CONTRASTING THEORETICAL GROUNDS OF BUSINESS PROCESS MODELING AND SERVICE BLUEPRINTING

Jukka Ojasalo, Laurea University of Applied Sciences

ABSTRACT

The purpose of this article is to examine and contrast the theoretical grounds of modeling business processes in general and service blueprinting. Modeling typically aims at developing an explicit representation of part of reality to understand, to change, to manage, and to control that part of reality. Service blueprinting is a mapping technique for visualizing service systems. The existing literature includes plenty of knowledge of modeling and service blueprinting, however very little knowledge exists of their similarities and differences. Clearly, there is a need to contrast the theoretical grounds of these two streams of literature. The present article responds to this need. The article is based on an extensive literature analysis on modeling business processes as well as on service blueprinting. First, this article discusses the general principles of the modeling of business processes and systems. Then, it discusses service blueprinting, which can be understood as a specific type of a business process modeling tool developed for services context. As a research implication, this article contrasts several aspects of modeling of business processes in general and service blueprinting. The results of this study help in understanding the characteristics and applicability of both fields. They also facilitate the exchange of ideas between the two research areas.

KEYWORDS: Modeling, Service blueprinting, Business process, System

INTORDUCTION

Modeling business processes and systems has attracted a great deal of interest of researchers. It has a long history and a large number of applications. Modeling has been widely used, for example, in the area of organizational and business process development, as well as in information systems and services design (Will, 1975; Dolk and Konsynski, 1985; Applegate, Konsynski, and Nunamaker, 1986; Geoffrion, 1987; Raghu, Jayaraman and Rao, 2004; Danesh and Kock, 2005; Sun, Zhao, Nunamaker and Sheng, 2006; Damij, 2007; Frye and Gulledge, 2007; Turetken and Schuff, 2007; Wegmann, Lê, Regev, and Wood, 2007). Kettinger, Teng and Guha (1997), conducted a study in which they examined altogether 25 methodologies, 72 techniques, and 102 tools in business process reengineering. A service blueprint (1984) is map that displays the service process so people involved in providing, designing, and managing the service can understand and deal with it objectively regardless their roles and individual points of view (c.f. Zeithaml and Bither, 2003). Service blueprinting can be understood as a specific modeling technique in the service context. The earlier literature includes plenty of knowledge of modeling and service blueprinting. Sill, little knowledge exists of their similarities and differences.

Clearly, there is a need to address this issue and increase the knowledge. The present article responds to this need. The rest of this article is organized as follows. First, this article discussed modeling of business processes and systems in general. Then, it discusses service blueprinting. Next, as a research implication, it contrasts the theoretical grounds of business process modeling in general with the special characteristics of service blueprinting. The contrasting takes place in terms of several aspects. They are the type of process, perspective of model, objectives, perspective of methods, characteristics of methods, and "soft" vs. "hard" qualities. After that, the article draws the final conclusions.

Modeling Business Processes And Systems

This section discusses the principles of modeling business processes and systems (c.f. Ojasalo, 2011). According to Pidd (1999), a model is an external and explicit representation of part of reality as seen by the people wish to use that model to understand, to change, to manage, and to control that part of reality in some way or other. Model is a statement of a problem, characterized by a set of inputs, a set of outputs, and relations between them (Wright, Chaturvedi, Mookerjee and Garrod, 1998). Models are also used for exploring possible consequences of actions before they take them, which can be called "reflection before action" (Boothroyd, 1978). Pidd, (p. 119) describes models by saying that "..a model is a convenient world in which one can attempt things without the possible dire consequences of action in the real world.

In this sense models become tools for thinking. This thinking might relate to one-time events.. Or thinking might concern occasional events.. Alternatively, the thinking might concern routine events.. We also use models as tools for thinking when we try to understand a complex system, even if we contemplate no immediate action."According to Hammer (1990), a business process is a collection of activities that takes one or more kinds of input and creates an output that is of a value to the customer. It is also defined as structured, measured sets of activities designed to produce a specified output for a particular customer or market (Davenport, 1993). A business process refers to a set of related tasks performed to achieve a defined business outcome (Davenport and Short, 1990). It is network of activities and buffers through which the flow units have to pass in order to be transformed from inputs to outputs (Laguna and Marklund, 2005). Denna, Perry, and Jasperson (1995) refer to three basic types of business processes:

- *Acquisition/payment*. This type of process includes the activities of acquiring goods and services needed by the organization to perform its functions.

- *Conversation.* This process refers to activities of transforming goods or services from raw material to finished products.

- *Sales/collection.* The sales/collection process includes activities of attracting customers, delivering goods or services, and collecting payments for delivered goods and services.

Curtis, Kellner, and Over (1992) identified four most common perspectives to process models: functional, behavioral, organizational, and informational

- *The functional perspective* illustrates a process by showing what activities are being performed and which data flows are needed to link these activities.

- *The behavioral perspective* illustrates a process in terms of when activities are being performed and how they are performed. It uses, for example feedback loops, iterations and triggers.
- *The organizational perspective* illustrates a process by showing where and by whom activities are being performed.

- *The informational perspective* illustrates a process by showing the entities being produced or manipulated by the process. Entities refer to documents, data, or products.

Luo and Tung (1999) proposed a framework for selecting business process modeling methods. The framework consists of modeling objectives, perspectives of modeling methods, and characteristics of modeling methods. Their framework is described is the following.

- *Objectives of process modeling* include three alternatives: communication, analysis, and control. *(a) Communication*. The primary objective of modeling may be facilitating communication related to modeling. Process designers need to describe existing and improved processes. They

have to agree upon a common representation among themselves. The need to share their knowledge of business processes with other employees. Simplicity and clarity may be the most desired features of a modeling for the communication purpose. *(b) Analysis*. Another objective of modeling may be analyzing and improving existing processes. Identifying the best process requires generating alternative representations, simulating process behaviors, and measuring process performance. *(c) Control*. Managing and monitoring a business process may also be the objective of modeling. Since there are several interrelated processes in the organization, there is need to control process operations, manage process relationships, and audit performance. Modeling methods of automated procedures, multi-level process descriptions, and other sophisticated modeling tools can used to achieve this objective. The second main element in Lue and Tung's (ibid.) framework relates to perspectives of modeling.

- *Perspectives of modeling methods* consist of the object perspective, activity perspective, and role perspective. *(a) Object perspective*. This perspective emphasizes what is being done. The objects that are being manipulated in the process are followed in the modeling. These objects can data, documents, or physical goods. Data flow diagram (DFD) is an example of the object perspective approach. *(b) Activity perspective.* This perspective is about how things are done. The modeling methods focus on representation on the activities being performed and relationships between activities. Integrated definition of function modeling IDEF0 (see e.g. Kim and Jang, 2002) is an example the activity perspective. *(c) Role perspective*. The role perspective focuses on who does what. A business process is modeled by representing roles and relationships between roles. The role activity diagrams (RAD) are an example of role perspective methods.

- *Characteristics of modeling methods* include formality, scalability, enactability, and ease of use. *(a) Formality*. This refers to question: how formal or precise are the languages and notations of the modeling method? Some methods have a set of well-defined notations and require formal semantics to be strictly followed, while others only have a set of guidelines. Formal methods may be well positioned to provide a more precise representation of a process and have the benefits of well-developed properties for advanced analysis. However, they may also be less flexible in terms of modeling ambiguous processes and human involvement. *(b) Scalability.* This relates to question: how large and complex a business process can the modeling method represent? Some methods can handle large processes and offer mechanisms that support multi-level representations, while others are best suited for modeling processes that are relatively small in size. *(c) Enactability*. This relates to the question: does the modeling method support automated enaction and process manipulation? Some modeling methods only allow process designers to depict a process in a static state, while others also provide automated tools for process simulation and analysis. *(d) Ease of use.* This relates to question: how difficult is the modeling method for process designers and other non-technical employees to understand and use? Some methods use simple and easy-to-understand notations such as arrows and boxes, while others utilize more complicated mathematical symbols and formulas. According to Martin and McClure (1985), a good model should provide a good basis for communication, be capable of subdivision, and have a consistent notation.

Willemain (1994) examined professional modelers. He (ibid.) reported on following findings related to *models*, *modeling process*, and *modelers*. The qualities of an effective model, in decreasing order of importance, are (1) validity, (2) usability, (3) value to client, (4) feasibility, and (5) aptness for client's problem. The relevant qualities of an effective modeling process are (1) problem context, for example discovering the real problem, (2) model assessment, for example validation and verification, (3) model structure, for example selection of key variables and elaboration of submodels, (4) model realization, for example prototyping and data collection. The important qualities of a modeler include: (1) the modeler's

mindset, for example creativity, sensitivity to client, and persistence, (2) nontechnical expertise, for example communication and teamwork skills, (3) OR/MS (Operations Research/Management Sciences) expertise, and (4) subject matter expertise. Pidd (1999) suggested six simple principles of modeling. They are as follows.

- *Model simple, think complicated.* Models are simple representations of a complex world. Models should be easy to understand, at least in outline form, and should be easy to manipulate and control. Relatively simple model can support complicated analysis. However, a simple model does not have to be a small model.

- *Be parsimonious, start small, and add.* It is impossible to know in advance how complicated the model should be. The principle of parsimony in modeling means that one should develop models gradually, starting with simple assumptions and adding complications only if necessary. Rather than attempting to build a final model from scratch in one effort, one can make initial assumptions that are known to be too simple, but allow proceeding in the modeling. Then, one will refine the initial far-too-simple model over time until it is good enough and fits for its intended purpose. One should deliberately develop a series of models, each more complex than its processors. The modeler build models that are too simple and, when their limitations become too obvious, throws them away and builds another to overcome some of the limitations. Through a series of prototypes, the modeler gradually ends up to a model that fits the original purpose.

- *Divide and conquer, avoid megamodels.* Developing a set of small (interrelated) models id often most useful when a large model is needed. According to Raiffa (1982, p. 7), "Beware of general purpose, grandiose models that try to incorporate practically everything. Such models are difficult to validate, to interpret, to calibrate statistically and, most importantly to explain. You may be better off not with one big model but with a set of simpler models" (Raiffa, 1982).

- *Use metaphors, analogies, and similarities.* Modelers can seek an analogy with some other system or an association with some earlier work. The modeler relies on his own or somebody else's previous experience. The idea is to search for previous well-developed logical structures similar to the problem at hand. Analogies are most useful in the early stages of modeling.

- *Do not fall in love with data.* Some people assume, that because a model is a representation of some system, examination of data from that system will reveal all they need to construct the model. Such an assumption may be a mistake, even though exploratory data analysis is useful. The availability of user-friendly software packages for data analysis may also make people to imagine that modeling is primarily data analysis, preferably with lots of data. However, modeling should drive data collection, not the other way round. One should first think about the type of model that might be needed before attempting large-scale data collection.

- *Modeling may feel like muddling through.* Model building is not a linear process which moves from step 1 to step 2 to step 3 and so on. A pretence that model building is a rational process may create various problems, particularly for beginners. (Pidd, 1999)

Willemain (1994) brought forward four ways for teaching and improving modeling capability. Firstly, *don't forget craft skills*. "Soft" qualities in modeling were emphasized more than "hard" qualities. "Soft" qualities include creativity, teamwork, and communication skills, while "hard" qualities cover technical knowledge, subject matter knowledge, and OR/MS (Operations Research/Management Science) knowledge. Secondly, *don't forget model assessment*. Effective models are valid and usable. Thirdly,

don't forget the client. Working and interacting with the clients is important in order to understand the context of modeling problem and to assess the model. Fourthly, *don't forget wisdom.* In addition to understand equations and algorithms, it is very important to open up discussion about important issues of less technical nature, and to do less talking and more listening.

SERVICE BLUEPRINTING

Service blueprinting is a specific type of business process modeling approach developed for services and service innovation. While a large number of methods and approaches have been introduced for modeling business processes and systems in general, very few have been dedicated just for services. The service blueprinting approach that was introduced by Shoestack (1984) is the most well-known and popular in method in the services context (Shostack, 1982, 1984; 1987a, 1987b; Kingman-Brundage, 1989; 1993; 1995; Kingman-Brundage and George, 1996; Kingman-Brundage, George and Bowen, 1995; Gummesson, and Kingman-Brundage, 1991; Fleiss and Kleinaltenkamp, 2004; Bitner, Ostrom and Morgan, 2008; Johne and Storey, 1998). Next, based on the above referred literature, service blueprinting approach is discussed. According to Nyman, Mickelson and Strandvik (2011), service blueprinting, service experience blueprinting, customer scenario mapping, and service story telling are all techniques for understanding the service process. Service blueprinting has the focus on activities and service process.

Service experience blueprinting has the focus on experiences and service process. Service scenario mapping has the focus on customer's process and activities. Service story telling technique has the focus on experiences and customer's process. A blueprint can be regarded as a two-dimensional picture of a service process (Fliess and Kleinaltenkamp, 2004). The horizontal axis represents the chronology of actions conducted by the service customer and the service provider. The vertical axis distinguishes between different areas of actions. These areas of actions are separated by different lines. "Actions" include customer actions, onstage contact employee actions (actions visible to the customer), backstage contact employee actions (actions invisible to the customer), support processes, and physical evidence. "Lines" of a service blueprint include the line of interaction, line of visibility, line of internal interaction, and line of implementation. These lines dive the map into separate zones where the actions of customers, contact employees, and support personnel are placed. (Fitzsimmons and Fitzsimmons, 2006; Zeithaml, Bitner, and Gremler, 2009; Bitner, 1993; Kingman-Brundage, 1989; Kingman-Brundage and George, 1996; Kingman-Brundage, George and Bowen, 1995; Bitner, Ostrom and Morgan, 2008).
According to Zeithaml and Bither (2003), "actions" can be characterized as follows.

- *Customer actions.* Include steps choices, activities, and interactions that the customer performs in the process of purchasing, consuming, and evaluating the service.

- *Onstage employee actions.* Encompass steps and activities that the contact employee performs that are visible to the customer.
- *Back stage contact employee actions*. Include contact employee actions that take place behind the scenes to support the onstage actions.

- *Support processes*. They include internal services, steps, and interactions that take place to support the contact employees in delivering the service.

According to Fliess and Kleinaltenkamp (2004), "lines" can be described as follows.

- *Line of interaction* separates the customer action area from the supplier action area. It represents the direct interactions between customer and supplier. Above the "line of interaction" are activities, choices and interactions performed by the customer.

- *Line of visibility* differentiates between actions visible and invisible to the customer, actions and decisions carried out by front office employees are shown above the line of visibility.
- *Line of internal interaction* separates between front stage and back office activities. Support processes, which are necessary for front stage employees in delivering the service, are carried out beneath the line of internal interaction.

- *Line of implementation* differentiates between planning, managing and controlling (management zone) and support activities (support zone). Support activities are directly related to the service process performed by the contact personnel for a specific customer. Management activities are also related to this specific service process but can also be used to direct numerous service processes.

The process of building a service blueprint includes the following phases (Zeithaml, Bitner, and Gremler, 2009).

1. Identifying the service process to be blueprinted

2. Identify the customer or customer segment experiencing the service
3. Mapping the service process from the customer's point of view

4. Mapping contact employee actions and/or technology actions
5. Linking contact activities to needed support functions,
6. Adding physical evidence of service at each customer action step.

Indeed, service blueprinting is a mapping technique for visualizing service systems. It is a holistic method of seeing in snapshot all relevant resources, actors, and activities involved in the service delivery process, which is essentially a dynamic and living phenomenon. It documents all process steps and points of divergence in a specific service. This documentation is carried to whatever level of detail that is needed to distinguish between any two competing services (Bitner, Ostrom, and Morgan, 2008; Shostack, 1984). A service blueprint is a map or picture that portrays the service system so that the different people involved in providing it can understand and deal with it objectively, regardless of their roles or their individual points of view. A service blueprint visually displays the service by simultaneously representing the process of delivery, the points of customer contact, the roles of customers and employees, and the visible elements of the service. It visually breaks a service down into its logical components and depicts the steps and tasks in the process, the methods by which the tasks are executed, and the evidence of the service as the customer experiences it. Service blueprinting is a particularly powerful technique in the services context, since services are essentially customer experiences rather than objects or technologies (Zeithaml, Bitner, and Gremler, 2009). According to Bitner, Ostrom and Morgan (2008), compared to other to other process-oriented design techniques and tools, service blueprints are first and foremost customer-focused approach, allowing firms to visualize the service processes from their customers' perspective.

RESEARCH IMPLICATIONS: CONTRASTING BUSINESS PROCESS MODELING AND SERVICE BLUEPRINTING

As a research implication, next, the theoretical grounds of business process modeling in general are contrasted with the special characteristics of service blueprinting. This is based on the above literature analysis. This happens in terms of a suggested framework (Table 1). The framework pays attention several aspects, such as the type of process, perspective of model, objectives of modeling, perspective of methods, characteristics of methods, and existence of "soft" and "hard" qualities.

Table 1: Contrasting Business Process Modeling and Service Blueprinting

Aspect	Modeling Business Processes in General	Service Blueprinting
Type of process	Any business process or system	Service process
Perspective of model	Functional, behavioral, organizational, informational	Functional, behavioral, organizational
Objectives	Communication, analysis, control	Communication, analysis, control
Perspective of methods	Object perspective, activity perspective, role perspective	Activity perspective, Role perspective
Characteristics of methods	Formality, scalability, enactability, ease of use	Formality, scalability, ease of use
"Soft" vs. "hard" qualities	Both "soft" and" hard" qualities	Both "soft" and "hard" qualities

Type of process. The present analysis reveals that, business process modeling literature in general covers any types of processes and systems. Service blueprinting literature, on the other hand, focuses only to services processes. Business process in general is a set of activities that takes one or more kinds of input and creates an output that is of a value to the customer (Hammer, 1990). Service, on the other hand, is defined as a process consisting of series of more or less intangible activities that normally, but not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customers problems (Grönroos, 1990, 2000). Indeed, service is a process, a business process. However, there are certain characteristics that distinguish services from physical goods.

Thus, service process may be very different from other processes. Goods are tangible, homogenous, their production and distribution is separated from consumption, their core value is produced in factory, customers do not participate in their production process, they can be kept in stock, and they transfer ownership. In contrast, services are intangible, heterogeneous, their production, distribution and consumption are simultaneous processes, they are activities or processes, their core value is produced in buyer-seller interactions, customers participate in the production, they cannot be kept in stock, and they do not transfer ownership (Grönroos, 2000). *Perspective of model*. The general business process modeling literature includes four main perspectives. They are functional, behavioral, organizational, and informational perspective. In contrast, service blueprinting, mainly involves functional, behavioral, and informational perspective. The functional perspective is involved while a service blueprints visually illustrates the service process and shows what activities are being performed in the service. The behavioral perspective is present because a service blueprint shows when activities are being performed and how they are performed. Moreover, the organizational perspective is involved since a service blueprint also shows where and by whom activities are being performed in the service process. The informational perspective is not so strongly involved in a service blueprint, because service blueprints seldom show documents, data, or products being produces or manipulated by the process. The informational perspective, as defined here by Luo and Tung (1999) is perhaps more strongly present in manufacturing and information system processes.

Objectives. The general business process literature involves three objectives. They are communication, analysis, and control. Clearly, service blueprinting includes all these objectives as well (c.f. Gummesson and Kingman-Brundage, 1991; Zeithaml, V. A. and Bither, 2003). A service blueprint facilitates the communication between employees, service designers, and management by visually showing the flow of process, as well as persons involved, and their roles and activities. It facilitates analysis by showing potential weak points of the service process as well as opportunities to improve the efficiency, the use of resources and time. Line of interaction between external customers and employees shows the customer's role and demonstrates where the customer experiences the service quality, thus contributing to informed service design. Line of visibility promotes a conscious decision on what customers should see and which employees will be in contact with customers. This facilitates the service design. Line of internal

interaction clarifies interfaces across departmental lines whit their inherent interdependencies. This facilitates continuous quality improvement. A service blueprint stimulates strategic discussion by illustrating the elements and connections that constitute the service. It also constitutes the rational basis for internal and external communication. The analysis of service blueprint identifies fail points, in other words, weak links of the chain of activities, which can be the target of continuous quality improvement. It provides the basis for identifying and measuring cost, revenue, and capital invested in each element of the service. A service blueprint also facilitates control of the service process. It promotes top-down and bottom-up approaches to quality improvement by enabling managers to identify and support quality improvement efforts of employees working both on front line and support functions (c.f. Gummesson and Kingman-Brundage, 1991; Zeithaml, V. A. and Bither, 2003).

Perspective of methods. The general business process modeling literature includes three perspectives of methods. They are object perspective, activity perspective, and role perspective. From these, the activity perspective and role perspective are clearly present in service blueprinting. A service blueprint shows the activities being performed and relationships between activities in the service process. Also, a service blueprint shows who does what by illustrating roles and relationships between roles. The object perspective is not so strongly present in a service blueprint, since the blueprint usually does not show, at least in detail, the data, documents, or physical goods that are being manipulated in the in the process.
Characteristics of methods. The general business process modeling literature includes four characteristics of modeling methods, namely formality, scalability, enactability, and ease of use. From these characteristics formality, scalability, and ease of use are clearly involved in service blueprinting. Both the structure and building process of a service blueprint are very systematic, strict, and precise. Clear guidelines help in building a service blueprint in a stepwise manner. Also, the structure of a service blueprint itself is very strictly defined, even though it has evolved to some extent over the years. A service blueprint is also scalable. Those who develop the service blueprint may decide the scope of modeling. They may decide how large or small service processes they analyze. They may also decide to delimit their blueprinting effort in certain sub-process. Moreover, there is a clear intention to ease of use in service blueprinting. The service blueprint does not include any complex mathematical symbols or formulas. Instead, it is composed of simple boxes, arrows, and zones. Also, developing a service blueprint does not usually require any sophisticated technical or mathematical expertise. However, enactability is usually not strongly present in service blueprinting. Automated process manipulation and simulation are not usually discussed in the service blueprinting literature. Still, it can be anticipated that, due to the increasing influence of ICT, this characteristic will be more strongly present in service blueprinting as well.
"Soft" vs. "hard" qualities. The general business process modeling literature refers to "soft" and "hard" qualities in modeling. They both are required in service blueprinting as well. Analyzing the service process and building the service blueprint is a systematic process requiring analytical approach. Thus "hard" qualities are needed. But also "soft" qualities are essential. Often, service blueprinting effort is team work that requires communication and inter-personal skills, as well as creativity.

CONCLUSIONS

The purpose of this article was to examine and contrast the theoretical grounds of modeling business processes and service blueprinting. The earlier literature includes plenty of knowledge of modeling and service blueprinting. Still, very little knowledge exists of their similarities and differences. Clearly, there was a need to contrast the theoretical grounds of these two streams of literature. This happened in terms of an extensive literature analysis on modeling of business processes in general as well as service blueprinting. As a research implication, this article contrasted the theoretical grounds of business process modeling in general with the special characteristics of service blueprinting. The contrasting took place in terms of several aspects, and they were type of process, perspective of model, objectives, perspective of methods, characteristics of methods, and "soft" vs. "hard" qualities.

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