KMDL FOR INNOVATION AND PRODUCTION RAMP-UP PROCESS EVALUATION

A Case Study

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Abstract: The Knowledge Modeling and Description Language (KMDL) is a method for analyzing knowledge activities in business processes. This contribution presents version 2.1, the latest version of the method KMDL in a real life scenario. In the case study presented in this contribution we aim to review the practicality of the KMDL procedural model and the benefit gained from its application as it allows the identification of problems. KMDL analysis delivers the identification of causes as well as measures to overcome these problems, which are highly accommodating for process improvements.

1 INTRODUCTION

Knowledge management has not derived to an ultimate solution. A mixture of methods and instruments individually combined has to match the company specific goals, culture and requirements.

Business process oriented knowledge management is seen as bridging link that individually combine methods and tools from both worlds in the context of a process with a demand driven perspective. The business process itself stands as a starting point and the design concept for knowledge management (Abecker et al., 2002). In fact, it is the area for application and learning as well as context for sharing knowledge. Several approaches have been developed from various researchers (Woitsch and Karagiannis, 2005, Heisig, 2003, Kim, Lim and Mitchell, 2006, Allweyer, 1998, Remus, 2002). However, only limited results and experiences from projects have been published. Exceptions are (Telesko and Karagiannis, 2002) as well as (Fröming, Gronau and Schmid, 2006), who present the application of a prior version of KMDL (Gronau and Weber, 2004) in the domain of software engineering.

One of the aims of this paper is to introduce the expanded functionality of the former Knowledge Modeling and Description Language (KMDL) version 2.1 (see http://www.kmdl.de). To facilitate this aim, we will provide some practical evidence to answer the following research questions by means of a case study:

- How does KMDL help to identify and to highlight the knowledge activities or processes?
- How is KMDL an appropriate method to analyze and improve knowledge intensive business processes?
- How can KMDL be improved? Which benefits do the expanded functions in version 2.1 offer?

2 CASE STUDY

Our reason of choosing case study as the approach is explained by (Yin, 1993), as he defined case study as „[…] an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident“. The underlying theory of the KMDL application was described in the former section.

2.1 Case and Data Selection

The selected case study took place in a major German household appliances producing company,

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which has chosen to stay anonymous in this publication. The project this case represents covers a thorough implementation of the KMDL method in evaluating the company's innovation and production ramp-up processes.

A qualitative data gathering approach as research method was selected, due to its conformation with the KMDL method. The result of the examination will be analysed along with a comprehensive literature research. However, since it is not up to the analysts to perform the recommended measures and changes, the direct impact of the KMDL method to the company cannot be presented in this paper.

2.2 Implementation

In the next sub-section, we will define the actors involved in the case study (from hereon will be referred to as project) and the identified problems. Subsequently, we will illustrate the application of KMDL following the structure of the KMDL phases (see Chapter 2), including its achieved results.

Generally categorized, there are two types of actors involved in the project: The client and the analysts.

The client in this case is a large and globally active company, which comprises of multiple business units. The one focused on has a central product development with more than 10 globally distributed production sites. Approximately 200 people work in the product development, including hardware engineering and software customizing. Fourteen people are directly involved in the project from the client side while the analysts comprise of two assistant researchers with expertise in the KMDL method and experiences from former other process evaluation and optimization projects The project was initiated at the first place because there was a disparity between the anticipated and actual processes at the client side, as discovered and agreed on in several initial meetings by means of unstructured interviews.

Due to the global distribution, the client had been faced with a delayed production start. The problem lies in the handover process of the bill of material from the development to the production sites, despite the fact that a central product development was instigated.

2.3 KMDL Phases Implementation

2.3.1 Project Acquisition (P0)

A thorough KMDL analysis dealing with the structure, the processes, and the information systems of the client was offered. The project also includes particularly the factors related to information or knowledge transfer and creation in the handover process.

The subject of analysis is the product development process including the handover process as part of the process.

2.3.2 Setting Focus (P1)

During the initial meetings possible areas of examination within the production development processes were also discussed. In order to examine the process intensively, the analysts decided to observe two process instances from the recent past, which represent a real-life example and serve as basis of the interviews. As a matter of fact, one of these instances has an exceptionally long delay of production start.

The objectives for every KMDL project were derived in mutual discussions. In this project, they include a complete, unambiguous and redundant-free documentation, a punctual handover and development process cycle and the employment of minimal efforts for the hand-over.

2.3.3 Capturing the Process-based View (P2)

A kick-off workshop including a KMDL basic training was performed in conjunction with Phase 2 and Phase 3. During this workshop the prepared objectives were approved by the project participants.

Due to the limited time frame, Phase 2 was performed backwards. Instead of performing interviews to gather data, the analysts primarily generated a draft model of the process view based on the information they obtained in the initial meetings and presented them afterwards in the kick-off workshop. Suggestions for improvements and possible focus points for the activity view were then discussed among the project participants.

By discussing the (pre-modelled) process view with the project participants, the analysts gain the validation needed for them to proceed to the next phase. Through the workshop, the client gains a prompt understanding of the process as well as a new perspective of the examined process.

A validated process view visualizing the important steps of the development project including initialization, conception, pre-series conduction up to the hand-over to production sites, which marks the start of the production was produced.

This phase aims to identify performed the knowledge intensive tasks. As explained before, since a pre-modelled process view was developed and presented in the workshop, the identification of the tasks took place simultaneously.

Identifying knowledge intensive tasks provides an outline. This outline is essential for the development of the activity view, which provides process visualization in a higher detail. After the tasks were identified, relevant interview partners were identified.

2.3.4 Capturing the Activity-based View (P4)

In capturing the activity-based view, the analysts used the interview method as recommended by the KMDL procedural method. This phase aims to gather as much information as possible about the activities taking place within each task in the process.

A total of twelve semi-structured interview sessions were performed with the client. They included employees from the engineering, the management and ramp-up agents from production sites. The process model as well as the two selected process instances were used as a guideline for the interviews.

Each interview was documented in a protocol, which was used to developthe activity models. Subsequently, each protocol was mailed to the interview partner for approval and clarification of any remaining ambiguities. A total of 10 activity models were generated.

For the analysts, this phase serves as the basis and data resource for their further examination.

2.3.5 Analysis (P5)

The identified problem lies in the handover of the bill of materials. Two different process instances from the past reflecting distinctive bill of materials compilation processes were selected.

The first instance shows that only segments of the bill of materials are compiled at the development site, which results in an inconsistency as the compilation was completed at the production sites. The second instance shows a complete compilation of the bill of material.

In both cases, adoptions to local markets take place at the production site. Most development works are split up into technical segments anddocumented within these segments. The documentation involves a central database with change notes as well as material follow-up chart per segment

Using the KMDL method, it was found that the first instance relies predominantly on informal communication mainly dealing with identifying which version of a segment should be used for a complete product. This finding interestingly contrasts the documentation efforts made during the actual development.

Furthermore, required documents are often no longer up to date and must be validated. This might be caused by the fact that the ramp-up personnel from the production site only has limited access to these documentation.

In the second instance, a significant domination of internalization and combination was found. A large number of documents, often having no relevance to the production site, need to be interpreted. A crucial document called the material follow up chart, despite its employment across all segments, within each segment, and sometimes even each project, uses individual formats. Having to adjust each time to a new document format containing the same content is a waste of time and increase risk of error. Furthermore, a large number of development projects were found, although it often entails only minor changes.

Based on the above findings, the analysts suggested a standardization of processes, especially by defining responsibilities for pre-series purchasing as well as by reverse scheduling, i.e. by assigning roles for list maintenance as well as processes review. The use of the list should be encouraged or even made mandatory. Subsequently, this list could be linked with the existing systems, e.g. to access drawings or change orders. The centrally created master bill of material of the one instance should be made part of the standardized interface towards production sites, since it would provide an immense time saving at the production site. Their creation at the development site would allow informal knowledge acquisition and validation of documents. Lastly, the total number of products and variants developed should be examined, whether the amount is truly necessary.

They also suggested a standardization of the interfaces towards production sites to make contacts known at both ends. The material follow-up chart should use a common template in order to improve its comprehensibility.

For the client, the recommended measures should serve as a basis for their process optimization. Being shown the actual process as observed from the knowledge management angle, the client gets a direct overview of their process' vulnerability. However, the analysts cannot directly influence the positive result of the improvement of the process since the implementation of the measures remains the task of the client.

2.3.6 Development of a Qualified Concept (P6)

The preliminary results and measures were discu-

ssed with the client. Their feedback serves as a basis to validate the above findings and to check the possibilities for the measures to be suggested. The potentials and problems as well as excerpts from KMDL models were presented during the result workshop. Subsequently, the client discussed the measures described above and jointly prioritized them by considering their estimated benefit and costs.

3 CONCLUSIONS AND OUTLOOK

Objective 1: How does KMDL help to identify and to highlight knowledge activities or processes?

KMDL enables process analysts to gain an in-depth understanding of a process and the underlying, often previously unidentified knowledge activities. By means of interviews as well as feedbacks and approvals on various levels, the actual situation can be reflected and intensely examined.

The interviewed employees can bring up the problems concerning the knowledge transfer, generation, sharing and the like according to their field of expertise. The client is able to look into their business processes beyond the typical flow oriented point of view. The process and the activities are reviewed by multiple actors from different perspectives, which encourages unbiased views. As a result knowledge activities are documented and made visible.

Objective 2: How is KMDL an appropriate method to analyze and improve knowledge intensive business processes?

Prior to the application of the method the client's understanding of the problem was only vague. During the project, this understanding was broadened and concrete causes of the problem were identified by obtaining transparently reflected processes and activities within the processes. They also benefit from the analysis and the recommended measures.

Apart from that, clients of KMDL projects do not need a comprehensive method knowledge Any inquiries about the method or the analysis could easily be transferred during the two workshops.

By focusing on concrete instances of the process a better caption of the actual activities was obtained. However, two instances are hardly enough evidence for empirical analysis. It remains an issue of interpretation to evaluate the models, which is why the analysts are required to have sufficient experiences in the field.

Objective 3: How can KMDL be improved? Which benefits do the expanded functions in version 2.1 offer?

As described, in this case the procedural model has been simplified, due to very limited resources. However, the separation of the process and activities views has proven to be a significant improvement. The process model acts as source for an overview and reference for a detailed analysis of knowledge activities. Transfers and applications can also be traced within various activities.

In capturing the general characteristic of the communication, the evaluation of small numbers of process instances produces only exemplary results. Formal and quantitative methods are more appropriate to capture communication. These communication acts can indicate additional knowledge exchange.

Only recently KMDL was extended with an additional view for communication (Müller, 2008), which captures actors, communication acts as well as communication instruments. The view differentiates types of communication by anytime / anyplace matrix. New angles such as a planned (e.g. scheduled during a meeting) and random (e.g. met in the hall) communication act are used to validate the activity view and to incorporate random acts of (informal) knowledge exchange into the analysis.

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