Systematic improvement of IT processes. Application of CMMI.DEV in implementation of ERP

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Abstract (English)

This article presents and analyzes the experience of a IT European multinational company in the analysis, evaluation and improvement of internal processes of implementation of ERP tools, taking as a reference model of good practice CMMI.DEV within their management system quality.

A model but is intended for software developers and the company activities are the parameterization of ERP, provides a proven methodology to maintain, among other things, the baseline and carry out the "monitoring and configuration control so the interaction between information (requirements), configuration (current status and evolution of software) and documentation (of support and revisions) can be managed effectively and the concordance of states throughout all the ERP implementation project.
This work has also allowed the analysis of the model itself what has a disciplined approach for improvement based on a set of progressive steps also apply to the certification process and what contrasts with the methodologies proposed by other sectorial quality models based on the ISO 9000.

Keywords: implementation of ERP, CMMI, sectorial quality standards.

1.1 Introduction

ERP systems (Enterprise Resource Planning) have an enormous potential to promote the improvement of the competitive position of companies. Successful implementation of an ERP system can afford to cut operating costs, have tighter demand forecasts, speed production cycles and improve customer service (Umble et al, 2003)

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However, the results obtained with its implementation aren´t often so positive. Studies like the Langenwaltre (2000) indicate that between 40 and 60% of implementation projects of ERP systems can be classified as failures

Although these data can be questioned, if we regard that too often companies have dealt with these projects without fully assess what should be its rate of return (Umble et al, 2003) or that IT investments involve for business improvements that hardly can be assessed by ROI (Peerstone Research, 2004). On the other hand, it also highlights that the positive results in implementing ERP systems doesn´t occur automatically but they need to be given certain circumstances linked mainly by the implementation process itself.

The participation of the authors of this paper in the implementation of ERP's and methodologies of process improvement, has allowed to set some of the key factors to consider in carrying out this process of integration successfully.

1.2 Antecedents. Implementation of ERP

The implementation of an ERP system is, first and foremost, a project. Because although the effort required for system analysis and software development has been done, even it´s necessary the analysis of business processes to adapt it and get all the rate of return possible. A survey published in Information Week points out that managers assert, among others, as triggering keys of the failure the bad planning or management of the project (77%) and the alteration of the targets during its implementation (75%).

And is that based on the premise that the client in an ERP implementation is aware that this is a standard, it is very common as to which progress on the project and consultants services provider enters the customer processes, are generated or modifying the initial requirements obtained in the stage of making requirements

But we can't think that the only source of these changes or new requirements are customer requests, there´re many other sources as the impossibility of the implementation service provider to consider in the ERP standard the necessities of the processes, the discovering, while the project is progressing, of the limitations of the software, or even in some cases the review, unplanned, internal processes of the client organization to improve its effectiveness/ efficiency taking advantage of the implementation of the ERP standard processes.

Apart from that these new requests or modifications aren´t generated at the same time (or at least not completely) or by the same means, because the speakers aren´t usually the same in the different processes: consultant of logistics ERP is difference of financial ERP, and of course the key user at the client isn´t the same in both processes.

In general, this situation is multiplied insofar as that more organization processes are being implemented at the same time, because it generates the logical bidirectional exchange of information customer and service provider, not managed

and/or controlled, at different times (taking requirements, solution design, proto-type, prototype changes, training, etc..) and from different pathways (purchases, sales, production, CRM, ...).

The combination of at least these three "axes" (processes/origin, different times/project phases, bi-directional exchange of information/customer-supplier) makes not only the management/planning of the project will be a task rather com-plicated, but also increases their complexity as they increase in magnitude, ie to take part a third actor as a supplier of other applications to integrate with ERP, to extend the deadline of the project will, to broaden the scope of the project to im-plement new processes, to incorporate new partners, etc.

Additionally, if the implementation service provider of does not have set pro-cesses that enable him effective management of ERP implementation project, cer-tainly the interaction of these axes can jeopardize the success of the project: status unknown of parameterization, much amount of information without management, documentation of date, etc.

In practice most of the services providers of implementation take the necessary steps to manage and control the projects, but only to a certain level of detail. The tasks carried out by the consultants to overcome the abovementioned situations, usually lost in the control overview of the project. These tasks that individually observed, from the point of view of resources, in some cases seem negligible, add-ed up can be a huge number of hours consultant on various programs, modules, at different stages of the project or in different documents and applications, or what is the same increase in project cost, failure to comply with the project deadlines, quality problems, etc.

That ineffective management of the implementation project, the lack of control, brings consequences unwanted, from the increase of working hours in parameteri-zation/re-configuration, to in some cases, unnecessary developments.

From this perspective, this paper presents and analyzes the experience of a IT European multinational company in the analysis, evaluation and improvement of their implementation internal processes of ERP tools, considering as reference model good practices within their system quality management the standard CMMI.

1.3 Capability Maturity Model Integration (CMMI)

The initiatives that have been emerging around the world about software process assessment and improvement, have led to the development of several models which propound different methods of self-assessing the process capacity, different ways of representing the activities necessary for the improvement and different ways to guide the organization to maturity, and one of the best known and current-ly applied in the IT sector is CMMI (Athos et al, 2006).

Currently the model, which is oriented to the evaluation, change and improvement organization, is divided into three "constellations"

- CMMI-DEV model is used for process improvement in organizations that develop products and services
- CMMI-SVC model provides guidance to organizations that establish, manage, and deliver services
- CMMI-ACQ model provides guidance to organizations that manage the supply chain to acquire and integrate products and services

The improvement in the model is based on a set of progressive steps, in contrast to the dramatic transformation that other quality models such as ISO 9000 propose. In this sense, CMMI provides a framework for organizing these steps gradually by selecting one or more process areas in order to improve their processes, the continuous representation, or by using predefined sets of process areas that define the improvement way, the staged representation.

Both representations are equivalent and differ in the selected process area to the improvement approach. CMMI model suggests specific process areas according to the approach and the level goal choose.

Regardless of which representation is chosen, the CMMI assessment follows an approach of levels that wants to characterize the improvement in terms of the evolution from an improvised and chaotic process to a mature one with adequate discipline and greater ability:

In CMMI, unlike other models, these requirements are not a prescriptive, but provide a disciplined approach to process improvement based on the objectives and priorities of the organization.

This, for the reasons will be stated below, facilitates both its adoption, because it allows the company to set the pace of change and improvement, and its integration with other standards, that sometimes the organization must have implemented by a requirement of their customers, either general like ISO 9000 or specific like ISO 20000, ISO 27002 or ISO / IEC 12207.

1.4- Methodology for IT process improvement

The division in charge of ERP tools implementation in the company when the study was carried out isn´t indifferent to the current facts in which the quality of the software provided to customers is becoming increasingly important both as a differentiating factor as f its influence on the final costs.

This project arises from the sum of the search of opportunities to improve processes in this division and the intention to continue spreading throughout the organization using the CMMI methodology for evaluating and improving processes and more specifically the standard CMMI-DEV representing the domain for development.

A model that although is designed for software development and the company activities are ERP parameterization, a standard, changes in the initial requirements motivated by the interaction of the three areas mentioned: processes/origin, different times/project phases, bi-directional exchange of information/customer-supplier, means an update of the parameters and therefore an update of the documentation at the different stages of the project.

In this sense, the application of the CMMI.DEV tools (process areas and their practices) provide a proven methodology to maintain, among other things, the "baseline" and carry out the "monitoring and configuration control "so the interaction between information (requirements), configuration (current status and evolution of software) and documentation (of support and revisions) can be managed effectively and the concordance of states throughout all the ERP implementation project.

From this perspective, we analyzed the ERP implementation procedure of the company, which is based on the methodology of a globally recognized brand in implementing ERP solution.

The study analyzes according to requirement for a CMMI maturity level II as a goal: the implantation procedure of the ERP, the institutionalized practices in the company and the practices not documented in procedures but used by the organization.

This level includes, as seen in Figure 2, all process areas related to the implementation of an ERP. Moreover according to the model to achieve the maturity level II all process areas must achieve capability level 2 or higher.

The requirements, goals and practices both specific and generic that process areas must satisfy at this level are directed to ensuring that organization manages its processes and establishes monitors and maintains the resulting products.

This framework is the starting point of the empirical work that was formalized in the following stages:

- Diagnosis, is the initial assessment of the practices applied by the company about the satisfaction of the model requirements and it was carried out by different check-list.
- Analysis, is the preparation of the progress report that contains diagnosis information in relation to compliance with the practices of the model for the different process areas and besides the actions needed to develop and reach the maturity level II.
  This report provided, for each process area of ERP division, the definition of the causes of the deviations between the target profile and the profile reached, and recommendations (action needed) to get the first one.
- Evaluation, is the determination of the degree of approach, deployment and results evidenced for each specific and generic practice of the model, this work allowed quantitative evidence of the diagnosis findings and the vision of where the improvement efforts should be directed.

- Assessment is the establishment of performance indicators found in the earlier phases for each of the areas of process: the diagnosis, analysis and evaluation. The graphical representation provided a quick overview of the capacity level of each one of the process areas, besides their maturity level.
- Improvement proposals, are the definition of actions to be undertaken to reach maturity level II in the ERP division.

Finally, all actions required as necessary were set in a matrix to facilitate the "navigation" between the practices required by the model and the proposed measures, which also included an assessment based on immediate need or otherwise of its implementation according to their impact with respect to achieving the target level, and its difficulty of execution according to company culture and staff, and investment and training required.

1.5 Analysis and Conclusions

As expected the study has shown weaknesses in business processes that justifie the initial idea of the necessity of good practices (some existing, some existing but non-standard, and other only non-existent) in implantations and which correspond with the main causes that didn´t allow the fulfillment of the goals and practices of both generic and specific CMMI.DEV model.
The implementation of recommendations arising from the study will enable to make a qualitative step forward in improving the processes of division, highlight that for the purposes of requirement fulfillment of the CMMI standard for Level II of maturity is necessary to implement all the recommendations without exception.
Note that in general, these proposals don´t require significant initial financial investment like the procurement of technology, outsourcing, etc. or training on a large scale, and its implementation doesn´t assume complex a priori.
Common organizational culture in a company of this type and the structure of the standard, with different levels, makes it possible to think about a certain ease or little difficulty to carry out successfully, although its implementation will require time and especially the involvement of all staff.
In fact the analysis showed the effort made by the organization on standardization of processes and the development of procedures throughout years: sometimes by internal initiative (implementation of a standard), other times by customer demand (procurement of services only if you have implemented "X" standard) and in others by the same market demand (possible public procurement only if you have "Z" certificate).
In this sense affect the need to address the process improvement process in a comprehensive manner, the fact of implementing different methodologies or standards should not lead to the coexistence of separate management systems within the organization, but must seek a single process map to ensure that the re-

quirements of the models in question are coordinated and avoid duplication by reducing disparate systems, bureaucracies and especially discrepancies.

One aspect that there should be emphasized of CMMI, is its ability to incorporate other quality standards, but that is based less on sharing requirements, EN-9100 or TS 16946 are based on ISO 9000, but on their integration as part of a scheme of goals and practices within the different process areas.

Moreover the model doesn´t indicate in what order processes should be carried out, it only defines and depicts them, which allows the organization to establish its own pace in the improvement process based on their objectives and priorities and facilitates the necessary cultural change in the organization. It takes a long time to involve people in using and improving the system as part of their daily work.

And despite this implicit recognition that if you want to improve, is necessary to impact on the way of working on certain products, is also obvious that often influence on the design of the organization of work is avoided and assuring quality is limited to the control of the process by setting certain standards or guides of good practice that are slowly converging to international recognition models but are made outside the system itself which they are applied to (though often sectoral specificities are recognized, of organizational size, etc.) and to which are incorporated a certification scheme for its audit and evaluation (Prida y Grijalvo, 2008).

Besides, the values placed by the market for quality system certification has resulted in implementations based on impose certain requirements on the organization, regardless of their own culture. This has led not to internalize the new routines and once achieved the certification of the quality system it can only be maintained through strict and often expensive control system, focused mainly on what that is measurable within the system.

Simple tools such as Kankan or suggestion systems have taken 10 years for its adoption in Japanese corporations. The implementation of these techniques requires time not only for training people in new skills, but also for undertaking them and putting them into practice. (Galgano, 1993; Fortuna, 1991; Camison et al, 1991).

In this sense, highlight that the model assessment framework based on the five (maturity) levels introduced by Phil Crosby Cros80, chapter3 not only promotes the development of a disciplined approach for improvement but allows that the efforts to formalize and integrate the IT service management have visibility and recognition within and outside the organization.

The certification is a key as has shown up the implementation of other standards such as ISO 9000, EN 9100 or TS 16496, and which is motivated by the quality assurance goal from the industry, in fact audits have kept on an element of control to determine the conformity or not conformity of suppliers quality management systems (Nanda, 2005; Duran, 2005; Grijalvo and Prida, 2005, Martinez, 2004).

One area that the Scheme developed by the CMMI model stands out from the initiatives taken in recent years from different sectors: automotive, aerospace, defense and more recently tourism, to develop their Certification Schemes have been

oriented more to define and control its operation through various organizations than to promote appropriate management commitment and improvement project.

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