM 49(7): 49-54.
Sheth, A., K. Verna, et al. (2006). "Semantics to Energize the Full Services Spectrum." Communications of the ACM 49(7): 55-61.
Tan, J., H. J. Wen, et al. (2005). "Health Care and Services Delivery Systems as Complex Adaptive Systems." Communications of the ACM 48(5): 36-44.
Tas, J. and S. Sunder (2004). "Financial Services Business Process Outsourcing." Communications of the ACM 47(5): 50-52.
Ulbrich, F. (2006). "Improving Shared Service Implementation: Adopting Lessons from the BPR Movement." Business Process Management Journal 12(2): 191-205.
Vargo, S. L. and R. F. Lusch (2008a). "Why "Service"?" Journal of the Academy of Marketing Science 36: 25-38.
Vargo, S. L. and R. F. Lusch (2008b). "Service-Dominant Logic: Continuing the Evolution." Journal of the Academy of Marketing Science 36: 1-10.
Vidgen, R. and X. Wang (2006). "From Business Process Management to Business Process Ecosystem." Journal of Information Technology 21: 262-271.
White, S. A. (2004). Introduction to BPMN, BPMN.ORG.
Ågerfalk, P. J. and O. Eriksson (2004). "Action-Oriented Conceptual Modelling." European Journal of Information Systems 13(1): 80-92.