QUALITY MANAGEMENT IN KNOWLEDGE INTENSIVE BUSINESS PROCESSES

Development of a Maturity Model to Measure the Quality of Knowledge Intensive Business Processes in Small and Medium Enterprises

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Abstract: Up to now the isolated tools for quality, business process, and knowledge management can be integrated to develop a suitable structure for SMEs to measure and gradually build up the competence for knowledge processing. A maturity model is being developed for SMEs to measure and assess the quality of their business processes. This enables the companies to determine their existing status, and to take the necessary actions for the competence development of their business processes, which should contribute to the attainment of their knowledge management goals.

1 INTRODUCTION

In the European Union, companies with 50 to 250 employees or having the total of up to 50 millions Euros annual turnover is to be categorized as small and medium enterprises (European Commission, 2005). Due to the given characteristic, they are forced to draw profit on top of making ends meet by spending the least of resources and costs.

Managing knowledge is certainly not only the necessity of small and medium enterprises since problems on dealing with knowledge emerge as well in large companies. For them, however, knowledge, in whichever form it may exist in the company, is a fundamental asset that assures the continuity of their existence.

North (2005) lists some typical problems faced by small and medium enterprises according to their type of nature. A family establishment faces the typical problems of generation changes and employee retirement as well as resignation. A company with a mature market with high technical know-how is often confronted with problems of deficit of use and safety of specific knowledge. A rapidly growing company in a fast changing environment deals with problems of resource insufficiency, lack of communication between teams as well as project documentation, capacity deprivation and the like.

Aiming to attend to this necessity, the Federal Ministry of Economics and Technology in Germany has been financing a collaboration project by the University of Potsdam and the University of Kassel. This project intends to develop a maturity model and the associating self-assessment method to evaluate, analyse and optimize the knowledge intensive business processes in German's small and medium enterprises.

This paper will first address the characteristics of a knowledge intensive business process. The following chapter describe the development of its maturity model. Subsequently, the role of the maturity model in the quality management of knowledge intensive business process will be explained. The last chapter discusses the future prospect of the project and the planned development of the self-assessment tool.

2 KNOWLEDGE INTENSIVE BUSINESS PROCESS

2.1 Tacit and Explicit Knowledge

In order to define a knowledge intensive business process we preliminary need to agree on the meaning and characteristics of knowledge. Polanyi (1958) classifies knowledge into two categories. Tacit knowledge, the first category, is produced by personal experiences and individual perceptions. It is difficult to articulate and formalize. Tacit knowledge is person-oriented.

The second category is called the explicit knowledge. This type of knowledge is not bound to person. Explicit knowledge can be effortlessly transferred using a formal and systematic language (Schmidt, Kiemele and Berdine, 1996).

Nonaka and Takeuchi (1995) define the course of actions that happen between the two categories as knowledge conversion. They develop the Socialisation, Externalisation, Combination and Internalisation (SECI) Model (See Figure 1) to describe the four conversions between tacit and explicit knowledge (Froeming, Gronau and Schmid, 2006).
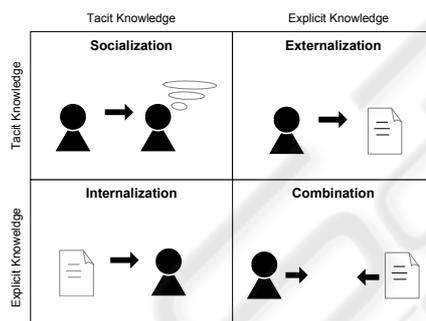

Figure 1: SECI Model (Nonaka und Takeuchi, 1995).

2.2 Knowledge Modeling Description Language (KMDL)

A business process as knowledge intensive if its value can only be created through fulfillments of the knowledge requirement by the process participants (Froeming, Gronau and Schmid, 2006).

The characteristics of a knowledge intensive business process make it difficult to abstract and to generalize. Therefore, the University of Potsdam has been developing a method aiming to enable the modeling of knowledge-intensive business processes. This method is called the Knowledge Modeling Description Language (KMDL) (Gronau and Weber 2004).

Business process models generated using the KMDL method can be viewed from two point of views. The process view describes the course of tasks and their possible alternative routes. The level of detail in this view is held low in order to assure a clear and structured presentation. This view has process interfaces as crossing points at the beginning and end of a process.

Not all tasks in a process are knowledge intensive. Therefore, those who need to be identified before the activity view was being substracted. The activity view has a higher level of detail, in which the single tasks are broken down into activities. These activities represent the knowledge conversions within the process.

The KMDL method comprises of 6 phases. In Phase 0 and Phase 1 the project preparation activities, the project objectives and its object of modeling is determined. The object of modeling is the scope of area to be analyzed within the business process. In Phase 2 the process view is captured by performing semi-structured interviews with the process participants. The captured result is iteratively validated and improved.

In Phase 3, the knowledge intensive tasks taking place in the process view are identified. These tasks are used as a basis to capture the activity view in Phase 4. Just like in the process view, the captured activity view result is iteratively validated and improved.

In Phase 5, the captured process and activities are analyzed. Within this phase, factors marking the success as well as failure of the process are identified, suggested, classified and evaluated. KMDL features formal methods for analysis based on previously collected patterns. In addition process analysis is supported by reports and views (Fröming, Gronau and Schmid, 2006, Bahrs and Gronau, 2005).

Based on the analysis, a to-be concept is developed in Phase 6. The implementation of the concept follows in Phase 7 and the evaluation in Phase 8. The KMDL method also includes formalized analysis concepts, which is irrelevant in the implementation of this project framework, but have proven to be reliable in the past projects.

In this project the KMDL method is used to collect the initial data, which will be used as a basis for the maturity level analysis. Apart from that, the compilation of the gained experiences and analysis results from the former projects will be used in this project to develop a reference business process serving as the exemplary best practice.

3 MATURITY OF KNOWLEDGE INTENSIVE BUSINESS PROCESSES

Different approaches have been suggested to determine the knowledge management maturity level (Ehms and Langen, 2000).

However, since these models are mostly specific to the evaluation of the entire knowledge management activities of an organization, there exists no connection to single business processes. A direct assessment of processes is thus not possible. Significant process improvement potentials in SMEs remain hidden because neither the information about the improvement opportunities in the processes are fully recognized and collected nor the quality of design is improved.

Identification of the level of maturity serves as a basis to uncover those potentials in SMEs. After the maturity level has been identified and the actual situation recognized, only then can SMEs set a starting point for process optimization and goal achievement (see Figure 2).
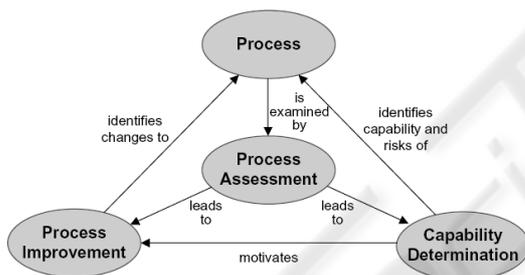

Figure 2: The central position of process assessments (ISO/IEC 15504-01, 2004).

According to Mackie (2007) implementing sustainable improvement requires people to recognise opportunities for improvement. A process assessment affords an internal benchmarking, which serves to guide employees to adopt preferred similar approaches for appropriate knowledge intensive business processes. The possibility to compare local knowledge intensive business processes with those of other market actors allow strengths to be consolidated and weaknesses focused (benchmarking capability).

Process assessment also increases motivation for change. It encourages employees to start implementing possible improvements. By systematically analysing a process with using process assessment it is possible to pinpoint potential improvements.

A periodically performed assessment forecasts trend information. The improvement analysis discloses indirect information on which improvements provide an impact and conclusively, the level of such impact. It also helps to explore needs. The integrated reference processes could be used to build new approaches and match new ventures.

The project evaluation model in development based on the maturity level criteria can be used to evaluate and analyze the business processes at the outset. Based on this, an iterative development of the performance ability takes place (see Figure 3). The maturity level measurement provides a benchmark as well as a reference value for the quality of knowledge-intensive business processes. This measurement is based on well-researched and classified critical success factors that are to be transformed into a knowledge intensive reference pattern at later stages.

A specific questionnaire based on the formerly gathered success factors and their particular indicators enables a detailed data collection. Based on this questionnaire and the maturity model an interactive self-diagnostic tool will be developed in the later project phases. SMEs should then be able to determine the maturity level of their knowledge-intensive business processes without the need of any special data, systems or advanced required skills.

4 DEVELOPMENT OF THE MATURITY MODEL

The development of the maturity model begins with the investigation of actual processes in the cooperating companies. As prototypes for further development we decided to examine the customer relationship management and innovation as well as product development processes.

Ahlemann, Schroeder and Teuteberg (2005) define maturity model as an instrument that characterizes different maturity levels using a specific competence model, in which it assesses the certain level of requirement the competence object has fulfilled as defined for the particular class. The suitability of the maturity level model is constituted by taking into consideration the requirements of objectivity, reliability and validity, whereas consistency, replicability and efficiency are the additional requirements to be consider.

Firstly, the information obtained from interviews will be codified and generalized in form of a process model, which is repeatedly validated by the process

participants. The models serve as the prototype for further analysis.

Then a complete range of factors are collected as the results of expert interviews and by considering the best practice models in selected firms from different application domains. The process of determining the success factors is validated through a two-stage validating process by an interdisciplinary project committee.

Subsequently, indicators are developed and defined in order to confirm the success factors. They should be measurable qualitatively and quantitatively. On this basis, a questionnaire to validate the factors' acceptance level is designed. The questionnaire includes not only knowledge-intensive business processes success factors in general, but also specifically those in customer relationship management as well as for the product innovation process domain. In turn, the maturity level model will be deduced from existing established approaches. The maturity levels will then be assigned to the success factors and the factors to the indicators in order to derive a classification of the maturity level.
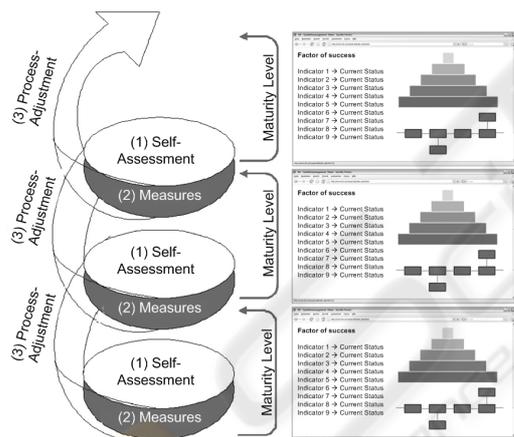

Figure 3: Maturity Level Model.

The result of the maturity level determination enables a simple derivation of measures for skills development in relation to the handling of knowledge and the design quality-oriented processes.

5 CONCLUSIONS AND OUTLOOK

As part of the future advancement on the project, an interactive self-assessment tool will be developed, which aims is to facilitate the companies to evaluate

and determine the maturity level and the quality of their knowledge-intensive business processes.

The tool will have an advantage over the pure design method because it will allow the end user/operator of the process to implement it at his own. It ensures personalized solutions. Resistance of change is expected to be considerably low compared to the case where an external consultant was involved.

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