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Abstract. Large-scale enterprises struggle with an effective alignment of business processes and IT services with business strategy. While process models play an important role for bridging between strategy and IT, there is a need to systematically organize the huge number of models. Process architecture defines an overarching structure for the organization of processes. However, there is a notable research gap on how process architectures are designed in practice. In this paper we address this problem by integrating insights and approaches from practice. We use Grounded Theory to analyze eleven in-depth interviews we conducted. Further, we present findings from studying documents provided by the interviewees. Our contribution is a conceptual framework about process architecture design, along with a classification of process architecture archetypes found in practice. Our results have strong implications since they demonstrate that process architecture design is more complex and context-dependent than assumed.

Keywords: Process Architectures, Process Modeling**,** Process Management

1 Introduction

Large-scale enterprises face an increasing challenge with aligning their business processes and IT services with business strategy. Traditionally, business process models play an important role for achieving the required level of transparency such that strategic decisions can be effectively operationalized. Corresponding modeling initiatives often yield several hundred, sometimes thousands of process models [1] . In this context, enterprises arrange their business process models in terms of a process architecture. In essence, a process architecture defines how the entire set of process models of a company can be systematically organized. In this way, process architecture can be regarded as a research area where business process modeling meets enterprise architecture.

At this stage, there are several studies available on success factors of business process modeling revealing different dimensions of organizational benefits [2-3]. In contrast, process architecture has hardly been subject to information systems research so

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far, partially because it has been regarded as an art rather than an engineering discipline. Practitioners including Rob Davis [4] have summarized their design recommendations for process architecture. Also academic contributions tend more to the conceptual side [5-6]. However, we are not aware of any research exploring how companies design their process architectures and what factors influence the design.

In this paper we address this gap of research on process architecture. More specifically, our research objective is to explicate and integrate insights and approaches that have been implemented in industrial practice. To this end, we utilize a Grounded Theory approach, essentially because it has proven to be useful in settings where little explicit knowledge on phenomena and their relationships are documented. Our contribution is a conceptual framework about process architecture design, along with a classification of process architecture archetypes found in practice.

The remainder of this paper is structured as follows. We continue by revisiting essential concepts from business process modeling and process architecture. Then, we describe Grounded Theory as our research method. After that, we present the research findings in two parts. First, we discuss a conceptual framework for process architecture design which emerged from our analysis. Second, we define four process architecture archetypes resulting from our interviews and analysis of supplementary material provided by the interviewees. The subsequent section discusses the findings and emphasizes implications for research and practice. Finally, we conclude the paper with a summary and an outlook on future research.

2 Background

2.1 Business Process Management/Modeling

A business process is commonly defined as a sequence of activities, which is required for transforming input to some business-related output [7-8]. Accordingly, business process management can be understood as the set of all management activities that relate to business processes [9]. These activities are often structured in terms of a so-called business process management lifecycle, comprising the analysis, design, implementation, monitoring, and evaluation of business processes [9]. Business process models play an important role for many of these management activities. A model of a business process helps to systematically define the activities of a process along with relevant actors, inputs and outputs. Models are most often used in the analysis, design, and evaluation phase.

Many companies use process models not only for analyzing singular business processes, but also for systematically documenting their entire business operations. Such process modeling initiatives typically yield hundreds, sometimes thousands of process models. The usage and the benefits emerging from utilizing process modeling have been studied recently, but mainly with a focus on singular processes. Bandara and Gable find a set of success factors for process modeling [2]. These factors can be subdivided into project-related and modeling-specific factors. These factors have an organizational impact on different levels. Kock and Verville investigate the benefits of mapping processes using flowchart-like notations [3]. They find that using a visual notation for processes increases process redesign success. While these insights are important for understanding benefits of modeling a singular process, they do not directly permit conclusions on the rationale for leading an entire process modeling initiative, and how the entire set of models shall be organized.

2.2 Process Architectures

The set of process models resulting from a modeling initiative typically requires a systematic classification. The design of such a classification is closely related to the concept of a process architecture. In an organizational context, an architecture is often understood as an abstraction of the enterprise, namely its elements of various types and their interrelations [4]. Consequently, a process architecture can be defined as a means for understanding the organization from a business process perspective [10]. It has been observed that organizations often focus on singular processes while failing to look at an integrated set of processes [11]. Therefore, one of the main concepts which characterize a process architecture is identifying the linkage between processes.

It is understood that enterprises can differ in various regards. From the perspective of research on process architecture, it is still not clear whether a range of architecture approaches is needed, or if one specific approach might be viewed as superior in all situations [12]. It is common practice in process modeling projects to employ a top-down approach of process development. This implies that processes are often decomposed into higher levels of granularity which provides greater detail on the constituent parts of the integrated process [13]. Therefore, a key element of a process architecture is the notion of model composition and decomposition in order to manage complexity at each architectural level [6]. Additionally, in some cases it may be required to structure the business processes relative to the process responsibilities and functional organizational structure for a given enterprise [14].

In literature, there are several suggestions on how companies should design their process architecture. Different reference models such as SCOR, eTom [15] or the Handels-H model [16] focus on specific domains and define architecture levels. Other works like ARIS [4], [17], the BPTrends BPM Pyramid [18] or the DoD Architecture Framework [19] take a more general, domain-neutral perspective. Both have in common that they provide a means of positioning the business processes on a predefined structure based on hierarchical decomposition. However, some authors have reported problems when applying these approaches in practice. For instance, Spanyi [20] emphasizes that reference models lack cross functionality and that this would be also the case for industry-specific models such as eTom. Interestingly, most authors suggest that a generic approach can be applied in any business setting. As a consequence, the decompositional process architecture proposed by zur Muehlen and Wisnosky solely focuses on the scope and the number of architecture levels [6]. However, the portability of this approach is explicitly emphasized. Hence, adapting the definition and the number of levels is considered to be an appropriate customization for any organization. A similar perspective with regard to the levels is taken by Frolov and Megel [5]. On the other hand, the potential impact of the specifics of a certain organization type on the design of process architectures is indicated by the Riva Framework [21]. It suggests that, for instance, any university can adopt a similar process architecture because of belonging to the same type of business.

Considering the process architecture literature, we observe differing perspectives. Nevertheless, all approaches focused on the notion of decomposition and a universal process architecture design. In order to shed some light on the actual application of these concepts, we investigate the practice of process architecture design in an industrial setting.

3 Research Method

In order to gain a deep understanding of the applied process architecture approaches, we apply the systematic methodology *Grounded Theory*. The Grounded Theory method was developed in 1967 by Glaser and Strauss and supports inductive discovery of a theory that is grounded in data [22-23]. It is particularly suited and recommended for emerging topics where little research has been done before. Due to the lack of research on process architecture design we hence consider Grounded Theory to effectively support us in accomplishing our research goals.

In conformance with the method, we start with the data collection and then continue with coding of the material. Subsequently, we derive a model explaining how companies organize their business process models in a process architecture. Finally, we create a classification of the observed process architecture approaches.

3.1 Data Collection

We employed two different sources for our study. First, we conducted eleven semi-structured in-depth interviews with organizations from various industries documenting their business operations using process models. Our interviewees were BPM experts involved in all steps of the BPM implementation in the respective organization. In preparation for the interviews we designed an interview guideline containing specific questions about approaches used to organize the process models, and also general questions with regard to the business process modeling initiative. In total we classified the questions into the three categories *process documentation (e.g. How do you document your processes?)*, *process identification (e.g. What are the process models used for?)* and *process architecture (e.g. Do you prioritize your documented processes?)*. Table 1 gives an overview of the interview participants.

Table 1. Interview Participants

ID	Industry	Company Size	Years of BPM	Number of Processes	Documented Processes
1	Service/Retail	93	Not known	~1000	~20
2	Service/Retail	740	Not known	400	Not known
3	Service/Medical	~21000	Not known	Not known	Not known
4	Insurance	881	Not known	Not known	242
5	Service/Energy	313	1	Not known	Not known
6	Consulting	~4300	1	>150	~80
7	Service/Retail	~100	3	~100	~50
8	Service/Retail	~1000	3	Not known	120
9	Insurance	~5900	8	Not known	~350
10	Consulting	75	Not known	Not known	Not known
11	Consulting	~160	Not known	Not known	Not known

In order to maximize the opportunity to explore relevant insights, we included organizations varying in size, industry and their temporal experience with regard to process modeling. In addition to the interviews, we tried to collect complementary material from the interviewed organizations. In total seven companies provided us with internal documents visualizing and describing their process modeling practices.

3.2 Data Analysis

As in many qualitative studies, the data collection and the data analysis were conducted simultaneously. This enabled us to accordingly adapt questions, adjust the focus in the subsequent interviews and hence to effectively study the phenomena of process architecture. Following the Grounded Theory approach, the data analysis was done in three coding phases: open, axial and selective coding.

Open Coding. The *Open coding* phase is an analysis procedure with the goal of identifying concepts and categories in the data [23]. Thereby a concept is understood as the basic unit of analysis in the Grounded Theory method. Concepts are labels associated with happenings, events, and other instances of phenomena. A category is an abstract element grouping several concepts together. In line with the methodology, we started our analysis by going through the interview transcripts and tagging paragraphs or sentences with a discrete name, which properly reflected their content. We used the tool *ATLAS.ti* to keep track of all concepts, categories and conceptual relationships. In order to achieve representativeness and consistency, we iteratively went through the material and validated the concepts. For discovering categories from the identified concepts, we grouped concepts that are found to pertain to the same phenomenon.

Axial Coding. *Axial coding* is used to identify connections between the categories accordingly organizing them in a new way [23]. In order to accomplish this, we employed a coding paradigm with four columns: causal conditions, phenomenon, actions / strategies and consequences. We assigned each category to each of these columns by accordingly determining the role of the category with regard to the phenomenon. If, for instance, a category represents an event which leads to the occurrence of a certain process architecture type, we assigned this category to *causal conditions*. As a final result, the initial categories (e.g. *Goal for Process Architecture Design)* turn into subcategories of the main categories (columns) offered by the paradigm.

Selective Coding. The *Selective coding* phase is the process of selecting and focusing on a core category. Thereby, a core category is understood as the central phenomenon around all the other categories are organized [23]. The main goal of this phase is given by the refinement of the previously identified categories to a set of more abstract and focused categories. Accordingly, we iteratively went through the material and created more abstract categories related to the phenomenon. As a result, we derived a theoretical framework explaining the phenomenon of process architecture design.

Derivation of Process Architecture Approaches. In addition to the qualitative analysis of the interviews we also studied the complementary material. In particular, we complemented the information from the interviews with the graphical descriptions from the documentations. Focusing on the process architecture design, we were able to derive a set of different process architecture approaches. By abstracting from the specifics of the approaches and by focusing on differences and commonalities, we developed a classification of process architecture approaches.

4 Research Findings

As a result from the application of the Grounded Theory method, we derived a conceptual framework on process architecture design. Figure 2 illustrates the derived framework including its main categories, namely, the causal conditions, the phenomenon, the actions and strategies carried out for designing process architecture, and the according outcome of it.

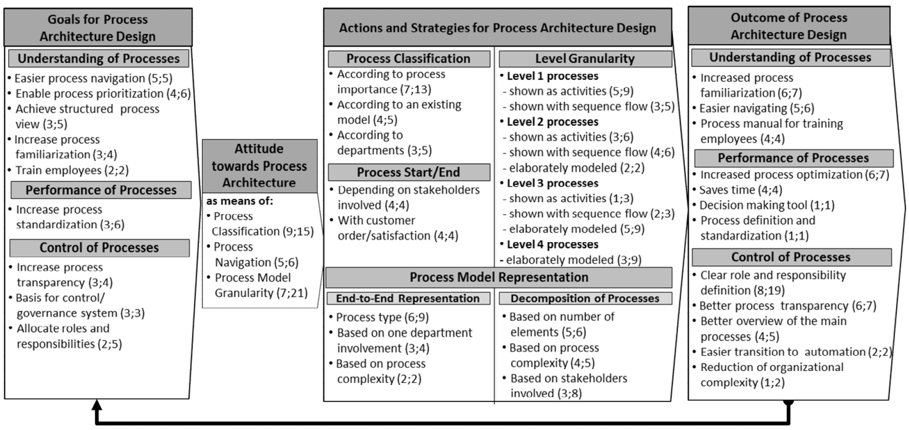

Fig. 1. Process Architecture Design Conceptual Framework

The values in the brackets next to each concept denote the number of companies which mentioned this concept and the total number of occurrences of this concept among all interviews. In the following subsections we explain the contents of the framework, accordingly using insights from our interview material.

4.1 Goals for Process Architecture Design

The goals for process architecture design can be classified into three categories: goals concerned with understanding, performance and controlling of processes. Most of our interviewees explicitly emphasized the role of understanding processes. They indicated the enablement of process prioritization as one of the major reasons for having a process architecture: *"We don't just sit there and say 'ok', we have like a 1000 processes…"*(I9). In addition to aiming towards better understanding of processes, three of the companies pointed out the increased performance a process architecture would yield, especially in a case of a merger: *"…because of every merge the company changes and we had to consolidate our processes, so to avoid all the time moving around the processes we moved to 'general terms'"*(I9). This is also closely connected with the goal of controlling processes by increasing the overall transparency of the company's operations: *"It* [the process architecture] *will make it easier for us to achieve a complete transparency of our company"*(I5). As a result of the clear overview of their business processes, some organizations were also able to significantly increase the process familiarization on the different levels.

4.2 Attitudes towards Process Architecture

The phenomenon of our study is the attitude of companies towards the design of a process architecture. By this means, the attitude is based on the perceptions about future benefits that can be derived from introducing a process architecture. We observed that organizations particularly considered three specific use cases for process architecture design: process classification, process navigation and process model granularity.

Process Classification. Classification of processes is often considered as one of the most critical aspects. We observed that our interviewees emphasize the prioritization of their processes. *"…because these processes are used on a daily basis and contribute to the company's strategy"*(I8). As a result, this focus often determines the design of the process architecture: *"All of the processes are aligned around our main process, 'the execution of projects' process"*(I10). Consequently, this could lead to managing organizational complexity: *"… to avoid the system getting more complex and burdensome over time"*(I3).

Process Navigation. Many of our interview partners emphasized the importance of transparency: *"The process architecture will make it easier for us to achieve complete transparency of our company"*(I5). In addition, the structured overview enabled easier navigation, which in turn could result in an increased organizational efficiency: *"The process architecture gives us an overview of the most important processes without going into depth, unless necessary"*(I8).

Process Model Granularity. More than half of the organizations wish to model their key processes at a higher level of granularity: *"Usually granularity is interrelated with the importance of the specific processes. The more important the process is for the company, the more detailed it is modeled"*(I11). A process architecture enables them to do so, while still having an overall view of the company's operations.

4.3 Actions and Strategies for Process Architecture Design

Process Classification. The foremost issue when designing a process architecture is deciding on the manner of classifying the process models. Whereas some of our interviewees classify their processes based on an existing model: *"We use the Handels-H reference model to classify our processes"K(I8).* Most of them do the same in accordance with the process relevance: *"Those processes that are executing the services our company offers and the orders from the customers are classified higher"*(I10). The manner organizations classify their processes may also reflect their initial goal for designing a process architecture. Thus, companies that claimed to classify their process models based on their departments, focused on roles and responsibilities allocation: *"… then we have process map for each department"*(I7).

Process Start/End. For defining the relationship between the processes, an organization needs to decide where one process ends and another begins. Our data shows that most companies used the stakeholders involved in the process execution as a separation criterion. If more than one stakeholder was involved in the execution of a single process, the process was decomposed accordingly: *"The process ends when one department did its job, and another department needs to continue"*(I9). While others based this on a customer order: *"The process starts when an order has been placed by a customer, and it ends when the customer has been served"*(I11).

Process Model Representation. Processes can be either represented in an end-to-end manner or as decomposed processes. The former is a whole process with a higher level of granularity. The later represents parts of a whole process at a lower level of granularity. Our findings show that some companies capture all details of certain process types, as for instance support processes: *"The support processes show the beginning and ending of the procedures, and what tasks are done in between"*(I3). Others do not practice process decomposition when only one stakeholder is involved: *"…so we don't decompose the process if it is the same department that deals with it, but model it until the end no matter how big and complex the process gets"*(I9). Nevertheless, the complexity of a process is an important criterion for the representation decision: *"If the process gets too big, more than 15 elements, we try to decompose it"*(I8).

Level Granularity. The granularity of the process models belonging to the different levels of a process architecture varied among our interviewees. We found that the first level was mainly used to show processes represented as non-connected activities: *"The 1st level holds the major business processes shown as activities"*(I3). In the residual levels, we encountered several strategies. Whereas many companies used the second level for representing their process models forming a value chain, others already introduced detailed modeling. In the third level, most organizations captured elaborately modeled processes: *"Detailed modeling is done in the 3rd level"*(I4). In the case of this level still being used for holding non-detailed models, the total number of levels was accordingly higher.

4.4 Outcome of Process Architecture Design

As a result of the process architecture design, organizations experienced various outcomes. Congruent with the goals for designing a process architecture, these outcomes can be differentiated into three categories: outcomes concerned with the understanding, performance and control of processes.

Understanding Processes. We found that organizations used their process architecture as a manual for training employees: *"Also when there is a new employee, it is easier to show this person how the company works"*(I5). By showing the structured process models to new employees, they could gain knowledge not only of particular processes, but also of the overall organization.

Performance of Processes. More organizations than anticipated experienced process optimization as a result of the process architecture enabling process prioritization: *"…if a weakness in a process is discovered, the 4th level process 'execute improvement' is called to resolve this issue"*(I10). One organization even used their process architecture as a decision making tool: *"Setting up such an architecture helps in deciding if a certain request from a customer can be executed"*(I10).

Control of Processes. The findings show that an established process architecture significantly eased the allocation of roles and responsibilities to processes. It was stated that it is much easier to identify roles when the process models have been aligned on the different levels of an architecture. In many cases, the lower levels were used to allocate the roles or to define the collaboration between them: *"Levels 3 and 4 are used to divide the responsibilities among the employees"*(I3). In addition, a well-defined process architecture increases the process transparency among the different decision makers. Consequently, it contributed to a faster identification of the main processes: *"We have a better overview of the processes mostly used by our customers"*(I1). Moreover, the overall understanding of the business was improved: *"It makes it easier to understand the culture of the process, depending on the level it belongs to"*(I3).

5 Process Architecture Classification

As a result of the analysis of the complementary material, we derived a general classification of the observed process architectures. Although the majority of the companies designed their process architecture by hierarchically decomposing their processes, we also identified deviating approaches. At the center of our classification is the observation that process architectures vary in terms of the restrictions defined upon relationships between processes. Relationships between processes can be either horizontal (one process succeeded by another) or vertical (an activity of one process is decomposed into a whole process at more fine granular level). Restrictions relate to the cardinalities of these relationships. In the following we describe two major classes of process architectures: decompositional and service-oriented process architectures.

5.1 Decompositional Process Architectures

A Decompositional Process Architecture is a structure where activities of processes are decomposed into more fine-granular sub-processes. We observed three different ways how companies decomposed their processes. Hence, we identify three types of decompositional process architectures: the *Hierarchical Process Architecture,* the *Pipeline Process Architecture* and the *Divisional Process Architecture*. All have in common that a fine-granular process relates to exactly one activity in a more coarse-granular model.

Hierarchical Process Architecture. The Hierarchical Process Architecture is characterized by a hierarchy where each level captures processes having a particular granularity. Hence, a more detailed process model will be placed on one of the lower levels while more abstract models are assigned to higher levels.

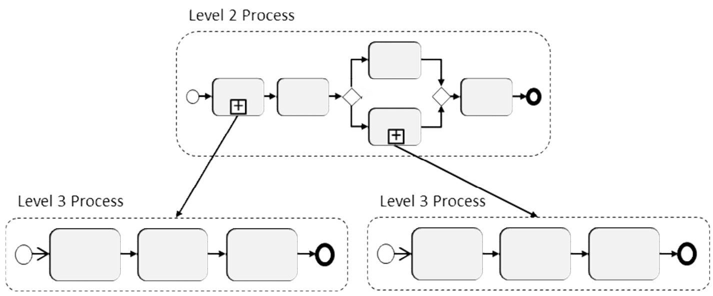

Fig. 2. Process Decomposition in Hierarchical Process Architecture

We observed that all interviewed organizations considered at least three levels, while further levels depended on the organization's complexity and their individual perception of it. Although many companies introduced terms such as main, core, or support processes, their definition of these terms varies significantly. Accordingly, we use numbers to refer to the decomposition levels. The upper level of the Hierarchical Process Architecture contains those processes which are considered to be most general and most relevant. Organizations select these processes depending on their contribution to the company's goals. Various relationships between these upper-level processes can be defined without any formal restrictions to the structure. If required, the first level processes are decomposed into second level processes. The decision whether a process is decomposed is based on its complexity, the stakeholders involved or the process type. As a result, a level 1 process might be decomposed in one or more level 2 processes. This principle is recursively applied down to the last level of the architecture. A restriction is here that a fine-granular process always has one single more coarse-granular process it relates to.

Figure 2 visualizes the decomposition relationship by showing a level 2 process and its decomposition into level 3 processes. In the depicted case, two activities of the level 2 process were considered to be excessively complex. Consequently, these activities were further specified on the underlying architecture level.

Pipeline Process Architecture. The Pipeline Process Architecture is a specialization of the Hierarchical Process Architecture. Similarly to the Hierarchical Architecture, it is characterized by a hierarchy of levels, which is capturing processes of different granularity. However, the relationship among the processes on each level and the relationship between two levels of the architecture is more restrictive. Essentially, a Pipeline Process Architecture only contains a single process. On the first level an all-encompassing process is subdivided into a number of processes. These processes relate to each other in terms of order such that they define a sequential chain of partial processes. In this way, the completion of the first level 1 process provides the trigger for continuing with the second process, and so forth. In this way, the level 1 processes form a sequential pipeline of processing. The relationships among the processes on the levels below follow the same logic. As a result, the formal structure of the relationships between the processes can be regarded as an ordered decomposition tree, which is processed in a depth-first way. On the right hand side of Figure 3 the Pipeline Process Architecture is visualized.

The Pipeline Process Architecture offers less flexibility due to the tight connection between the processes on the same level. We identified this process architecture type only in organizations facing a strict order of production. The most prominent example is given by an organization having a manufacturing process. In this case, each level 1 process was representing a manufacturing step of a product. The first level 1 process is initiated with the requirement of a new product, and the last level 1 process is finished when the product has been produced. Nevertheless, this architecture was also used by a company which solely focused on the customer order process.

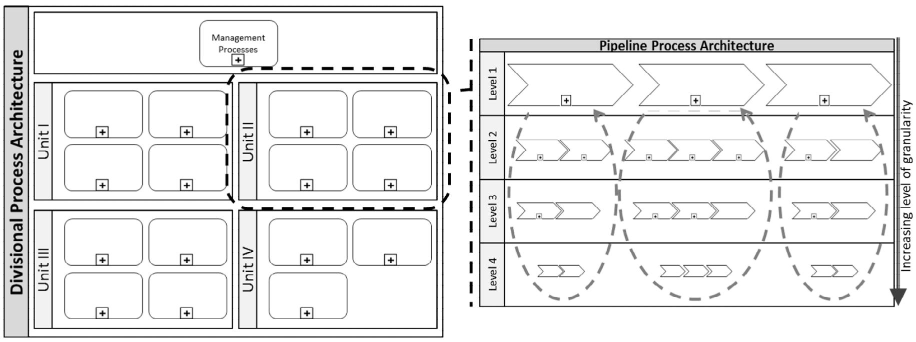

Fig. 3. Divisional Process Architecture – Pipeline Process Architecture

Divisional Process Architecture. The Divisional Process Architecture is an extension of the previously introduced approaches. Instead of just having one set of level 1 processes and their decomposition, the Divisional Process Architecture defines several process categories or so-called units. Thereby, each of these divisions contains a set of level 1 processes and their decomposition. The left hand side of Figure 3 visualizes this concept. The figure shows multiple units and their associated level 1 processes. Organizations applying this architecture first divide their processes into units. Thereby a unit can be derived via any suitable categorization criterion. We observed that organizations commonly use business divisions as units as they often desire to have a clear cut between them. This indicates their necessity for a precise allocation of roles and responsibilities of their business processes. Accordingly, each unit contains the process models the associated department is concerned with. Each set of level 1 processes is further decomposed as shown in the previous architectures. Thus, in each unit the processes are either decomposed with the Hierarchical or the Pipeline Process Architecture. In addition to the units, the Divisional Process Architecture contains a set of management processes. These processes are visible to all units as they relate to the organization's strategy.

5.2 Service-Oriented Process Architecture

The second class of process architectures we identified is the Service-Oriented Process Architecture. It considerably differs from the perspective taken in the pure decompositional approaches. In a Service-Oriented Process Architecture, the processes are categorized in different groups. The main feature is the reuse of processes across the process categories. Hence, a single, more fine-granular process can relate to several more coarse-granular processes. This means that Service-Oriented Process Architecture does not include any strict level dependency as the strict top-down decomposition is replaced by a service-oriented perspective of reuse. Although each process in a process category may entail a hierarchical decomposition, the Service-Oriented Architecture provides more flexibility.

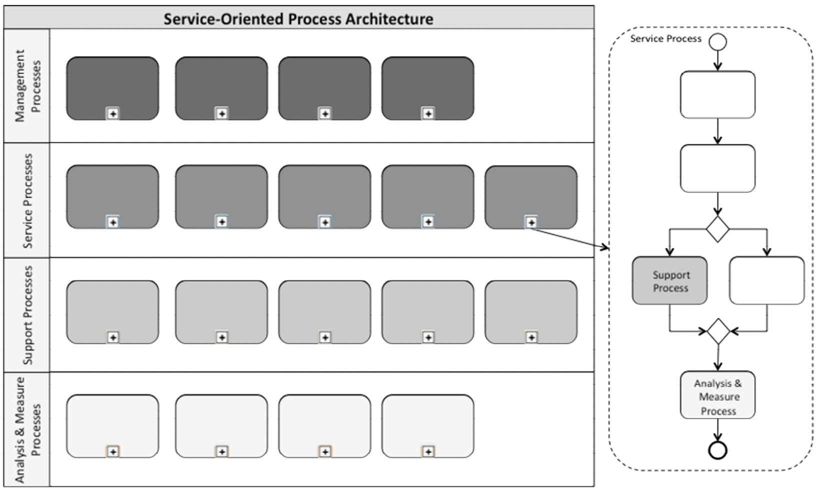

Fig. 4. Service-Oriented Process Architecture

Figure 4 illustrates an exemplary Service-Oriented Architecture including a small example process. It consists of four process categories: Management Processes, Service Processes, Support Processes and Analysis & Measure Processes. Among others, the management category could include processes such as risk and human resource management. Processes from the service category could be concerned with the manufacturing of products. The support processes encapsulate functionality for the execution of the service processes. They consist of processes like invoicing, purchasing or IT support. The processes from the analysis & measure category are impartial processes that are called by all processes from the service or support category. They are used for handling errors that occur during process execution or to analyze costs. The model next to the architecture shows a process from the service category. For accomplishing its process goal it requires processes belonging to the analysis & measure and the support category. In the depicted example this is reflected by using the according tone of grey from the architecture visualization. As an example from the interviewed organizations, consider a sales process which is using a support process for issuing an invoice. Since tasks like issuing an invoice are required as service by various other processes, this example shows the benefits of a Service-Oriented Architecture. Instead of establishing a pure hierarchical decomposition, the redundant definition of processes is reduced.

6 Implications

There are two main implications for research and practice from our study, namely the impact of context on process architecture design and the hierarchical decomposition.

The interviews show that there are several commonalities in the way how process architectures are designed. However, we were able to identify different archetypes of process architectures. Apparently, there is a connection between the type of a company and the way a process architecture has to be designed. This observation has two implications. First, in terms of as-is modeling, there are companies that, according to their industry or business model, are closely associated with a particular architecture type. As an example, we have seen that a manufacturing company with a single product or service can be nicely described using a pipeline architecture, while a diversified enterprise would be better captured in terms of a divisional or service-oriented architecture. Second, in terms of to-be modeling, this observation suggests that certain types of process architectures are simply not appropriate for certain types of businesses. It would simply not be possible to design a pipeline process architecture for a diversified enterprise. This contextual perspective on process architecture design has mainly been ignored in practitioner-oriented contributions, which tend to work with a single approach, which is supposed to work in all circumstances [5-6].

We also observe commonalities in the organization of the different layers. Clearly, hierarchical decomposition plays a central role for organizing processes in an understandable way and for refining coarse-granular towards a fine-granular representation. This is in line with conceptual research on structuring process models in an easy to comprehend manner [24-25]. However, hierarchical decomposition may be broken from two directions: from a top-down perspective and from a bottom-up perspective. First, the top-down break of decomposition can be observed if enterprises have different product categories or different divisions. Those companies are likely to use a divisional process architecture. The corresponding top-level divisions can be defined based on alternative criteria. For such an architecture, the relationship between a top level element and elements on the next level is not of a type decomposition, but rather that of belonging to a category. Second, the decomposition relationship is broken in the Service-Oriented Process Architecture. While in the first three architecture archetypes, at each level one element is further refined by a set of elements, we observe that here a fine-granular service process can be reused in several more coarse-grained processes on a more abstract level. This means that a service-oriented architecture is only in the upper levels of a decomposition tree, until a certain level of granularity is achieved where the reusable services are defined. The explicit representation of this complexity provides for a better traceability and alignment between processes and services.

7 Conclusion

In this paper we investigated the design of process architectures in the context of a qualitative study with Grounded Theory. Based on eleven in-depth interviews with different companies and seven sets of complementary material we derived a conceptual framework about process architecture design and a classification of process architecture approaches. Although our study showed that many companies follow decompositional approaches, we were also able to demonstrate that there are more specific and also deviating concepts. Particularly, we showed that the type and the structure of the company is an important factor for process architecture design. Thus, for instance the Pipeline Architecture should not be adopted by a diversified organization but rather by a business with a focused production line. Beyond that, we found that companies see the benefits of process architecture not only in terms of organizing and understanding processes, but also in terms of better performance analysis.

In future research we plan to extend our study with regard to several dimensions. At this stage, the insights presented in this paper are based on a limited set of interviews. Therefore, we aim to conduct additional interviews with partners from industries not yet covered. In this way, we want to find additional process architecture concepts and further relations between company characteristics and process architecture design. In addition, we plan to have a more detailed look into the modeling practice on the different levels of a process architecture. This may, for instance, include an investigation on the degree of granularity among processes on the different levels. As a result, a detailed understanding of process architecture can be acquired and a precise definition of their design could be provided.

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