Users As Developers In Information System Projects

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Abstract

Users have been described as necessary experts in information system developments. This research introduces a viewpoint that the users are the main actors in development projects and the other participants only give their experience for the use of the actual developers.

In addition to the strong involvement of users, our research emphasises the special nature of the information system project with earlier-made specifications. This article suggests that in order to achieve a successful output, a reflective and flexible working process is needed. This suggestion is valid especially in a case that is out of the line of common approaches that are described in the literature.

The research approach in this study was qualitative and the empirical material was gathered from a case study. The approach was subjective and it necessitated interpretation when analysing the results. The case included an information system development that was carried out to produce an inter-organisational information system to support certain functionality between organisations. Despite the output was an information system, we argue that the approach with active users is also applicable in the development of any other artefact.

Introduction

This paper discusses the role of users in an information system project where the future users participated in the development work. User participation has already been noted in information systems development and its significance is notified. However, the approach is generally that of the information systems developer. We aim to reflect the users' point of view instead of the implementer's approach. We note the importance to keep users involved even in situations that they feel not important or when they perceive the technical issues too difficult to be understood.

Our case comes from a case where an inter-organisational information system was developed to support officials when they managed specific functionality between their organisations. The officials were experienced in their affairs but not in information system technology or information system development. In addition, acting in a project was not their common way to work. Besides by officials, the information system would be used by thousands of other users. However, the other users would only use the system to apply for permission and the main functionality was planned to support the officials. Therefore, only the officials were represented in the development work. Despite the feedback received from the other users was mainly shining, the users were left out of the scope of this research.

Literature recognises users as an important key factor. The role of user participation in information system

developments has been under discussion already for decades (Markus 1983, Kensing & Blomberg 1998, Dewulf & van Meel 2002, Halonen 2005). In our case the users acted as key players and we argue that without their active involvement the output would not have been achieved.

There is not much literature about information system developments made by several users representing different organisations (Dahlbom, oral communication June 11, 2005). This paper contributes this gap in the information system research. In this paper we point out the actions of users that strongly influenced the output and its characteristics. The empiric material is gathered from memorandums, emails from project participants and a personal diary written by the researcher. The interaction between student affairs officials and the researcher was active and it was carried out in good terms.

Our empirical case comes from information system science and the artefact is an information system. We believe that the findings in this research can be generalised to concern any other development projects and artefacts in them.

This article continues with a literature view that introduces the framework for the empirical case. After that, the research approach is explained. The empirical case is introduced next and it gives evidence and findings from the inter-organisational information system project. In that chapter, several quotations are expressed and they display the true attitude of the project participants. The article ends with a concluding discussion that emphasises the findings of the research.

What we already know

To simplify, an information system consists of a set of interrelated components that collect, process, store and distribute information (Laudon & Laudon 1998). The definition by Laudon and Laudon does not include people. However, we want to emphasise also the need of human beings in the composition and take another definition: *"Information system means an interconnected set of information resources under the same direct management control that shares common functionality. A system normally includes hardware, software, information, data, applications, communications, and people."* (ostinato.stanford.edu/hipaa-feedback/definitions.html). Formal information systems can be either computer based of manual. Manual systems use paper and pencil technology (c.f. Halonen 2004a) while computer based information systems are dependent on computer hardware and software technology (Laudon & Laudon 1998).

Information systems have a life cycle, like any new artefact, and traditionally it is represented as Lucas (1985) expressed it already twenty years ago:

Inception –> Feasibility study –> Systems analysis –> Requirements analysis –> Design –> Specifications –> Programming –> Testing –> Training –> Conversion and installation –> Operations.

Information systems are implemented in organisations because the organisations tend to improvements with their business processes and efficiency (Hevner et al. 2004). Organisations benefit from integrating their information systems but this integration is challenging and needs careful planning (Kudrass 2006). Furthermore, developments in information and communication technologies have enabled the improvement of the efficiency and effectiveness of administration with government (Gichoya 2005). With the developments, government services may be located closer to the citizens.

User participation in information system developments has for decades been considered to be critical to the output of the developments (Barki & Hartwick 1994). Users are the right persons to explain the whole work process that is to be replaced or supported by the new information system under development (Halonen 2007). On the other hand, communication problems between users and designers are recognised as a major reason why user requirements are not included in information systems and why users are thrown away of the implementation project (Laudon & Laudon 1998). In addition, users and information technology developers typically belong to different organisational units with different objectives and values (Gefen & Ridings 2003). Therefore, in many cases users are not or cannot be actively involved in developing or testing new information technology. Despite that, Gefen and Ridings suggest that information technology developers should strive to create relationships with their users that will reduce any polarity between users and developers. Noble (1986) stated already twenty years ago that the role of users compared to that of the designers should be very carefully considered.

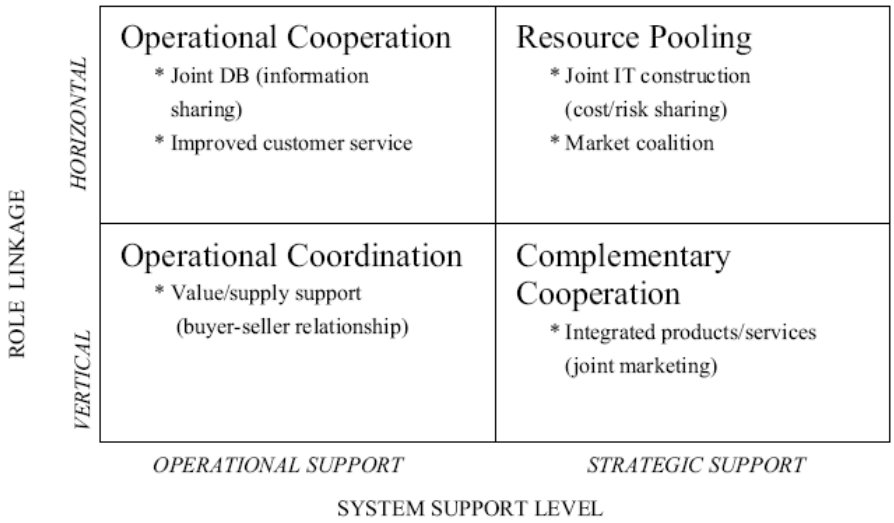
From the users' point of view, in information system implementations it is not enough that the organisations tend to improvements with their business. On the contrary, the users need reasons to use new applications. Keefe (2003) emphasises the importance of focusing on the user in every phase of the system development. Users must be motivated to deliver their knowledge when developing new information systems. Without motivated users there is no traction to get the implementation project to succeed, Keefe argues. Halonen (2004a) verifies that argument with her findings among factory workers who did not want any new information system to record their work. Adding to that, Kujala (2007) concludes that the most significant user involvement occurs at the beginning of product development, when the decisions about the product and its nature are on table. Kujala argues that the process of early user involvement needs to be simple enough to be practical in product development. Despite the novelty of the article by Kujala, we find its approach still biased.

Managing interpersonal cooperation in information system implementations is described as a challenge (Barki & Hartwick 2001), and in inter-organisational information system developments this challenge even increases (Halonen 2004b). Very often the challenge is too great to be overcome as the failure rate still exceeds 80 percent (Furton 2003). The failure or success of a project is often a perception that is

influenced by people who have different backgrounds and experiences (Rad 2003). However, it is not axiomatic if an information system project is a success or failure, as Larsen and Myers (1999) discuss the question of what if an information system turns out to be a failure even if it was at first evaluated to be successful.

Inter-organisational information systems allow the information or processing capabilities of one organisation to improve the performance of another organisation or to improve relationships among organisations (Laudon & Laudon 1998). In this sense, information flows across organisational borders and the role of collaboration is emphasised. Hong (2002) introduces a framework for inter-organisational information systems with horizontal and vertical linkages (Fig. 1). The focus in the framework is on participants' roles and it points out the need to examine the system in terms of how the participants' roles are linked with each other. The framework introduced by Hong classifies inter-organisational information systems into four categories: resource pooling, complementary cooperation, operational cooperation and operational coordination.

Fig. 1. A framework for inter-organisational systems (Hong 2002).

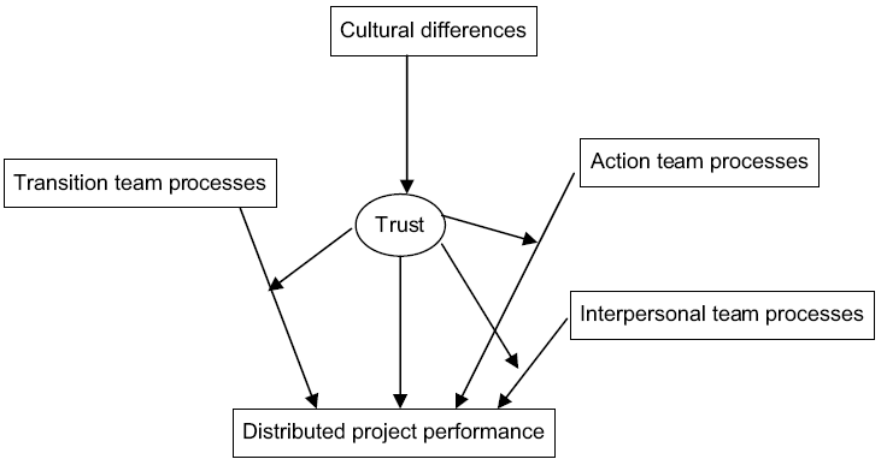


Collaboration in such inter-organisational information systems may be problematic if the goals of the participating organisations are not congruent (Halonen 2004b). Schrage (1990) describes collaboration as a purposive relationship that has a need to solve a problem, create something or discover something. This relationship is limited by constraints such as expertise, time, money, competition and conventional wisdom.

Furthermore, Schrage argues that any technology that reshapes collaboration reshapes also the fields in which collaboration is important.

Collaboration is closely related to trust (Karahannas & Jones 1999). According to Karahannas and Jones, trust plays three interrelated roles in inter-organisational relationships: it may act as on obstacle to opportunistic behaviour, it may substitute for hierarchical governance and it may provide a competitive advantage. The importance of trust is highlighted in the management of any distributed projects (Evaristo 2003). Trust itself is influenced by cultural differences and trust influences action team processes, transition team processes, interpersonal team processes and finally distributed project performance (Fig. 2). Furthermore, without trust collaboration is less likely to exist. Evaristo concludes that the amount of trust may determine which goals will be given extra weight especially in situations where there are both competitive and cooperative goals.

Fig. 2. The role of trust in managing distributed projects (Evaristo 2003).



As trust is influenced by cultural differences the role of culture is worth taking into account in information system implementations. As a concept, culture conveys the feeling of a pervasive way of life or set of norms (Handy 1999). Culture should be defined in a holistic way and its influence on individual's behaviour should be considered properly (Gallivan & Srite 2005).

Academic organisations have their own cultural and national context where science is practiced, managed and organised (Hearn 2003). Hearn argues that universities are complex mixtures of classed, gendered and culture-bound practices where also power and moral relations are emphasised. Mintzberg (1983) stated over twenty years ago that universities represent professional bureaucracy that is described with

coordination of the standardisation of skills and its associated design parameter, training and indoctrination. The organisational nature of universities can also be seen in implementation projects (Heiskanen et al. 2000, Kudrass 2006).

The concept of culture refers to shared values and attitudes within a specific organisation or other form of social grouping (Walsham 2002). Culture is not static. Instead, there are dramatic changes in many societies in areas such as attitudes to gender, the environment, race, sex, family life and religion. Walsham continues that in the context of globalisation, it is increasingly difficult for any group to remain isolated and uninfluenced by other cultures.

Cultural and social background has its impact on changes in organisations and on the implementation of new technology (Walsham 1993). The development and implementation of an information system are instances of organisational change (Davis & Olson 1985) that can be carried out in at least three different ways: 1) letting users not notice the change, 2) users noticing the new information systems, and 3) both information system and process change and users notice that (Markus 2004).

In their recent article Zhang et al. (2005) argue that users still are too little noticed in information system implementations. Therefore, often a gap is seen between satisfying organisational needs and supporting and enriching human users. To avoid that gap, the authors introduce a methodology for human-centred information system development. In their literature review, Zhang et al. sum that human interaction with technologies should be driven by human's different levels of needs and goals. The fundamental message for this new approach is that the concern should be human-centred or human-oriented instead of task or technology oriented. Zhang et al. continue that it is necessary to communicate to the users or teammates about the human-computer interaction development activities and results.

Despite users and their contribution to the information system development are emphasised in the paper by Zhang et al. (2005), the users are not considered equal to the designers. We add to that with our research and explore the active participation of users from the beginning to the end of an information system project.

Research approach

This research was qualitative and the approach was subjective. The main research method was case study and the empiric material was collected from an information system project where an inter-organisational information system was implemented. The subjective approach enabled the researcher to reflect on her past and it also necessitated interpretation when analysing the research material (Walsham 1993). The material from the case was gathered by remembering Yin's (2003) notes about an exemplary case that

needs to be significant and complete, to include alternative perspectives, display sufficient evidence and to be composed in an engaged manner. The case also offered a diversified environment with several stakeholders and project parties and therefore it represented an intrinsic case (Stake 2000).

The research material consisted of project memorandums, emails sent to the researcher, SMS's and a personal diary written by the researcher. The diary was written with a confessional style (Schultze 2000) and it reflected the project memorandums and emails, added with the subjective interpretations by the researcher. In addition, users had given feedback with a specific automated form and their feedback was independent on the project meetings or their atmosphere. Interviews were not carried because the researcher did not want to influence the response. However, triangulation (Klein & Myers 1999) was found in the research material because the emails and project memorandums were written by other people.

The diary met the criteria described by Schultze (2000): authenticity (the role and identity of the researcher was explained in the text); plausibility (the text was structured, following the timeline according to the empirical case) and criticality (the diary helped to understand the attitude of the researcher and was still questioning the objectivity of the data). In addition, a self-revealing approach was expressed by making notes about success or failure felt in the process (van Maanen 1998). In the diary there were notes about 350 days.

To ensure the quality of the performed research, the principles introduced by Klein and Myers (1999) had been in the background when carrying out this research. A hermeneutic circle was concerned when trying to understand the relationships between project stakeholders in the context of the inter-organisational project organisation. Interaction between researchers and subjects had been active in project meetings and encounters, including emails. Multiple interpretations were realised in this research by using both project documentation and the personal diary written by the project manager in interpreting events. The subjective interpretation of the researcher was questioned by using the several emails and SMSs that were sent during the implementation, giving evidence about the atmosphere and situations in the project. The principle of suspicion led us to evaluate the subjective diary of the project manager and the short minutes that were written about meetings and encounters.

Evidence and findings from an inter-organisational information system project

The empiric material was collected from a case in an information system project during the years 2003-2006. The researcher was called to act as a project manager due to her background and working experience in other information system projects. The researcher was called to a meeting that was held in June 2003 and the goal of the meeting was to get plans to set up an information system project. There

were eleven persons in the meeting and the researcher knew only one of them. The attendees represented several organisations and they were experienced in the operations that the information system was to support. From this viewpoint, the approach of the forthcoming users was in evidence already before the project was even established.

The starting point for the new information system project was declared in the first meeting, as well. The basic principle was to use previously made specifications as a basis for the new information system. The goal was put in words by an attendee: *"We need a workable tool into use. With that we can prove the utility of the information system."* This goal was also formulated in other words: *"After three years there will be an information system in use in three organisations and it will be used to support our defined tasks. The assumed number of users will be one thousand."* These formulations proved that the information system (called eSystem in this paper) was truly waited for and a lot of expectations were laid on the project.

It took several months before people from all participating organisations were nominated to the project group. Due to other duties of the project personnel, there were also changes in the project group and new participants were nominated as others left the project. The project group consisted mainly of forthcoming users and they were eagerly waiting for the new information system. However, developing information system needed experience that was not familiar to people who had no previous experiences or knowledge about the tasks.

Due to the requirement concerning the use of earlier made specifications, the previously made specifications had to be carefully acquainted. This task appeared to be a tedious phase before the actual planning and coding could be started. The users did not find important to go through the documents and they were about to loose their interest in the development project. There were all together 94 files to be read and 19 of them were thoroughly evaluated and their usability assessed. The most important document was the description of the process that included the viewpoints of the actors and involved organisations along the timeline. However, knowing the process was not enough. Instead, the participants had to be able to describe their work processes from their own point of view. As there were many organisations involved, there also were many work flows needed.

The specifications made by other stakeholders caused troubles for collaboration. The project manager wrote her diary on June 8, 2004: *"She said that the project group has no more any rights to discuss or abandon the user interface that is made by them."* Later the conflict continued with a phone call from the vendor and the project manager wrote her diary: *"He insisted that the user interface is not in agreement with the requirements specification and it should be modified according to that."* The tension between the project manager and one of the stakeholders continued and the conflict was highlighted every now and

then. The researcher wrote her diary on March 3, 2005: *"I recalled that the project had paid a lot for doing the user interface to look like their suggestion and many discussions and meetings were held because of it."*

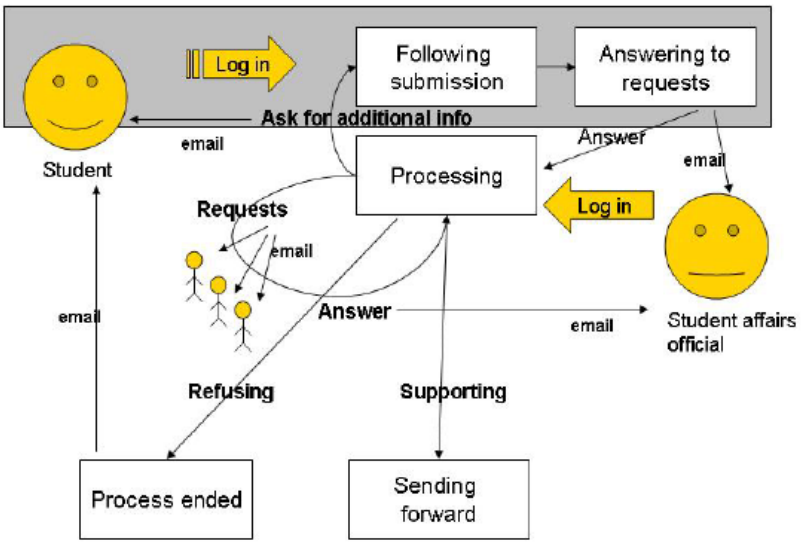
However, there were also positive moments in the project meetings. The researcher wrote her diary on June 11, 2004: *"The atmosphere was very warm and things seemed to proceed."* In addition, the role of trust between project participants was emphasised every now and then. They kept saying in project meetings: *"Of course we rely on that the other officials offer qualitative services and do not suspect it."* (Diary notes from a project meeting on October 25, 2005). *"I don't believe that anybody would on purpose do wrong or anything unauthorised."* (Diary notes from a project meeting on November 4, 2006).

As eSystem included also personal data, the security issues had to be thoroughly considered. The users were authenticated by a middleware called Shibboleth (Shibboleth 2007) that enabled the identification of the users with the usernames given by their organisations. The national Personal Data Act was to be conformed in depth. In practice, this requirement also necessitated the principles of transparency to be followed. That caused several conversations in the project group because the realisation of the principles were not jointly agreed. Some of the participants supported limited opennes while others wanted to share all information that concerned the ones in question. "*Damned, sometimes this principle of information visibility is ridiculous! There is interaction between officers that does not belong to others*." (Email in February 2005).

Except the outside vendor, the project participants were not technically oriented or experienced in information system developments. That is why the development work was perceived challenging by the users. Despite the modest experience, the users were asked to describe their work processes and requirements for the new information system. However, they were the best experts in their own work and work processes. It appeared that describing every-day work processes was found difficult in the project group. Therefore, the vendor had to suggest possible work processes to them. In order to help the users to understand the use cases, several pictures were drawn for them (Fig. 3). The figures were found descriptive and some of them were used when training new users after eSystem was piloted.

The approach of the vendor differed from that of the users. The vendor understood that every action had to be coded in the information system and that the actions also influenced other actions and the data. The forthcoming users were mostly interested in bigger functionalities and, from time to time, the smaller actions in the functionalities were not perceived important. Occasionally several discussions about the functionality and coding them into the process were felt annoying by the forthcoming users: "*You may do yourself an information system that you can learn to use and manage all the tasks for us*." (Diary notes from a project meeting in March, 2005).

Fig. 3. Modelling the use of eSystem.

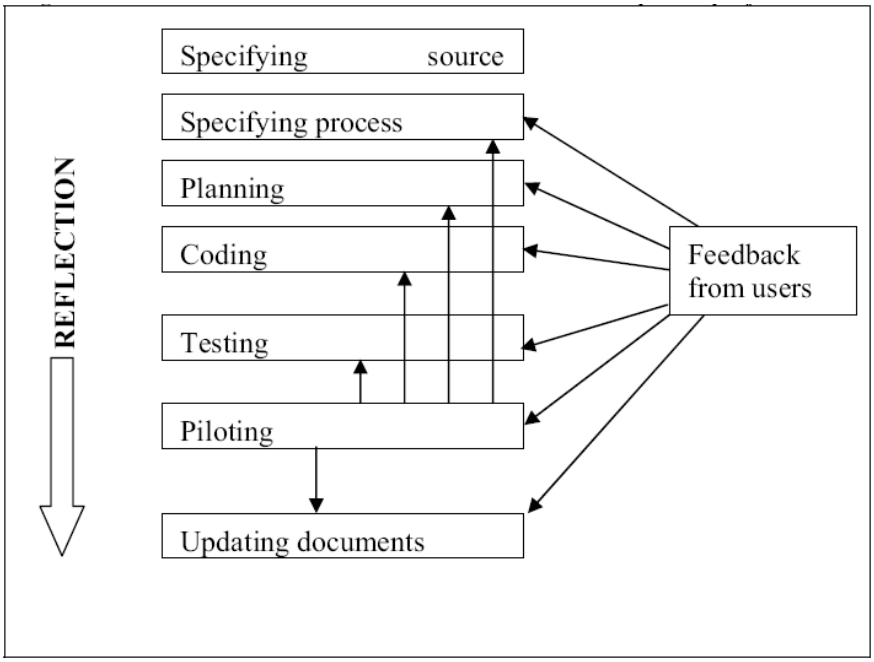


Due to difficulties in defining work prosesses, several changes and modifications were needed after the designed functionalities were coded and tested in the system. An interesting opinion concerned the cost and importance of conceivable faults in the information system: *"And in the background there is the thought that this eSystem is developed for us and that we are paying for it. If there are mistakes or if there are unsatisfactory decisions – it shouldn't be any end of the world."* (Email in May 2006).

Despite the active role of the users in this development project, the amount of suggested targets for development after careful designing and discussions increased up to 176 during the pilot. The number proved the difficulties to understand the effects of made changes in work processes or in database. Very often the conceivable effects were impossible to prefigure and they did not come visible until the information system was changed and tested in use. It also appeared difficult to figure out the relationships between suggested changes. The user supposed that her suggestion only influences that specific action but usually the influence was accumulated. A new risk was added to the risk list on February 2, 2006: *"New features are included in the system too late."*

In addition, the changes that were made in the information system influenced also the documentation. However, to avoid overlapping work, the project manager did not want to update the documents before the information system was as ready as possible. That decision led to problems in completing the documentation .The situation was recorded in the project memorandum on November 27, 2006: *"Due to late accepted changes in eSystem the documents will not be completed in time."*

Fig. 4. Influence of user feedback on functions in the development project.



Altogether 47 project meetings were held during the piloting phase. The users participated actively and they were able to give feedback whenever they had found something to say about the functionality of eSystem. Fig. 4 represents the influence of user feedback on the information system project. Due to the active involvement, the project was not stabled until at the very end of the project. The final endpoint was dictated by the schedule that stated the project to end on December 31, 2006.

The role of the project manager could be described as a facilitator between the users and the vendor. One of the most important tasks of the project manager was to ensure that the project would progress and that it would be completed in time. Following Schön (1983), her role could be characterised as a reflective conversationalist with a situation where she acted as both an agent and an experient. She used to send encouraging messages to the users: *"Really, you are an excellent information system developer and experimenter! It is splendid that you tested it so quickly and told about your experiences to all the others!"* (Email November 2006). The interaction was perceived mostly friendly and also the users sent actively emails to the project manager: *"To my mind, the gathering was very successful. Occasionally, the network was found slow but no rebelling was found there."* (Email November 2005).

Despite negative experiences from her past (Halonen 2004a) the researcher felt the influence of users fruitful and supportive. The information system was evaluated by praising words by the officials: "*This*

report is an excellent addition compared to previous situation. This kind of information was not available when the mobility was managed decentralised." (Email in March 2005). Some of the officials used also the feedback form that was aimed to other users*: "At least in this issue we have done a good development work :) "* (Feedback October 6, 2006). The
project work, too, was perceived as a positive experience: *"To my mind, this collaboration [in the project] has been really fruitful and interesting."* (Email in December 2006).

Concluding discussion

This article reports the findings that were found in a research project. In the project, an interorganisational information system called eSystem was developed and tested. The significant character in the project was that the users were involved in the project from its beginning, even before the project manager was invited to join the project. Inter-organisational information systems and their developments are studied and reported already earlier, but the active role of the organisations and users representing them has so far been under lesser attention.

The research approach is qualitative and subjective and it necessitates interpretation when analysing the findings. The findings propose that the development of information system should be more flexible compared to the theory that literature traditionally proposes. We argue that information system developments in real life seldom resemble any theory even if widely reported. Our information system project did not follow the classical life cycle described by Lucas (1985). On the contrary, the development process seemed occasionally go backwards. Furthermore, we argue that only flexible routines enable the users to be taken sufficiently into account.

In our case, the trust in interaction was perceived reciprocal in the project meeting and the several emails were sent between project participants. The natural and easy terms between people enable the fruitful interaction. The users were not afraid to express their opinions and wishes about the functionalities when discussed in the project meetings.

A special character in our project was the role of the project manager whose main task was to act as a facilitator in the project. The users were the main actors from the view of the output. In addition, the role of the vendor who did the actual coding can be seen as a hired employee. Following this, the users were not people who offered their experience. Instead, they were the primary actors in the project.

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