FINDING ERP REQUIREMENTS THAT SUPPORT STRATEGIC MANAGEMENT IN ORGANIZATIONS

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ABSTRACT

The article discusses a problem of identifying requirements of enterprise resource planning (ERP) systems. Although ERP vendors offer best practices in their packages, these are not necessarily applicable to all companies or not even to all companies within one industry. At the end of the paper, we offer a model for requirements gathering, dividing it to two – business and software – parts.

ABSTRAKT

Článok sa venuje problému identifikovania požiadaviek pre enterprise resource planning (ERP) systémy. Hoci poskytovatelia ERP ponúkajú systémy so zakomponovanými „best practices", tieto nie sú nevyhnutne použiteľné pre všetky podniky, resp. ani pre všetky podniky v rámci jedneho odvetvia. V závere článku je uvedený model pre zber požiadaviek, je delený na podnikovú a softvérovú časť.

Introduction

Nowadays, some of the most pervasive and invasive information systems that are being implemented by and made us of in organizations are those referred to as Enterprise Resource Planning (ERP) systems (van Stijn, 2006, p. 73). The problem discussed in this paper is how to find the requirements on a future ERP system so that it supports the strategic management of the organization.

It can be stated that there is a gap of knowledge, information or data between the business analysts and developer for ERP. This gap can be described as a lack of knowledge, information or data between these two stakeholders in the development chain. One basic problem with developing ERPs is that the one who identifies the needs is often not the one who further builds the system. This is not something unique for developing ERPs, instead it can be stated that this is more or less always the case in software development. However, the problem gets more evident since an ERP is supposed to be the system that deals with processes in the entire organization and therefore have a lot of different users all-around the entire organization. One basic thought with ERPs is that they should support executives with the information that they need to have for running the organization in a strategic way.

The motivation for investigating ways of requirements specifications gathering is our participation in *The third generation ERP* (3gERP) project financed by the Danish National Advanced Technology Foundation.

This paper departs from an initial model for gathering ERP requirements suggested by Johansson, and Bjørn-Andersen (2007) and discusses transformation of ERP business requrements to software requirements.

1. Approaches to Information Systems Design

According to Sumner (2004, p. 39), there are two main approaches to information systems design. Traditional system development process consists of:
- problem definition,
- feasibility study,
- systems analysis,
- systems design,
- detailed design,
- implementation,
- maintenance.

The ERP systems development process consists of:
- planning,
- requirements analysis,
- design,
- detailed design,
- implementation,
- maintenance and continuous improvement.

Although the both approaches look very similar, there is a substantial difference between the two. The former is tailor-made for a specific company, automating processes as they are (or as the company wishes them to be), while the latter is one-to-fit-all approach, where a vendor tries to design an ERP system according generic business processes based on best practices.

2. Best Practices

Requirement analysis in an organization consists of analyzing business processes and choosing, which processes will be supported by the ERP systems. Since the company is buying into the vendor's view of best practices, it is important to select a system, which fits with the organization's goals and competitive strategy (Umble, Haft, and Uble, 2003).

Regarding vendors' views, ERP suppliers claim to develop their software so as to package 'best' practices. This might imply that they are able to identify and represent 'best' practices in their chosen 'target' organization (van Stijn, 2006, p. 77). Target organization being a generic company or a company in a specific industry.

For example, in many industries it makes sense to use first-in-first-out (FIFO) principle (based on a purchase date) in production. But when it comes to e.g. food industry, an expiration date is far more relevant than a purchase date. However, many packages do not support ordering by a purchase date. Therefore some authors prefer a term "good practice" to "best practice".

The reason for investigating additional (good) practices and eventually providing them in a standard package is the fact that firms are more successful in implementing ERP systems under budget or on-budget when the amount of customizing is kept to minimum (Marbert, Soni, and Venkataramanan, 2000). Providing these additional good practices in a standard package should therefore lead to not exceeding budget while still being able to stick with the previously used business practices.

3. ERP Systems and the Problem of Requirements

From early on the ambition of ERP-systems has been to: 1) integrate all transaction systems within the same system; 2) share common data and practices across entire enterprises, and 3) produce relevant information for decision-making purposes in real-time (Nah, Zuckweiler, and Lau, 2003; Shanks, Seddon, and Willcocks, 2003).

The main objective of *The third generation ERP* (3gERP) project is to come up with the research breakthroughs that will enable the development of a much more comprehensive ERP system, which can be localized to the different countries, industries, and enterprises with a minimum effort (like MS Office package). So these systems

- may be distributed globally at relatively low costs,
- will be much easier to implement,
- will be easy to localize to different markets/industries/enterprises,
- will be easy to maintain/update when there are changes in the environment on the international, national, industry or enterprise level (Soh, Kien, and Tay-Yap, 2000),
- will allow for collaboration between enterprises through easy integration with ERP systems of other enterprises in the value chains/value networks (Akkermans, Bogerd, Yücesan, and van Wassenhove, 2003), and
- will provide better business insight (data mining) for managing the enterprises.

The most important issue is to identify the business requirements of SMEs, which 3gERP project focuses on. But identifying as well as presenting requirements for information systems as such is a difficult task to conduct (Alvarez, 2002).

4. The Initial ERP Requirements Model

There are many different approaches to requirement gathering. They are discussed in a greater detail in (Johansson, Bjørn-Andersen, 2007). In general, we need to develop scenarios in order to obtain specification of requirements for "the" future ERP systems. These can be obtained by observing (and modifying) current scenarios, which can be gathered from existing ERP systems or in the form of narratives from vendors, distributors and users; by studying literature or other outputs of researchers; by following innovations; by using experience from other ERP systems and other information systems (stand-alone and best-of-breed ones); and last but not least by following company goals and requirements set up by executive management. This model for capturing business requirements, based on (Jarke, Bui, and Carroll, 1998, p. 157), is illustrated in figure 1.

Although this model is rather complex, it does not elaborate on how to obtain software requirements specification from developed scenarios, which regard business requirements (i.e. arrow called "reverse engineering"). This issue is the reason for introducing a new model in the next chapter.
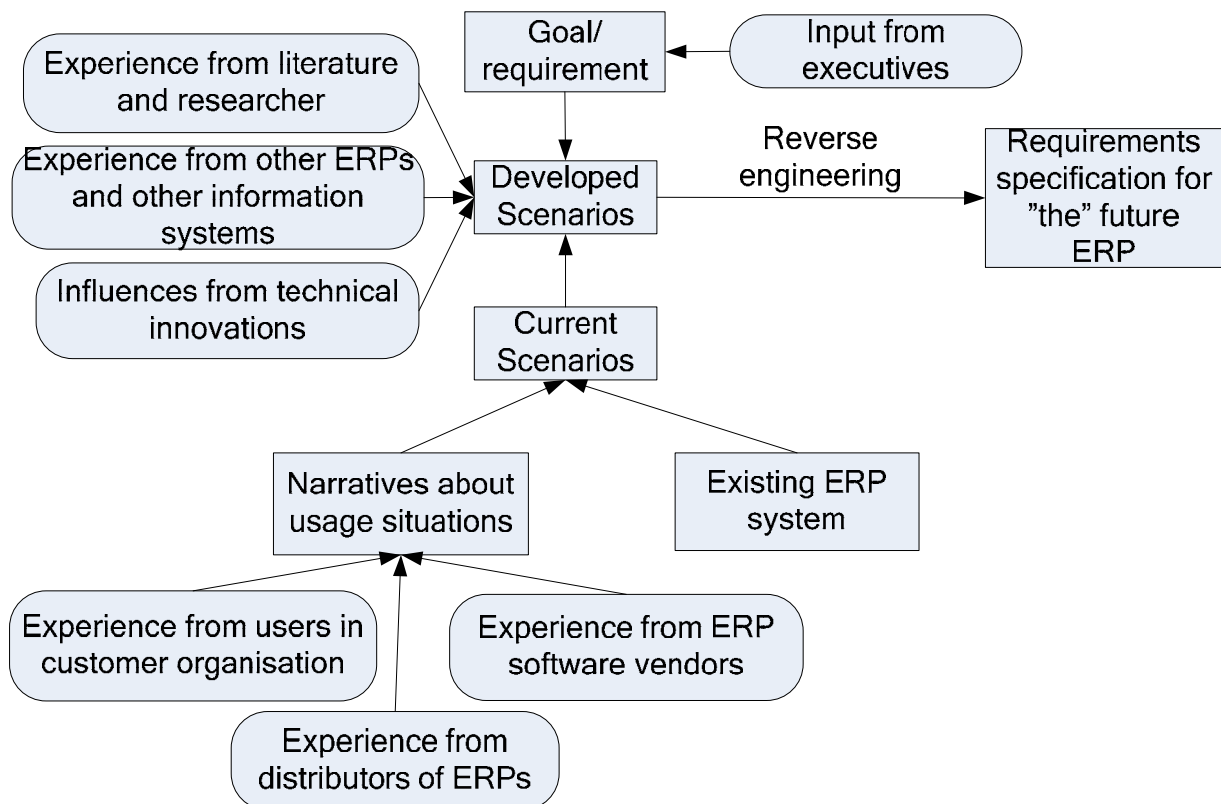
Figure 1 An initial model for gathering ERP requirements (Johansson, Bjørn-Andersen, 2007)

5. Expanding the ERP Requirements Model

While there are some trade-offs between different stakeholders about the level of business requirements, ranging from statements "we want the ERP to support this business process" to "we want this functionality", developers care more about "what data would you like to see on this screen" or "which data type to use for decimal values".

This gap has to be filled with some kind of a "translator" between these parties. The question is then what kind of translator there exists or how to do this translation. This leads us to the question whether there exists some kind of modeling tool that could be of help in doing so.

It seems that Business Practice Modeling Notation (BPMN) introduced by White (2004) might be a good solution. On one hand, figures describing processes in BPMN are relatively easy to understand for business people. (This statement is based on experience of Copenhagen Business School and IT University students, who took the ERP systems course this spring and gathered information of business processes in companies using BPMN.)

On the other hand, they are more-or-less compatible with Unified Modeling Language (UML), so it is relatively easy for developers to use BPMN diagrams to draw UML diagrams. Moreover, it was suggested (White, 2004) that BPMN may be once incorporated into UML. (According to specification of the current version of UML, is has not happened yet.) If it happens, it might be even easier to transform requirements,

mapped by BPMN, to a new ERP system, since software development tools supporting UML will have to support BPMN as well.

So, the arrow called "reverse engineering" in figure 1 may be expanded into the model illustrated in figure 2.
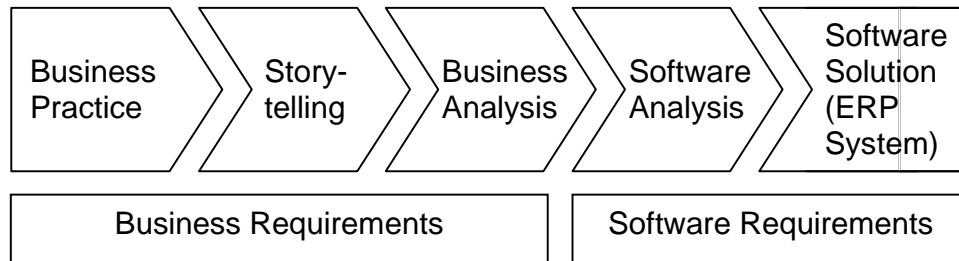

Figure 2 A model for transforming ERP business requirements to software requirements

As it follows from the previous chapter, the base for requirement specification is *business practice*, i.e. reality in which companies operate. This can be viewed from two different but not contradicting points of view. Historically first, business practice can be viewed as business processes (or functional areas) within an organization (or also beyond the organization, e.g. in case of supply chain management). The second view takes into consideration roles, i.e. different roles of people – some of them may need to access more than one process, others may need to access only a part of one process. This view might be extended by the concept of personas, so users are not perceived as stereotypes but as real persons, where one takes into account even their non-office-related background. This may make it easier to predict goals and actions of users (Nielsen, 2002).

This reality, whether we look at it from a process or a role point of view, needs to be communicated somehow. According to Hedman and Borell a narrative might be a communication medium suitable for presentation of ERP requirements since narratives can manage a high degree of uncertainty and ambiguity. The statement they make is that "In fact, narratives might be the only way to capture invaluable input regarding a project size and complexity of an ERP implementation" (Hedman, and Borell, 2004, p. 287). In addition, Clausen (1994) describes the use of narratives in system development and claims that the approach is "more or less" the solution on the problem with the gap of knowledge between end-users and systems designers. This is also a clear improvement over the "trial and error" strategy that is the most common approach for development and implementation software applications. Therefore *story telling* precedes business analysis in our model.

Under *business analysis* we mean modeling of business processes (or roles), which were communicated by narratives. BPMN is a suitable tool for that because the notation is easy to learn since it uses only four basic categories of elements (each containing only up to three elements). BPMN diagrams can be shown to business people who can check whether a business analyst understood them correctly.

Moreover, it is important to realize that development of an ERP system is not pure automation of existing (paper-based) processes. As Hammer (1990) suggests that

with ERP systems, it is actually possible to obliterate some processes. So, in this stage a business analyst should critically look at gathered modeled processes and decide whether any business process reengineering is needed before handing papers to system developers.

There might be other concepts useful in this step. For example, the contracting language (Andersen, Elsborg, Henglein, Simonsen, Stefansen, 2006) is worth noting. If a reasonable graphical user interface is developed (preferably supported by a debugger) for the language, it may be used for description of commercial contracts, possibly even of some business processes.

Software analysis involves modeling of the system in UML, deciding on technical issues etc. It should be noted that the boundary between tools for business analysis and software is somewhat fuzzy. On one hand, BPMN diagrams are usable for software analysis. On the other hand, some UML diagrams, such as data flow diagram, can be used to model things already in the business part of requirements specification gathering. The contracting language, in its nowadays form, seems to belong rather to the software analysis stage but with a graphical user interface, it may be easily used also by a business analyst.

Last but not least, an ERP system (*software solution*) is developed. Hopefully one that fits well and requires minimum number of updates (with the exception of legal ones implied by law makers).

Conclusion

To sum up, challenges regarding development of future ERPs may be divided into three areas: 1) future ERPs need to be a global product with local reach (can be implemented with a minimum of effort), 2) the business landscape has changed and will change over the years to due to globalization and most organizations will become more and more virtual 3) new technical innovations will increase the benefits of ERPs to a great extent if these are used correctly.

In this paper we have attempted to answer the question how to gather requirements for future ERPs (in a form of developed scenarios) and how to transform gathered these business requirements into software requirements, not expecting business people to deal with too technical modeling methods. Though many issues still remain open and it is probable that we will be able to identify additional methods and tools supporting both business and software analyses.

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