Requirements Engineering Method and Maturity Model for ERP Projects

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ABSTRACT

Requirements engineering is an important component of Enterprise Resource Planning (ERP) projects. We propose: (1) An ERP maturity model (EMM) for assessing the ERP maturity within the organization and (2) A Requirements Engineering (RE) method to capture the requirements from the different types of users of an ERP system, verifying and validating them. The EMM consists of three levels and each level has a focus and a key process area. Key indicators of ERP functionality identified by a major ERP vendor have been used to apply the EMM to an enterprise. This identifies the level of the EMM to which an enterprise belongs. Then the RE is used to enable the enterprise to assess its ERP system requirements and refine it using a process database to reach a higher level in the EMM. We deem that the EMM and the RE can benefit users across all the ERP projects.

Keywords: customization; ERP functionality; ERP maturity model (EMM); information systems; requirements engineering method; validation; verification

INTRODUCTION

Enterprise systems are complex and expensive and create dramatic organizational change. Learning from high performance projects is crucial for software process improvement. Last, but not least, by determining the crucial factors of a successful ERP system, we create incentives that likely will yield higher performance. Weinberg (1971) demonstrated many years ago that the proverb “You get what you measure” also is highly valid in the software engineering field. ERP projects are a subclass of software projects (Stensrud & Myrtveit, 2003). According to a report by Advanced Manufacturing Research (AMR) (www.amrresearch.com), we find that the entire enterprise applications market which includes Knowledge Management (KM), Customer Relationship Management
(CRM) and Supply Chain Management (SCM) software will top $70 billion by 2007. Many researchers and practitioners have suggested that it is easier and less costly to mold business processes to ERP systems rather than vice versa (Davenport, 1998; Holland & Light, 1999). A high failure rate in implementing ERP systems has been widely cited in the literature (Davenport, 1998), but research on critical success factors in ERP implementation is rare and fragmented.

To date, little has been done to theorize the important factors for initial and ongoing ERP implementation success (Brown & Vessey, 1999). Enterprise Resource Planning (ERP) systems (Fui-Hoom Nah & Lee-Shang Lau, 2001) have emerged as the core of successful information management and the enterprise backbone of organizations. ERP implementation is a lengthy and complex process and there have been many cases of unsuccessful implementations which have had major impacts on business performance (Parr & Shanks, 2000). Also, ERP applications require the capability to link all internal transactions (Hiquet, 1998). Though the ERP implementation and its critical issues, success factors and implementation problems have been identified (Markus, Axline, Petrie, & Tanis, 2000), but no empirical studies and no explicit proposition are evaluated so far.

One study of mid-size to large companies conducted by AMR research found that 67 percent of these companies are implementing some form of ERP, while another 21 percent are evaluating potential ERP systems solutions. As a growing number of companies adopt ERP systems, the performance of ERP systems is identified as one of the top five IT priorities among global CIOs according to independent surveys conducted by the Morgan Stanley (Togur & Bloomberg Morgan Stanley, 2003) and Deloitte & Touche/IDG Research Services Group (Deloitte Touche, 2002).

In this article, we propose: (1) An ERP maturity model (EMM) for assessing the ERP maturity within the organization and (2) A Requirements Engineering (RE) method for ERP system requirements (ERPRE) to capture the requirements from the different types of users of an ERP system, verifying and validating them. The EMM consists of three levels and each level has a focus and key process area. Key indicators of ERP functionality identified by a major ERP vendor have been used to apply the EMM to an enterprise. This identifies the level of the EMM to which an enterprise belongs. Then the ERPRE is used to enable the enterprise to assess its ERP system requirements and refine them using a process database to reach a higher level in the EMM than the present one. The EMM and ERPRE proposed in this article have been validated and the upshot of the study is that the proposed method to handle requirements engineering and an exclusive ERP maturity model for ERP projects is set to yield quality outcome leading to the performance enhancement of the ERP projects.

LITERATURE REVIEW

Customizations that must be carried over from one version of enterprise software to the next are the biggest technology headache (Beatty & Williams, 2006). The fit between the business processes and the ERP systems is believed to be the critical success factor of the ERP implementation (Holland & Light, 1999; Hong & Kim, 2002; Markus & Tanis, 2000; Van Everdingen, 2002). This is termed “Customization.” It is observed that the higher
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