# Organizational Roles in Capability Management – Experiences from an Industrial Project

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**Abstract.** Methods are an important means to provide guidance and support for modelling, systems development, organizational change or problem solving. To engineer new methods is a complex task that usually includes various develop-evaluate cycles. The paper aims to contribute to method engineering by investigating the difference of methods in larger organization and in small and medium-sized enterprises (SME) with a focus on the roles required by a method and how their operationalization differs between larger enterprises and SME. The paper uses a capability management method and an SME case study introducing this method as the basis for presenting experiences.

**Keywords:** Capability modelling, role distribution, SME, method engineering.

## 1 Introduction

In many areas of computer sciences and information system engineering, methods are considered as an important means to provide guidance and support for modelling, systems development, organizational change or problem solving (cf. section 2.1). To engineer new methods is a complex task that usually includes various develop-evaluate cycles for different aspects of a method, such as procedures, tools and concepts. In the context of method engineering, the possibility to adapt a method to the situation of method use is considered as very important.

This paper aims to contribute to method engineering by investigating the difference of methods in larger organization and in small and medium-sized enterprises (SME). Our particular focus is on the roles required by a method and how their operationalization differs between larger enterprises and SME. Based on observations from engineering and use of the Capability-driven Development method (CDD) (see section 2.3) and an SME case (see section 4), the paper offers experiences considered relevant for method engineering. Capability management was selected as an application case because the introduction of capability management into an enterprise and establishment of an organization structure is, like for many other management approaches, affecting different parts of the enterprise and requires careful preparation.

The remainder of this paper is structured as follows: Section 2 summarizes the theoretical background for our work. Section 3 briefly presents the research method. Section 4 details the industrial case study and section 5 contains the case analysis and

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observations. Section 6 discusses the case study results. Section 7 summarizes the work and reflects on future activities.

# 2 Background

## 2.1 Method Engineering

The field of method engineering focuses on knowledge how to systematically construct, deploy and maintain "methods". In general, methods are supposed to provide guidance for problem solving or for performing complex tasks in a way which is adaptive to the actual situation the method is applied in 13. Methods build on perspectives, values, principles, and concepts, which are expressed in the method's elements and express the underlying theories and rationality. Different conceptualizations of the term "method" and related terms have been proposed. If there is a close link between procedure, notation, and concepts, the term method component is used 16. The concept of method component is similar to the concept method chunk 12 and the notion of method fragment 14. Methods often consist of an integrated set components, which also could be referred to as methodology 15.

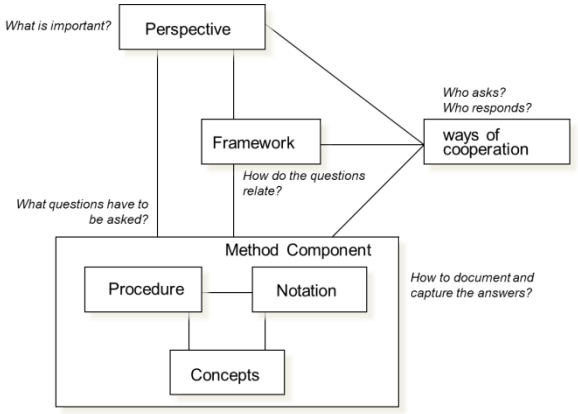


**Figure 1.** Method components according to Goldkuhl et al. 16

In this paper, we will use the method conceptualization proposed by Goldkuhl et al. 16. According to this conceptualization, comprehensive method descriptions ought to include perspective, framework, cooperation principles and method components. Figure 1 illustrates how these elements are related:

- Method components consist of concepts, procedure and notation. Concepts specify what aspects of reality are relevant and should be captured in a model. The procedure describes how to identify the concepts, incl. prerequisites and resources. The notation specifies how the result of the procedure has to be documented.
- Framework describes the relationships between the individual method components, i.e. sequence and conditions for the use of method components.

- Forms of cooperation: many modeling tasks require a range of specialist skills or cooperation between different roles. These necessary skills and roles must be described, along with the division of responsibilities and the form of cooperation.
- Perspective defines the aims and purpose of the method.

Goldkuhl et al. emphasize that methods should not be considered as rigid frame to be performed in always the same way, but methods and their components have to be adaptable for the situation at hand. Thus, the method conceptualization is not only suitable for traditional software modelling methods but has also been successfully applied for defining methods in other domains (see, e.g. [20]). The method conceptualization clearly shows the importance of defined roles in methods and supports our view that roles have to be subject of research in method implementation.

### 2.2 Capability Management

Different areas of business information systems use the term "capability". Although in literature there seems to be an agreement about the characteristics of the capability, but there is no generally accepted definition of the term. The definitions mainly put the focus on "combination of resources" 3, "capacity to execute an activity" 2, "perform better than competitors" 5 and "possessed ability 7".

Capabilities must be enablers of competitive advantage and should help companies to continuously deliver a specific business value in dynamically changing circumstances 6. They can be perceived from different organizational levels and thus are utilized for different purposes. According to 17 performance of an enterprise is the best, when the enterprise maps its capabilities to IT applications. Capabilities as such are directly related to business processes that are affected from the changes in context, such as, regulations, customer preferences and system performance. Companies need to anticipate these changes and respond to them 4. Adaptations to changes in context can be realized promptly if the required variations of processes have been anticipated, defined in advance and can be instantiated.

In this paper, capability is defined as the ability and capacity that enable an enterprise to achieve a business goal in a certain context 8. Ability refers to the level of available competence of a subject or enterprise to accomplish a goal; capacity means availability of resources, e.g. money, time, personnel, tools. This definition utilizes the notion of context, thus stresses the need to take variations of the standard processes into consideration. To summarize, capabilities are considered as specific business services delivered to the enterprises in an application context to reach a business goal. In order to facilitate capability management, we propose business service design explicitly considering delivery context.

### 2.3 Capability Design and Delivery for Capability Management

Capability management has been a topic of the EU-project "Capability-as-a-Service in Digital Enterprises (CaaS)" 10. CaaS investigated capability management in the context of enterprises and their business services. CaaS developed the Capability-

driven Development (CDD) approach. Business services are IT-based services which digital enterprises provide for their customers. Business services usually serve specified business goals, they are specified in a model-based way and include service level definitions. In order to ease adaptation of business services to changes in customer processes or other legal environments, CDD approach explicitly defines (a) the potential delivery context of a business service (i.e. all contexts in which the business service potentially has to be delivered), (b) the potential variants of the business service for the delivery context and (c) what aspect of the delivery context would require what kind of variation or adaptation of the business service.

**Table 1:** CDD-related stakeholders and roles

| *Role Group* | *Role* | *Tasks* |
|---|---|---|
| Core CDD | Capability analyst | Analyses capabilities and operating context, to predict evolution of the context and to use these predictions by providing new services or improving existing services |
| | Method engineer | Person who has knowledge about CDD methodology and can tailor it for certain needs |
| | CDD provider | Provides and maintains the CDD methodology |
| Business stakeholders involved in CDD | Business service manager | Responsible for management strategies for changes in business and to identify opportunities for capitalizing on these changes |
| | Business analyst | A person who analyses the business models and proposes and guides changes in the business models |
| | Solution engineer | Configures and carries out business solution implementation, such as by using IT system support. |
| | Business service operator | Aims to follow best practices for achieving the delivery of services to the customers |
| | Solution architect | Works closely with solution engineer to ensure proper implementation. Solution architect is the link between the needs of the business and the solution engineer |
| Other stakeholders | Capability provider | Responsible of providing capabilities to the customer |
| | Customer (client) | The end user who benefits from the capabilities |
| | Capability worker | Works directly with the actions needed to deliver the capability |
| | Capability feedback provider | Provides capability feedback received from customers, capability workers and from other roles within the business |

The potential delivery context basically consists of a set of parameters or variables, the context elements, which characterize differences in delivery. The combination of all context elements and their possible ranges define the context set, i.e. the problem

space to cover. The potential variants of the business service, which form the solution space, are represented by process variants. Since in many delivery contexts it will be impractical to capture all possible variants, we propose to define patterns for the most frequent variants caused by context elements and to combine and instantiate patterns to create actual solutions. If no suitable pattern is available, the conventional solution engineering process has to be used. The connection between context elements, patterns and business services has to be captured as transformation or mapping rules. These rules are defined during design time and interpreted during runtime.

The above simplified summary of our approach has been further elaborated by defining meta-model and method components, by developing a tool environment and by performing feasibility studies. Details are available in 9. The CDD methodology consists of several components with the following focus:

- Capability Design Process. Contains an overview on how to design, evaluate and develop capabilities by using process models, goal models and other model types.
- Enterprise Modelling. The component contains method components that guide the creation of enterprise models that are used as input for capability design.
- Context modelling. Describes the method components needed for analysing the capability context, and the variations needed to deal with variations.
- Reuse of Capability Design. This component contains guidelines for the elicitation and documentation of patterns for capability design.
- Run-time Delivery Adjustment. Describes the components needed to adjust a capability at runtime.

During methodology development, required roles and stakeholders were identified, which are summarized in Table 1 11. These roles and stakeholders are part of the descriptions of the method components, i.e. each CDD method component clearly defines the tasks and activities for each of the roles involved, but not all roles are involved in all method components. The roles shown in Table 1 reflect what ideally should be implemented in an organization using CDD with all method components. Experience from CaaS shows that this can be seen as set-up for larger organisations.

## 3 Research Method

Our research work started from a research question, which is based on the motivation presented in Section 1: *When introducing a new method into an organization, how does the operationalization of roles differ between large organizations and SME?*

The research method used for working on this research question is a descriptive case study. We decided to perform a case study in order to gather information pertinent for the subject area. Qualitative case study is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources. This ensures that the subject under consideration is not explored from only one perspective, but rather from a variety of perspectives, which allows for multiple facets of the phenomenon to be revealed and understood. Yin differentiates various kinds of case studies 1: explanatory, exploratory and descriptive. The case study

presented in this paper has to be considered as descriptive, as it is used to describe the phenomenon of method implementation and the real-life context in which it occurs.

The case study focuses on capability management and the introduction of the CDD methodology for this purpose. CDD was developed using a method engineering approach which aims at the most preferable and, thus, somehow "ideal" role distribution as part of the cooperation principles (see section 2.3). Possible constraints regarding resource availability or organizational limitations, which are more likely to appear in SME than in larger organizations, were not taken into consideration. Furthermore, CDD was validated in several industrial cases which for larger organizations confirmed feasibility and utility of the role distribution. In this context, we decided to focus the case study on a medium-sized enterprise with the intention to compare this case study enterprise with the "ideal" CDD set-up which proved suitable for large organizations. The guiding questions for this investigation were:

- Q1: Which organizational roles were involved when introducing CDD into the organization?
- Q2: What were the activities or tasks performed by these roles?
- Q3: How do the roles identified in the use case relate to the roles included in the CDD approach?
- Q4: What conclusions can be derived from the comparison for CDD?

It should be noted that - from a perspective of the method engineering process of CDD - the case study can be seen as an additional validation step of CDD in the context of an SME. The result of this validation step might lead to a new cycle in CDD method design if the case study results should indicate the need and possibility of method (component) variants specifically adapted for SME needs.

## 4 Industrial Case

SIV group from Rostock (Germany) operates in the utilities sector and offers different kinds of services to their clients. SIV.AG (SIV) is the independent software vendor (ISV) of the ERP platform kVASy® while SIV Utility Services GmbH (US) acts as a business service provider (BSP) for kVASy®. The target group for these services is medium-sized utility providers and other market roles of the energy sector in Germany, Bulgaria, Macedonia and several other European countries (cf. Figure 2).

The BSP offers business process outsourcing (BPO) services, i.e. performing a complete business process for clients outside of the organization. The BSP as such provides services (e.g. billing, message clearing, and accounting) for the clients running kVASy®. Integrated with the business process environment, the "native" kVASy® services providing business logic for the energy sector are implemented using a database-centric approach. In particular, the BSP deals with intercompany business processes between partners in the utility market that requires exchange of messages about energy consumption or customer master data. The exchanged messages have to be both syntactically and semantically correct before being processed further. In case of a faulty message, the BSP might act as a clearing centre

involving the manual interaction of a human agent (knowledge worker). The decision whether to route a case to BSP depends on the case context, such as the policies between the BSP and the client, the available resources on both sides and the number of transactions to be cleared. Different roles participate to the BSP related activities, which are documented in the next section.

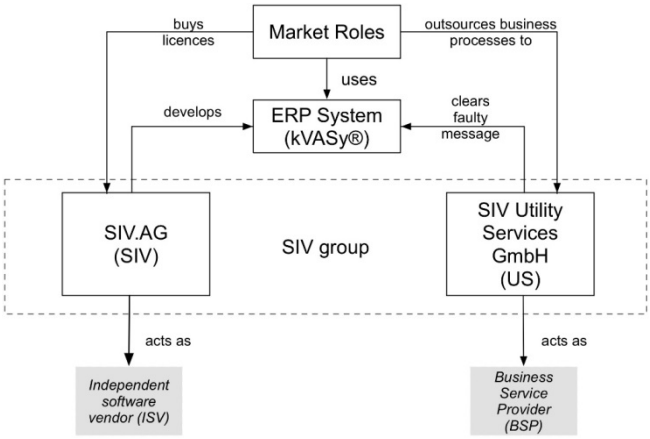


**Figure 2:** The business model of SIV group 19

## 5 Case Analysis and Observations

In order to find information for Q1 (roles involved when introducing CDD into the organization) and Q2 (activities and tasks performed by those roles), we analysed documents related to capability design in the case study company, which included material about business services and development processes related to capabilities. The documents were created between May 2014 and February 2016. They included

- hand-written notes from project meetings taken by project members,
- documents produced by bachelor and master students involved in the project, e.g. a report from a study project on instructions for clearing tasks, assignment work or thesis documents,
- deliverables from the CaaS project and internal working documents.

The analysis showed that only a few documents included explicit information about roles. More often, names of persons and their tasks were documented; sometimes the position was noted down, which often is identical to the corresponding role but also can include several roles. Since all documents are related to the same use case and period it was possible to deduct missing information (e.g. the name of a person having a certain role) from other material. As a result, Table 2 was created. Due to the fact that two different subsidiaries of SIV group are involved in the use case (SIV as software provider and SIV Utility Services (US) as BPO service provider; cf. Figure 2) and as the CaaS project created new roles in the organization, the table also includes a column “context” shows in which context the role exists.

**Table 2:** Identified roles in SIV case

| *Person* | *Context* | *Role* | *Tasks* |
|---|---|---|---|
| JK | SIV group | Enterprise Architect | Development and maintenance of enterprise architecture as basis for business/IT alignment |
| UC | SIV group | Software product manager<br>Strategy board member | Strategic / operational management of software product's business value and required technical features. Management of business / service strategy on enterprise level incl. target setting |
| TD | SIV | IT-architect | Definition of method and technology standards for all software products; evaluation of new technology developments and their impacts |
| FT | SIV | Systems engineer | Configuration and adaptation of software product for requirements from US or clients |
| HP | SIV | Platform operator | Maintenance and operation of the technical platform for software products and BPO services |
| TB, JS | US | BPO service manager<br>Key Account Manager | Strategic and operational management of BPO product's business value and required customer features. Contractual agreements with client, service level agreements, client care |
| MA | US | Business analyst | Analysis of clients' business requirements and implementation in BPO service |
| TR | US | BPO knowledge worker | Perform all action to deliver the actual BPO service to the client |
| JK, UC | CaaS | Capability Analyst | Analysis of information about capabilities and operating context |
| JK | SIV | Solution Engineer | Development of adjustment algorithms; spec. of interaction between solutions components |

The next step in our work was to compare the identified roles in the SIV case with the roles defined in the CDD methodology (Q3) to derive conclusions for the CDD roles and stakeholders (Q4). The comparison had to include the following aspects:

- CDD-related roles that are clearly visible in SIV case, although they might have different names.
- CDD-related roles not visible at all in the use case. For such roles, we need to investigate potential reasons of their absence and implications for CDD.
- Roles visible in the use case but not defined in CDD. Such roles could be candidates for including them in CDD.

For comparing the CDD-related roles with the situation at SIV group, we started from the CDD roles and stakeholders (cf. **Table 1**) and identified which roles performed the tasks associated to the CDD-roles within SIV. The result of this comparison is shown in Table 3. The results of this comparison show most of the roles defined in CDD correspond to the roles in SIV group. Existence of these roles is an indicator for the method engineers that they are sufficiently well-defined, useful

for organizational practice and should be kept further. The two CDD-roles, *business service operator* and *capability worker* were identified in the organization with different names. We argue that the change in those roles not only relate to the industrial practices, but also addresses the paradigm shift in the company by introducing CDD (e.g. application of patterns as best practices for business service operator or context-aware clearing processes provided to the capability worker). In that regard, one new role, *capability analyst* has to be established in the organization.

**Table 3:** Comparison of CDD-related and SIV stakeholder roles

| *CDD Role* | *Corresponding role in SIV* | *Comparison / Comments* |
|---|---|---|
| Capability analyst | Capab.. analyst (SIV group) | Role was newly established at SIV group in the CaaS project |
| Method engineer | n/a | Method engineers for SIV group were the CaaS partner universities. Thus, this role was not required in SIV |
| CDD provider | n/a | The CaaS project provided and maintained the CDD methodology. Thus, this role was not required in SIV |
| Business service manager | Software product manager (SIV) BPO service manager (US) | As the business service forming the core of the capability and the software product being the basis for the business service are tightly intertwined, both SIV and US have to be involved with established roles when it comes to management strategies for business changes |
| Business analyst | Business analyst (US) | The business analyst at US has a wider area of responsibility than defined in CDD. The role includes business models and capability configuration |
| Solution engineer | Systems engineer Solution engineer (SIV) | Responsibility at SIV is divided in responsibility for the software product and responsibility for the capability operation |
| Business service operator | BPO knowledge worker (US) | Same task, but different name of the role |
| Solution architect | Enterprise architect (SIV group) | The enterprise architect has a wider responsibility than the solution architect, but the work includes the link between the needs of the business and the solution |
| Capability provider | Key Account Manager (US) | From an organizational view, the key account manager is responsible of providing capabilities to the customer. |
| Customer (client) | US and the clients of US | In SIV there are two customers: (1) US as an internal customer using the results of CaaS, (2) the clients of US using business services and capabilities provided by US |
| Capability worker | BPO knowledge worker (US) | Same task, but different name of the role |
| Capability feedback provider | Not established | Many roles provide feedback: software product manager, BPO service manager, business service operator, solution architect, BPO knowledge worker |

Two roles defined in CDD, *method engineer* and *CDD provider*, were not established in the organization, as the CaaS project partners supported SIV group and the other industrial project partners in performing the tasks of the respective roles. Furthermore, the tasks of the *capability feedback provider* did not correspond to a single role in SIV group, it is rather performed by more than one stakeholder.

We observed that two roles from SIV could not be mapped to the role list from CDD: platform operator and IT-architect (cf. Table 2). The activities of those roles overlap to a certain extent with the role of a *solution engineer* in CDD. However, the platform operators and IT-architects operate on a wider basis, i.e. define solutions for all software products and services rather than on the capabilities, as defined in CDD.

## 6 Discussion

CDD defines stakeholders and roles responsible for developing, maintaining and adapting capabilities. In order to investigate their operationalization in an SME, we compared CDD roles with the stakeholders at SIV group, an enterprise from utility industry. We draw different observations and conclusions from this comparison:

- The vast majority of the roles and stakeholders defined in CDD are visible in the use case. The roles are involved in the components of the CDD methodology, such as capability modelling, context modelling, adjustment implementation or business service configuration as anticipated.
- The "feedback provider" role in the SIV use case is distributed on several roles or stakeholders. It seems that collecting, evaluating and implementing feedback should rather be considered as a process involving several roles than as a task of a single role. The established method components of CDD methodology actually already include feedback processes. Thus, the role "feedback provider" should be removed from the CDD role definition.
- The naming of some business related roles at SIV/US is different from what was defined in CDD. This was expected as many industries experience different naming of roles across organizations. Thus, this does not imply that name changes in CDD are required.
- CDD includes a more fine-granular differentiation between roles and their tasks than SIV or US. Some SIV roles basically aggregate the tasks and responsibilities of more than one CDD role (e.g. solution engineer). This observation could be attributed to the rather small number of persons involved in the use case as compared to a large organisation with a rather big or a special CDD organisation unit. In a CDD unit, all defined roles probably would be needed.
- Two roles from SIV are not part of the role and stakeholder list from CDD: platform operator and IT-architect. The role description of a solution engineer in CDD should be extended with additional tasks performed by those two stakeholder roles.

As an overall conclusion, the CDD role and stakeholder model confirmed to be complete and suitable.

## 7 Summary and Future Work

The introduction of new methods or approaches into an organization often does not only affect the organizational processes but also the organizational structures that are usually reflected in roles, positions and organizational units. This paper investigated the effects of the CDD introduction (if any) on organizational roles and addressed the research question how does the operationalization of roles differ between large organizations and SME? For this, we analysed whether the role and stakeholder definitions described as part of CDD are applicable and adequate in practical use or if changes are required. For the future, the following activities should be considered

- SIV group needs to investigate whether the role of a method engineer should be established within the organisation. Establishing this role is advisable because there might be the need to make situational adaptations of the CDD methodology, e.g. if a new capability development and design activity is started. Furthermore, the method engineer could have the responsibility to spread method knowledge to business analyst in the organization and maintain the method knowledge. From a competence perspective, installation of this role would not require extensive training or other knowledge transfer activities from the CaaS partners to SIV group since the CaaS team at SIV group already has most of the required knowledge.
- As soon as more experience with CDD use in SMEs exists, it should be discussed whether an SME version of the CDD role and stakeholder description can be developed, which would basically have to include fewer roles by aggregating some of the current ones. The experiences from SIV/US could be a blueprint for this.
- Some of the CDD-related activities with many roles and stakeholders involved could benefit from more information about the kind of involvement in the activity. Currently, the methodology explicitly defines who does what, but do not include roles who should be informed about results of activities or supporting roles which might be relevant. More concrete, this kind of information could be proved by adding RACI-like charts to the method components. One example of a RACI chart has been included in CDD methodology's Context Modelling component 18.

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