

# Memory as an Elephant: How prior Events Determine User Attitudes in ERP Implementation

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**Abstract.** Assimilation of a standard ERP system to an organization is difficult. User involvement seems to be the crux of the matter. However, even the best intentions for user involvement may come to nothing. A case study of a five year ERP implementation process reveals that a main reason for this miss may be that the perception of usefulness in any given phase of the implementation is heavily dependant on preceding events – the process. A process model analysis identifies eight episodes and nine encounters in the case showing that users attitude towards an ERP system change between acceptance, equivocation, resistance and rejection depending on three things: (1) Dynamic between user and consultants, (2) Dynamic between different user groups, and (3) Understanding of technical, organizational and socio-technical options.

## 1 Introduction

Organizations may have very diverse technical and strategic reasons for adopting integrated Enterprise Information Systems [1], [2], and success is not a monolithic concept; rather it is multidimensional and relative [1]. However use is one of the most frequently reported measures of system implementation success [3]. We therefore assert that a successful implementation must be coupled with high quality of use in order to fully realize the benefit of the ERP system. Quality of use defined as “how well an end user understand a piece of software and how effectively the user can exploit the capabilities of the software” [4]. Although research shows that most organizations implementing ERP systems may expect difficulties using the system for a shorter period after go-live [2], some organizations continue to struggle with the use of the system for years after go-live[5]. The poor quality of use can be caused by:

- The capabilities of the ERP Package being unable to meet the organizational requirements[6], [7].
- Poor design decisions regarding configuration of the ERP Package, customizations and integration with other systems [1], [8]
- Human factors: Unforeseen human enactment of the software [4] and resistance to change[9].

Having users participate and being involved in ERP implementations are considered essential for success ([10], [9], [8])and will result in a better fit of user requirements,

achieving better system quality, use and acceptance [11]. “User participation” refers to the behaviours and activities that users perform in the system implementation process. “User involvement” refers to a psychological state of the individual, and is defined as the importance and personal relevance of a system to a user [12]. However we should not assume that having users participate will automatically result in personal involvement and commitment to the result. To better understand how user involvement during an ERP experience is changing over time, and how it is affecting the attitude toward the new system, this paper uses a longitudinal case-study and a process-oriented view inspired by Newman & Robey’s [13] model. The analysis shows how the user involvement and perceived usefulness of the system change over time as the dynamic between the participating users and consultants changes and knowledge to re-design the system and the organizational work processes is generated.

## 2 Research Question and Method

A longitudinal case study within the interpretive tradition of information technology studies [14] is conducted. The aim of the research is to better understand how and why the user involvement and the perceived usefulness of the system change over time. Especially how the dynamic and the communication between the users and the developers are influencing the outcome. In line with the assumptions of interpretive research I focused on the participants’ subjective descriptions of the implementation process and their expressed feelings and thoughts about their involvement and the perceived usefulness of the ERP package. The first initial analysis of the interviews revealed that actions and events in the case were strongly influenced by prior events, and that user involvement and the perceived usefulness of the system had changed over time. Thus a process model inspired by Newman and Robey’s model [13] was used to guide the analysis to focus on the social dynamics between the users and the developers (consultants) during the implementation.

The study was carried out in the Danish headquarter of an international engineering company called Alfa (pseudonym). In January 2001 Alfa started up the process of selecting and implementing a standard ERP system, and in October 2003 they went live. The case study covers a 5½ year period from January 2001 to summer 2006.

*Data collection* was carried out through interviews with the ERP project program manager, users serving as team leaders during the implementation, managers and end-users from all functional areas within project scope, a consultant participating in the project on the vendor side, and the vendor’s solution architect. All 16 interviews were semi-structured and lasted 1½ to 2 hours. The interviews were taped and transcribed. An initial interview with the project program manager were conducted in February 2005 and the rest of the interviews from November 2005 to August 2006. It has not been possible to follow the project from the start although it had been preferable. Thus to cover the implementation from the beginning and up to date, the interviews have been conducted with a retrospective focus.

One of the difficulties using the interview material is, that the interviewees’ interpretations of the history as well as the immediate situation often is influenced by difficulties or conflicts taking place at the time of the interview. Written project

documentation has therefore been used to verify the interviews where possible. Alfa has provided elaborate documentation including detailed requirements specification, documented workshop evaluations of the candidate systems, business cases, gap analysis, issue-log and change requests.

*The data analysis* were an iterative process going back and forth between coding and collecting data to allow gaps to be identified and addressed, and different interviewees interpretations to be commented and reflected on by others. A hermeneutic interpretive approach [14] has been used going back and forth between the field material and different interpretations. Going through the transcribed interviews the initial analysis made it clear, that end users and IT-experts had very different interpretations of the usefulness of the new systems, and that the end users perceived the usefulness of the system to have changed over time. Therefore another round of analysis was conducted using a process model inspired by [13].

The process model focuses on sequences of events over time in order to explain how and why particular outcomes are reached. The constructs in the process model are *antecedent conditions*, *episodes* (a series of events that stand apart from each others), *encounters* (mark the beginning and end of an episode), and *outcome* over the course of time (see figure 1). The historic context of the ERP implementation is expressed through the antecedent conditions. During each episode the antecedent conditions of the episode may be challenged and the users may choose to respond by changing their involvement and attitude toward the new system. In this paper the process model is used to analyse how and why user involvement and the user's attitude toward the ERP implementation is changing over time. I have adopted Newman and Robey's four categories of episodes which are: (1) episodes led by the IT-expert – focus on the technology, (2) episodes led by the users - focus on the business, (3) episodes of joint development, and (4) “*wait and see*” episode when both party are uncommitted. As possible responses to each episode four categories of user attitude are used: (1) acceptance of the system, (2) equivocation, (3) resistance, and (4) rejection. Category 1, 2 and 4 are included in Newman and Robey's original process model, however I found, that a fourth category were necessary; rejecting a system or parts of a system may not be an option for the users, but resisting or enacting the system in order to minimise the use or the consequences is a milder but still powerful way to express non-acceptance.

### **3 Implementation of an ERP System at Alfa Engineering**

The case organization Alfa is an engineering company with more than 80 years of experience - a leading supplier of systems, consultancy and engineering services to the pharmaceutical and biotechnological industry. The organization has 1200 employees in Europe, China and USA. Employees typically have a degree from a technical university. Most of the work in Alfa is conducted in large projects lasting several years and costing billions of US\$. Thus Project Managers are quite powerful and influential.

The ERP project started in January 2001 at Alfa's headquarter in Denmark. A Project Manager with extensive ERP Project Management experience was hired to

manage the project. From the very beginning it was clear, that this was a common project for management and employees in Alfa. It was never questioned that users should participate throughout the project and in all aspects of the project. A project organisation was set up and user representatives from all functional areas included in the project scope were appointed.

Alfa's core business is project administration and project management on behalf of their customers, but they don't do any production. Alfa was aware that ERP systems in general are not targeted at their line of business. Therefore a thorough evaluation and selection process was to be conducted to ensure that the standard system meet their needs. Alfa spend almost a year specifying requirements, evaluating candidate systems and finally selecting a system and 9-10 month configuration and customizing the system before going live in October 2003.

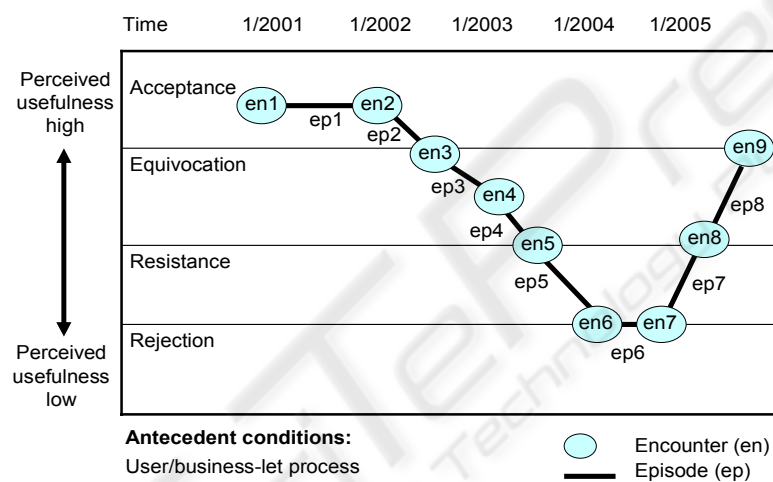


Fig. 1. Alfa's process model adapted from Newman & Robey (1992).

### 3.1 A Process Model for Alfa's ERP Experience

In this section Alfa's ERP process model is described and a graphical representation is depicted in figure 1.

**Antecedent Conditions:** Up until the decision to buy and implement the ERP system Alfa had no experience with integrated systems, and very limited experience with standard systems. Historically software had been developed specifically for functional areas and allowed the users significant influence on the design of the software.

**Encounter 1 – project initiated:** In order to improve the quality of services offered to the customers, improve resource management, and provide better financial control. Alfa as many companies before them had however come to the conclusion, that an integrated ERP Package providing real-time sharing of data were necessary Managers as well as users were aware that it would require the organization to adapt to the ERP

system, but at the same time they wanted to continue the tradition of user participation they had good experience with and therefore an approach involving the users from the very beginning and throughout the project were decided on.

**Users' attitude toward the system:** Users, the ERP Project Manager and top management at ALFA acknowledged the need for a new system and the intended approach, thus the project stated out with wide acceptance.

*Episode 1 - ALFA business processes and requirements specification:* First all business processes that should be part of the new system were described including Finance, Purchase, Project Administration and Resource Management. A large number of users throughout the organisation were involved in the process, and a number of simple business process models on different levels were produced using Power Point as a tool. For each of the four areas knock-out criteria were defined. After the Business processes were defined, they served as a common reference for discussing the requirements focusing on input (data) triggering a process, steps within a process and output from a process. More detailed requirements for each area were defined in a dialogue between the Project Manager and the participating users. It was a long and difficult process especially because it involved a large number of users who had little or no experience defining requirements. The requirements should at the same time reflect existing processes and be open towards processes within a standard system. The users did not know what to expect from a standard system and to inspire them a couple of standard systems were demonstrated by different vendors.

Alfa defined more than 800 detailed requirements which were simple and prioritised on a scale from 1-4. Finally all the requirements were included in a spreadsheet and mailed to the candidate vendors.

*Encounter 2:* The requirement specification is finished; users from the four functional areas were in charge of the requirement process and the users influence on the process has not been challenged. There personal involvement is high and the expectations to the new system high.

**Users' attitude toward the system:** Acceptance (no changes from the antecedent conditions).

*Episode 2 - Evaluating candidate ERP systems:* The vendors performed a written reply and for each requirement they defined too what degree the system could meet the requirement, they used 4 categories: 'Fully as standard', 'Customisation included in future upgrades', 'Customisation not included in future upgrades', 'Not at all'.

Parallel with the requirements definition a set of criteria for evaluating the vendor were defined, and knowledge about the industry and the vendors desire to understand Alfas situation were among the more important criteria.

The three pre-qualified vendors were invited to demonstrate there system in an all-day workshop using scenarios defined by Alfa. 10-15 users participated in the workshops evaluating the system and vendor performance using an evaluation framework. Finally 1-2 reference customers for each vendor were visited. An evaluation report comparing the three candidate systems and the tenders from the vendors were composed. The results from the evaluation process were summarized and presented as quantitative and qualitative scores in a number of different areas.

*Encounter 3 - Evaluation:* Alfes board of directors decided to follow the recommendation given by the project group and Oracle were chosen as Alfes new ERP system.

**Users' attitude toward the system:** The attitudes toward the systems are somewhat mixed. Some users developed an equivocate attitude but acceptance is still the domination attitude. The users were in charge of the evaluation and the analysts in charge of the demo. Some users, especially from project management, realise that the systems may not fulfil there needs. They have started to realise, that the approach for this implementation; minimise customization and require the organization to adapt to the ERP Package, will challenge there historical influence on the systems design, and therefore there anticipated usefulness of the system.

*Episode 3- Re-scoping:* Due to financial difficulties the ERP project were asked to cut the project cost by 5 million DKK before even starting. To re-scope the project Alfes ERP project manager and user representatives from the four functional areas together with consultants from Oracle implemented a 'Conference Room Pilot' a quick examination of the original requirements and scope. For each requirement, the implementation consultants would show the solution in Oracle, and the possibility of cutting something was discussed. This process very quickly made it visible that it would be necessary to add as well as cut requirements and scope. In the original requirement specification process the users had relied on assumptions about what a standard system would provide. Therefore the requirements now appeared to be incomplete. At the end of the two weeks the 5 millions were found and a contract were signed defining scope, price etc.

*Encounter 4:* A fixed price contract is signed with the vendor based on the original requirement specification with adjustments decided on during episode 3.

**Users' attitude toward the system:** Equivocation and some resistance, most users have started to feel that the historic situation has changed. The users got to make the re-scoping decisions, but the final result has to be approved by the steering committee. The project manager is driving the process very strictly to cut project cost and the users have to rely on the consultants' knowledge and judgment about the ERP system. Most users have now realized, that the requirement specifications not necessarily will help them achieving significant influence on the system's capability, and a feeling that the system will not provide what they asked for is developing. The process is now challenging the users' historic position of having significant influence.

*Episode 4 – Configuration:* In the following nine month three Conference Room Pilots were conducted. In each pilot the system "to-be" was (re-)scoped at a more detailed level and the configuration decisions were documented. The work was conducted in small workshops where user representatives and consultants worked together; the users provided knowledge about the existing work practice (requirements) and the consultants their knowledge about the standard system. The processes in the ERP Package were guiding the work and Oracle's process tool was used. The requirement specification was used as a checklist.

*Encounter 5:* The first version of the new ERP system is finished.

**Users' attitude toward the system:** Resistance and some rejection. Most of the user representatives are disappointed with the results and know it will be difficult to "sell" it to the users in there department. The functionality within resource management is

considered so poor, that the users have started rejecting the functionality. The consultants were in charge of the implementation process, the capability of the ERP Package is constraining the design and the requirement specification is used to evaluate the progress of the work. The users lack experience in the configuration process and knowledge about the capabilities of ERP Package, they are totally depended on the consultants. They have all realized, that the new system will not meet the expectations of their peers and some of them feel much stressed reporting back to the peers. Conflicting interests among the users is also influencing the process, most of the user representatives feel, that the financial department is too dominant.

*Episode 5 - Training and testing:* The project is under an extreme time pressure. In the Alfa concern it is not allowed to implement a new financial system the last quarter of a financial year, therefore the system have to go-live at the beginning of October. Thus the training of the users takes place alongside the final testing and data conversion.

*Encounter 6:* 8<sup>th</sup> of October 2003 Alfa's Oracle solution went live.

**Users' attitude toward the system:** A lot of resistance toward the system is building up in the organization during episode 6. The users succeed at this late stage having the resource management module taken out of the implementation because the functionality in their opinion is too poor. The consultants were in charge of the configuration of the system and the modifications to the system. However the user representatives have taken over responsibility regarding training and testing, and the overall responsibility for the socio-technical design.

*Episode 6 – Go-live and stabilizing the system:* Because of the time pressure many reports were still outstanding and a lot of promising and nice functionality were left to be implemented in a later phase. During the next months the users struggled with the system. Some parts of the system they learnt to manage but others they refused to use or used incorrectly thereby causing data quality problems as well as system malfunction in other areas. After a very turbulent period the system were stabilized and the most important reports were developed.

*Encounter 7:* An internal IT-competence centre was formed consisting of the project manager and some of the user representatives, and a former Oracle consultant, and a new project is decided on to improve the usefulness of the system.

**Users' attitude toward the system:** Resistance/rejection. As the users became more experienced using the system, they also became convinced that parts of it had to be redesigned thus using their political influence to have the design of the system support their daily work. No significant pattern in some areas the users are in charge of the process in others the members of the competence centre are in charge.

*Episode 7 - The follow up project:* Some of the consultants participating in the configuration had moved on to new project and some were still helping out correcting errors. Members of the new internal Oracle competence centre were assigned the roles of technology experts. The fit of the system were in some areas more problematic than in others. Meetings were set up where people from the competence centre met all user groups within Alfa. The analysts met the users with an open mind and all issues reported were noted without considering the relevance or the reason; resulting in a list of more than 500 issues. Afterwards the reasons for the issues were discussed

and the appropriate action decided. Some issues were met with end user education and some with reconfiguration or customizations of the system; some were researched thoroughly, but could not be solved due to the design of standard system.

*Encounter 8:* At the end of 2004 the follow-up project was completed.

**Users' attitude toward the system:** More functionality is accepted. In general the perceived usefulness of the system increased and some of the rejected functionality were re-designed or just re-introduced and now accepted. The users in general gained more self-confidence and they started to fight to get more influence on the socio-technical design of the new system. Project managers are still fighting what they perceive as very poor system design refusing to use some functionalities and have project assistances and secretaries use the system on their behalf.

*Episode 8 - Continuous improvement:* Users throughout Alfa and members of the competence centre are working to increase the quality of use. To do so they are customizing the software to change the original capabilities of the ERP Package, reconfiguring the system and enacting the software. The relationship between the users and the competence centre is in some areas problematic, but in other areas the relation is very good and fruitful based on a more joint development approach.

*Outcome:* The project is being considered a success from a project management point of view. Cost and time estimates (episode 3-5) were met, the functionality promised were delivered and after a chaotic go-live the system is now used throughout the organization and more functionality are implemented as an ongoing process. The selection and implementation process was relatively participatory, users were involved in the selection process, the scoping of the system, the configuration and implementation, and last but not least the user's issues that remained after the go-live phase were collected and seriously addressed. Participation was encouraged and organised for. However the quality of use can be questioned, many users are still complaining, that they lack knowledge to use the system correct, more powerful users resist using functionality with what they consider poor user interface. Users participating in the ongoing implementation of new functionality are complaining about not being able to understand the capabilities of the software and the consequences of different design possibilities. Episode 3 and 4 left the organization with a lot of internal conflicts and frustration, influencing the users' behaviour in the following episodes, and causing a lot of re-design and customizations years after the project officially finished in encounter 7.

### 3.2 Discussion

The purpose of this paper is to understand what made the users attitude toward the system change over time. As we can see from the process model, the users were enthusiastic and actively involved in the first episodes, during episode 3 and 4 a dramatic change happened, that culminated during episode 5 and 6 having users reject functionality and resist using the system. During episode 7 and 8 a more positive attitude to the system was developed although the quality of use is still low in many areas.



In the process model the outcome of an episode implies the preceding events [13] therefore to understand what led up to the rejection and resistance in episode 5 and 6 the preceding episodes are examined. In episode 3 and 4 the user representatives found themselves in a situation, where the consultants had taken over the design process of the new system and the users had realised that the result would constrain the organizational processes in ways the end users would properly not accept. However there was not much they could do to change the situation. Most of them had themselves been involved in defining the requirement specification and choosing the system, and a fixed price contract had been signed with the vendor using the requirement specification as a basis for setting up the new system. At the same time, the users had very limited knowledge about the ERP Package and its capabilities and design options, and therefore their ability to influence the design was rather limited. Furthermore interest conflicts between users from different functional areas were causing sub optimization, having the overall perceived usefulness of the new system decreased. Some of the user participants expressed frustration having to report back to their peers about the progress of the project because they thought they had nothing but bad news.

During episode 3 and 4 the user representatives were providing the consultants with enough knowledge about Alfa's organization to set up business processes within the scope of the project. Instinctively many of the user representatives know the usefulness of the business processes were doubtful, however the design process did not include activities evaluating the usefulness of the business processes giving them arguments to reject the design.

In episode 5 and 6 the new system was presented to the end users. Most of them had either been involved or had only very limited involvement in the previous episodes; therefore they had no loyalty conflict rejecting the new system.

Historically users in Alfa had had significant influence on the design and use of software, and probably for a good reason. Most of the employees have a university degree, their work is not easily automated, and they are knowledge workers being expected to take responsibility for the result of their work. They are not easily told just to do something. In episode 5 and 6 they were introduced to a new system that did not successfully meet their needs, they had no part in the design and were given very limited help to assimilate the new system. In response they were sending a very strong signal; large part of the system's functionality were rejected completely or enacted in ways that would cause no or very little change to the existing work practice. The user groups that during episode 3 and 4 had felt dominated by another user group chiefly resisted and rejected the system.

In episode 7 and 8 the attitude toward the system is changing direction becoming more positive. As a reaction to the resistance of the new system and the rejection of functionality in episode 5 and 6 the competence centre in episode 7 goes into a dialogue with the end users, where the user organization's perspective is in focus. The users are now in a situation where they are being heard and have an opportunity to influence the re-design of the new system although their understanding of the ERP software's capabilities and design options are still causing difficulties. In episode 8 the users' influence on the re-design of the new system is continued. As users gain more experience with the system, they help each other within departments and across functional areas to understand the capabilities of the ERP software and find ways to

re-design or enact the system to support their needs. Much of the work takes place without involving the competence centre or in a dialogue with them but on the end-users initiative and terms.

## 4 Conclusion

Assimilation of a standard ERP system to an organization is difficult. User participation and involvement seems to be critical for success. However, as this case study shows even the best intentions for user involvement may come to nothing. A case study of a five year ERP implementation process reveals that a main reason may be that the perception of usefulness in any given phase of the implementation is heavily dependant on preceding events – the process. User-led development was the antecedent condition in the case organization, and the general perceived usefulness of information systems was high. The case organization intended to continue the tradition having users participate and influence the design of the system when implementing an ERP system. However, a process model analysis shows that in reality the consultants/IT-experts take charge during the configuration and customization process challenging the status qua. Alfa is not aware, that lack of knowledge about the technological options, a fixed price contract and a strict timetable left them with no choose. As a response to the change in user-developer dynamic the users' attitude towards the ERP system change from accepts/equivocation to resistance/rejection and the users are fighting to regain control. When succeeding to regain control almost two years after go live their attitude toward the ERP system changes again. In summary the case analysis show, that the users attitude toward the system change between acceptance, equivocation, resistance and rejection over time depending on three things: (1) Dynamic between user and consultants, (2) Dynamic between different user groups, and (3) Understanding of technical, organizational and socio-technical options.

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