Volker Nissen, Dominik Jung, Mathias Petsch, Claus-Peter Präg

Recommendations for a general IT Service Catalogue structure

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IT Service Catalogues (ITSCs) make an important contribution to the administration and distribution of IT products. It is often particularly difficult to draw up a structural concept of an IT Service Catalogue, as appropriate examples are scarce. In the future, advanced ITSCs will be especially important in attracting external customers. So, a practical structure for the ITSC is important. Different perspectives and approaches for structuring an ITSC can be found in the literature, but the total number of works on this topic is relatively small. This article combines an analysis of the literature with consultation of business experts to determine the requirements for ITSC structuring and to formulate a design proposal. This stands out due to several levels of description in combination with a view concept, through which opposing needs can be met. The proposal is illustrated by means of a case study.

1 Motivation and Background

Currently, there is a tendency to use IT services rather than individual effort to carry out IT support of business processes (Böhmann and Krcmar 2005, pp. 45-83). An IT service - following the widespread IT Service Management framework, ITIL - can be seen as "a service provided by an IT service provider. An IT service is made up of a combination of information technology, people and processes." (Government Commerce 2011, p. 13). This development, known as "productisation" is meanwhile seen as an indicator for the maturity of an IT service provider.

Active IT service management (ITSM) is the foundation for IT service providers to focus the IT on business needs and support business processes and business transformations through IT. Since the early emergence of ITSM in the 1970s a number of different models and methods for ITSM has been developed.[1] An important advancement in this context are ITSM frameworks. These contain directives, management processes for the development and provision of IT services, best practices and templates, often complemented by training materials. Frameworks for ITSM, which can be public or private in nature, aim at supporting organisations in the development, implementation and provision of IT services. Well known public frameworks include the IT Infrastructure Library (ITIL) and the Control Objectives for Information and Related Technology (COBIT), while examples for private ITSM frameworks are the IT Process Model (ITPM) by IBM, Microsofts Operations Framework (MOF) and HP ITSM.

IT Service Management, according to ITIL, is described as: "The implementation and management of quality IT services that meet the needs of the business" (Government Commerce 2011, p. 16). In the framework of IT Service Management it is necessary for IT service providers (internal company IT departments or external IT service providers) to present and describe their processes and services in a standardised and structured way.

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[1] For a nice historic overview of the ITSM development see (Salle 2004, p. 9-10).

ITIL proposes the IT Service Catalogue[2] as a possible instrument for administering and presenting IT services (Government Commerce 2011, pp. 98-103).

In ITIL, an ITSC is part of the service portfolio, which is oriented towards the life cycle being characteristic for ITIL V3 (Government Commerce 2011, pp. 24-25). In principle, an ITSC offers an overview of how to present the complete range of IT services of an IT organisation in a comprehensible way for the service recipient as well as the service provider (Rudolph et al. 2008, p. 145). This is possible when the ITSC presents the range of IT services by giving detailed information concerning their characteristics (Olbrich 2008, p. 85). In a figurative sense, an ITSC resembles a mail-order catalogue in which all articles available are portrayed, described and priced (Elsener 2005, p. 125). In summary, the ITSC is the basis for the service offer of the service provider (Grawe and Fähnrich 2003, p. 284).

The ITIL framework differentiates between two points of view concerning the ITSC (Government Commerce 2011, p. 101):

- **Business/customer view:** Customer's point of view; overview of the services available for the customer and their relation to business departments and processes.

- **Technical/supporting view:** Provider's point of view; overview of the services offered to the customer as well as the supporting internal services, configuration elements and IT service processes.

The reason for this is that the customer as service recipient places different demands on the structural view of the ITSC to the service provider. But some organisations only use

one of the two views of the ITSC or depict both views together. In addition, the customer's view can be further differentiated and designed depending on the customer's individual needs. Within one view the services can be further categorised. Figure 1 shows a depiction of the ITSC in the context of the process structure of an exemplary organisation. As Figure 1 shows, business process 1 needs IT services 2 and 3, with these falling back on hardware, software and network support. So the services form the basis for the customer's business processes, which are shown by means of the Business/Customer view of the ITSC and are further defined by Service Level Agreements (SLAs). The SLAs are agreements in which service details like availability, duration, quality factors, rights, duties, etc. are fixed (Elsener 2005, p. 125).

However, ITIL does not give any concrete information on guidelines and recommendations for the actual design and structure of an ITSC. In addition, there are only a few approaches in science and practice which deal with the practical structuring of ITSCs (Rudolph 2009, p. 3). Many companies therefore have to rely on their own initiative for the creation of their ITSC.

The structure, as well as the exact design, of IT Service Catalogues are a challenge. In particular, development of the structure of an IT Service Catalogue is often difficult, as appropriate examples are lacking or unavailable, and are often inadequately described (Brocke et al. 2009, p. 3793; Mayerl et al. 2005, p. 271; Rudolph 2009, p. 21; Rudolph et al. 2008, p. 145).

Within the context of this article we attempt to reduce this gap. Existing proposals found in the literature on how to (formally) structure IT Service Catalogues, as well as ideas from business practice, were collected and evaluated. The results of this investigation led to recommendations for a formal description of IT Service Catalogues and made it

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[2]It should be noted here that other frameworks such as COBIT do not recognise an individual Service Catalogue Management. It is only the COBIT domain "Deliver and Support" within the process "Define and Manage Service Level" that contains different aspects of ITSC management (Finkemeier 2011, p. 93).
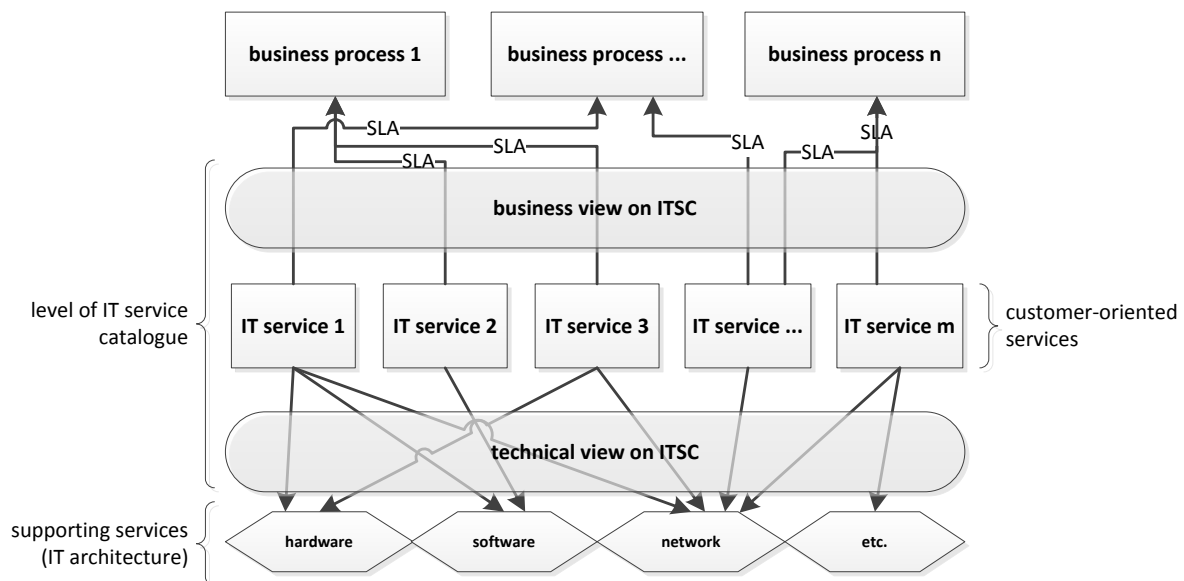
Figure 1: IT Service Catalogue (ITSC) in the context of the organisational structure.

possible to answer the main research question of this article: what should a generic formal IT Service Catalogue structure look like? The requirement for "generic" refers to sector-specific characteristics which - if they exist at all - are abstracted. This work does not focus on the question (which nevertheless is important and complex) of how IT services should be designed according to their content and granularity, which in practice is also called "cutting of IT services".

The following section first explains the basic research methodology before the results of the literature review are highlighted.

2   Methodological basis

The research gap highlighted made an explorative course of action necessary (Bortz and Döring 2006, pp. 351-392) in order to include existing proposals found in the literature, as well as the views of business experts concerning the structuring of ITSCs. Therefore, this work is subdivided into three main steps: a theoretical basis, an empirical section and the development of a model.

The search for relevant approaches in the literature was carried out according to the methodology of Webster and Watson (Webster and Watson 2002, pp. xiii-xxiii). For this purpose, the University Library Stuttgart, the City Library Stuttgart, the State Library Baden-Wurttemberg in Stuttgart, the library of the Fraunhofer IAO, the University Library Ilmenau as well as the meta search engine Google Scholar, were searched for sources containing the German terms "IT Service Katalog", "Service Katalog" or "Design", "Modellierung" and "IT Services", or the English counterparts, in the title, the abstract or the keywords. The search had no time limit. Every approach containing a model for the structuring of an ITSC was considered, but incomplete approaches which, for example, only dealt with target objectives for ITSCs or other individual aspects were left aside.

By means of a backward search, a further evaluation of the articles found was carried out (Webster and Watson 2002, p. xvi). Overall, eight sources were found, in which approaches for the structuring of IT Service

Catalogues are presented. The approaches identified formed the basis for guidelines which were then used in several interviews with experts. The results from the literature analysis and the interviews were collated and form the basis of recommendations for a formal approach of how to structure IT Service Catalogues. Figure 2 shows an overview of the research design.
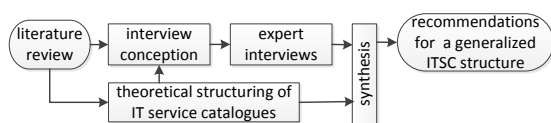

Figure 2: Overview of research design

3 Results of the literature analysis

3.1 Overview

The approaches found in literature can be systemised on one hand according to their approach to structuring and, on the other hand, according to their stakeholder groups. These two criteria were chosen for the following reasons: first, ITIL (to whose comprehension of an ITSC this work refers) differentiates between different stakeholder groups (customer, technology/support). Second, the approaches to structuring in the literature show important differences concerning the question of where to put the focus regarding the inner structure of the ITSC, which leads to the second differentiation criterion. Furthermore, approaches to structuring can be classified into formal approaches (abstract structuring patterns), content-related approaches (content-related structuring patterns) or hybrid approaches with different focal points concerning content-related and formal structure, respectively. The relevant stakeholder groups are either service recipient, service provider or service recipient and service provider (Table 1).

As can be seen in the overview, no approach could be found in the literature which offered a structuring proposal for the service provider only. The reason could be that no clear need for a suitable structuring proposal has been expressed by service providers until now, therefore the ITSC is primarily seen as an instrument to present the range of services to customers.

3.2 Formal approaches

The following formal approaches provide an abstract taxonomy for structuring an ITSC. Brocke et al. developed a structuring approach which is mainly directed towards service recipients. Victor and Günther also used a formal approach, which considers service providers as well as service recipients as a stakeholder group.

3.2.1 Approach by Brocke, Uebernickel and Brenner

Brocke, Uebernickel and Brenner present an exemplary structure pattern for an ITSC which, in the context of a customer-oriented IT service, aims to structure the service range by means of "basic products" (Brocke et al. 2009, p. 3794) as well as to offer a model of how to develop it (Uebernickel et al. 2006, pp. 203-208).

Within the pattern structure, the authors differentiate between IT Service Catalogues (technical performance description) and IT Product Catalogues (customer-oriented overview of service range), but the pattern structure of the authors refers to IT products only. The reason given for this is that the service recipient does not need to understand the technical details, so that making the ITSC clearer and more accessible is the focus (Brocke et al. 2009, p. 3795). The outcome of this model, therefore, is a completely customer-oriented pattern structure of an ITSC.

		Structuring of the range of services		
		Formal	Content-related	formal and content-related hybrid
Stake-holder groups	Service customer	Brocke, Uebernickel and Brenner	none	Olbrich
	Service provider	none	none	none
	Service customer Service provider	ITIL; Victor and Günther	Elsener; Weill, Subramani and Broadbent	Grawe and Fähnrich; Mayerl et al.; Rudolph

Table 1: ITSC approaches to structuring in the literature.

The content and structure of the catalogue is orientated towards the IT support needs of the service recipient and is based on the recipient's relevant characteristics and functions (Brocke et al. 2009, pp. 3794-3796). Basically, the approach differentiates between three categories according to which service range of the service provider is presented in the catalogue: base products, categories and optional products.

The base products of the catalogue form the highest organisational unit. The basic service of the base products can be further extended by means of optional products and additional descriptive detail can be added. The optional products are classified into categories and assigned to the base product in question and are differentiated by further detailed descriptions of product data, benefits, dependencies, etc. (Figure 3).

3.2.2 Approach by Victor and Günther

Victor and Günther present a process to develop an ITSC on the basis of ITIL and recommend structuring the ITSC by carrying out a complete IT service inventory (Victor and Günther 2005, pp. 97-102). Similar to the approach of Elsener (Elsener 2005, pp. 125-133) they present IT services in service bundles, which again are further differentiated by a hierarchical structure. Victor and Günther (Victor and Günther 2005, pp. 99-100)

cite the following content-related structuring possibilities without giving further reasons or explanations; they structure the services according to:

- the ITIL processes;
- the structural organisation of the service recipient;
- the system platform on which the services are carried out;
- the level of outsourcing agreed with the service recipient;
- the proximity to users and customers.

After suitable criteria for the ITSC have been chosen, the services offered by a service provider are classified into different service groups according to this criteria. These can again be classified into further levels (Figure 4). Here, the IT services are clearly presented for the service provider as well as the service recipient.

3.3 Content-related approaches

The following content-related approaches structure the IT services offered as bundles. Whereas Elsener does not explain how service bundles are arrived at, the service cluster by Weill results from extensive questioning of 89 IT companies. Both approaches concern service providers as well as service recipients as target groups.
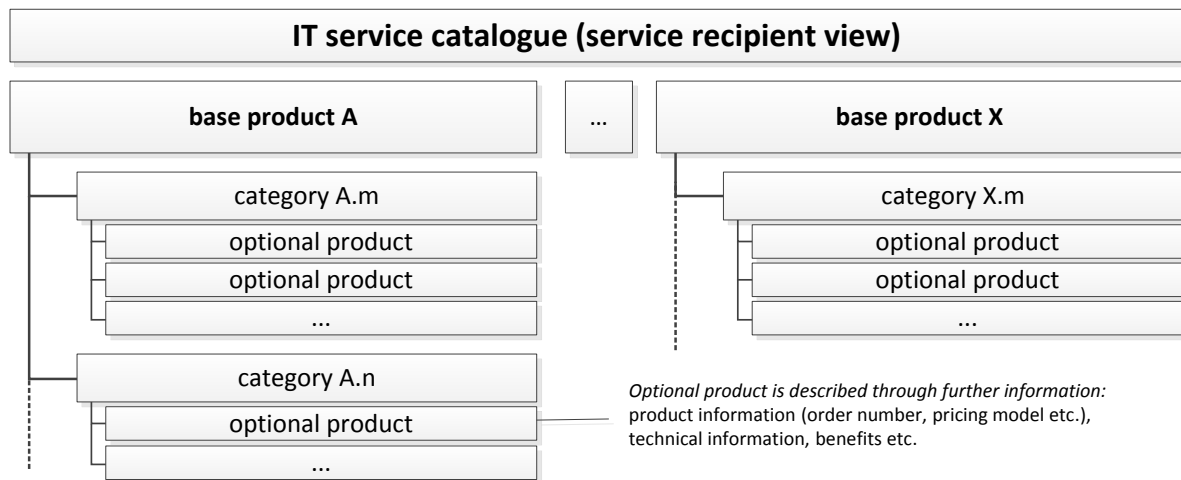
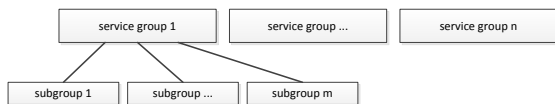*Figure 3: Sample structure of an ITSC according to Brocke et al.*

Figure 4: Formal structure of an ITSC according to Victor and Günther.

3.3.1 Approach by Elsener

Elsener recommends splitting the ITSC into three subgroups, each specialising in a particular task area (Elsener 2005, pp. 125-133):

- ITSC infrastructure services;
- ITSC application services;
- ITSC individual services.

Here, due to the different categorisations, one service may be found in more than one catalogue. The relations between the three ITSC subgroups are defined by Service Level Agreements (SLAs) (Figure 5).

The ITSC "infrastructure services" include infrastructure-related services offered by a service provider such as e-mail, calendar, maintenance, Internet access or helpdesk. These can be further classified into basic services,

hardware services and further selectable options. A service description gives more detailed information about the individual services. It contains information about service times, languages and quality, as well as one-off and monthly prices.
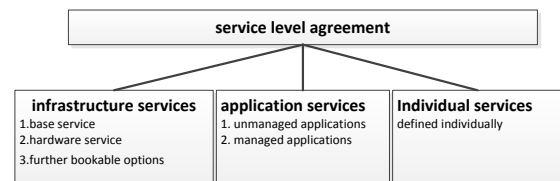

Figure 5: Relation between the three subgroups of an ITSC (following Elsener 2005,p. 126).

The ITSC "application services" comprise all business-relevant services with a distinction being made between the categories "managed" and "unmanaged" applications. The category "unmanaged applications" includes applications that do not have to be run or controlled and therefore can simply be installed and set up. "Managed applications"' om the other hand require some form of operation and supervision.

The ITSC "individual services" includes the individual offers made by the service provider

for the particular service recipient, which aim to cover the customer's specific requirements as good as possible. The content resembles that of infrastructure services, but is different, as these services cannot be used in the same way repeatedly and always have to be adapted individually (Elsener 2005, pp. 130-131).

3.3.2 Approach by Weill, Subramani and Broadbent

Within the context of an investigation among 89 IT companies, Weill et al. determined 70 central services on the basis of which ten service clusters could be formed and used as a content-related structuring basis for an ITSC (Weill et al. 2002, p. 59). The ten clusters can be divided into six technical and four management-oriented areas (Table 2). The meaning of the clusters is as follows:

- Channel management: Communication services such as web performance, e-mail or wireless terminals for contacting customers and business partners;

- Security and risk management: Services necessary for safeguarding and control and protection of brand, reputation, data, equipment and cash inflow;

- Communication: Network-related communication services;

- Data management: Data administration and evaluation;

- Application infrastructure: Standard applications and services throughout the company;

- IT facilities management: Services necessary for the coordination of the technical infrastructure such as servers or development environments; o IT management: Coordinates the IT infrastructure and regulates the relationship between the individual business units and the service recipients;

- IT architecture and standards: Contains the guidelines concerning the handling of current and future technology;

technical services	management services
channel management	IT management
security & risk management	IT architecture & standards
communication	IT education
data management	IT research & development
application infrastructure	
IT facilities management	

Table 2: Service clusters in the ITSC according to Weill et al. 2002, pp. 59-61.

- IT education: IT training services;

- IT Research and development: Services for the research and development of new technologies.

The clusters are integrated into an organisational system, which includes the relations of the individual clusters and produces an integrated IT infrastructure (Figure 6). Clusters that border on another are very dependent on each other, but clusters that have no mutual border do not or would rather not interact. These service clusters may work as
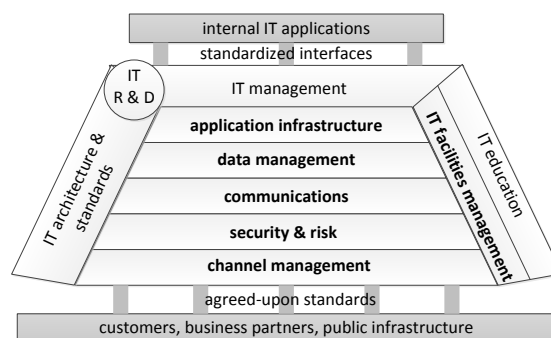

Figure 6: Integrated IT infrastructure according to Weill et al. (Weill et al. 2002, pp. 59-61).

a content-related structuring model for an ITSC (Rudolph 2009, p. 33; Weill et al. 2002, p. 57). The approach does not only cover

the technical view, but also the view of the service recipient and is therefore suitable for both stakeholder groups.

3.4 Hybrid approaches

The following approaches categorise the ITSC according to formal and content-related aspects. Olbrich's approach mainly focuses on service recipients, whereas the other proposals consider service recipients and providers as stakeholder groups.

3.4.1 Approach by Olbrich

Olbrich suggests structuring the ITSC into the following content-related criteria: organisation, contact persons, services - general section, services - detailed description, change process, service index, glossary and appendix, which can also be seen as a formal requirement (Olbrich 2008, pp. 85-90). Division of the ITSC into the view of the service provider and service recipient was not made, and the focus is on the services available to the customer (Figure 7).

In an upstream part to the service description can be found information on change history, commitment by management or a foreword underlining the purpose of the document, if required, a presentation of the organisation and contact details for the individual who is in a position to answer questions about the ITSC.

In the so-called "general section" all services offered are described in detail and are legally binding. A detailed description offers more precise information about all services. In this context, a further structure level such as, for example, LAN/WLAN services or application services, may make sense (Olbrich 2008, pp. 87-88).It is advisable to coordinate the detailed descriptions of the services with the practical purpose of the ITSC. [htb]

In a downstream part it is outlined how and to whom proposed changes can be directed

(change process). A general service index, explanation of important terminology and an appendix of additional remarks and documents, such as the General Terms and Conditions, can also be found here.

3.4.2 Approach by Grawe and Fähnrich

Grawe and Fähnrich see the ITSC as a tool for product data management of the service provider that presents services from the view of internal as well as external service providers. Their idea for how to structure IT services comes from the "platform strategy" of the car industry, where specified and standardised components are based on each other (Grawe and Fähnrich 2003, pp. 140-141, 2008, pp. 286-291). Generally, they differentiate between:

- Service components: granular service modules as the basis for integral service offers and which can be reused;
- Service products: services offer by the service provider consisting of the service components.

To be in a position to develop this architecture supported by components they suggest a model where first, all services of a service provider are taken apart into their components and are then divided up, classified and systemised into functional areas (service components). In addition, inheritance mechanisms for service components may be defined, which means that abstract service components are able to pass characteristics (e. g. things within the competence of a certain employee) to derived service components.

Since, according to the authors' experience, the categorisation of an ITSC in practice is often similar, they carried out a research project with different partners in practice that resulted in the structuring proposal presented in Figure 8 (Grawe and Fähnrich 2003, pp. 291-292). The basis for the structuring
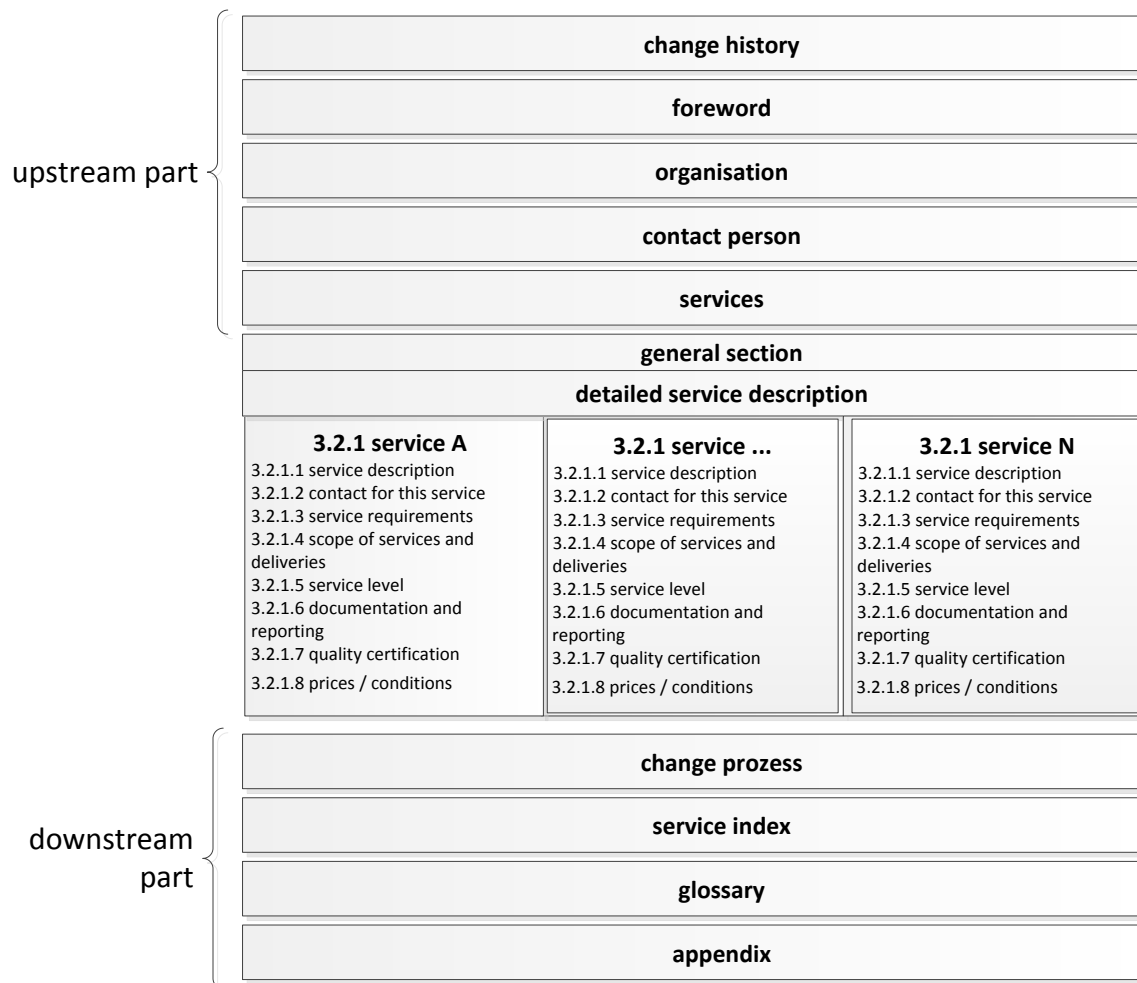
Figure 7: Structuring of an ITSC according to Olbrich (Olbrich 2008, pp. 85-90)

is the life cycle of a service, which consists of the phases Plan, Build and Operate. As the first two phases consist of rather more personnel-intensive services in the form of projects, Grawe and Fähnrich refer to them as "Professional Services" as opposed to "Operational Services", which are constructed on their basis.

Vertical structuring into the categories infrastructure, applications and business processes follows the value creation chain of IT. Planning, development, implementation and running of IT may be situated on the first level of infrastructure. The second level (applica-

tions) includes services based on the services of the first level, which are used for internal service provision whereas the final level (business processes) includes the services necessary to carry out business processes.

3.4.3 Approach by Mayerl et al.

Mayerl et al. divided IT services within an ITSC formally into core services and additional services (table 3). Core services are responsible for the functional treatment of the service recipient's information by using the recipient's IT system for business processes (Mayerl et al. 2003, pp. 335-338; Mayerl et al.
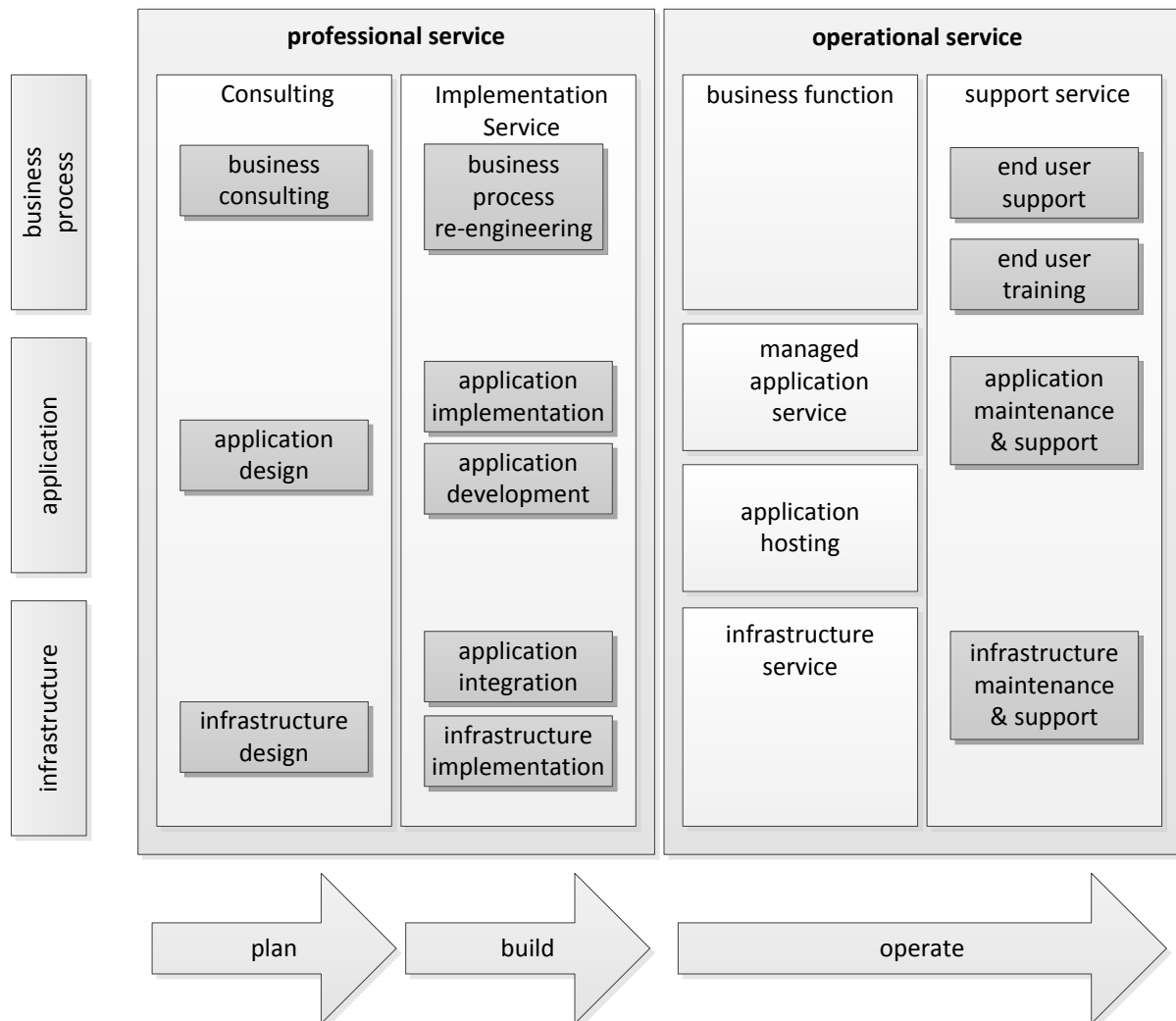
Figure 8: Service map according to Grawe and Fähnrich (Grawe and Fähnrich 2003, p. 292

Core services	Additional services
Communication	Information
System	Training
Application	Consultation
	Planning

Table 3: Structuring of IT services according to Mayerl et al.

2005, pp. 271-272). The additional services are necessary in order to use the core services and are enlisted by the service recipient depending on need. In the ITSC, IT services are described in detail by service characteristics without core and additional services being formally differentiated, but with different statements concerning quality being possible. According to Mayerl et al. the most important service characteristics are availability, time to recover, response time, capacity and number of (active) users (Mayerl et al. 2003, p. 336). In this context, an outline of IT services is retained for the stakeholder group's service provider and service recipient.

3.4.4   Approach by Rudolph

Rudolph makes a design proposal for an ITSC structure in which the service recipient and service provider are both seen as target groups. It differentiates between a formal and a content-related ITSC structure. Within the formal structure it is again differentiated into three structuring levels, which integrate the service recipient and the service provider view (Rudolph et al. 2008, pp. 145-146; Rudolph 2009, pp. 182-195).

On the first level, the range of services is presented in such a way that orientation in the ITSC is possible. The service range is again further structured by means of modules, which, on the second level, present the range of options possible to adapt the services to one's needs. In this way, the service offer is presented in a more differentiated way for service recipients in comparison to other approaches. On the third level, IT services are technically provided. Within the framework of the formal ITSC structure this method of structuring serves as a service description completed by means of catalogue information and organisational regulations (Figure 9).

Rudolph derives a content-related structure pattern for an ITSC from this formal structure. It is classified into cross-business IT services, where service categories such as e-mail, telephon and desktop management are found. These include services that are neutral for the process procedures and support several business processes. In addition, there are business process-related IT services containing categories such as procurement, manufacturing execution system and customer relationship management (Rudolph 2009, pp. 196-197). Table 4 shows an exemplary pattern structure.

3.5   Intermediate summary of the state of the art

It can be recorded that different perspectives and approaches of how to structure an ITSC can be found in the literature, but none has gained full acceptance until now. All in all, the number of proposals dealing with concrete structuring and description of an ITSC with a view to its practical importance is rather limited and rarely empirically confirmed.

To be in a position to present a proposal for the structuring of an ITSC, based on the current situation and offering an enhancement of it, it is first necessary to clarify the requirements which should be met. On the basis of the data found in the literature these can be summarised as follows[3]:

- The structure of an ITSC has to meet the requirements of both stakeholder groups (service provider and service recipient).
- IT services should be differentiated and transparent and should contain all information relevant to the stakeholder groups. The structure of the ITSC supports the distribution and the provision of IT services.
- Performance parameters of SLAs for IT services can be transferred to the catalogue structure.
- Different possibilities for combining IT services should be shown.
- The structure should be flexible enough to include new IT services if necessary.
- It should be possible to supervise and to control the quality of the IT services.

These requirements could be defined as the criteria that an ITSC structuring should fulfil. All the different requirements are very versatile and explain why only a few research attempts have been made up until now to derive an extensive structuring model.

To be able to better judge the contributions to the discussion from the literature and to extend them, it makes sense to practically examine existing ITSCs. The following survey was carried out for this reason.

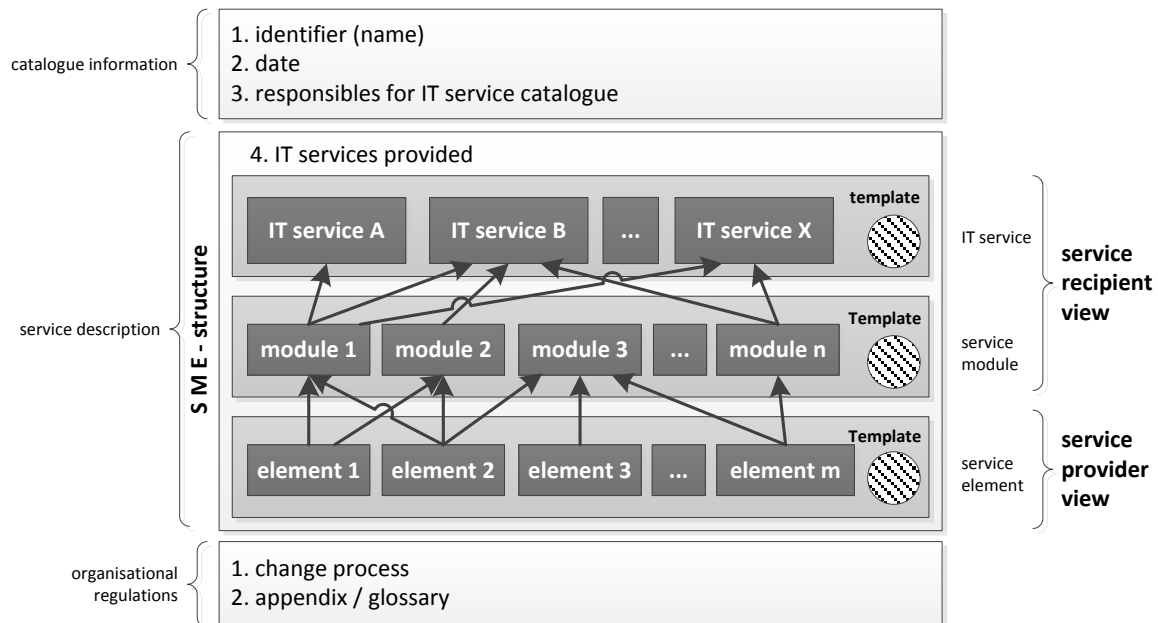[3]Rudolph provides a similar summary (Rudolph 2009, p. 32).

Figure 9: Formal structure of an ITSC according to Rudolph Rudolph 2009, p. 195.

Cross-business process IT services	Business process-related IT services
E-mail	Individual services
Desktop management	CAx applications
Telephony	CRM
File storage / network drive	Accounts department / controlling
Equipment of conference rooms	Purchasing / procurement
	Manufacturing execution system
	Project and portfolio management
	Human resources / personnel
	Integration of customers and suppliers

Table 4: Formal structure of an ITSC according to Rudolph

4 Results of interviews with experts

4.1 Method and data basis

The examination and surveying of ITSC structures in practice was carried out by interviews with experts (Mayer 2013). Participants were considered as experts if they had several years' work experience in ITSM, especially ITSCs. The participants were free to speak frankly about the topic (open questioning), but by means of guidelines (standardisation) it was ensured that important aspects of the research topic were covered (Mayring 2003, p. 66). However, no pool of requirements was presented to the experts. All requirements were mentioned by the experts themselves. The findings from the preceding literature analysis were the basis for the first version of the guidelines, which were pre-tested to optimise the comprehensibility of the questions. The interviews were recorded and then transcribed word-for-word before the evaluation was made.

Concerning the choice of experts it was em-

phasised that representatives of service providers as well as of service recipients should be invited and, in addition, participants were chosen from SMEs and major companies. Despite the moderate scale of this investigation with only four expert interviews, the relevant sampling criteria were adequately covered. Nevertheless, a more extensive survey, in which the ITSC structure developed in this article may also be discussed, should be attempted in the future.

The evaluation followed the summarising protocol method according to Mayring (Mayring 2003) with which the data material was first standardised and the level of abstraction then raised step by step. This is performed by the working steps Paraphrase, Generalisation and Reduction. The steps themselves can be repeated several times, respectively the reduction itself can take place in several steps, in which irrelevant sections are deleted or sections with similar information are summarised until the material has reached the required level of abstraction and, therefore, the level of desired suitability for the examination. The results of Reduction can be compiled as a summarising category system, within which the results can be compared and evaluated with respect to the question (Mayring 2003, p. 59).

For reasons of size, the complete category system cannot be shown here. It is divided into two classes of categories. The first contains all the requirements desired by the experts in an ITSC, as well as the objectives that an ITSC should fulfil. The second consists of design proposals for an ITSC as suggested by the experts.

4.2 Practice requirements of an ITSC

The requirements shown in Table 5 were mentioned by at least half of the experts asked. The most common requirements as named by the experts concern the clarity and comprehensibility of the ITSC as well as adapted views for the different parties using the catalogue. As such, the ITSC has to present IT services for service recipients and service providers in different ways. The service recipient needs an ITSC which is as clear as possible, the service provider an ITSC as differentiated as possible. However, both parties require the ITSC to present the services logically and differentiate them in a comprehensible way.

Many of the requirements mentioned in the literature also seemed important to the experts. Contrary to the literature, the experts did not think that the features of SLAs for IT services should be transferred into the catalogue structure. It was also not required for different combinations of IT services to be presented. Consultation with the experts did not give rise to any completely new requirements missing in the literature.

4.3 Ideas from practice for structuring an ITSC

The interviews with experts led to the design recommendations concerning the structuring of an ITSC presented in Table 6. All experts asked said that they design an ITSC to be customer-oriented, business process-oriented, costs-oriented or service-oriented. This recommendation is especially important for the design of service categories as many inexperienced service providers have to think the question of how to design an ITSC at all.

Most of the experts also said that the ITSC should be differentiated into main and subcategories. In major companies especially it makes sense not to offer every single product opaquely next to another, but rather to offer general products and to further subdivide them into basic and additional services. For the purpose of meeting the different requirements mentioned and at the same time to maintain transparency, the experts recommend a view concept (Table 6).

Requirements of an ITSC	Frequency
The ITSC has to present services for service recipients and service providers in different ways.	3 of 4
The ITSC has to present the services offered logically and has to differentiate them in a comprehensible way.	3 of 4
The service recipient needs an ITSC which is as clear as possible, the service provider an ITSC as differentiated as possible.	3 of 4
The ITSC has to support IT Service Management.	2 of 4
The ITSC has to selectively be developed as a customer interface.	2 of 4
The ITSC is in development and under control permanently.	2 of 4
The ITSC has to make reporting possible in order to safeguard quality.	2 of 4
The ITSC contains all operative services.	2 of 4

Table 5: Requirements of an ITSC cited in the interviews with experts

Structuring recommendations for an ITSC	Frequency
The ITSC may be designed product respectively customer-oriented, business process-oriented, costs-oriented or service-oriented.	4 of 4
It makes sense to classify the ITSC into main and multistage subcategories.	3 of 4
As a compromise between differentiation and clarity the ITSC should be presentable in different views.	3 of 4

Table 6: Ideas from the expert interviews for the structuring of an ITSC.

5 Synthesis

5.1 Development of a formal ITSC concept

On the basis of the literature analysis and the results from the expert interviews a formal ITSC structure can now be designed, which summarises the findings. One of the most important requirements for the structuring of an ITSC cited repeatedly in the literature and in practice is that it has to meet the requirements of the different stakeholder groups, respectively has to present services in a differentiated way. On the other hand, there is also the requirement to create a document of high clarity and transparency. Grawe and Fähnrich (Grawe and Fähnrich 2008, p. 294) therefore suggest the use of a standardised service taxonomy. However, the stakeholder groups ask for very different IT services and with the number of service providers involved the complexity grows steadily.

As a solution, other approaches suggest designing the detailed presentation of the service for service recipients only, as the ITSC primarily is designed for them (Kleiner 2013, p. 89). But here it is often forgotten that among the service providers - especially in very big IT companies -heterogeneous and differenti-

ated requirements concerning granularity and structuring may prevail and that sometimes a compromise between these opposite requirements may be impossible.

In the following it is therefore suggested that different user accounts with different views should be set up for an ITSC and that these views should be assigned within the framework of a role and authorisation concept. These determine which IT services respectively which additional services should appear in the catalogue. For example, an IT administrator has all levels and IT services in his view, a standard specialist only a small part of it and an external customer a totally different view. By means of these different roles the outline can be adapted individually to the needs of the different stakeholder groups, at the same time making an individual IT Service Catalogue for each user superfluous, as suggested in some parts of the literature (Brocke et al. 2009, pp. 3794-3796; Elsener 2005, pp. 125-133).

The structure suggested for the ITSC itself (Figure 10) consists of two levels: a selection level, in which the selectable contents are presented, and a realisation level, in which the conditions for the selectable services are summarised. Concerning the structure, the selection level - with reference to the approach of Olbrich (Olbrich 2008, pp. 85-90) - consists of a front and a back frame. The frames cover the most important information concerning the ITSC, with the front frame dealing mainly with organisational issues and the back frame with content-related issues, while both frames clasp the core of the catalogue with the service outline in the form of individual IT services.

The aim of the separation into IT services, which are differentiated into core services and additional services, is to improve the clarity of the product range and was suggested in a similar way by Brocke and Rudolph (Brocke et al. 2009, p. 3794; Rudolph 2009, pp. 182-185; Rudolph et al. 2008, pp. 145-146). The

core and additional services consist of individual services with service elements assigned to them. This improves clarity as not every IT service recipient needs to understand the detailed technical descriptions of the IT services. According to the requirements analysis, the services of the service provider can be presented distinctively and can be classified into the range of services. In addition it is possible to clearly present the variety of service combinations.

The exact description of the IT services is deliberately not formulated in detail, as the individual features will differ a lot between service providers. It is recommended that the features of the SLAs should be transferred directly into the catalogue structure. This does not necessarily raise the complexity of the ITSC, as can be seen in Figure 11. With the help of the view concept, the SLA structure for certain user groups could be reduced to a price list, offering the possibility to other users of remaining within an extensive SLA frame structure.

In the final step - the provision of services - the realisation of IT services makes use of the different elements of IT architecture. In conclusion, an IT service can be assigned to one or more service elements and a complex IT service may assume several individual IT services. The reason for this is that the IT services (e.g. 'internet browser') may need more than one partial service (e.g. internet access, browser, etc.) and for this they have to make use of different elements of the IT architecture (e. g. network, desktop computer, etc.).

To illustrate the suggested ITSC structure, it will be applied in the following case study, "Internet".

5.2 Example IT service "Internet"

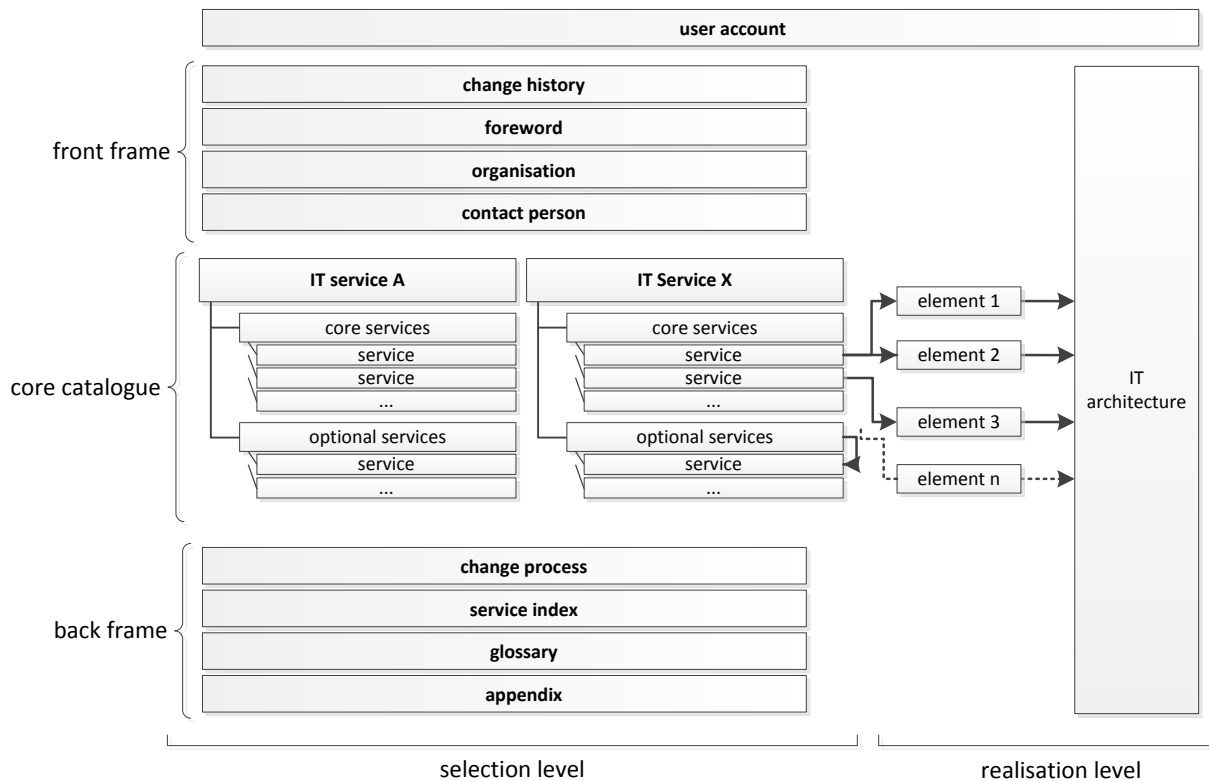Peter Müller, as a standard user (user account "standard user"), has only a minor need for

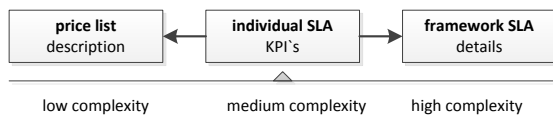*Figure 10: Suggested model for formal ITSC structuring.*

Figure 11: Presentation options for SLAs in the frame of an ITSC.

information within the ITSC, therefore in his view of the ITSC he has only a few available services such as "Internet", "e-mail" or "office". Within a company's nomenclature the IT service "Internet" (Figure 12) has a clearly assignable marking such as in this case, "No. 0001". It consists of a core service, which every user receives at the moment of booking. Here, this is the availability of Internet Explorer, a DSL connection and an ad blocker.

Further additional services may be added to the core service, such as an alternative browser or better connectivity. The individual services

are deliberately formulated simply and it is not intended to provide the service recipient with any unnecessary technical detail. Recipients have access to certain elements of the IT architecture of the service provider, such as memory or network. This extended view within the realisation level is meant for user groups such as IT administrators. The catalogue core is clasped by a framework, where the user finds all the information outside the catalogue, such as, for example, a contact person for the service "Internet".

6   Conclusions and Future Work

IT Service Catalogues are important and necessary tools within the context of IT Service Management. In these catalogues, IT services are described, classified and inventoried according to different criteria. The development of the structure of an IT Service Catalogue is
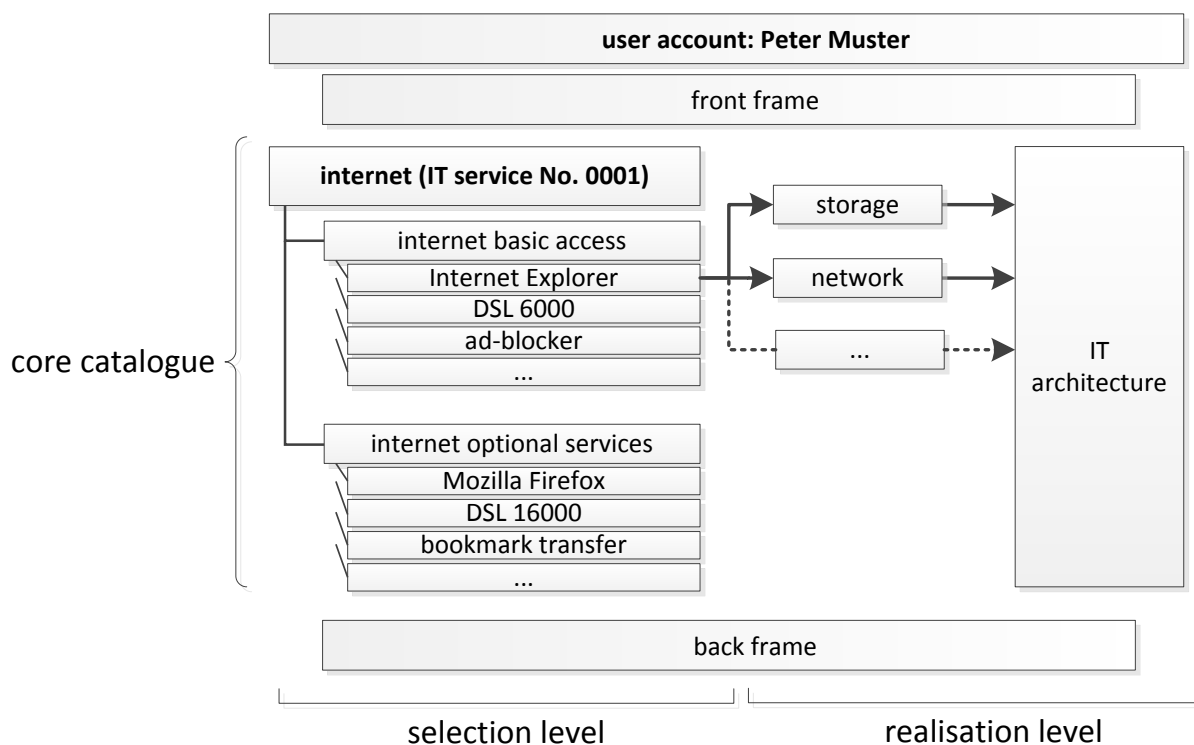
Figure 12: Case study "Internet" in the suggested ITSC structure

often difficult in practice, as appropriate examples are lacking or inadequately described. Even the ITIL framework does not provide information on guidelines and recommendations for the actual design and structure of an ITSC.

Within the context of this article, we develop recommendations what a generic IT Service Catalogue structure should look like, abstracting from sector-specific characteristics. Existing proposals found in the literature on how to structure IT Service Catalogues, as well as ideas from business practice, were collected and evaluated in the research process. The considerations focus on a formal structuring proposal, which through a complementary view concept leads to a balance between the requirements of the service provider (fine-granular ITSC structure) and the service recipient (clear service range). From the point of view of the service recipient (in-

ternally and externally) in particular, it seems to make sense to further differentiate the different views according to the requirements of the user and to organise them by means of user accounts.

The structuring proposal suggested here is to be extended in future in a number of ways. On one hand, the question of how IT services should be clustered and structured according to their content ("cutting") remains unanswered. Relevant published works can already be found, e. g. by Grawe and Fähnrich, Mayerl or Rudolph (Grawe and Fähnrich 2008, pp. 291-292; Rudolph 2009, pp. 196-197; Mayerl et al. 2003, pp. 335-338; Mayerl et al. 2005, pp. 271-272). We are currently preparing a proposal on this topic, which will become the basis for a generic IT Service Catalogue generator. This generator aims to put companies in a position to create a company-individual ITSC with relatively little effort.

Nevertheless, a generic basis is adapted to the requirements of individual companies. Research questions in this context are: What could a generic IT service catalogue generator look like? How much of an IT service catalogue can be viewed as generic structure? Somewhat related questions would be: What is the right level of granularity for a specific IT service? Which pricing models for IT services are useful?

ITSCs contribute much to the structuring and administration of IT services and IT products. There is therefore an urgent need to structure the ITSC practically. But ITSCs could be useful, too, for example, in the interaction of ITSM and financial management as a high quality ITSC could be used as a tool for cost planning. But the potential for these is only relevant when they have already been considered during the ITSC design process.

In the future, sophisticated ITSCs will be of more importance in contacting external customers, as they are an indispensable instrument to offer well-developed IT services. Major IT companies will deal with ever more diverse customer groups and will have to meet ever more differentiated needs, different company cultures, desires and objectives (Brocke 2011, pp. 1-2; Dimensiondata 2012). In future, the service provider has to be successful in bundling a large number of internal and external services and in presenting these optimally to the customer. The provider's task will become increasingly that of a "service integrator" (Brocke et al. 2009, pp. 3791-3792). Conventional ITSCs are generally not in a position to meet these individual requirements. High quality ITSC structuring approaches are therefore of increasing importance for the service provider of tomorrow.

References

Böhmann T., Krcmar H. (2005) Konzepte für das Service Engineering: Modularisierung, Prozessgestaltung und Produktivitätsmanagement Modularisierung: Grundlagen und Anwendung bei IT-Dienstleistungen. Physica-Verlag, Heidelberg, pp. 45–83

Bortz J., Döring N. (2006) Forschungsmethoden und Evaluation : für Human- und Sozialwissenschaftler. Eine optionale Notiz. Springer Medizin Verlag, Heidelberg

Brocke H. F. (2011) Kundenorientierte Gestaltung und Vereinbarung standardisierter IT-Dienstleistungen. Dissertation, Universität St. Gallen http://www1.unisg.ch / www / edis . nsf / SysLkpByIdentifier / 3872/$FILE/dis3872.pdf

Brocke H. F., Uebernickel F., Brenner W. (2009) Kundenorientierung in der IT-Service-Produktisierung - ein Datenmodell zur Leistungsbeschreibung Informatik 2009: Im Focus das Leben, Beiträge der 39. Jahrestagung der Gesellschaft für Informatik e.V. (GI), 28.9.-2.10.2009, Lübeck, Proceedings. In: Fischer S., Maehle E., Reischuk R. (eds.) GI Jahrestagung. LNI Vol. 154. GI, pp. 3790–3804

Dimensiondata (2012) The Rise of Multisourcing Service Integrators http : / / www . dimensiondata . com / Global / Downloadable % 20Documents / The % 20Rise % 20of % 20Multisourcing % 20Service % 20Integrators % 20Latest % 20Thinking.pdf Last Access: 13/12/2013

Elsener M. (2005) Kostenmanagement in der IT: Leistungssteigerung und Kostenoptimierung. mitp-Verl., Bonn

Finkemeier F. (2011) ITIL-COBIT-Mapping: Gemeinsamkeiten und Unterschiede von ITIL V3 und COBIT 4.1. Symposion, Düsseldorf

of Government Commerce O. (2011) ITIL Service Design. TSO The Stationery Office, Norwich

Grawe T., Fähnrich K.-P. (2003) Wissensgestützte Konfiguration komponentenbasierter IT-Dienstleistungen in Wertschöpfungsnetzen. In: Herre H., Fähnrich K.-P. (eds.) Content- und Wissensmanagement. Arbeiten aus dem Forschungsvorhaben PreBIS und Beiträge auf den Leipziger Informatik-Tagen 2003 Vol. I. LIV, pp. 174–182

Grawe T., Fähnrich K.-P. (2008) Service Engineering bei IT-Dienstleistern In: Entwicklung IT-basierter Dienstleistungen: Co-Design von Software und Services mit ServCASE Fähnrich K.-P., van Husen C. (eds.) Physica-Verlag, Heidelberg, pp. 281–301

Kleiner F. (2013) IT Service Management Aus der Praxis für die Praxis. Springer Vieweg, Wiesbaden

Mayer H. O. (2013) Interview und schriftliche Befragung Grundlagen und Methoden empirischer Sozialforschung. Oldenbourg Verlag, München

Mayerl C., Abeck S., Becker M., Köppel A., Mehl O., Pauze B. (2003) Dienstbeschreibung und -modellierung für ein SLA-fähiges Service-Managment. In: Irmscher K., Fähnrich K.-P. (eds.) Kommunikation in verteilten Systemen. Springer, Berlin u.a., pp. 333–344

Mayerl C., Link S., Racke M., Popescu S., Vogel T., Mehl O., Abeck S. (2005) Methode für das Design von SLA-fähigen IT-Services.. In: Müller P., Gotzhein R., Schmitt J. B. (eds.). Springer, Berlin u.a., pp. 271–282

Mayring P. (2003) Qualitative Inhaltsanalyse: Grundlagen und Techniken. Beltz, Weinheim und Basel

Olbrich A. (2008) ITIL kompakt und verständlich. Effizientes IT-Service-Management - Den Standard für IT-Prozesse kennenlernen, verstehen und erfolgreich in der Praxis umsetzen. Vieweg + Teubner, Wiesbaden

Rudolph S. (2009) Servicebasierte Planung und Steuerung der IT-Infrastruktur im Mittelstand. Ein Modellansatz zur Struktur der IT-Leistungserbringung. Gabler, Wiesbaden

Rudolph S., Böhmann T., Krcmar H. (2008) Struktur von IT-Servicekatalogen: Ein praxisorientierter Gestaltungsvorschlag für die Dokumentation des IT-Leistungsangebots. In: Bichler M., Hess T., Krcmar H., Lechner U., Matthes F., Picot A., Speitkamp B., Wolf P. (eds.) Multikonferenz Wirtschaftsinformatik. GITO, Berlin, pp. 145–147

Salle M. (2004) IT Service Management and IT Governance: Review, Comparative Analysis and their Impact on Utility Computing HP Technical Report HPL-2004-98. Hewlett Packard, Palo Alto

Uebernickel F., Bravo-Sànchez C, Zarnekow R, Brenner W. (2006) Eine Vorgehensmethodik für das IT-Produktengineering. In: Lehner F., Nösekabel H., Kleinschmidt P. (eds.) Multikonferenz Wirtschaftsinformatik 2006 2 Vols. GITO, Berlin, pp. 199–210

Victor F., Günther H. (2005) Optimiertes IT-Management mit ITIL So steigern Sie die Leistung Ihrer IT-Organisation - Einführung, Vorgehen, Beispiele. Vieweg, Wiesbaden

Webster J., Watson R. T. (2002) Analyzing the Past to Prepare for the Future: Writing a Literature Review. In: MIS Quarterly 26(2), pp. xiii–xxiii

Weill P, Subramani M, Broadbent M (2002) Building IT Infrastructure for Strategic Agility. In: MIT Sloan Management Review 44(1), pp. 57–65

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