Introducing Reference Models in ERP Development

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Introduction

Business process reference modelling is not a new topic in the ERP software industry: ERP vendors have used reference models for analysis and configuration of their ERP systems since the mid-nineties. Also from a research point of view, the field working with reference models and ERP systems is well established, typically addressing formal topics, such as e.g. model configuration and correctness (Recker et al. 2006).

However, there is no prior research on how reference models may enter a real software engineering context. We lack empirical evidence on the actual process of introducing reference models in ERP software development. What do people do when they are involved in such a project? How do they make the reference modelling approach fit the current systems and practices of the software development organisation? The aim of my research project is to make this work visible.

The motivation for this investigation is to improve the understanding of how new design ideas may enter an already existing development practice – this knowledge is relevant in the context of the current research cooperation between universities and industry, and may guide the way in which innovative ideas founded in theory are implemented in practice. Moreover, there is both a practical and theoretical relevance in understanding how reference models are made to fit the very particular situation of one ERP vendor: from a research perspective, this provides a more detailed picture of what kind of phenomenon reference modelling is, and from a practical perspective it may inspire how the ERP vendor support the process of introducing reference modelling.

Research questions

My investigation is guided by the following research questions:

> What is characterizing the process of introducing reference models and modelling tools in ERP software development?

- What aspects of the ERP software development are the reference models designed to support, and how are the different kinds of anticipated model use negotiated?
- How do the people involved in model and modelling tool design make sense of their activity, its outcome and the domain they are targeting?
- What is the connection between the model design and the already existing systems, practices and conceptualizations within the ERP software development organization?

Empirical study

I have been doing empirical research on the introduction of reference models in Microsoft Business Solutions (MBS) since 2004. This long-term engagement makes it possible to get a historical perspective on the process.

In 2002 Microsoft acquired a number of successful ERP vendors targeting the market of small and midsized companies. The ERP vendors were grouped under the common name Microsoft Business Solutions, but still maintained their original products. Based on extensive research on the current use of their existing ERP systems, MBS formulated a vision for the future ERP development and started a project exploring these ideas. Project Green was the name of this development effort that had the objective of building a completely new ERP system (the name refers to a system developed in a "green field", from scratch). The system was to be based on new technology, new architecture and should introduce a number of features that were not supported in the current generation of ERP products. Business process reference models played an important role in this vision, where one aim was a "process centric application design delivered through a model-driven approach" (MBS internal white-paper).
From summer 2004 until spring 2005 an interdisciplinary project group worked on how to flesh out the Green vision with regard to e.g. workflow support, user interface design, reference models and model repository. In spring 2005 the idea of a radical change of architecture and a completely new developed ERP system was exchanged by a more pragmatic approach that would gradually introduce the visions formulated in project Green into the already existing ERP products. From

2005 there have been several projects working on how to integrate the reference modelling approach with the current ERP systems. The case that I am going to present here is related to one particular project team developing a modelling tool for the ERP partners based on reference models. This modelling tool is to be used for implementing one of the ERP products that MBS has on the market.

The data material is collected using qualitative empirical methods such as participant observation, structured and unstructured interviews, and reading of project specific documents. The material consists of design discussions and decisions in the project group, the group's meetings with other teams in the organization taking interest in the project, the group's visits at the partners to gather requirements for the modeling tool, the model in different draft versions, and specifications and presentations communicating the modelling tool design project internally in the ERP development organization.
The collection of data, and my interpretation of it, is guided by the principles of interpretive field studies described in (Klein and Myers 1999).

Theoretically, I perceive my observations of the work in the project team as a process of *sensemaking* (Weick 1995). The ERP development practice is viewed from the perspective of activity theory (see e.g. Korpela et al. 2002). I use the concept of a *design artefact* introduced in (Bertelsen 2000) to describe the different purposes and meanings that the model and modelling tool are assigned by the project members. A design artefact is mediating design by supporting different aspects of a design activity, namely *construction*, *cooperation*, and *conception* (Bertelsen 2000). Especially the aspect of conception is important in the context this study, since it relates to the work of re-conceptualization caused by the introduction of a new design artefact.

Currently, I am in the process of analysing my field material. Since this is ongoing work, I will not present the final result of my analysis, but rather point at some themes I have discovered so far. I structure my observations according to different areas where the modelling tool project team is engaged in sensemaking. Below, I will briefly present one of these areas: how the project team makes sense of the business domain. The other areas in my analysis that I leave out here are how the project team members make sense of the partners' practice and of their own project.

Making sense of the business domain

In context of the Green project, a business process reference model was developed internally at MBS. This model was defined on the basis of an existing supply-chain reference model, and its design process was to a high degree an effort of adopting and adapting the terminology to make it fit within an MBS context: the original model was designed to model supply-chains, not to support ERP systems development. The model was introduced to support cooperation between the different professions within ERP development (UI designers, developers, etc) by serving as a common frame of reference on the work of the users of the ERP

system. However, building and maintaining a shared understanding of the business domain has proven to be a continuous task. Over time, the interest from different parts of the organization is influencing and changing both the goals and the structure of the model. The model is now a boundary object between different uses - it has its own history inscribed, and each project that has used the model has left its fingerprint. The members of the current modelling tool project deal with this inheritance since they reuse e.g. already existing diagrams, and in particular since some of the project members have been part of previous projects working with the reference model. They bring their good and bad, shared and individual, experiences to the current project.

Concurrently with the adaptation of the supply-chain reference model, a generic model of the users of the ERP system was developed. This work was initiated in a different part of the ERP organization, and the model was made using a very different approach, namely by making ethnographic studies of the end users, and abstracting these descriptions into a model of generic users in a generic organization.

The concepts of the business process reference model are partly overlapping with those of the generic user model, but even though it has been a long term wish to integrate these models, it is still ongoing work. This work is also performed in the modelling tool project.

One of the big challenges for the project group is that neither ERP system nor reference model is developed from a green field. This resembles a legacy problem: The ERP system is already there, which means that the model cannot be understood as a specification of the system, and the model is already there, which means that the model cannot serve as documentation of the system. This picture gets even more complicated since the ERP system is still under development as new modules are added and new versions released. Many design discussions touch upon the question of whether the model and modelling tool should reflect only how the system is today, or whether the project team should be "pioneering" and making requests for changes to the existing ERP system. The strict division and causal relationship between model and ERP system seems to break down in the design discussions; instead they are envisioned to be in a dialectic relationship: they are co-constructed.

Other problems with relating the model to the existing ERP system stem from the clash of two different design paradigms. One of the visions from the Green project was that when a reference model was introduced it would drive the change from a data-centric to a business process centric "design philosophy". From a practical point of view, the tool project team struggles with this shift from the current data centric ERP system to a process centric paradigm. The project group experiences problems with mapping the newly introduced concepts of the model to the already existing ERP system. The existing ERP system is menu based, document and data centric, not process centric, and this causes problems: One example is that the form (a window corresponding to a paper form, where the user can view and enter data, e.g. a sales order) is the smallest conceptual component in the current systems. The problem is how to map an ERP system to a model that

has a much finer granularity (e.g. the concept of a task, as "find product number")?
Alignment of the business process reference model with its historical and current versions, the generic user model, and the existing ERP system means negotiating content, scope, structure and key concepts: what is a business process, what is a task, what is a user role?

Concluding remarks

The reference model, its concepts and its purpose is in a dialectical relationship with what is already there. The process of introducing reference modelling is characterized by inertia - the changes that the model is envisioned to make is constrained by existing structures. However, through processes of sensemaking the reference model is made to fit these structures while transforming them.

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