

# Applying PPM to ERP Maintenance and Continuous Improvement Initiatives

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## Abstract

Enterprise Resource Planning Systems (ERP) has been implemented in many companies during the last decade and has gained an increasing significance. For many companies it means that the focus is no longer on how to implement the ERP system, but rather on how to maintain and improve the system to gain business benefits from the systems. However the ERP literature on how to do this is limited. The purpose of this article is to explore how Project Portfolio Management (PPM) from the Research and Development (R&D) literature can be applied to an ERP second wave context, when companies are to prioritize and select maintenance and continuous improvement initiatives. This is done by reviewing the existing literature in the fields of PPM from R&D literature and then by reviewing the existing literature about maintenance and improvement initiatives in the ERP literature, after which the two are compared and discussed using three case-studies. The paper contributes with a discussion on how PPM from R&D can be applied to maintenance and continuous improvement initiatives in the second wave of ERP. The paper ends with arguing that emphasis needs to be given to this field, since a conscious and systematic prioritization of maintenance and improvement initiatives is believed to be able to increase business performance.

**Keywords:** ERP, second wave ERP, ERP maintenance initiatives, continuous improvement, project portfolio management.

## 1. Introduction

Enterprise Resource Planning (ERP) Systems have become an important part of the IT- infrastructure of an enterprise. ERP systems have a major impact on organizations, and therefore the implementation is often referred to as a never ending journey (Markus and Tanis, 2000; Ross and Vitale, 2001; Kræmmergaard and Rose, 2002). This journey is divided into two stages, where the first stage consists of acquisition, implementation and configuration of the system, and the second stage consists of continuous improvements and maintenance (Willis and Willis-Brown, 2002; Kræmmergaard et al., 2005). ERP maintenance initiatives are understood as *“Post-implementation activities related to the packaged application software undertaken by the client organization from the time the system goes live until it is retired from an organization’s production system”* (Pui et al., 2002, p. 100).

Many organisations have implemented an ERP system - in Denmark it is close to 90% of the 500 largest companies (Møller et al., 2003) - and are thereby moving into the second stage of the journey. Companies in the second stage are facing new challenges, where maintenance and continuous improvements of the systems are on the agenda to be able to constantly align the system with the business strategy and objectives.

Annual ERP maintenance costs average approximately 25-33 % of the initial ERP investment (Glass and Vessey, 1999). Because of the large amount of money spent on this account the intriguing question is – how to spend them wisely? In this paper we focus on the area of PPM in an ERP maintenance context with special emphasize on the ERP initiative prioritization and selection.

In this paper we take PPM theory from the R&D literature and relate it to an IS context, more precisely to an ERP context. This is believed to bring new insight into the IS-field (Hirschheim and Klein, 2003). The paper sets out to answer the question, how PPM can be applied to an ERP second wave context, involving the prioritization of maintenance and continuous improvement initiatives, and to discuss the implications of it by using the case studies as illustrations.

In the next section the background of the study is presented, followed by a section about PPM theory from the R&D literature. Next a review of ERP maintenance and continuous improvement literature is presented with the aim of finding a categorization of the ERP initiatives and the activities within these categories. Then both fields are combined in a “framework” for prioritizing ERP maintenance and continuous improvement initiatives. Further three case studies and the methods used to conduct them are presented, illustrating how the companies carry out the process of prioritizing initiatives in the second wave of ERP. This is followed by a discussion on the implications of prioritizing initiatives using PPM theory from R&D, pointing at the most interesting issues arrived from the case-studies. Finally conclusions are drawn and implications for further research are outlined.

## **2. Background**

Historically modern portfolio management was founded by Harry Markovitz in the 1950's and was originally developed for financial investments (Markovitz, 1952). Not until the 1980's portfolio management was explored in the context of IT project, where McFarlan used a financial risk-based approach to prioritizing IT projects. In the following years the area of IT PPM did not attract much attention (De Reyck et al., 2005). Studies within the last decade have focused on how to divide IT projects into groups (Cameron, 2005); how IS projects are selected within different organizational groups (McKeen et al., 1994); how to incorporate dependencies among IT projects (Bardhan et al., 2004) and how to adopt PPM for IT projects (De Reyck et al., 2005). However further and more extensive studies, incorporating PPM tools from the R&D field applied to IT projects, have not been developed further.

An element of IT projects are ERP maintaining and improving initiatives. The ERP second wave has been explored within recent years. Nah et al. (2001) and Pui et al. (2002) have concentrated on maintenance categorizations and Pui, et al. (2002) takes this area to a higher level by incorporating the categorizations in an ERP-client

benefit-oriented maintenance taxonomy. The main objective of this taxonomy is to divide the ERP maintenance initiatives into those providing benefits (also referred to as non-compulsory), and thereby being prioritized, and those that do not provide benefits (referred to as compulsory initiatives). However, research within this area has been limited in relation to prioritizing ERP maintenance initiatives, and the link between PPM and ERP maintenance initiatives has not yet been revealed.

PPM is not to be seen as an isolated event in a company. It is rather an event that must be interrelated with other major decisions within the company. Weill and Ross, (2004) have shown this in their book about IT Governance, where they term these major decisions; Key IT Governance decisions, as illustrated in the figure below.

<b>IT principles decisions</b> High level statements about how IT is used in the business		
<b>IT architecture decisions</b> - Organizing logic for data, applications and infrastructure captured in a set of policies, relationships, and technical choices to achieve desired business and technical standardization and integration	<b>IT infrastructure decisions</b> - Centrally coordinated, shared IT services that provide the foundation for the enterprise's IT capability  <b>Business applications needs</b> - Specifying the business need for purchased or internally developed IT applications	<b>IT investments and prioritization decisions</b> - Decisions about how much and where to invest in IT, including project approvals and justifications

**Figure 1.** Key IT Governance Decisions (Weill and Ross, 2004, p. 27)

IT investments and prioritization decisions interact with the rest of the decisions, where IT investments and prioritization decisions either influence or are influenced by the other decisions, and thereby create a company, where all means are working towards the same objective. As shown in Figure 1, IT investments and prioritization decisions are part of the IT governance key decisions, where focus of this paper is on prioritizing IT investments, because ERP maintenance initiatives are part of these investments.

### 3. Project Portfolio Management

PPM can be defined as *“a dynamic decision process, whereby a business’ list of active new products (and R&D) projects is constantly up-dated and revised. In this process, new projects are evaluated, selected and prioritized; existing projects may be accelerated, killed or de-prioritized; and resources are allocated and reallocated to the active projects”* (Cooper et al., 2001).

In the 1990's and up until today, PPM received increasing attention, but the focus changed from only concerning the financial aspects when prioritizing projects, to also concerning strategic aspects among others (Cooper et al., 2001). In assessing these aspects of a project, several different tools emerged from the literature. We have divided the tools in the literature into two groups, because they differ from each other in the way they prioritize projects. The first group is named; the balancing

group - thus these tools were used to balance the portfolio of projects. By balancing, the portfolio is insured the mix of projects that results in better performance<sup>1</sup> (Cooper et al., 2001). The second group of tools is named the ranking group and is used to rank the projects in respect to each other, thus these tools create a list from which projects must be conducted in the given order (Cooper et al., 2001). This is illustrated in Table 1, where the type of tool is depicted to the left and thereby divides the table into the two groups, followed by the names and descriptions of the tools attached to the group.

**Table 1.** Project portfolio management tools

Type	Tool	Description
Balancing	Program division	Division of projects into programs
	Risk analysis	Division of projects into different risk groups
Ranking	Financial assessment	Economic calculations on project value
	Scoring models	Scoring within different areas
	Checklists	Yes/No answers to several questions
	Dependencies	Assessing dependencies between projects

#### *Program division*

These tools use the business strategy as a basis of allocating resources to different types of projects, which are termed programs. It is possible to make up own categories (Cooper, et al. 2001). The programs represent a distinct type of projects or group of projects that all work towards a shared objective. When the programs are established, resources are allocated to them, and the projects are distributed into the programs that they belong to. In the individual program, the projects are prioritized using a ranking tool, and the resources are allocated from the top of the list and down (Cooper et al., 2001).

#### *Risk analysis*

These tools are used to balance the portfolio according to the wanted risk level of the business which depends on the business strategy and risk tolerance. Cooper et al (2001) has presented a diagram to assess the risk of the project portfolio, called the risk-reward bubble diagram.

#### *Financial tools*

These tools are used to evaluate the economic value of the project. They can be used to either rank the projects according to each other, or to a specific economic criterion. The latter approach is used to make go/kill decisions. Examples<sup>2</sup> of these

<sup>1</sup> Performance is according to Cooper, et al. (2001) based on high value projects, the right balance of projects, a strategically aligned portfolio, the right number of projects, that projects are done on time and that spending reflects the business strategy.

<sup>2</sup>Other examples identified in the literature are Internal Rate of Return (IRR), Return on Average Investment (RAI), Payback Period (PBP), Expected Value (EV), The Capital Asset Pricing Model

tools are Return On Investment (ROI), Economic Value Added and Net Present Value (NPV) (Luftman, 2004).

#### *Scorings models*

These tools are used to evaluate the projects on several different areas with associated parameters. Each project is scored on every parameter, and the overall score is used to rank the project according to other projects, or to a certain economic criterion. The latter approach is again used to make go/kill decisions (Cooper et al., 2000).

#### *Checklists*

These tools consist of a list of yes/no questions, which are conducted for each project, and used to rank projects according to each other or go/kill decisions (Cooper et al., 2001; Cooper et al., 1998).

#### *Dependencies*

These tools are used to assess, whether a project depends on or is dependent on other projects. A way to do this is inspired by the real options theory, transforming the dependencies into an option in the project, and adding the value of that option to the project value (Trigeorgis, 1996).

## **4. ERP maintenance and continuous improvement initiatives**

ERP maintenance initiatives are all initiatives after go-live until the system is retired from the organization, in accordance with the definition used in this article. This section describes the initiatives after go-live proposed by different authors to locate the initiatives to be used throughout this paper.

Markus and Tanis, (2000) and Willis and Willis-Brown (2002) have dealt with ERP in the time after going live with the system, and have primarily addressed the phases in the ERP journey, but explicitly addressed the maintenance and continuous improvement initiatives. In contrast Pui et al. (2002) concentrates exclusively on ERP maintenance and has classified the initiatives into several categories, which are listed below:

- Corrective
- Patch-maintenance corrective
- Enhancement
- Adaptive
- Patch-maintenance adaptive
- Functional upgrade
- Technical upgrade

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(CAPM) (Archer and Ghasemzadeh, 1999), Expected Commercial Value (ECV) (Cooper et al., 2000), Return On Net Assests (RONA) and Productivity Index method (Cooper et al., 2001).

- Patch-maintenance standard
- User support

These categories are the result of a longitudinal study in the field of ERP maintenance, and are characterized by a high degree of detail. However the findings are based on a single study and therefore not exhaustive (Pui et al., 2002). Furthermore Pui et al. (2002) suggests that initiatives are divided into compulsory and non-compulsory initiatives, where the latter is to be prioritized. Still this is not taken into account in this paper.

A multiple case study within the area of ERP maintenance was conducted by Nah, et al. (2001). The results produced a categorization consisting of six maintenance categories, which are listed in detail in Table 2.

**Table 2.** Maintenance categories (Nah et al., 2002)

Category	Initiatives
Corrective	Application of hot packs, troubleshooting, import new objects from ERP vendor
Adaptive	Transfers, testing, modifications and enhancements, Authorizations, tuning of systems interfaces
Perfective	Version upgrade
Preventive	Routine administration, monitoring workflow
User support	Training users, help desk
External parties	Coordination and administration, creation of Online Service System (OSS) notes

The last category, External parties, consists of supporting activities that are necessary across the first five categories (Nah et al., 2001).

By reviewing the literature of ERP maintenance initiatives, we found two types of initiatives - intention-based (Nah, et al. 2001) and another type of initiative, which we named; task based initiatives. Markus and Tanis, (2000) and Willis and Willis-Browns', (2002) categories of initiatives are primarily task-based, whereas Pui et al. (2002) and Nahs' et al. (2001) categories are intention-based. The difference between task- and intention-based categories is that the initiatives are either grouped after the nature of the initiative, or after the underlying intention of performing the initiative. Given an example, configuring a new module could be classified as a task, but on the other hand this initiative could also be classified as intention based. Where the intention by configuring the module is to perform an adaptive behaviour, the initiative is classified into the adaptive category, which is an intention-based categorization. In addition the intention-based categories have a greater level of detail in contrast to the task based categories.

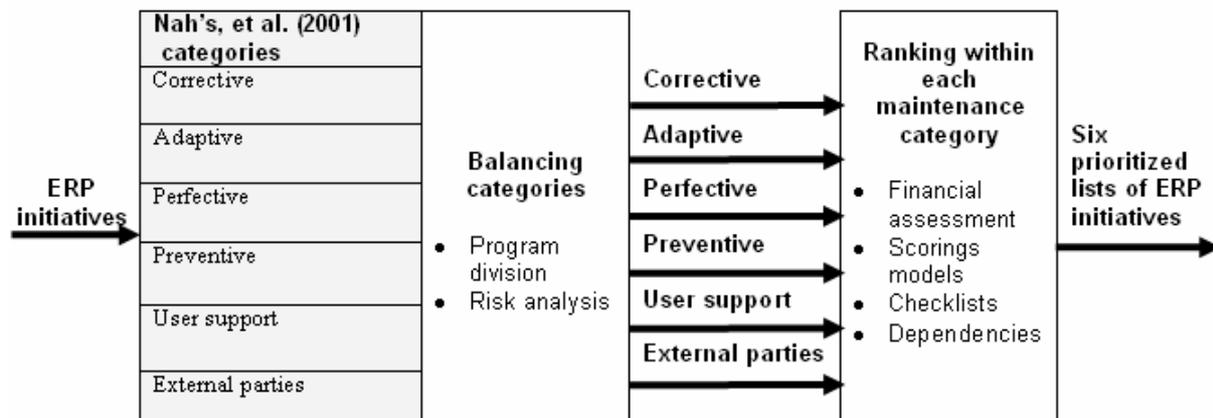
Both Nah et al. (2001) and Pui et al. (2002) have proposed categories of maintenance, but the reason for choosing Nah's et al. (2001) categorization is due to the fact that their findings enclose Pui's et al. (2002) categories in a more abstract form, thus having fewer and quite distinct categories.

## 5. PPM applied to the second wave ERP initiatives

In this section ERP maintenance and continuous improvement initiatives are discussed in relation to the PPM theory from R&D, and two different combinations are presented. Both of them use Nah's et al. (2001) categorizations as the base for prioritizing the maintenance and continuous improvement initiatives.

The PPM literature suggests that the optimal solution for prioritizing is to use several tools, a conscious structure and a balancing tool as the dominating tool (Cooper et al., 2001). This is supported implicitly by Pui et al. (2001), who suggests a framework using a balancing tool first (the categorization), and afterwards a ranking tool (a scoring model).

The first option is to use the categories proposed by Nah et al. (2001) and balance these categories according to risk, strategy or amount of money. Afterwards the initiatives within the category are ranked using one of the ranking tools illustrated in the table below. In this way each category ends up with a list of prioritized initiatives, and the order of execution is presented. The process is illustrated below.



**Figure 2.** PPM applied to ERP maintenance initiatives, option 1

The second option does not balance Nah's et al. (2001) categories, but take all the initiatives and balance them across these categories, and thereby regrouping them according to the balancing tool used, followed by ranking the initiatives within these categories, using ranking tools. This option can use Nah's et al. (2001) categorization as a program division tool, but not necessarily. In this way all the initiatives are regrouped, and each new category ends up with a list of prioritized initiatives, and the order of execution is presented. The process is illustrated below.

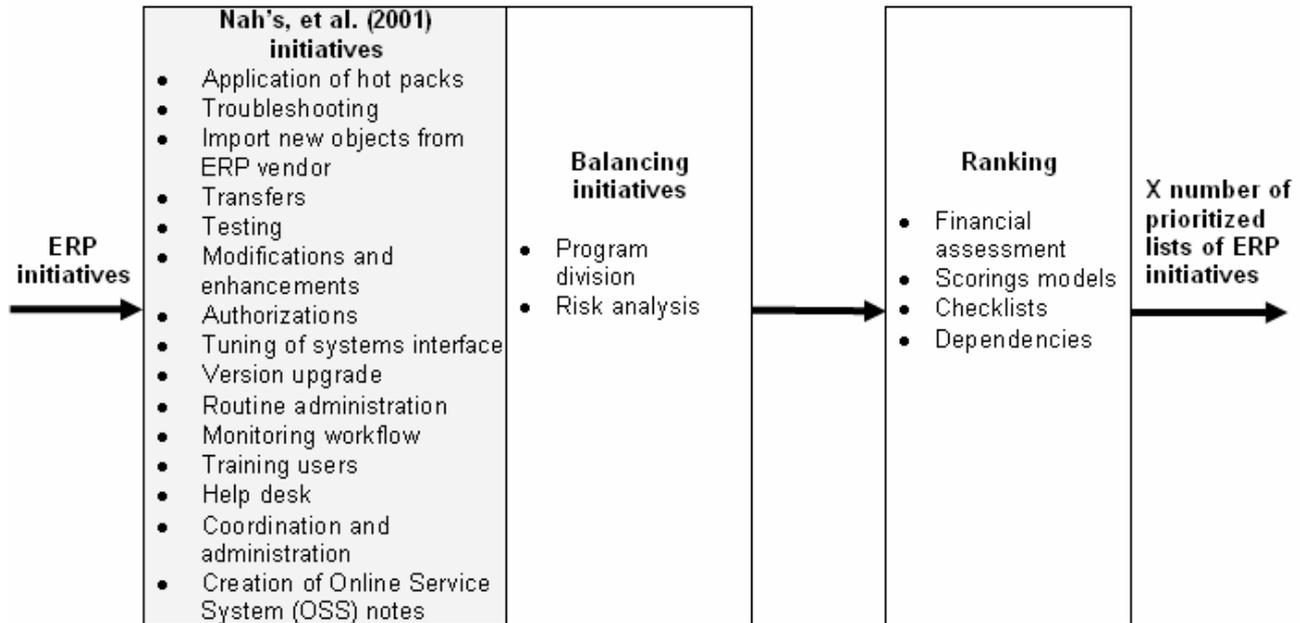


Figure 3. PPM applied to ERP maintenance initiatives, option 2

The two options of combining the PPM and ERP literature can provide a conscious structure for prioritizing ERP maintenance and continuous improvement initiatives. Furthermore both options use a balancing tool first, followed by the use of ranking tools. The result of applying PPM to the prioritization of ERP maintenance initiatives, should give rise to achieving better business performance thus enabling proactive planning.

## 6. The case studies

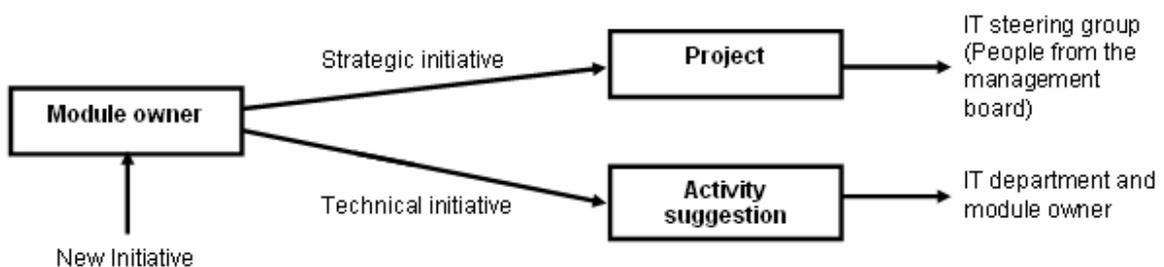
In order to explore the PPM approaches used by companies, case studies were conducted. Three companies were chosen, and they all differ in industry and size, but are all similar in their ERP architecture maturity level. The reason for choosing companies with different characteristics was to achieve a broader picture of how PPM is carried out in different types of companies. Interviews with top level management within the IT area were conducted using semi-structured interview guides in the companies, where the informant could lead the dialogue hence unexpected areas could be revealed. The interviews were undertaken during a period of four months in the summer of 2005 and were all taped and transcribed. Subsequently the transcript was analyzed to observe, how the companies performed their prioritization of the ERP maintenance and improvement initiatives.

An analysis of these case studies is presented separately, giving an introduction to the initiatives that the companies have taken with regard to their ERP systems, and how they prioritize these initiatives. Secondly it is described who is involved in the prioritization, and what the procedure is for deciding which new initiatives to launch. The findings of each of the case studies will lead to a discussion on PPM applied to ERP initiatives.

## Alfa

This company started in 1881 and is in the food industry. It has 2,000 employees around the world in more than 60 countries. The implementation of SAP was carried out in 1999.

Alfa divides their initiatives into strategic projects and activity suggestions that are more technical. Alfa strives to achieve ERP initiatives being proposed by the organization through the module owner, who decides whether the initiative is a good idea – also referred to in the literature as a go/kill decision. Next, the initiative is categorized as a project or an activity suggestion, based on the division of initiatives, which can be strategic and thereby a project, or technical and therefore an activity suggestion. A project could be upgrading the entire SAP system. Each module has a module owner, who is responsible for all decisions concerning initiatives belonging to a particular business area. Initiatives such as functionality configurations are activity suggestions, and the module owner prioritizes these initiatives in collaboration with the IT department. If the initiative turns out to be a strategic project, the project is prioritized by the IT steering group. The procedure for prioritizing the initiatives is shown in the figure below.

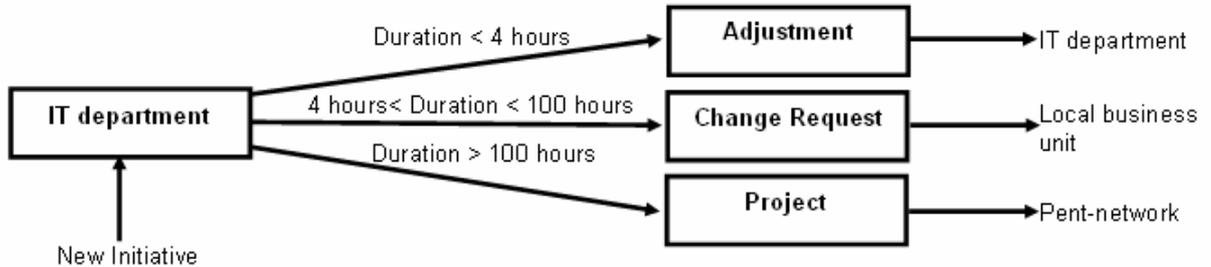


**Figure 4.** Alfas division of ERP maintenance initiatives

The prioritization differs from a project to an activity suggestion. For each project a business case is made, primarily containing a financial assessment, but the IT steering group also prioritizes the projects on importance in relation to the business, which seems to be a subjective judgment. Activity suggestions are prioritized by the IT department in collaboration with the module owner, but the underlying principles are not revealed, though it seems as if urgency is the critical factor. However some activity suggestions are not directed through the module owner. Sometimes the activity suggestion is addressed by calling a programmer in the IT department and thereby the normal procedure is bypassed.

## Beta

The company was established in 1932 and is a family-owned business. Furthermore the business has 7,300 employees worldwide. They began implementing SAP in 1993, but had some difficulties on their way. Even though it took several years to get an integrated system running in the whole company, this was done to the satisfaction of the company a few years ago. Beta divides its ERP initiatives into adjustments, change requests and projects based on the amount of hours estimated to complete the initiative. Adjustments are initiatives that are done within 4 hours, whereas projects are initiatives lasting more than 100 hours, though this limit is not fixed. In between these categories, all the initiatives called change requests are placed. This is also illustrated in the following figure.

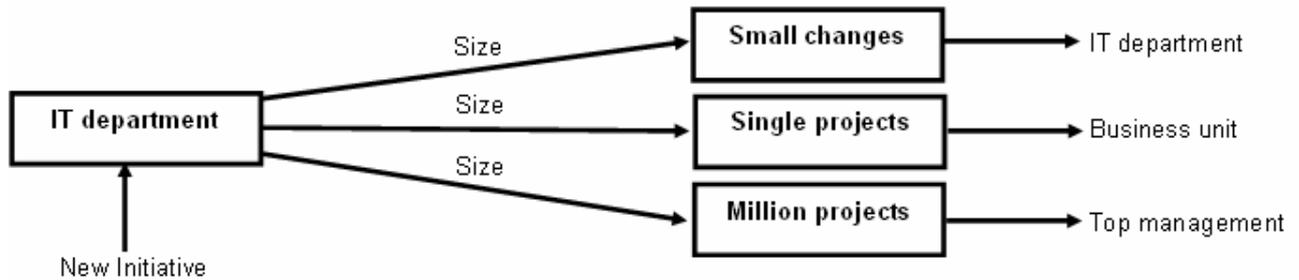


**Figure 5.** Beta's division of ERP maintenance initiatives

Beta prioritizes its initiatives using different methods in the hour categories. The adjustments are not prioritized, they are just put into action by the IT department, because they are viewed as minor changes, and therefore only having a local effect. The change requests are prioritized by the local business unit requesting the changes, and the prioritization mainly relies on the financial aspects, but is also based on common sense, which probably is the reason why the change request is in accordance with their strategy about having a flexible, but integrated IT system. Due to the common sense aspect in the decision process, it can differ from person to person whether a change request is found sensible. Initiatives categorized as projects require a business case to justify the purpose of the project, which forms the basis for the prioritization process performed by the Pent-network. The Pent-network consists of a manager with coordination responsibility, an IT architect and a number of users from Beta. Sometimes the projects are viewed all together by the management and prioritized. This was a very difficult task, and at the last meeting only one project was rejected, namely a project concerning an upgrade to the newest SAP version. This seemed to be the only project, where no one had an ownership feeling and therefore no problems occurred, when rejecting it.

### **Gamma**

Gamma was founded in 1933 and is in the industry of mechanical/ electronic components and control systems. The company employs more than 18,000 people and is represented in 20 countries. The implementation of SAP began in 1988 and since then, it has been upgraded to the newest version. Gamma does not explicitly divide their initiatives into categories based on certain criteria, but it seems as if the amount of money estimated is the underlying criteria. In figure 6 it is shown how Gamma manages its initiatives.



**Figure 6.** Gamma's division of ERP maintenance initiatives

The IT department categorizes the initiatives into three groups. The small changes such as normal changes or hot packages, are handled by the IT department and are not prioritized, but mainly just performed. Single projects on the other hand are managed by the business unit requiring the change. How the single project is prioritized alongside other single projects in the business unit is not revealed, though the manager of the business unit decides upon a rough estimate of the project. This rough estimate seems to consist primarily of a financial assessment. Million dollar projects, such as upgrading the system and configuring new modules, involve top management and the IT department, but once again the exact prioritization process is not clarified.

## 8. Discussion

In this section the aim is to discuss how the companies could benefit from applying PPM in their handling of ERP maintenance initiatives. To obtain a structured approach in the discussion, it is divided into the following sections: Balancing the ERP initiatives, Ranking the ERP initiatives, Applying a conscious structure, Pros /cons of using PPM, and PPM in a larger perspective. These sections are chosen due to the fact that PPM is the underlying line of thought.

### Balancing the ERP initiatives

The case studies showed that the companies use a limited amount of the identified tools in the PPM literature or categories in the ERP literature. They all divide their initiatives into somewhat floating and loosely defined categories, and thereby not into conscious program division. The outcome of not balancing the ERP initiatives is for instance that initiatives of perfective character are competing with adaptive initiatives generating quick benefit. The risk is that the latter initiatives always are favoured. By balancing the initiatives using either risk analysis or program division, reflecting the business strategy, the companies will become aware of which initiatives they actually spend money on, and on the basis of this, determine how much to spend on each category in the future. Thereby initiatives with similar characteristics are competing with each other.

In the case of Beta, who has had a long and troubled ERP implementation period, a risk analysis tool could provide the company with an overview of the portfolio of initiatives, thus giving them the opportunity to focus on initiatives that match their wanted level of risk, which probably is at a lower level than companies who managed the initial implementation to greater satisfaction. The other companies, Alfa and Gamma, could draw benefit from using a distinct kind of balancing tool

providing the basis for prioritizing the initiatives homogeneously within each category, hence configuring functionalities and upgrading the ERP system, are in separate categories. This should be fulfilled by either an underlying model that will capture their strategy into several programs, or the risk analysis tool which will reflect their risk tolerance.

### **Ranking the ERP initiatives**

Ranking tools are used in Alfa, Beta and Gamma, but they all primarily use ranking tools of financial character. According to Cooper, et al. (2001) this assessment used alone results in bad performance, and should be utilized alongside other ranking tools. Giving an example, the financial benefit of configuring a new module (corrective maintenance) could result in a tangible benefit in comparison to an intangible initiative such as training users (user support) - still it is an important task to build additional user skills (Markus and Tanis, 2000). This could be incorporated by using a scoring model. Another example where the use of several ranking tools could come in hand is in situations where an upgrade is a necessity before configuring new modules, and this reliance could be incorporated by using the ranking tool dependencies as a supplement to another ranking tool like a financial assessment. The ranking tools to choose among are scoring models, financial assessment, checklists and dependencies using option theory. All of the companies could gain advantages by using any of the ranking tools, and using several tools is even better, because it will provide a varied picture of which initiatives in the prioritized list, are to be performed first. Furthermore scoring models and checklists can be created to meet the companies' specific requirements.

### **Applying a conscious structure**

The aim of applying PPM to ERP maintenance initiatives is to attain a conscious structure and thereby homogenous criteria of how initiatives are prioritized. According to Cooper, et al. (2001) the best performers have a conscious structure for PPM and use a balancing tool as the dominant tool. Furthermore an average of 2.4 tools should be deployed – this finding is based on an average number of tools utilized by top performers. The practical implication however, is to ensure sufficient use of the tools - three tools should be chosen.

By using one or more balancing tools, followed by one or more ranking tools, several tools are utilized, and a balancing tool is dominating, hence a conscious structure is obtained. This paper argues that PPM can be applied to ERP maintenance initiatives and thereby bringing in a conscious structure, which will induce better performance in the ERP initiatives portfolio. Alfa could e.g. use a program division tool as Nah's, et al. (2001) categorization, and then use a couple of ranking tools to rank the ERP initiatives within the programs, such as a scoring model and a financial assessment like NPV, and thereby achieve a better performance.

### **Pros/ cons of using PPM**

There are several consequences of applying PPM to prioritize ERP maintenance initiatives, which is outlined as pros and cons below.

The main advantage of using PPM is the increase in the performance of portfolios by using the company's resources on the right projects (Cooper, et al. 2000) resulting in greater benefit for the business. Given the fact that ERP maintenance is a costly area (Glass and Vessey, 1999), the issue of spending the resources on the right

initiatives arises. By applying PPM to ERP maintenance initiatives, the resources are spent on initiatives providing greater business benefit. Additionally the planning becomes proactive (Gartner|G2 report, 2004) instead of prioritizing initiatives on the grounds of urgency, like Alfa. Additionally PPM makes the prioritization explicit and ensures that the project selection process is not based on politics, opinions or emotions (Cooper et al., 2001). Another advantage is that initiatives, such as the SAP upgrade in Beta, are assessed using the same criteria as other similar initiatives, without involving any kind of ownership feelings for specific initiatives.

The disadvantage of using PPM is that it requires somewhat substantial resources to perform it, which could be the reason for not prioritizing all the ERP maintenance initiatives. Additionally if top management is involved in the PPM process, it will require a great deal of their time (Cooper et al., 2000).

### **PPM in a larger perspective**

As earlier mentioned, PPM is not to be seen as an isolated event in a company and neither is the portfolio management of ERP initiatives, which in fact is part of the company's overall PPM. Decisions within this area are rather to be considered as being interactive with the rest of the major decisions in a company. Broadly viewed, the prioritization decisions and the following investments are influenced by, and do influence other decisions, such as IT infrastructure or IT architecture decisions. An example of this interconnectivity within an ERP second wave context, could be, that a third party product is dependent on whether or not the IT architecture supports the technical integration. The use of the recommended PPM tools and structures ensures that these decisions are in accordance with each other, making every part of the company work toward the same objective.

## **9. Conclusion**

ERP maintenance costs constitute one fourth of the initial implementation investment (Glass and Vessey, 1999) on an annual basis. However the question was how to spend them wisely? And how is this done in accordance with the other key IT governance decisions? This paper argues that PPM can be applied to ERP maintenance, which is part of the IT investment decisions. The literature on PPM was reviewed, and it was found that the tools revealed could be divided into two groups – balancing and ranking tools. Furthermore the literature on ERP second wave was reviewed to reveal which initiatives are carried out in this wave. The maintenance categories proposed by Nah, et al. (2001) can either settle the base of dividing the initiatives, or the initiatives can be divided by another balancing tool. Within these categories the idea is to utilize one or several ranking tools, which produce a list of prioritized initiatives. The case studies outlined in this paper were used as illustrations in the discussion upon PPM appliance in a second wave context. By applying PPM to ERP maintenance initiatives, a better performance should be obtained thus proactive planning is possible.

The study presented in the paper can be seen as a pre-study, and therefore a more comprehensive study that aims at exploring multiple companies' approaches to prioritizing ERP maintenance and continuous improvement initiatives, should be conducted. This could be performed quantitatively in order to build a framework for PPM in an ERP maintenance context. This paper creates the basis for a quantitative

study, and it is encouraged that our findings are examined further. The quantitative study should contribute to clarify, whether better performance is achieved using our recommendations outlined in this paper, in regard to prioritizing ERP maintenance initiatives.

The ERP literature questions whether all initiatives should be prioritized. Pui, et al. (2002) proposed that some maintenance initiatives are compulsory and therefore not prioritized. Despite of the fact that the aim of this paper is not to explore whether the initiatives are divided like this, the case studies still revealed that the companies do not prioritize the initiatives, if they are of a minor change. The question is whether all initiatives should be prioritized using PPM, and whether initiatives that are compulsory for maintaining the daily operations exist. This paper encourages further examination of this area.

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