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Service Development and Implementation - A Review of the State of the Art

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Abstract
As service development is a complex and interdisciplinary issue, service research has been conducted in numerous disciplines and sectors. As a result, different approaches containing manifold models, methods, and tools with different foci have been developed and discussed in recent years. Due to the diverse nature of the approaches, it is a challenge for organizations to distinguish between them. Against this background, the aim of this paper is to propose a framework for classification and, based on the framework, to present an overview of the state of the art in the research field of service development and implementation.

Keywords: Service Development and Implementation, Service Engineering, State of the Art

1 INTRODUCTION

The relevance of services, which belong to the tertiary sector, has increased significantly in industrial countries during the last century. Today, in many industries, services are the most important business sector, amounting to more than 70% of the national economy [1] [2] (cf. Figure 1). This increasing impact of the service sector is not only based on the growth of self-contained services. Changes in the producing industries involve modification of product ranges. Product-relating and product-supporting services have become integral part of the tertiary sector [3].

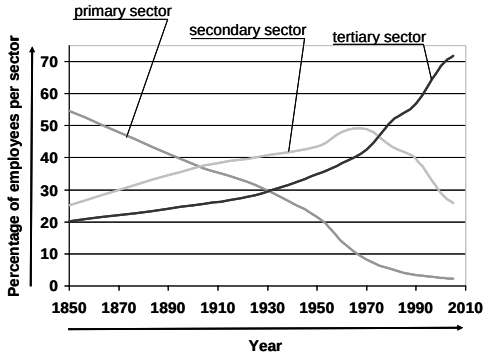

Figure 1: The economic significance of services in Germany [1] [2].

For self-contained services as well as for product-relating and product-supporting services, quality is essential for the success of offered services. However, as a study of Cooper/Edgett [4] showed, more than 40% of services introduced failed to survive in the market. Reasons for this high failure rate are often caused by two (main) factors: the spontaneous and unsystematical procedure for the service development [5] and a lack of service-specific methods and tools [6].

So far, no distinct definition of the term “service” is established in scientific literature [7] [8]. Generally, three distinctions are made in the literature [9] [10]: the definition by enumeration (q.v. [11] [12]), the definition by negative demarcation (q.v. [13]), and the definition by the constitutive characteristic of service. The latter definition is the most prevalent [14] and will be used as basis here. The constitutive characteristics of services are intangibility and the integration of external factors (i.e. customers) and therefore the uno-actu-principle (q.v. [9] [15]). Compared to conventional product development processes, this service’s related characteristics imply particular challenges for the development process of new services and the required methods and tools.

Differences in the degree of customer integration and in the variety of service variants lead to a heterogeneous range of service types (Figure 2). Four different service types can be distinguished [16]:

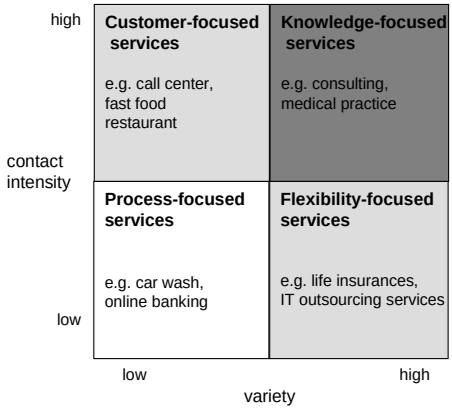

Figure 2: Types of services [16] [17].

- Process-focused services: The integration of an external factor as well as the variety is low. Therefore, a high-standardised service process is applicable.

- Customer-focused services: Because of its low variety and high contact intensity, clearly defined standardised services are proposed which can be influenced by customers only to a certain degree.
- Flexibility-focused: Regarding the high variety, the emphasis is on a systematic and efficient way for creation of variants (i.e. modularisation).
- Knowledge-focused: Services are determined by high contact intensity and high variety. Due to this fact, standardisation is difficult, as a considerable amount of customisation is necessary.

Due to these, a lot of rather problem-specific, singular solutions exist. In consequence, a deduction of a uniform standardised development process is very difficult. Simultaneously, the services to be developed are significantly influenced by different factors [18]. Thereby, the most import factors are the strategic alignment and the general conditions.

Along this background and its complexity the main question is how to develop service in an efficient way in order to ensure high-quality service processes. As services are not just "black boxes" but "a designable part of the business activities" [17], an adequate development process is required. Consequently, the development process for services needs to be systemised or standardised in the same way as it is done for physical products. Hence, the differentiation between "physical product" and "service product" will be made in the remainder of this article.

A development process that is standardised tested and adapted to the special requirements of services benefits from the quality and professionalism of the development process itself [19]. By introducing standardised processes, the existing high failure rates in the implementation of services can be reduced [20]. Furthermore, positive influences on the time-to-market [21] can be achieved as well, due to a more convenient operation method and subsequently reduced development costs [22] [23].

2 FIELDS OF SERVICE RESEARCH

Service research considers a socio-technical system. Therefore it is a complex and interdisciplinary issue, which is investigated by various scientific fields. Research in services is not a self-contained scientific discipline up to today. As a result, research has been conducted in numerous disciplines and sectors like engineering technology, information technology, economics or psychology (see Figure 3) [15] [24].

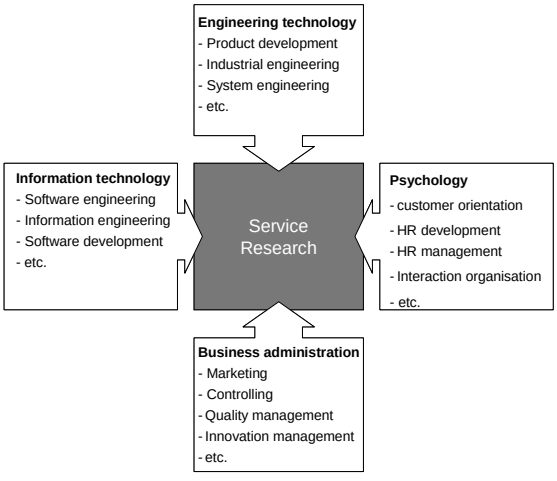

Figure 3: Important factors of influence for the organization of services.

Accordingly, different approaches containing manifold models, concepts, and tools with different foci have been developed and were discussed in recent years. Until now, none of theses approaches could be established as a general accepted one [24].

Service researches can be divided in service development and service management, respectively service operation (see Figure 4). While on the one hand the research in the development of services deals with the process from the first idea for a new service up to the post processing of its introduction or with an improvement of an existing service, service operation research on the other hand focuses mainly on management and the continual improvement of already implemented services. This research paper concentrates on the existing approaches for service development. Here, the field of research can be divided into two different mainstreams:

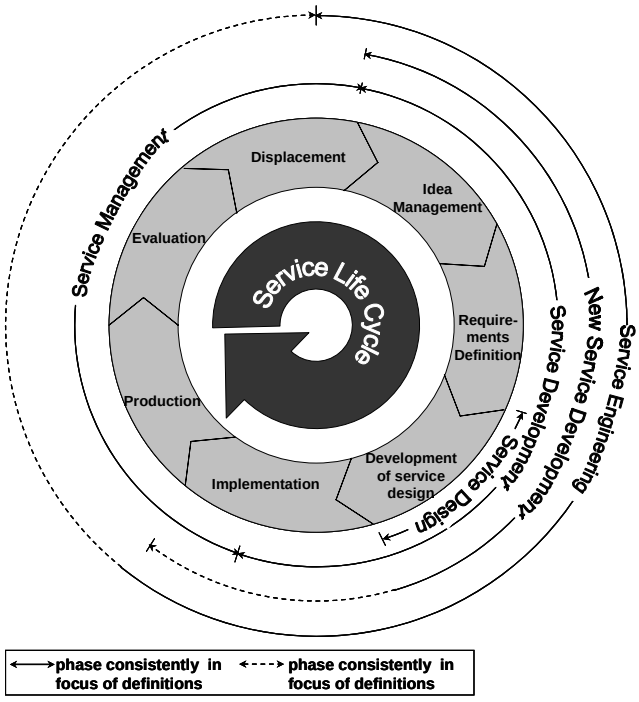

Figure 4 : Research in service life cycle.

New Service Development and Service Design

First researches were based on the area of business administration and on particular marketing. They focus on customer satisfaction and service quality. Using the terms of "new service development" they were conducted with the aim in mind of devising a systematic and analytic method for the development of new services, which can reproduce an expected result in a satisfactory quality with reasonable costs [8]. The first approaches referring to the topic as "New Service Development" in the 1970s in the Anglo-American sphere were held on a simple level and did not offer practical methods [16]. This field of research mainly started in the USA with the "Service Design and Service Management" Model of RAMASWAMY (1996) [25]. This model can be described as the basis of many subsequent researches and models for service development. With respect to the definition given by LUCZAK, "Service Design" focuses on the elaboration of perceivable elements of a service (e.g. colour, sound) [26]. Whereas in the definition of Service Design given by RAMASWAMY all steps of the design of a new service are included [25].

In recent years the "New Service Development Model" was developed by EDVARDSSON/OLSSON (1996) [27]

[28]. This model puts its focus on the service life cycle phases from idea management to implementation [27]

Service Engineering

The second mainstream in the development of services is the new research discipline “Service Engineering”, which was created especially for the systematic development of services. The notion of “Service Engineering” was chosen on the assumption that services can be developed in the same way as physical products. Hence the term “service engineering” clarifies the aim of finding a process for systematic development and design of new services by using appropriate methods and tools [28] [29] [30]. Service Engineering mainly aims at the improvement of service planning and service developing procedures, in order to create more professional services. This approach is mainly prevalent in Germany.

Today, research regarding the development of services is mainly done in the USA, the UK, Canada, Scandinavia and Germany [23].

3 FRAMEWORK OF REFERENCE FOR SERVICE DEVELOPMENT

Due to the complexity and the diverse natures of existing service development approaches, it is a real challenge for organizations to distinguish between them. Furthermore, it is a task for them to identify and evaluate the different approaches, finding out which is capable of fulfilling the given requirements.

Against this background, a framework (Figure 5) is proposed in this paper to classify the manifold kinds of concepts, methods and tools of service development and implementation with their different foci. The aim thereby is to render a concise overview and to provide transparency for concerned organisations.

The constructivist point of view is based on the assumption that a service can be designed just as a physical product (cf. chapter 1). Thus, the framework is based on the definition of the term service engineering. In this way, the disciplines service design and new service engineering are neither considered separately nor will there be made a distinction between them. The presented framework distinguishes between three aspects: activity dimension, service dimension and aggregation layer.

3.1 Activity dimension

According to the definition of service engineering, the framework deals with the fields of activity within the service development process. The individual stages of the service development process are visualised in Figure 5. The process is divided into three main stages: “service planning”, “service conception” and “service implementation”, which are again divided into three sub-stages (cf. [26] [29] [31]).

The first phase, “service planning”, includes the situation analysis of the company and the environment analysis, in order to identify the requirements of the stakeholders. However, depending on the stakeholder group, the derived requirements can have different and partly opposing foci. Based on this, a target system will be created for the later design and assessment of the service concept. The result of the service planning phase is a detailed project description of the service development project. It includes fixation of the project’s scale and its main objectives and ultimately the particular instructions for the development team.

In the first step of the “service conception”, the specified requirements of the service format, as described by the project specifications, are supplemented with the object definition and the fixation of the object system. Subsequently, firstly the design of (several) detailed possible solutions with respect to the different service dimensions is mapped out and secondly the adjacent evaluation (which is done i.e. by prototyping or service simulation) of the service concept is formulated. The result of the “service conception” stage is an evaluated service conception. It describes the planned objectives (i.e. target group, service quality and range of offer) and gives detailed illustrations regarding the different aspects of the service, both of which are to be implemented in the following steps.

Finally, the “service implementation” phase deals with the preparation of the implementation, the testing of the service concept (this is done i.e. by running a pilot project), and the confirmation of improvements, which will be adapted in a feedback loop. Furthermore, the objective of the implementation phase is to control the service concept, which deals with the specified objectives and requirements. If these are not attained, the process step in question has to be repeated until the requirements and goals are fulfilled completely. The result of the service implementation phase is a service format which describes the objectives as well as the tested and fixed operation plan which fulfils the customer requirements according to the service concept. After this step, the service format is

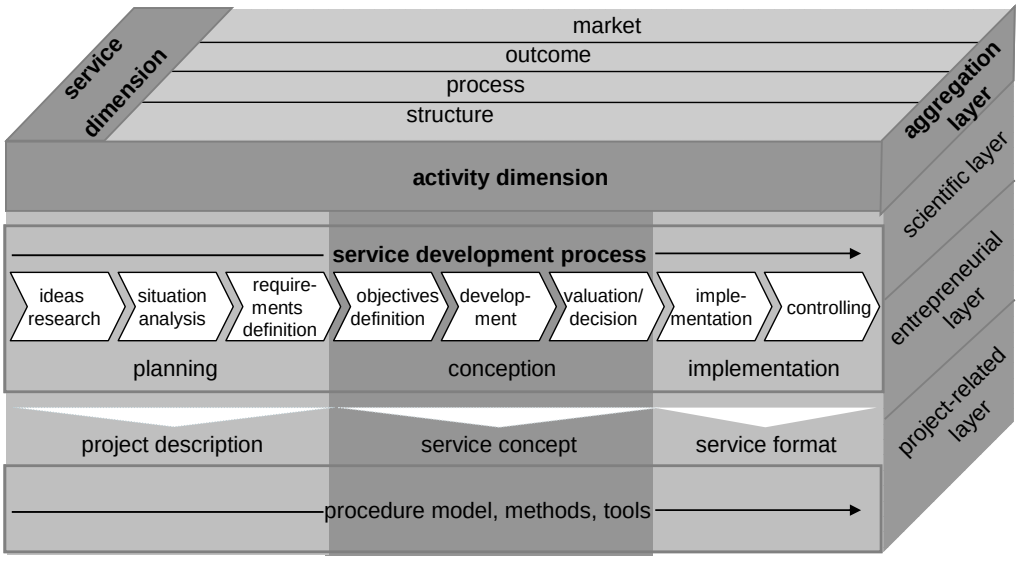

Figure 5: Framework for the classification of service development approaches

redirected to the service management.

Procedure model, ,methods and tools

The general aim of a procedure model for developing services is the description how to structure and manage the complex, multi-disciplinary service development process more efficiently. By combining appropriate methods and tools into defined, single process steps, the procedure model assists service development from the initial idea to the final implementation. This leads to transparency, lucidity, and defined steps. Therefore it ensures high service quality [24]. Methods include definite instructions, which determine activities, in order to reach a certain objective [17] [32]. Tools support the operationalisation of a method [33].

The procedure model defines the single stages and activities of the service development process in a first step. Subsequently, suitable methods and tools have to be chosen for every stage in a second and third step. Methods and tools have to be selected considering the type of service (cf. Figure 2), the service's complexity and the situation of the company. The latter concerns the range of offered methods and tools as well as the experiences employees have with them [15].

3.2 Service dimension

The service dimension is derived from the constitutive service characteristics. This is done analogous to the single phases of the service. Hence a distinction can be made by analysing the service's dimensions, i.e. its structure, its process, and its outcome [10] [16] [32]:

- The structure dimension focuses on the provision of services. It describes the basic ability and readiness to deliver a service by combining internal (i.e. employee, technology, information) and external (i.e. customer) factors.
- The process dimension focuses on the process of service by integrating external factors.
- The outcome dimension describes the (tangible as well as intangible) outcome and its respective impact on the customer.
- In addition to this three dimensions mentioned above, which are based on the constitutive service characteristics, Meiren/Barth [34] takes the market dimension into account. This underlines the necessity of considering market requirements to avoid undesirable developments for the customer.

3.3 Aggregation layer

Finally, as the third aspect, a distinction can be made by analysing the focus and therewith the aggregation level with regard to a scientific, a company- or a project-related viewpoint (see Figure 6) [15].

The scientific layer deals with the provision of approaches to procedure models, of methods, of tools and of classifications of services as well as of human resource concepts. The entrepreneurial layer reconciles these scientific approaches to the company's requirements by selecting either a range of suitable methods and tools for the company's service development system process or by determining the reference models and employee qualification standards. The aim is to configure a holistic service development system. Finally, the project-related layer refers to separate, concrete service development projects with an applicable project plan, with methods, tools etc.

Consequently, by linking these three introduced aspects together, a grid emerges, making the systematisation of approaches with respect to different aspects possible. An example is on the one hand the classification of methods regarding the procedure model respectively the single stages and on the other hand regarding the service dimension.

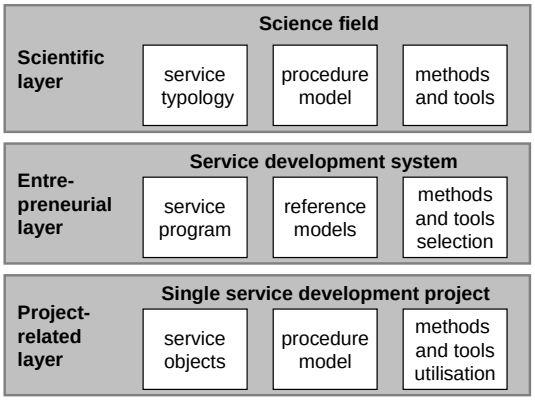

Figure 6: Aggregation layer [15] [23]

4 REVIEW METHODOLOGY AND RESULTS

Approaches for the service development research field with its different foci and structures can be distinguished in approaches for the service development procedure model, methods and tools regarding different criteria. Therefore, starting from the activity dimension, classification is made based on the service development process (Figure 7). Hereby, all reviewed approaches can be differentiated depending on whether the approach considers the whole service life cycle (service life cycle spanning) or only some aspects respectively only one stage (service life cycle phase). Furthermore, the approaches are classified with regard to the service dimensions and the aggregation layer.

4.1 Classification by activity dimension

Service development procedure model

Many approaches of the service development research field focus on the development of a general, efficient and life cycle spanning procedure model for the service development process [23]. The most important are [25] [27] [29] [35] [36] [37].

Beside this, further important research foci and life cycle spanning approaches have been identified. Thereby, some of this approaches also integrated methods as well as approaches for tool support:

- Approaches which focus on the modularization of the service development process to offer a customised service with a high degree of standardisation with regard to the base of modules. Important authors are [19] [38]. Moreover, standards are defined by DIN [29].
- Further approaches deal with innovation-management [39] [40] and knowledge-management [41] for the service development.
- Finally, some approaches from the different research fields consider special issues: Marketing and psychology (integration of the internal and external factors with emphasis on the customers integration [42] [43]) and information and computer science (with focus on the tool-supported service development [44]).

Furthermore, procedure models can be differentiated according to the following aspects:

- Degree of physical product integration: Approaches can be differentiated according to the degree of physical product integration. While the main part of the research in service, as well as the basic models in service development are concerned only with the development of pure services, further research approaches (q.v. [45] [46]) focus on the integration of

services and products (as in product-related and product-supporting service developments) as well. The technical service development is concerned with the development of product-related services based on existing products [46]. In contrast, an integrated and reciprocal approach which considers planning, developing, producing and using of services and products is known as a hybrid performance bundle. This integrated approach tends to bear utilisation-orientated results [47].

- Kind of procedure model: Two kinds of procedure models for the service development process exist: sequential phase models and iterative structured models [14]. Most approaches, which are presented in the service development literature, integrate a model with sequential phases [48], q.v. [17] [25] [27] [29] [35]. Only a few models contain an iterative structure (q.v. [32] [36] [37]) with feedback loops.
- Level of detail: The procedure model's level of detail as it is composed of the number of aggregation levels in the model as well as of the number of stages respectively the number of activities [23]. While on the one hand the model of Fähnrich [17] includes only four phases on one single aggregation level, the model of Meiren [33] on the other hand considers 74 phases on three aggregation levels.

These procedure models are supported by suitable life cycle spanning and life cycle phase related methods and tools, which are classified in the following sections.

Methods

In order to pass the steps of the service development process in a goal-oriented way and in order to achieve high-quality services, suitable methods are used in the individual steps. Because of its interdisciplinary background, various methods from different research disciplines are available. Most of them are methods from the fields of economy and engineering.

At first, methods for service development can be divided into the three following categories, according to the *degree of service-specification* [17] [31]:

- Existing methods i.e. from the research field engineering or economy are used in the service development process. Examples are brainstorming, expert interview as well as the different kinds of analysis methods such as the competition analysis, the cost-benefit analysis and the value-benefit analysis.
- Modified methods (mainly form the research field engineering), which are based on proved methods and were adapted to the service characteristics (i.e. intangible, uno-acto-principle, integration of an external factor). Examples are Service-FMEA (*Failure Mode and Effects Analysis*), an analytic method to identify prospective failures in a complex system and thereby remedy failure sources betimes or Service-QFD (*Quality Function Deployment*),. a systematic method for quality control in the planning process to interpret customer requirements into objectives in a multistage process [31].
- Service-specific methods, which were specifically developed for service development like Service Blueprinting [49], a service modeling method, which offers transparency with regard to the customer contact intensively in the service process [31], or ServQual [50], an approach for multiattributive measuring of the attitudes and contentment orientation in services by uncovering different kind of gaps in the service offered.

Hereby, a study [17] showed that the best known and most used methods in the practitioner's field are analytical methods from the economic research domain, such as the competition analysis, the cost-benefit analysis, the value-benefit analysis or the profitability analysis. Less used are engineering methods, such as process modeling, prototyping, FMEA and QFD. Service-related methods, such as gap-analysis [51] and Service-Blueprinting are little known and less utilised.

Furthermore the selection and application of methods depends on the *service type* (cf. Figure 2). Hereby the

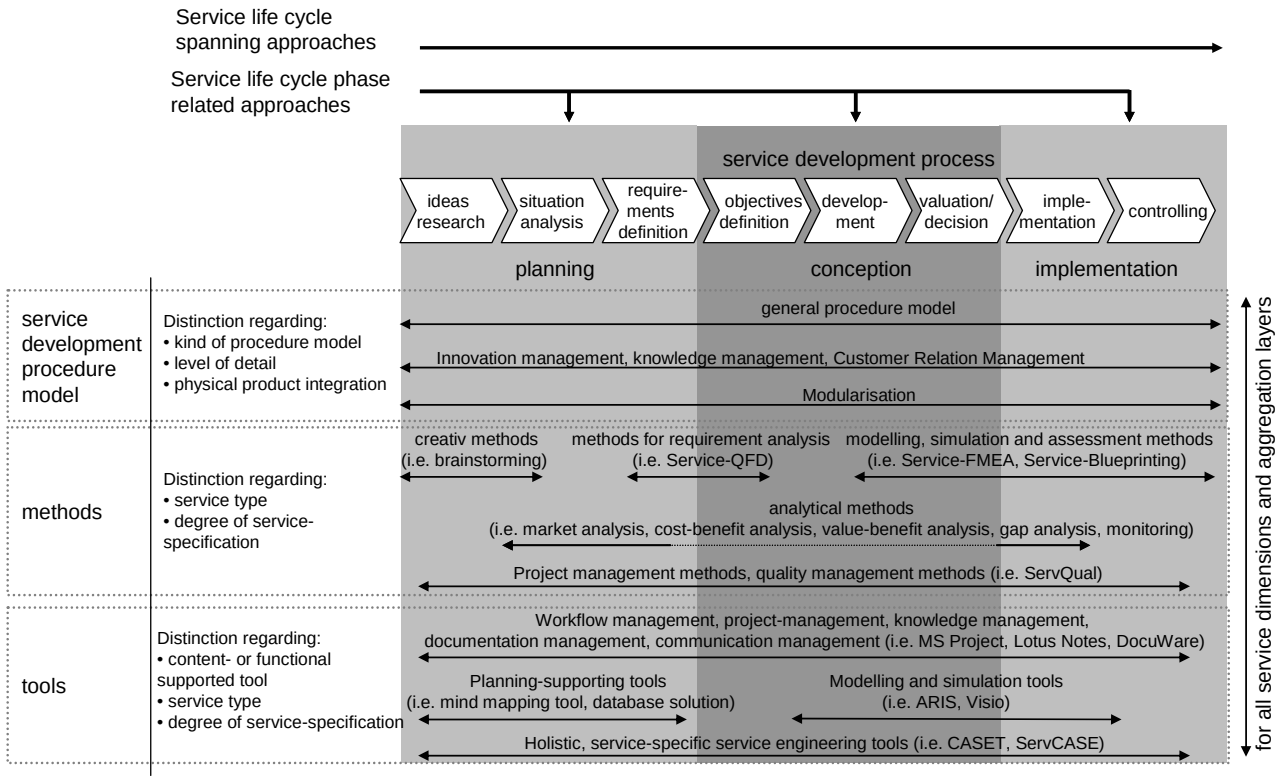

Figure 7: Classification by activity dimension

contact intensity has a significant impact [16]:

- Low contact intensity: Service methods, stemming from the conventional physical product development process, are used. A possible explanation for their application might be seen in the similar character of this type of services and of a physical product because of the latter's low contact intensity.
- High contact intensity: On the other hand, engineering methods are less relevant for this type of services. Due to the fact of high integration of the external factor (mainly the customer), economic and service-specific methods, but also social and behavioural aspects accentuating the customer interaction, are brought into focus.

Furthermore, the methods can be differentiated with regard to the life cycle phase and their objectives as well as to the different service dimensions. Hereby, the methods have to be select regarding the specific character of the service respectively the service classification (cf. Figure 2) [14]

- Service planning: For example creative methods like brainstorming or morphological box are used for the idea generation. Methods for requirements analysis, such as customer survey, studies and monitoring, and analytical methods, such as the competition analysis, the cost-benefit analysis, or the value benefit analysis are applied for the situational and requirements analysis.
- Service conception: Modeling methods (i.e. Service Blueprinting, Event-driven process chain), simulative approaches and assessment methods are used in the conception phase.
- Service implementation: In this stage methods for the testing (i.e. pilot projects) and controlling are necessary. Due to this, in this phase also analytical methods such as customer survey, gap-analysis, monitoring and again competition analysis, the cost-benefit analysis are used as well as simulation methods for the testing of services.
- Finally, the whole service development process is supported by life cycle spanning methods such as general project management methods (i.e. time and work scheduling or team coordination) and quality management methods.

Tools

Tools support the operationalisation of a method [33]. Therefore, tools can, as well as methods, be applied for single phases or for the whole service development process. Furthermore, the selection of tools also depends on the type of service, according to the supported method.

In the context of service development, tools are defined as information and communication tools which provide functions that support the steps of the service development process [31]. Thus, most of the tools stem from the field of information science or computer science. Examples are tools for business process management, analysis and simulation as well as modeling and project management [32]

When comparing the usage of modern development tools for products or software to the domain of services, discrepancies become visible. If any, software tools in the field of service engineering offer a more functional than content-oriented support. Therefore, Corsten [9] distinguished between

- Tools which give a content-oriented support for the core functions of the service development process. Examples for the planning phase are planning-supporting tools like MS Office tools and mind-mapping tools as well as database solutions (i.e. SAP R3, Data Warehouse). The conception phase is supported by modeling tools such as ARIS and Visio.
- Tools, which give a cross-sectional support, such as project management tools (i.e. MS Project), communication and groupware tools (i.e. Lotus Notes, MS Office), and knowledge- and documentation tools (i.e. DocuWare).

Existing service engineering tools have the problem that they can be considered as isolated applications rather than solutions, offering an integrated support. Until now, there is a lack (in practise) of service life cycle spanning tools, which support the service development process through the whole service life cycle in every step [23]. The essential task of a holistic service engineering tool can be identified in the area of knowledge management, the methodological integration of existing tools, as well as the monitoring of service development projects [52].

Therefore, current researches focus on the development of a holistic, service-specific, engineering tool for the support of the service development process. First theoretical approaches are shown in [45] [52]. Furthermore, concepts and approaches for engineering tools are developed in the research projects CASET (Computer Aided Engineering Tool) and ServCASE (Computer Aided Engineering für IT-basierte Dienstleistungen) [15].

4.2 Classification by Service Dimension

According to chapter 3.2, the four service dimensions (structure, process, outcome and market) have to be considered for a systematic design of services in every step of the development process [31]. An example for a service development process in the automotive industry is given in Figure 8.

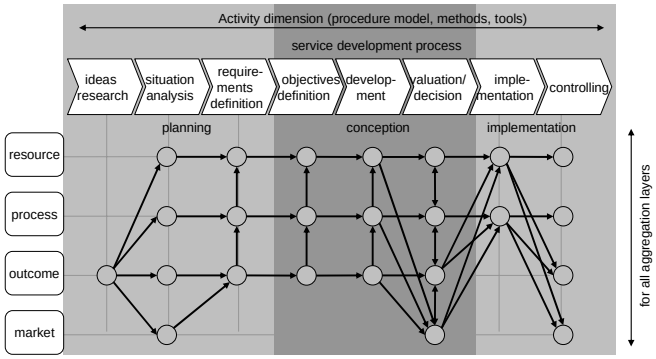

Figure 8 : Consideration of the different service dimensions in the service development process (q.v. [34])

Due to that, also appropriate methods and tools have not only assigned to the single steps but also to the associate service dimensions [16] [32].

The methods can be assigned to one or more of the four service dimensions. While on the one hand i.e. methods for the capacity planning, information system planning and employee qualification serve for the resource dimension, on the other hand i.e. methods for process modeling are used for the process dimension. Beyond, many methods consider several service dimensions or even all dimensions.

Most of the important service development procedure models include the differentiation of the described service dimensions and include all of them [32]. An integrated framework for the comprehensive illustration of a service concept based on resource model, process model and outcome model is shown in [23].

4.3 Classification by aggregation layer

This paper focuses on approaches belonging to the scientific layer. Therefore, a detailed classification, regarding the three layers was not made in this paper, but the following distinction:

The procedural models can be distinguished depending on whether they are more generic (q.v. [25] [29]) or specialised for certain kinds of services, such as financing (q.v. [53]) or health services (q.v. [54]) [23]. Due to that, these mentioned approaches can be linked to the scientific layer respectively to the project-related layer.

5 SUMMARY

A classification of approaches (procedure models, methods and tools) for the service development process was done on the basis of a proposed framework. This framework distinguishes between three aspects: activity dimension, service dimension and aggregation layer. The aim thereby was to render a concise overview and to provide transparency for concerned organisations. Further research opportunities can be found in the mapping of the individual approaches to the proposed framework. Based on these results gaps in the research fields can be identified and discussed.

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