

Applying Business Process Modeling Tools in Enterprise Resource Planning System Replacements

A Case Study

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Abstract: Enterprise resource planning systems are the IT backbone of companies in the IT markets and in all those where efficient and integrated business processes are a necessity to stay competitive. As the markets change also the IT requirements do and the need for an Enterprise resource planning system replacement rises. This article argues that business process modeling tools can be used to document and communicate changes in the operational and organizational structure related to the replacement. The suitability of a tool with typical modeling features is evaluated within a project. The findings regarding semantics, structure, documentation, and re-usability are discussed and an outlook for future research is given.

1 MOTIVATION

In order to meet the constantly rising market expectations information technology (IT) does matter (Carr, 2003). Especially for large companies with complex and interleaved processes a well-designed Enterprise resource planning system (ERP system) supporting all business processes (Davenport, 1998) is of particular importance. During ERP system usage a point will be reached where the individual adaptation (in case of individual software) or the updates (in case of a standard ERP system e. g. SAP AG's ERP Central Component, SAP ECC) are not satisfying the customer needs anymore or are too costly. At this point in time the replacement of the complete ERP system is required. The migration from the old system to the new one is a complex and time-consuming project (Huang, Hung, Chen & Ku, 2004; Peslak, Subramanian & Clayton, 2008). This project and its subprojects are nearly always supported by external consultants because the required ERP system knowledge is not present and the human resources are missing.

In such projects tools like Microsoft Project or more sophisticated tools are often used. In this article we focus on business process modeling tools (BPM tools) supporting the change management

subproject. Literature states, that these tools have a positive influence on critical success factors like understanding the current and new business processes including their IT and organizational interrelations (as-is and to-be models) (Holland & Light, 1999; Nah, Lau & Kuang, 2001). Hence, we argue that BPM tools are particularly well suited in documenting and communicating the changes.

But often the usage of the BPM tool is a project in its own. A full grown tool like the Architecture of Integrated Information Systems Toolset (ARIS Toolset) (Scheer & Nüttgens, 2000) is too complex for simply supporting the external consultants with their documentation. In contrast, tools like Microsoft Visio or Microsoft PowerPoint are too limited regarding their modeling functionalities. Therefore, the research questions of this article are:

- RQ1: *Are BPM tools well suited for documenting and communicating changes related to ERP replacements?*
- RQ2: *Which features are especially relevant for a BPM tool in order to efficiently support the documentation and communication of changes in the context of an ERP replacement?*

The remaining article is structured as follows: in the next section the case and research method is

presented. In Section three the main features of the BPM tool within the running project are discussed. The last section concludes the findings and outlines future research potential.

2 RESEARCH METHOD IN THE PROJECT

One of the main discounters operating across Europe is replacing its individual piece of ERP software by SAP ECC for Retail. This happens because the old software did not meet the clients’ expectations anymore regarding integrated processes, centralized data management, and performance. An agile method for ERP replacement is chosen in order to have a runnable prototype at an early stage in the project. The prototype is developed continuously with all involved stakeholders. The main characteristics of the project and company are depicted in Table 1.

Table 1: Project and company overview.

Dimension	Description
Purpose	ERP replacement
Method	Agile
Duration	Summer 2012 – approx. summer 2014
Domain	International Warehousing
Articles	Food and Non-Food
Employees	Approx. 80 (only employees involved)
Customers	Business-to-business customers
Budget	Approx. 3,000,000 euro

The project has several subprojects like migration, test management, support, training, and change management. Within the latter subproject one goal is to determine and manage the changes related to the system replacement. This is done in the three phases identification, documentation and communication as depicted in Figure 1 and described in the following subsections.

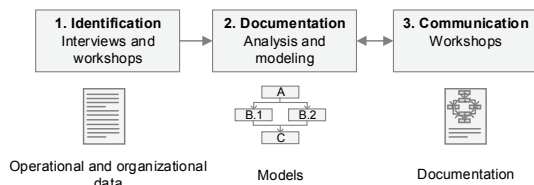


Figure 1: Research steps.

2.1 Identification Phase

In the first phase of the research 9 interviews are

conducted in order to learn about the as-is processes. The external consultants also have the opportunity to observe the daily business and to take notes. The results of this phase are the as-is processes including descriptions regarding IT systems and responsibilities. Furthermore, the interviewees are asked for possible improvements from their point of view. This feedback is incorporated in the to-be processes directly. It is also explicitly addressed in the communication phase in order to improve the acceptance of the new to-be processes.

2.2 Documentation Phase

On the one hand the changes were anticipated within the business processes (gap analysis between as-is and to-be processes) and on the other hand within the organizational structure. The findings of the analysis and the input of the interviewees and workshops help to optimize the business processes, determine staff requirements (new positions or changed position descriptions within the organizational hierarchy) and support the key- and end-user trainings for the new ERP system (communication phase).

Due to constraints in the project there is no time for implementing a project specific tool supporting the process analysis. Hence, a BPM tool is selected which is suitable for the purpose of describing the operational and organizational structure changes. The selection of the tool is based on the following key features:

- Business processes modeling on multiple levels
- Support of organizational and IT structures
- Central glossary for project terms and model elements
- Modeling conventions enforced
- Re-usable (reference) models
- Easy access for stakeholder

After a tool (Becker, Clever, Holler & Shitkova, 2013) satisfying all the above features is selected the collected data in phase 1 is documented with the tool. The findings regarding the suitability of such a BPM tool in the context of an ERP replacement is discussed in section 3.

2.3 Communication Phase

In the last phase the outcome is presented and discussed in workshops and the process models are adjusted where necessary. Also the final documentation is created including all

organizational, operational and IT system changes related to the ERP replacement. The features the BPM tool provided regarding communication are discussed in the next section, e. g. stakeholder tool access or reporting and export functionalities.

3 KEY FEATURES OF A BUSINESS PROCESS MODELING TOOL WITHIN SYSTEM REPLACEMENTS

The following section discusses the suitability of the above mentioned and further features (Table 2) for supporting the change management within an ERP replacement clustered in the following sub-sections.

Table 2: Key features in the project.

Feature	Cluster
Syntax checker	Semantic standardization
Integration of semantics	Semantic standardization
Inclusion of modeling conventions	Semantic standardization
Integration of a glossary	Semantic standardization
Harmonized layers of abstraction in processes	Structured models
Organization charts	Structured models
IT system charts	Structured models
Attribution	Integrated documentation
Export and reporting	Integrated documentation
Reference process elements	Re-use of knowledge
Best-practice models	Re-use of knowledge

3.1 Supporting Model Quality by Semantic Standardization

An often mentioned tool feature is the possibility to support the user in checking the model syntax. This is definitely a nice feature to enhance the model quality. In this context it is questionable if and how model quality can be measured by means of syntactical correctness. Although many metrics are defined in literature for model quality (Moody, 2005) the most important quality aspect of a syntactically and semantically correct model is its “fitness for use” with respect to its purpose (Becker, Rosemann & von Uthmann, 2000; Rittgen, 2009). A model as abstract representation of reality should exclude not relevant details and focus on the main aspects regarding the purpose of the model (Dean, Orwig, Lee & Vogel, 1994). Typical purposes of process models are to cope with the process

complexity, to document it, and to support conceptualization, analysis and communication (Dean, Orwig & Vogel, 2000; Ould, 1995; Van Hee, 1994; Becker, Kugeler & Rosemann, 2011). For satisfying these purposes a process model has to take the semantics of the process into account. Hence, the tool should foster semantic correctness by increasing the clarity, comparability, readability, and manageability of the models by implicit inclusion of modeling conventions (Mendling, Reijers & van der Aalst, 2008; Becker, Rosemann & Schütte, 1995; Becker, Clever, Holler, Püster & Shitkova, 2013a).

A further aspect of semantic standardization is the usage of a glossary. All business objects, activities, and allowed relations between them are defined within it. In the best case only the content of the glossary is (re-)used for describing the process element identifier by using activity-object phrase structures. For example, there is a glossary in which the business object “delivery plan” and the activity “create” are included. In addition, the business object “delivery plan” is associated with the activity “create”. Hence, the element identifier “create delivery plan” is valid based on this glossary (Figure 2). By this means, uniform terms are used and misleading synonyms and homonyms are avoided (Becker, Richter & El-Hawari, 2010; Becker, Clever, Holler, Püster & Shitkova, 2013b; Breuker, Pfeiffer & Becker, 2009).

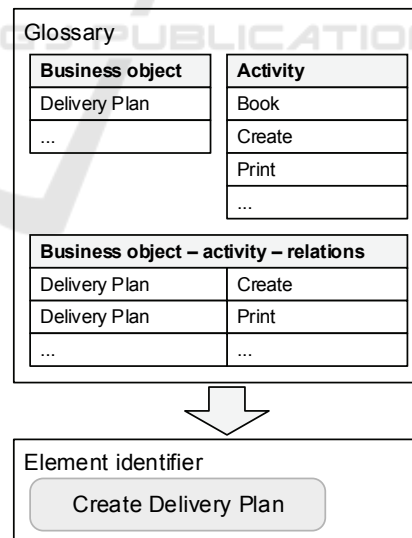


Figure 2: Glossary and element identifier.

In terms of change management the glossary is particularly helpful because it contains all terms used within the as-is and to-be processes in one central index. It also includes definitions of new ERP specific terms, e. g. the SAP info record as

master data for the connection between suppliers and articles. By this means the tool can help to standardize the used vocabulary within the models and therefore in the project.

3.2 Clear Structured Models

In order to communicate changes it is common sense that the content is presented in a clear and structured way. One main issue is the granularity of the business process models. On the one hand detailed descriptions of the process flow are necessary in order to understand the processes. On the other hand too detailed descriptions and therefore too complex processes are hardly understandable. The usage of different layers of abstraction is a commonly used method to cope with the complexity. With respect to communicating changes it is beneficial that all process models should follow the same levels of abstraction. Based on literature a four level structure is a good compromise regarding fast navigation, clarity, and overview. It should consist of an organizational framework (process landscape or process overview), main processes, detailed processes, and process building blocks (Becker et al., 2010; Becker et al., 2013; Harrington, 1991). Through the upper layers an executive summary for managers is given. The lower levels in the structure provide a detailed description for employees working in the departments.

These different layers are implicit within organizational charts and of IT system hierarchies, which are relevant for a full representation of all changes within the company. Organizational charts are very helpful to display all employees within the project and future working environment. Comparing

the old hierarchy to the new designed one helps to communicate changes regarding the amount of positions and job descriptions. For Example park invoices will no longer be necessary because of using optical character recognition for invoices. The differences within the IT systems diagrams are of great value while estimating the need for new hard- and software.

3.3 Integrated Documentation

A full documentation of all changes is the main deliverable in change management projects. Hence, the tool has to support the user in creating the documentation. The basis for a documentation covering all relevant aspects (the scope of these has to be defined at the start of the project) are attributes within all process layers. It turned out to be beneficial, that attributes were available on all process levels and also within the organizational charts and IT systems hierarchies. Typical attributes are: generally description of process blocks, support by IT systems, or process responsibilities. The relevant position from the organizational chart or the documented IT system could be attached to process blocks directly. In the context of change management this allows a mapping of the old process responsibilities or necessary IT systems to the new ones. Also more sophisticated and ERP specific attributes like uniform resource locators (URLs) to documents stored in the SAP solution manager, direct links to the user interface, and interactive training videos add value for users.

Beside the documentation of the changes within the tool also export functionalities to office applications like Microsoft Word or Visio are

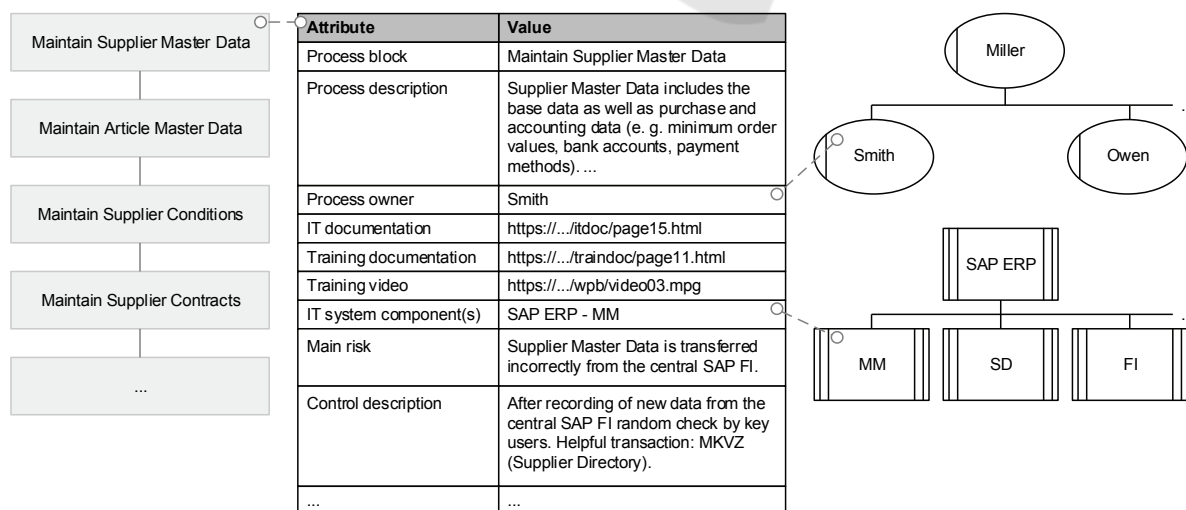


Figure 3: Attributes for process blocks.

important. They facilitate the creation of tests, trainings and system documentations. In the context of the project several reports like “which processes are assigned to specific IT system components” or “which contact persons are responsible for which process steps” are especially useful. These reports are easy to create within a tool providing flexible attribute definition and reporting functionality using these attributes. The attributes are also used for the implementation of risk management. For each process step specific attributes are defined describing the risk, its’ severity and its’ possible coverage (e. g. usage of SAP transactions for Intermediate Document (IDoc) monitoring to control communication risks with suppliers). Another application area in the context of change management is creating reports with reference to specific business objects taken from the glossary, e. g. during ERP replacement the communication with suppliers is switched to electronic data interchange (EDI) protocol. Hence, looking for any old process blocks containing the activities “print” or “send” is a good starting point for managing the change. Figure 3 depicts an example where the attributes are used for connecting the operational and organizational structures.

3.4 Re-use of Knowledge

The employees from the departments provide the external consultants with all necessary knowledge in order to model the as-is and to-be processes. The re-use of single process steps with a special highlighting of those remaining identical has turned out as a driver for the acceptance of the designed process models. Therefore, it is beneficial if the BPM tool is able to use references rather than simply copying process blocks. By this means, there is no redundant data. The same information can be edited and stored in one spot and is used in potentially several process models. Figure 4 shows a referenced process block “Archive Document” used in the two processes invoicing and billing. In both cases the used archive system and all other attributes were identical and can be edited consistently.

A further facilitator for eliciting the process knowledge is the usage of reference models. During the workshops and interviews in the identification phase the external consultants proposed “best-practice” process models and organizational forms including position descriptions. It is important to propose these reference models not in the beginning but after some time of discussion in order to consolidate the knowledge. Furthermore, it is easier

for all participants to adopt the existing reference models to their needs than to start from scratch. From a change management perspective the usage of the reference models yielded high quality models and allow to a certain amount benchmarking with reference companies. This is an important driver for acceptance in the communication phase.

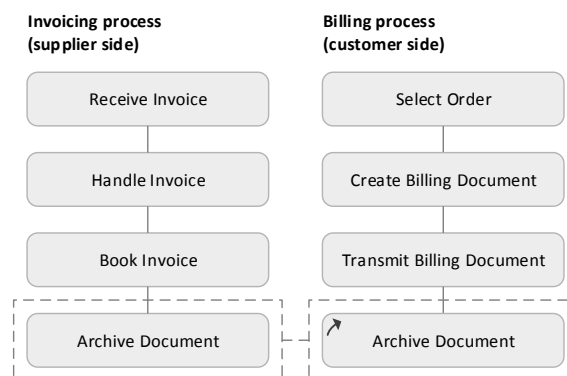


Figure 4: Process references.

Also the architecture of the tool as a web-based platform is beneficial because a quick access via web browser is possible instead of an installation hurdle. Changes could be entered during workshops directly and the user trainings could be supported by the tool since everybody was able to view the processes with additional information while using the new ERP system. Just alike, future employees will be able to use the process documentation to view and understand not only the processes they work in but also the previous and following processes.

4 CONCLUSION AND FUTURE WORK

For supporting the change management in the described project the usage of a business process modeling tool is a very promising approach. After having collected the information regarding the organizational and operational structure in the identification phase we documented and analyzed it with the BPM tool. Regarding our first research question, we conclude that a BPM tool is well suited in the context of an ERP replacement. In order to answer the second research questions, we clustered the key features in standardization of semantics, structured models, integrated documentation, and the re-usability of knowledge (Table 2).

Although the feedback within the project is positive (we are in the communication phase while writing this article), there are several potentials regarding integration, collaboration, and visualization we would like to address. We believe these do not only apply to the specific combination of used BPM tool and SAP ECC in our case. They are also relevant in comparable projects and for future BPM tool developments and research.

Integration: A strong link between the BPM tool and the new ERP system would probably increase the acceptance of the tool, e. g. a single sign on functionality.

Collaboration: Automatic version management was missing. We believe from our practical work during the project that the possibility to have a full version control of the models similar to a text document in a SharePoint environment is of great value. The version management would allow to trace the modified parts of a model, e. g. before and after a change request is implemented. Furthermore, some sort of social media integration would have been beneficial. Either to comment the different versions of the models in the review process or to interact with the process owner e. g. via chat directly. The web-based version of the tool was great for distributing the process models via a simple link. Nevertheless, in few situations during more informal meetings a mobile application would have enhanced the acceptance and would have further simplified the communication. For both solutions – the web-based and a possible mobile application – a more sophisticated user access control is needed, e. g. a guest access for a supplier. The authorization rules have to ensure that the supplier can only access the relevant and maybe new processes (e. g. transmission of shipping notifications). Similar user access control mechanisms would be relevant for the approval and monitoring of (new) process versions. E. g. processes are initially stored with the status “wait for approval”. After the new version is reviewed and released, the processes will be unlocked for all authorized employees.

Visualization: In several situations one model or different models were compared. A supporting function for a comparison of two versions of one model (e. g. as-is and the to-be) or for two IT system charts is missing but would have simplified the work for the consultant. A further aspect of the visualization is the tool visualization itself in different web browsers. Partly the tool behaved differently what definitely has to be considered when using a web-based tool in a company.

Beside the above mentioned potentials and open issues we want to continue with our evaluation until the ERP replacement is over. We are looking forward to use the BPM tool in future ERP replacements or implementations.

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