PROCESS MODELLING FOR SERVICE PROCESSES
Modelling methods extensions for specifying and analysing customer integration

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Abstract: Service Provider business processes require extensive customer participation. Due to the customer's substantial impact on the successful implementation of performance processes, measures of customer interaction must be planned meticulously. At present, there are numerous modelling techniques for a model-based structuring of these processes. Admittedly, most of these models provide only general operations for model modifications such as the ability to delete and add elements. This paper demonstrates possible extensions for process modelling techniques which are intended to assist service providers in analysing their processes with particular regard to customer integration and contract formulation.

1 INTRODUCTION

Active customer participation is one of the most important success factors in service processes (Lasher & Ives & Jarvenpaa, 1991; Henderson, 1990; Fließ & Kleinaltenkamp, 2004). Strictly speaking, without customer participation, services processes can not take place (e. g. Fließ & Kleinaltenkamp, 2004; Chase, 1978; Lovelock & Young, 1979) because it is essential for service providers to integrate external factors in order to accomplish their service processes. Service providers are inevitably dependent on customer information about their service requirements. Furthermore, they often depend on additional external factors such as human resources, legal rights, and the assets at their disposal (Fließ & Kleinaltenkamp, 2004; Kelly & Skinner & Donelly, 1992).

Consequently, one of the most important goals for service providers is to ensure an appropriate customer integration in service processes (Palmer & Cole, 1995). The foundation of successful customer integration is already determined within the pre-contract phase and at the point, where the service contract is concluded. At this very early point of time, service providers and customers have to negotiate and define exactly how the service process is going to be accomplished. However, contract formulation is a complex task, because a broad variety of experts from different academic disciplines (e. g. law, business administration, and information technology) are involved. Therefore, the aim of this paper is to develop a methodological support for the specification and analysis of customer activities in business processes of service providers, which also supports the appropriate definition of service contracts. For that reason, we combine the Event-Driven Process Chains (EPC) (Scheer, 2000; Nüttgens & Rump, 2002; Nüttgens & Rump, 2003) from the information research area and the ServiceBluePrinting approach (Fließ & Kleinaltenkamp, 2004; Kingman-Brundage, 1989; Kingman-Brundage & George & Bowen 1995; Shostack 1982; Zeithaml & Bittner 1996) from marketing research forming an integrated method.

The remainder of the paper is organised as follows. Section 2 presents our modelling methods extensions to support the specification and the analysing of customer integration. Section 3 illustrates the applicability of our approach by analysing experience from a project where the method has been applied. Finally, conclusions are presented in Section 4.

2 MODELLING METHOD EXTENSIONS

Our approach aims to provide a checklist-based preparation of process models. It comprises of

specific components presented below, that extend common process modelling techniques. Hence, we contribute to process modelling method development. The following components feature suitable rules for the above-mentioned area of additional problem-solving techniques. The most important components and their relationships are illustrated in the meta model in Figure 1. This Entity-Relationship-Model is a meta model, because it describes linguistic extensions of process modelling methods. The most important components are:

Segmentation schema: In order to facilitate an appropriate process analysis, specifications for segments of process models have to be developed. The design of these segmentation schemas is essential for a theoretical foundation of the checklists provided. For example, from a knowledge management perspective, it is highly relevant to distinct function in terms of data created, data stored, data distributed or data used. At least, a segmentation schema has to distinguish two segments. Each segment belongs exactly to one segmentation schema. A segmentation schema can be suitable for more than one perspective. In turn, one perspective can access several segmentation schemas. The segmentation structure expresses that segments can comprise other segments. Whereas segments structures are used to depict refinement relationships, segment groups allow for miscellaneous compositions of segments.

Central Questions: Checklists are compound of central questions that provide process analysts with design options. In context of knowledge management, for example, central questions have to ask if data stored by a specific function is used in other functions as well. Central questions are assigned to segments or segment groups. Central questions that simultaneously address different process modelling areas are predestined for an assignment to segment groups. All central questions
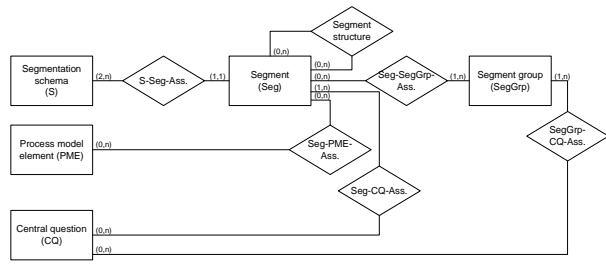

Figure 1: Meta model for a methodical extension of process models

of a segmentation schema result in a perspective specific checklist.

Assignment of segments to process model elements: By means of an assignment of segments to process model elements checklist are linked to process models. For example, the assignment can be realised through a direct or indirect attribution of process model elements. In case of a direct attribution, segment descriptions are used as attribute values of process model elements. In case of an indirect assignment, rules are defined and computed which derive the corresponding segments through origin process model attribute values which are used independently from our approach for other purposes of process modelling.

According to the meta model in Figure 1, corresponding segments must be identified that constitute the segmentation schema. Appropriate perspectives on customer activities are presented in different theoretical concepts from marketing theory. For a bilateral consideration of a business relationship, we propose the following distinction (see Figure 2).

- Firstly, it must be determined which activities are perceived as corporate internal opposed to external. This is reflected by the *outsourcing /make-or-buy* decision. In the *ServiceBlue-printing* approach this distinction is regarded in
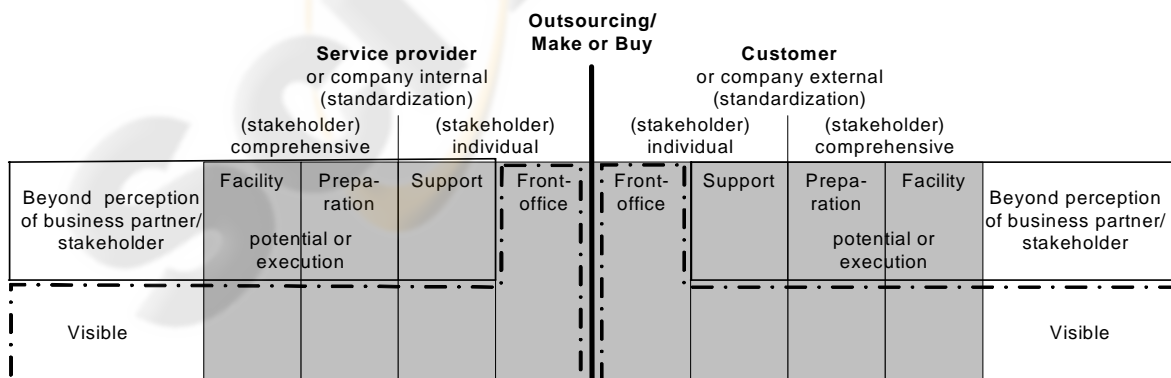

Figure 2: Segmentation schema for customer integration management.

the *line of interaction.*

- Within a bilateral business relationship, both from the company's point of view and from that of the business partner, it must be decided whether activities are executed *individually* for each business partner or *comprehensively* for all business partners. Standardization aspects affect all business relationship participants (*Service-Blueprinting line of order penetration*).

- In case of comprehensive processes, a distinction must be drawn between *potential* processes (ensuring the company's operating capability) and *execution* activities that establish performance processes. Potential processes are called *facility* processes; execution activities are called *preparation* processes (*ServiceBlue-printing line of implementation*).

- Individual stakeholder processes can be differentiated with respect to their reference to customers. Direct customer-contact activities are so-called *front-office* processes; activities without direct customer contact are called *support processes* (*ServiceBlueprinting line of visibility*).

- The decision as to whether to make activities *visible* is not solely limited to the business partner under consideration. The visualization of comprehensive activities between partners has to be considered as well. For each activity, it is necessary to record which activity aspects are visible to the business partner and how this visibility is to be established organisationally and technically. Activities with direct business partner contact are visible per se. As opposed to other categorisation approaches, Figure 3 emphasises the orthogonal relationship between visibility and standardization. In the bilateral case, this question should be answered both from the company's point of view and from that of the external partner. In the case of considering another business partner, the question of visibility must always be discussed individually with each respective business partner. Furthermore, a distinction must be made between activities that are visible by themselves and those that become visible through information activities regarding to certain aspects.

Since the customer depicted on the right side of Figure 2 may maintain customer relationships on his own, the provider aspects are reflected on the customer side. Hence, the same segments count for this aspect.

The question of institutionalising functions at a high level of granularity has already been addressed, where the decision on outsourcing or make-or-buy was elaborated. Within the scope of designing a company organization structure, this question has to be addressed further at a lower level of granularity. Thus, further differentiations of the company's organization structure are not made here.

The questions appear in related approaches, especially in form of 'shifting the lines' which define the boundaries of the different areas of activity (Fließ & Kleinaltenkamp, 2004). Table 1 contains an excerpt of the decision terms for different areas of activity proposed in the segmentation schema. For the purpose of this paper, the below-listed questions focus on the perspective of IT service providers. Likewise, central questions for the remaining area of activities can be posed. Examples for the appliance of the questions are given in Section 3.

Table 1: Excerpt of central questions for analysing customer activities in service processes

Segment Customer Activities
In which customer processes does the service provider wish to participate? Which is the relevant customer process that is to be supported by the service provider?
Which specific tasks of customer processes are to be provided by the service provider? Is cooperation with other companies necessary or reasonable in order to map the complete customer process?
Which activities in the performance creation process are adopted by the customer?
What is the impact of customer involvement on the process?
Where do problems occur if customers do not contribute in a required timely, qualitative and quantitative manner (e. g. service requirements and other information)?
How can adequate customer involvement be accelerated to simplify provider planning activities (e. g. by timely contribution demands)?
How can customer involvement be simplified from the customer perspective (e. g. by pooling customer activities in a timely manner and on-site)?
Must the division of work between provider and customer to be changed (shifting of line of outsourcing / make-or-buy)?
How can the deployment of communication channels and media (e. g. internet portals, call centres) at the customer interface be improved?
Which customer contact channels and media are to be offered to which customer groups at what stage of market transaction?
Are the number and quality of customer interaction points adequate or to be improved?
What customer data is to be collected from which interaction channel?

Segment Front-office Activities
Where is the process line of visibility towards the customer?
Are activities that are perceived as relevant, visible to customers?
What is the (estimated) customer judgement on visible activities? What data is to be collected in what form to evaluate visible activities from the customer perspective?
Which aspects of front-office activities should be visible to customers?
Which channels (internet, phone etc.) should be used to provide customers with the required information? Should a push or pull principle be used?

Segment Support Activities
How is customer data to be evaluated and managed so as to utilise them for subsequent processes?
What are internal coordination problems?   - between customer contact and support staff?   - with regard to the cooperation of support staff?   - with regard to the cooperation of front-office staff?
How can internal cooperation be improved? What types of coordination functions and systems are necessary or reasonable (e. g. access to shared databases)?
Is the centralisation or decentralisation of certain tasks preferable?
Which organisational unit is to be associated to these tasks?
Which aspects of front-office activities should be visible to customers?
Which channels (internet, phone etc.) should be used to provide customers with support activities that have been made visible? Should a push or pull principle be used?
Should support activities be relocated?

In order to facilitate the application of our approach, a process modelling technique must be selected and integrated into the segmentation schema. In this context, the EPC has been selected. EPCs are directed graphs which comprise three basic elements (functions, events and logical connectors) indicating the control flow (Scheer, 2000). In addition to basic notation objects, EPCs can easily be enriched with a large number of additional objects (e. g. organizational units, application systems, and outcomes) which leads to the extended event-driven process chain (eEPC). Various extensions of the EPC can be found in specific domains such as knowledge and document management, e-Government, or risk management (Nüttgens & Rump, 2002; Nüttgens & Rump, 2003). We apply the following widley-used extensions in our approach (cp. e.g. Scheer, 2000):

- An application system is a piece of software supporting a certain function.
- An organisational unit represents any type of organizational entity found within a company,

for example within subsidiaries, divisions, departments, or special project teams.

- A detailed function refers to a more detailed model. It is used with regard to the readability of process models.

Additionally, specific extensions with regard to the analysis and specification of customer activities have to be made:

- Segments (and their corresponding areas of activity) extend the conceptual aspects of the eEPC for a proper analysis of customer activities. Each function of the EPC is a specialization of 'process model element (PME)' of our meta model in figure 1. In consequence, business process functions can be divided in specific segments building up the areas of activity. The above-mentioned detailed functions are generally not assigned to a specific area of activity, because the underlying detailed models may be segmented into different areas of activity.
- As business relationships initiate the negotiation and formulation of contracts, business process models can also be used as a sound basis for the structuring and formulation of contracts. Especially complex business processes require time-consuming pre-contract, completion and post-contract phases involving experts from different working areas and scientific domains (such as business administration, information technology, and law). As a result, communication problems and ambiguities arise, which can be handled by business process models. Using business process models as an attachment to contracts provides an appropriate communication tool and a structured procedure for the negotiation and formulation of contract paragraphs. Therefore, (contract) paragraphs are assigned to functions of the process models. Thus, we extended the meta model of the eEPC by the entity type 'paragraph' and the relationship type 'paragraph structure'.

For the application of the extension, corresponding notation constructs are needed both for segments and paragraphs. We propose to illustrate the activity areas by means of the swimlane notation which leads to a segmentation of business processes (Scheer, 2000). Alternative notations could also use different colours for an alignment to segments (each colour representing a specific area of activity). To represent paragraphs we used rectangles including paragraph symbols and numbers which refer to a detailed description of the underlying contract clauses.

3 UTILISATION OF THE APPROACH

The application of our approach can be structured into four phases. During the first phase, as-is models of service provider's business processes are generated. For this purpose, a business framework should be used. Moreover, existing contracts of the company have to be investigated as they determinate the as-is situation. Based on the framework and on the exiting contracts, as-is business processes can be identified and documented. In Phase 2, an analysis of the business process models takes place with special attention to customer activities. In this phase, business process designers are supported by means of the central questions catalogue which has been developed. By answering these questions, process designers are effectively assisted in identifying strengths and weaknesses in their customer processes. Based on both, the answers to the central questions and the created as-is models, to-be models can be created, that allow for higher levels of customer-integration in each area of activity in phase 3. The to-be models are on the one hand the foundation of the final implementation phase, because they represent the requirements definition of business processes to be implemented in the information systems. On the other hand, they can be used for the contract negotiation and design between the service provider and customer.

Our method for customer integration has been applied at a medium-sized IT service provider which offers broad IT infrastructure support for its customers on such areas as acquisition, installation and maintenance of hard and software, configuration of networks, and IT consulting in general. For the most part, the customers (currently 550) are tax consultancies, solicitors, management consultancies, wholesaler, and retailer. The customer integration management method has been applied with regard to the procedure model.

Phase 1: As-is modelling: Initially, a business process framework for the as-is service processes has been developed. The IT service provider under consideration exhibits seven core processes and eight support processes that are embodied in value chains. Each value chain consists of several subordinated value chains that in turn comprise detailed process models. In the following, we focus on the processes 'Project preparation' and 'Project performance' of the IT service provider which are subordinated processes of the core process 'project business'.

Phase 2: Customer activities analysis: For the analysis of the as-is models, the central questions catalogue was applied. Thus, the level of customer integration in each process business model is analysed.

- Answering, for example, the central question 'Which activities in the performance creation process are adopted by the customer?' (see row 'customer activities' in Table 1) reveals for the as-is model of the 'Project performance', that customers are nor explicitly informed about preparations they have to make (e. g. provisions of rooms, availability of necessary staff members, access to information systems) in order to ensure a frictionless service performance. Moreover, customers are not regularly informed about the current project status and upcoming project milestones.

- Answering the central question 'Which aspects of support activities should be visible to customers?' exposes for the 'Project preparation process', that no customer integration in the support area has taken place during the preparation phase of outsourcing projects. Thus, customers had no opportunity to follow or participate in the process.

Phase 3: To-be modelling and contract formulation: The analysis of the as-is models resulted in a variety of requirements with respect to a higher level of customer integration in each area of activity.

- Requirements formulated for the 'Project performance process' were, for example, that necessary customer preparations are explicitly communicated by the IT service provider. In return, the customer ensures their observance. Within the to-be model the two additional functions 'Transfer customer preparations' and 'Make preparation' were introduced in the front-office and customer area. The according paragraphs have been assigned to the process functions. Paragraph 3.2 of the IT outsourcing contract comprises, for example, that the service provider has to inform the customer about the above-mentioned preparations two weeks in advance. Moreover, the customer has to be reminded one day before the on-site appointment takes place. Additional process design recommendations can be found in several new functions and events (e. g. 'Send delivery delay notice', 'Check observance of project plan', and 'Post-processing of appointment').

- Requirements exposed for the 'Project preparation process' were, for example, that important information for the customer should be

communicated as early as possible (such as determination of a project manager or contact person for technical questions, pre-existing documentations about the IT infrastructure of the customer). Thus, several new functions were created within the front-office area of activity (e. g. 'Present project manager to customer', 'Transfer evaluation', and 'Transfer project plan to customer').

Phase 4: Implementation: Finally the requirements documented in the to-be models have to be implemented. The implementation of the above-mentioned additional events from the 'Project preparation and Performance process' facilitated customers in a very early phase of the project to knew, where, why, and which services will take place and in which parts he/she has to participate. Furthermore, customers were able to evaluate support services performed by the service provider. Hence, they were able to understand the resulting invoice in detail. Moreover, the business process models supported the efficient and effective formulation of the corresponding outsourcing contracts (not only at the point where the contract was concluded, but also in the pre- and post contract phases).

4 CONCLUSIONS

The application of the proposed method showed that the identification of improvement potential of business processes in the context of service providing, can be supported efficiently by using a number of central questions. To some extent, these central questions indicate specific options for action. At minimum, they indicate critical points which must in turn be examined in more detail.

Segments allow – in an upstream analysis step – a segmentation of process models into separate fields of functions or areas of activity. Furthermore, they enable the formulation of segment-specific central questions for comprehensive corporate process models that are more specific than a global list of questions. In addition, they allow for a focussing of analysis.

The eEPC proved to be a process modelling technique which can be extended without difficulty for the analysis of customer integration and contract formulation. It should be mentioned, however, that the proposed concept is designed to be easily transferable to other process modelling techniques. For this purpose, adequate model elements must be identified which are suitable for assignment to segments.

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