

Handover of IS Development Projects Results and Responsibilities to Maintenance Organizations

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Abstract. Organizations are today more and more dependent on information systems (ISs) to conduct their business. Large resources are invested in IS development and its maintenance each year. There is research focusing on models and methods for IS development or IS maintenance, but there are research gap focusing on the relation between development and maintenance. This paper highlights the need for research that mediates between IS development projects and IS maintenance organizations. During an initial study problems and needs regarding the handover phase were explored. These problems and needs are important empirical grounding and a central contribution in this paper. The purpose of this paper is to highlight a knowledge gap in handover situations between project organization and maintenance organization. The result of this paper is a suggestion for further research in the area, and can be seen as a research proposal.

Key words: IS development method, IS maintenance, decision-making organizations

1 Introduction

Organizations are today more and more dependent on information systems (ISs) to conduct their business. Large resources are used for IS development and its maintenance each year. IS development is often conducted by project performance with defined objectives, milestones and deadlines (Berggren, 2001). There is usually a defined project organization including a project manager, project members and a steering committee (ibid). IS maintenance can be conducted by software specialists (e.g. Pigoski, 1997) often situated in the line organization's IT (Information Technology) division or can be seen as a temporary organization (April et al, 2005; Feng et al, 2006; Nordström and Welander, 2005) manned by both business and IT parties. These two organization forms mediate when the project will hand over its results. To my knowledge research is often focusing on models and methods for either the IS development or the maintenance. In IS development research the handover can be seen as an activity in the implementation phase in the IS life cycle (Avison and Fitzgerald, 2003) and to my knowledge most of the research focuses on the analysis and design phases. In maintenance research literature (e.g. Pigoski, 1997; Nordström, 2005; Kajko-Mattsson, 2001) the handover is already carried out and nor in this kind of research the handover activities are given any space. Here is a knowledge gap that needs to be filled, to build a bridge between the research areas of IS development and IS maintenance.

An initial study regarding handover situations (described below) clearly indicated several problems and needs that appear during the handover phase. The purpose of this paper is to

highlight the knowledge gap in handover situations between project organization and maintenance organization and to purpose issues and questions for further research.

After this introduction the paper has the following disposition: In section two a brief discussion of my theoretical frame of reference is made. Section three describes the research method and section four summarizes the empirical findings. These findings are then further discussed in section five. This paper can be seen as a research proposal for further research in the concerned area and in section six my research questions are posed.

2 Theoretical Frame of Reference

In this section, I discuss and define some central concepts that are used further on in this paper.

2.1 Information systems

An early definition of information systems (ISs) made by Langefors (1966) states that an information system is used in order to gather, store, distribute and use information. It was originally meant to contain computerized information processing as well as manual information processing (ibid). Khan and Zhang (2005) define IS as a type of system that is an interacting combination of components. When I refer to information system or just IS in this paper, I define IS as a type of system that includes components like functionality, processes and software.

2.2 IS development methodologies

Since the start of the computer era different types of development methodologies have evolved. During the late 1970s and early 1980s the system development life cycle (SDLC) was formed (Avison and Fitzgerald 2003). SDLC, or commonly, the waterfall model consists of several phases that are conducted sequentially and where each phase need to be completed before the next phase begins, hence the term waterfall. The phases are feasibility study, investigation, analysis, design, development, implementation and maintenance (ibid). Each phase defines some deliverables which will be produced before next phase begins. If problems occur or if changes are required, there is a possibility for iteration, according to this model. Avison and Fitzgerald (ibid.) state that the iteration possibility is often ignored in practice. The waterfall model has been criticized for its sequential phases and its weakness of managing changes during the development process. A reaction to the critique of the waterfall model, iterative and incremental development (IID) was formed. In IID the development and the implementation of an IS are divided into versions and conducted as a smaller waterfall models (Larman and Basili, 2003). Each new version contains the previous and the new increment (ibid). Similar to IID is the evolutionary model which acknowledges that the requirements are not fully understood and cannot be defined initially (ibid). Demands on i.e. shorter lead time, more frequent deliveries to the customer and cooperation between the business people and the developers have resulted in methods like Agile (Agile Alliance, 2009) which has become popular nowadays.

2.3 IS maintenance

According to ISO/IEC 14764 (2006) maintenance is the modification of a software product after delivery. Maintenance activities are to correct faults, to improve performance or other attributes, or to adapt the product to a modified environment (ibid). Zvegintzov and Parikh (2005) define maintenance as demands that cause software changes from requirements for functional and technological changes, failures and errors, user help and support. Definitions of maintenance often stress the post-delivery characteristic (IEEE 1998), i.e. a development project delivers a result that should be maintained. Nordström and Welander (2005) define another category besides the stated activities above, namely maintenance management. They argue that the characteristic of maintenance is inter-organizational, which implies that several different organizational parties are involved in managing and steering maintenance (ibid.).

2.4 Temporary versus permanent organization

IS development is often conducted in project form and therefore regarded as a temporary organization. IS maintenance is on the other hand often conducted in the base organization and is regarded as a permanent organization. The differences between temporary and permanent organizations can be described by means of four key aspects: time, task, team and transition (Berggren, 2001). With these four concepts a project can be delimited from the line organization. Table 1, below, illustrates examples of key differences between a temporary and a permanent organization.

	<i>Temporary organization</i>	<i>Permanent organization</i>
Time	Deadline	Indefinite, no limit
Task	A few defined objectives and activities	Overall strategies and objectives
Team	Created, chosen specialists, temporary	Base organizations roles
Transition	Make a change, transformation, accomplishment	Daily operations

Table 1: Temporary versus permanent organization – four key aspects, (Berggren, 2001, p. 39 translated to English)

A project form is a common way to conduct changes in an organization and the four concepts introduced above are a way of delimiting the project and facilitate the project management. Those four concepts are often well described in project directives and project plans. There exists a deadline (**time** limit), i.e. when the project will end. The **task** is well described according to results from feasibility studies and analysis. The **team** is manned by a project manager, specialists needed to develop according to the task etc. The result from the project is a change, i.e. a new application which did not exist (**transition**) before the project started.

When it comes to maintenance, there are two principal forms to conduct maintenance. Stressed from the waterfall model (above), maintenance organization is typically manned by software maintenance specialists (Pigoski, 1997) situated in corporate IT division or outsourced to an external party. The maintenance organization can also be seen as a

temporary organization (April et al, 2005; Feng et al, 2006; Nordström and Welander, 2005) with participants from both the corporate IS organization and from the business organizations that are using the functionalities based on the application. I have chosen to call this perspective an assignment perspective since this can be seen as an assignment between different parties. In this perspective, it is important to clarify what role the ISs play in the businesses and what kind of solution or support the ISs delivers (Nordström and Welander, 2005). It is also necessary to have a steering committee manned by line managers from both the business and the IT party (ibid) to ensure continuous high value of the ISs for the business party.

3 Method

In April 2008, a workshop was arranged with the theme “Handover from IS projects to maintenance organization”. The workshop was arranged within a competence network for knowledge development of IS maintenance. The purpose of the network is to develop knowledge of IS maintenance useful for practitioners (Nordström and Axelsson, 2008). The idea of the network is to gather several organizations who are willing to make a moderate investment for research within the IS maintenance subject.

The purpose of the workshop was to discuss the question: “What types of ordinary problems and needs do often appear in handover situations?” The question was addressed in an earlier conference within the network motivated by the fact that handover situations cause problems within the networks members’ organization. The outcome of these discussions is the foundation of this research proposal.

There were 45 respondents from 27 organizations, located in Sweden, participating in the workshop. The participants were mostly represented by people working within the IS maintenance area. Different types of sectors and segments were represented; e.g. different industries, county councils, banks, assurance companies and governments. During the workshop the participants were divided into five groups with an aim to discuss and describe experienced problems and needs that appear during the handover phase. Afterwards, each group presented the results of their discussions. The results are presented in the next section.

4 Identified Problem and Needs in the Handover Phase

In this section the identified problems and needs from the workshop discussions are reported.

A problem, which appeared to be usual, is to identify the owner and receivers of the project’s results. A system manager in one organization stated that “there is sometimes no obvious receiver of a project’s results”. He described a case where no maintenance organization had responsibility for that type of functionality before the IS development and therefore it was not obvious to whom the result should be handed over. Another participant agreed and said “sometimes a similar problem happens when the owner should be identified”. A consequence of this is that it is unclear which party in the line organization that will be responsible for ensuring the maintenance management. The conclusion that was drawn in the workshop,

regarding the problems above, is that if no owner and receivers are identified, the project will still be responsible for the results and will not be able to close.

Related to the problem above, the participants identified a similar problem with inadequate agreements for maintenance between the business parties and the IT parties within an organization. In an IS development project the personnel from the business party are identified and often members of the project team. When it comes to the maintenance, several participants experience a spread misconception from the business parties; that maintenance of ISs only concerns the IT parties. One participant said that “in our organization maintenance activities are seen, by the business parties, as activities to uphold and to run the application”. Experiences from the respondents show that there is more to handover since some artefacts are not visible at first sight; e.g. knowledge, relations with the demanders from the business parties, agreements signed with suppliers, etc. They experience insufficient communication with the business party concerning e.g. requests for change. Several of the participants are responsible for further development and change management of the IS. They experience that the dialogue which existed in the project, between the users/demanders and the developers, ends when the project is closed. A possible consequence of this is that the developed IS in the future might not support the business that it is intended to support. After all, the ISs exist to be a tool for the business.

Another inter-subjective problem is that the handover activities start too late during the projects' ending phase. If there are different persons manning the project and the maintenance organization, the respondents find it necessary to have sufficient time to conduct the handover. They experience that this is very important when there are consultants developing the software or implementing a standard system. A statement from one participant was that “the consultants will bring with them the knowledge of the application when they leave the project”, which shows the importance and the necessity to ensure knowledge transition. The respondents, who are working with maintenance activities, experience a need of sufficient time to learn the developed IS functionalities in order to support and manage changes, incidents or problems. A consequence, experienced by several participants, was that if the maintenance organization had insufficient knowledge about the new functions or IS they were not able to support the users in their best way.

An unclear overview of activities regarding the handover phase was also a usual problem. Some respondents described a failure to implement and apply the models and methods for project and maintenance. Other respondents described that their organizations have insufficient models or models that were too extensively described, so that persons found them too complex to use for their purpose. In the organizations where there existed project and maintenance models, some participants experienced a gap between those two models. They described that the models are not synchronized according to the handover between project organization and maintenance organization. The participants had a firm opinion that it is important to have clearly described, understood and accepted models and methods. They suggested that the project model should consist of a section that describes what types of results and when to handover to the maintenance organization.

Experiences from the participants are that decision-making organizations (e.g. steering committees) for projects and IS maintenance are manned by line managers from different organizational levels. If there is divergence between the steering committees for projects with regard to maintenance this might be a problem when it comes to the handover situation of results and responsibilities.

One of the workshop groups made the following summary:

“There are in generally no obvious receiver of the result and no owner identified. In the cases where there are receivers and an owner identified; there are indistinct roles and agreements. And even if the handover situation is straight with roles and responsibilities, there is no one who understands it!”

This citation will end the reporting of empirical material generated from the initial workshop. The following list summarizes the identified problems and needs:

- There are, in some handover situations, no obvious owner or receiver of the result
- There are insufficient agreements between the business parties and the IT parties
- “Maintenance activities are only to uphold and to run the application” is a spread delusion by the business parties
- The handover activities starts too late in project
- There is an insufficient picture of what types of activities there are in the handover situation
- The knowledge of application disappears with the consultants when the project ends
- Steering committees for project and maintenance are manned by line managers from different organizational levels

5 Discussion

My impression, based on the result from the workshop, is that maintenance is seen as a phase in the IS development life cycle (Avison and Fitzgerald, 2003) and consequently the maintenance is secondary to development. Figure 1, below, is a simplified picture of area that was in focus during the workshop.

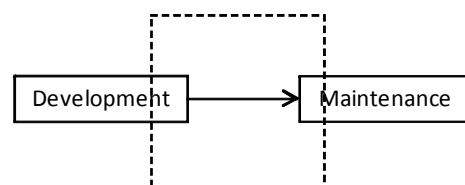


Figure 1: Simplified picture of the handover situation

In the IS life cycle perspective, maintenance is a phase during an IS life cycle and will be defined, organized and started during the implementation phase (Avison and Fitzgerald, 2003). Since the development project is responsible for the phases before maintenance, i.e. design, development and implementation, it will be the project’s responsibility to ensure the maintenance of the result from the project. Several identified problems from the workshop are

related to a life cycle perspective on the handover situation; e.g. there is no obvious receiver and no owner, there are inadequate agreements, the handover starts too late in the project.

None of the respondents described handover situations that have arisen from iterative and incremental development or evolutionary model (Larman and Basili, 2003). There are several plausible explanations for this. One explanation is that the participants of this workshop were all representing the same type of professional category and were all working with maintenance. Their expert competence concerns maintenance activities and not development methods. Another likely explanation is that the IS life cycle perspective is still the most ordinary model for IS development in the organizations that were represented in the workshop. This raises an interesting question: As Agile methods become more popular, how will handover be characterized using those agile methods versus more traditional IS development and method usage?

Several participants expressed problems when a project will identify the owner and the receivers of a project's result. One possible explanation is that those participants are viewing the maintenance from a life cycle perspective (Avison and Fitzgerald, 2003) which implies that when the handover is conducted the project will ensure maintenance for the project's result. This might imply that the focus will be on ensuring an owner of the result (which is often the same as the implemented IS) and not on identifying possible receivers in already existing maintenance organizations. It would be interesting to analyze handover situations arising from iterative and incremental development or evolutionary model (Larman and Basili, 2003). How would they be characterized? What types of activities are there and who are the actors involved? In agile methods where the development is iterative and conducted in several small projects (Agile Alliance, 2009), how is the responsibility divided between the project organisation and the maintenance organisation? And how are the steering committees manned?

Several participants from the workshop described that steering committees for IS project and IS maintenance are manned by line managers from different hierarchical levels within the organization. Figure 2 shows a simplified organization chart and possible findings for the steering committees for IS project and IS maintenance.

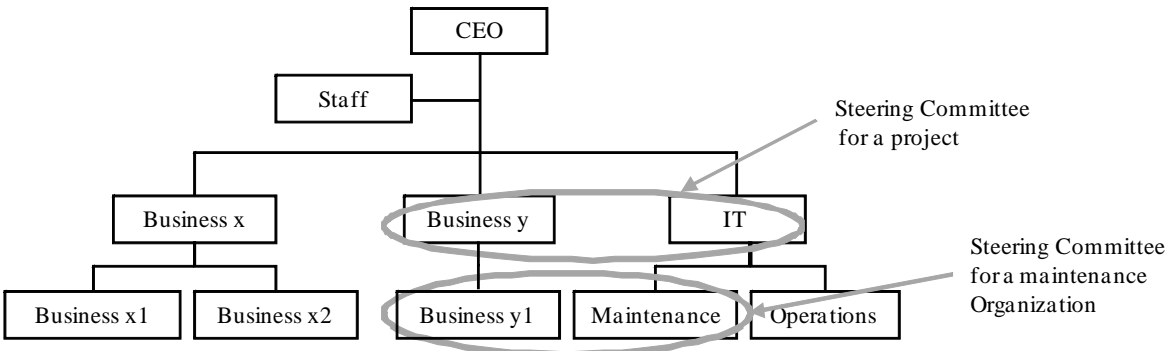


Figure 2: Conceivable manning of Steering Committees for IS project and IS maintenance in a simplified organization chart

Steering committees manned by line managers from different hierarchical levels was an identified problem by several participants. It might be a problem during the handover phase if the steering committee for the project will close the project but the steering committee for maintenance will not approve nor accept the result. It is therefore important to clarify which of the committees that will be responsible for approval of the handover.

The spread misconception among the organization's business parties is that maintenance activities are only to uphold and to run the application, shows that there is a gap between the notion of maintenance as an assignment (April et al, 2005; Feng et al, 2006; Nordström and Welander, 2005) and the respondents' experiences. The experiences from the workshop indicate that maintenance is conducted by the line organization as a mean. The responsibility for maintenance is, according to several of the respondents, often delegated to a few specific units in the line organization, usually some kind of IT/technical parties (internal in the organization or external when maintenance is outsourced). If maintenance should be seen from an assignment perspective (April et al, 2005; Feng et al, 2006; Nordström and Welander, 2005), it is important to clarify the business parties that are using the functionalities and ensure ongoing relations with those business parties. It will also be important to clarify time, task, team and transition (Berggren, 2001) for the maintenance assignment.

This initial study describes empirical problems and needs in the handover situation generated from several organization. The conclusion is that problems and needs are related to *actions* and *actors* within the handover phase. Actions include what types of activities that are conducted in the handover situation and actors include which roles that are involved and how relations between steering committees are handled.

6 Concluding Remarks and Further Research

This paper describes and motivates a need for theoretical and practical knowledge about handover situations of results and responsibilities from IS development project to IS maintenance organizations. For several organizations in Sweden representing different sectors, the problems and needs described in section four above show that this is a knowledge gap that needs to be filled. The results from this initial study have formed the emerging research question; How can the handover situation from IS development project to IS maintenance organization be characterized?

To answer the emerging research question the following sub-questions will be investigated:

1. Which activities are performed in the handover phase?
2. Which actors are involved in the handover phase (e.g. project manager, owner and steering committees) and what are their responsibilities?
3. What kind of preconditions are present (e.g. guidelines, tools)?

The research questions originate from practical problems and needs. It is therefore important that the result can be usable in practise in order to change and improve handover situations. This is a pragmatic view of the research process which implies that it is important to improve

practise by means of the usability of the research (Cronen 2001). Goldkuhl (2004) describes five meanings of pragmatism and its usability for research in IS:

- Interest for actions
- Interest for actions in their practice context
- Acknowledgement of actions knowledge content
- Interest for practical consequences of knowledge
- Interest in what works and what does not work

These meanings are applicable for research that springs from practical findings. The further research will enter deeper into studies of development models and methods, IS maintenance and organizational theory. In the research process, two empirical studies are planned. A frequently used method in qualitative research is the case study, an inquiry into a specific business/operation (Merriam, 1997) that “invests in contemporary phenomenon within its real-life context” (Yin, 2003, p.13). A primary object of this research is to situate it in such real-life contexts therefore a case study approach will be adopted.

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