Information Systems Quality Process in Theory and Practice: Results from a Preliminary Case Study.

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ABSTRACT

Several theoretical frameworks have been developed in order to achieve high information systems (IS) quality. Unfortunately, IS quality has not been fully achieved in practice, because most of the frameworks are either too theoretical or too technical. This paper reports a pilot case study, which investigates how IS quality is carried out in practice. We have developed a quality model to guide the case study process. The model is based on previous studies on information systems planning (IS planning), information systems development (IS development) and information systems evaluation. The range of disease interventions from the research on medical epidemiology provides a theory for explaining the relationship between the elements in our model. The results from the case study show that there are significant quality issues that are missing in the literature, which have to be addressed in practice. For example, the planning of business or organizational IS quality during IS planning.

1 INTRODUCTION

Achieving information systems (IS) quality remains an important issue in practice. IS quality has been conceptualized by many researchers as a multiple dimension phenomenon. Therefore, previous attempts to define the concept unidimensionally were criticized by most researchers. Instead frameworks and models are recommended as alternatives for defining the phenomenon.

In this research an IS quality process model is developed. The model tries to explain the nature of IS quality on the one hand, and a means for achieving IS quality in practice on the other hand. The model was developed based on the literature on IS planning (Galliers, 1991; Reponen, 1994; Lederer and Salmela, 1996; Premkumar and King, 1991, 1994), IS development

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(Pressman, 1994; Fenton, et al. 1997), and IS evaluation (Goodhue, 1995; Kumar, 1990). The range of intervention model by the institute of medicine on medical epistemology (Merzed et al., 1994) provide a theory for explaining the developed model

In this research our main concern is to investigate how IS quality is achieved in IS dependent organizations. This is an important issue because the need for quality in information systems, especially those with strategic importance can not be overemphasized. This is because for any IS to be successful one important ingredient for success is the IS qualities built into the system. One of our underlying assumptions is that if the most important business qualities were planned already during IS planning, and built during the developed phase (in addition to the technical qualities that will be identified during the development phase), then the chance that the system will be successful is much higher. The quality attributes built into an IS have always been one of the most important elements for IS success and we presume it will remain so.

This paper reports an exploratory pilot case study conducted in Parcomp. Parcomp is one of Partek's group of sister companies in Finland. Parcomp has invested resources towards achieving IS quality in the past. For example they have invested in Crosby's philosophy of quality and they have also tried standards like ISO 9000, but they are not very satisfied with it for several reasons. Parcomp is selected for this pilot study for several reasons. One important reason is that they provide a good illustration of how they have gone through the process of IS quality in the past. This paper can be considered as a response to the call for more empirical in-depth case studies concerning how to improve IS quality in practice.

The paper proceeds as follows. The next section discusses the theoretical background, focusing more on IS planning. The medical epistemology is also presented in this chapter for explaining the developed model. In the third section, the detailed analysis of the pilot case study is presented. The fourth section describes the methodology and the findings from the case study. The conclusions to the paper are presented in the last section.

2 BACKGROUND

Several of the attempts made to define quality have produced inconsistent results (Juran, 1988; Crosby 1979, Grönroos, 1990). IS quality is a multiple dimensional construct and any definition of it must take this into account. Most of the early definitions of quality considered one aspect of quality and have therefore been criticized. Reeves and Bednar (1994) noted that the fragmented nature of the literature suggests that multiple definitions and/or models of quality are required to

capture the complexity and richness of the construct. The best solution we might hope for, in our opinion, is a framework or model that explains the phenomenon clearly in multiple dimensions.

Many frameworks have been developed to address this problem (Erikkson and Törn, 1991, Kahn et al., 1997; Salmela, 1997). The problem with most of these frameworks is that they are often too theoretical to be used in practice. Recently, many organizations have turned towards IS quality standards for support. These standards include the ISO 9000 series and the Capability Maturity Model (CMM). Unfortunately, these standards are too technically oriented, and they hardly consider other aspects of IS quality besides the technical quality (Braa et al., 1994; Rao et al., 1992).

This situation has made several researchers call for a more empirically in-depth study of what is really happening in organizations. Case study methodology is very suitable for this kind of study. We have therefore developed a model for investigating the situation in practice. To construct the model we look into the literature on IS planning, IS development, and IS evaluation. The objective of this literature review is to investigate how these three phases address the issue of IS quality. The remaining part of this section presents the model and a theory for explaining it is presented, in sub-section 2.4, from the studies on medical epidemiology.

2.1 Information Systems Quality Process Model

The objective of the IS quality process model (figure 1) is to guide in the establishment of IS quality in organizations. Focusing on different aspects of quality during the planning and development phases will ensure the establishment of critical IS quality in practice. We define critical IS quality as all those quality attributes that an information system must have in order for the system to be a success. We have identified three categories of such IS qualities: the business quality, the technical quality and the use quality. These critical IS qualities can only be defined by the IS stakeholders at the various phases of the IS planning, development, and use.

The IS quality process model we have developed explains the nature of IS quality on the one hand and guides the achievement of the IS quality in practice on the order hand. One of our underlying assumptions as mentioned earlier, is that if business qualities were planned already during IS planning, built during the development phase (in addition to the technical qualities that will be identified during the development phase), then the establishment of IS

quality is almost certain. Furthermore, the attainment of high IS quality contributes towards IS success. The remaining part of this section discusses the model in detail.

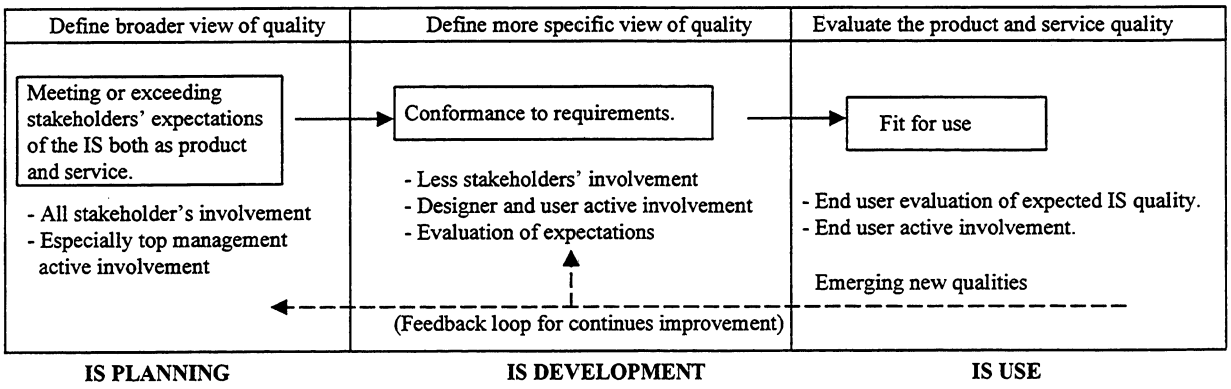

Figure 1. The information systems quality process model

2.1.1 IS Planning

The need to integrate the IS plan with the business plans of the organization have been emphasized by many researchers (e.g. Lederer and Salmela, 1996; Lederer and Sethi, 1992). IS planning requires top management to have a clear perception of the roles of IS in the organization. The term IS planning in this paper is used in the context that includes "all activities that are directed toward identifying opportunities for using information technology (IT) to support the organisation's strategic business plans and to maintain an effective and efficient IS function" (Premkumar and King, 1994, p.327). These activities present "plans for information systems design, implementation, and operation" (Reponen, 1993, p. 102).

The planning process is the core component of the planning system (Premkumar and King, 1991; Lederer and Salmela, 1996). This is the process of converting the information inputs into a system of plans that provides strategic directions for the IS function. It also analyzes the IS for opportunities and threats and assesses the internal environment for its strengths and weaknesses. The planning process forecasts the IS technology trends, and their effects on the industry and organization. This process further identifies the users' information requirements, developing an information architecture, and finally developing a set of strategic programs and plans for effectively managing the IS function.

In our literature review on IS planning, we found that IS planning frameworks (Guimaraes and McKeen, 1989, Earl, 1993) and methods (Method/1; BSP; IE) do not unfortunately consider the IS business quality. In this research we argue that the business quality for an IS is best planned during the IS planning. Salmela (1997, p.819) defined the IS business quality as "the net

value of an information systems for the user organization". He explains that the IS business quality is affected by both the cost of planning, developing, maintaining and using the system, and by the benefits achieved through systems use.

While many researchers have discussed the business and organization quality mainly from the financial aspect of the IS (see Delone and McLean, 1992), we think that IS business and organizational quality goes beyond the tangible financial benefit. Traditional cost/benefit analysis is applied to identify quantifiable IS benefits such as cost reductions, fee revenues, and increased product sales (e.g. see Strassman, 1985, DeLone and McLean, 1992). In our pilot study, three intangible organizational and business qualities were stated as follows:

1. *The system must be easy to use world wide, and the supplier must be able to supply the system world wide, because Partek is a large company that is operating world wide.*
2. *Ability of the company to continue developing the product. That is the supplier must be able to provide new version when needed*
3. *The supplier must be a large organization, which operates in several countries. This will ensure the ability of the supplier to provide customer services to the entire Partek group all over the world. Moreover, it will ensure that the supplier will be in existence for a long time.*

From the top and senior managements' point of view four years ago these are the most important quality dimensions when planning to change the financial application the organization was using. From our study we concluded that the IS business quality includes the financial benefits of the IS (tangible) plus the intangible benefits of the IS for the organization. In this paper the business quality also includes the organizational quality. Another study by Jelassi (1994) shows that the integration of British Petroleum (BP) group into one culture turns out to be the most important organization and business quality in the case of BP (pp.37-61).

We argue in our model that this type of quality dimension can only be identified by the IS planning stakeholders, because they are the only ones that know why they have initiated the IS project. IS projects should offer some financial and other organizational benefits to the top management. These benefits need to be formulated as expectations. Therefore we have defined IS quality at the planning phase as meeting or exceeding the IS business expectations. IS business expectations are generally broad and more general; however it is very important that they are identified and documented for the IS developers.

We argue that the IS business quality should be planned during IS planning for two reasons. Firstly, the IS stakeholders understand the business better than anyone else, therefore they are in the best position to identify the business benefits of the IS. Secondly, the developers and other stakeholders usually think of quality from a totally different point of view, thereby making it difficult to reason from the business point of view (Gavin, 1984).

To summarize this subsection we conclude the following. One, that a working definition of IS quality during the IS planning is meeting or exceeding IS business expectations. Two, the more extensive and comprehensive business quality listed during the IS planning, the more effective and useful quality that will be coded during the development phase. Three, without the IS planners identifying the business qualities, the IS developers can seek and build unnecessary and useless IS qualities into the system. Therefore, the arrow in figure 1 from IS planning to IS development implies that business quality should be planned and delivered to the developers.

2.1.2 IS Developing

IS development in our framework illustrates the software engineering paradigm. That is the use of tools, methods, and procedures to control the process of software development. This process provides the developers a foundation for building high-quality software in a measurable and productive manner (Fenton and Pfleeger , 1997; Pressman, 1994). The software development methods provide the "*technical how tos*" for building software.

The IS development literature has addressed the IS technical quality, mainly the software quality extensively (Garvin, 1984; Tervonen and Kerola, 1997; Pressman, 1994, ISO 9001; Erikkson et al, 1991). A commonly acceptable definition of software quality in this literature is conformance to requirement (Crosby, 1979). Viewing IS quality as requirement that should be meet enables the developer to build a technically sound IS. While this is good from the developers, or manufacture's points of view, it is quite limiting, in practice. The conformance definition does not consider the broader view of quality, which might be difficult to specify in precise terms.

In our model we propose that the quality view at this phase should be a combination of the conformance quality plus the business quality or expectation quality as in the model. While the developers can determine the technical qualities, which are more precise and detailed, they are not able to identify the organizational and business qualities as clearly as the IS planning

stakeholders. In the literature and in practice what is missing is the organization and business quality link from IS planning to IS development.

We conclude that developers need to make a request for these business and organizational dimensions of quality. This is a dimension that is often taken for granted. As one of our interviewees put it *we know the business and technical quality better than the business people*. We believe this is a misconception that needs to be changed among the IS developers. Furthermore, the developers need to break down the broad view of quality - specified by the IS planners - into codable forms, and then build it into the system.

2.3 IS Use

The last phase of an IS project starts from when a system is adopted, which some researchers have called the use-situation (Ehn, 1995). The use phase is the one of the most significant phases in the whole IS project. This is because that is when the final evaluation of the system will be conducted. The users will discover if the delivered system is useful for their work or not. Deming (1986) noted that quality can be judged by consumers (users); they determine whether a product (IS) or a service (the IS department supplying the IS) is fit for use. We define quality as fitness for use (Juran, 1988) in this phase. This definition was first introduced by Juran et.al., (1974) as the extent to which a product successfully serves the purpose of the consumer.

If we apply this definition of quality to IS, it implies that the final IS quality can only be judged by the users or customers in the use-situation (Ehn, 1995). They can determine if the system is fit for use or not. Sometimes it is not very simple to say whether an IS is fit for use or not, because it might be useful on the one hand and merely satisfactory on the other hand. Therefore, users might have to determine the extent to which the system is useful for their task. The use-situation may reveal some new quality dimension that might not have been considered during the earlier phase for several reasons. Firstly, the quality dimension might not be obvious before the system is taken into use. Secondly, the business environment might have changed significantly. Lastly, the business planners and the IS developers do not conceptualize IS quality along the same dimension, in most cases.

Therefore, there is a need to identify more IS quality during the use situation. Nowadays there are many IS development methods that try to simulate the use-situation during the development. However, it has been reported that there are significant differences between the prototype and the real system in use. Ehn (1996) uses the term quality-in-use as a balance

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Austin Flint, MD, began his investigation of an outbreak of typhoid fever in North Boston, he was destined to become one of the greatest physicians in history. The pioneer work by Flint since 1843, has lead to the development of the field of epidemiology (see Winkelstein, 1997).

The field of epidemiology can be described briefly as that aspect of medical science that seeks to understand the spread of diseases. Using a structured, scientific approach, it identifies disease causes, precursors, and vectors. Armed with this knowledge it then seeks to intervene in the process so as to prevent the disease from occurring. Ideally interventions take place as far upstream from the potential onset of the disease as is possible. The hypothesis is that the nearer to the source an intervention takes place, the more effective it is, the lower the cost, and the greater the potential savings.

It is therefore not surprising that the "medical organizations in America are seeking for means to control the cost of care and they are increasingly looking to the field of epidemiology for ideas." (Ongstad, 1997 p.3). Other social sciences have also exported the system oriented epidemiology principles and methodologies out of the medical field and used them to design interventions to prevent a variety of community and social ills. Some of the examples include firearm deaths (Craig, 1980), smoking among blacks and whites (Thomas, 1996), drowning in adulthood (Garen, 1988), alcohol-related violence (James, 1993), and school-related injuries, (Dennis 1992). Recently, epidemiology principles have been used as a powerful tool to address information system data quality in biometrics data produced by a medical system (see, Ongstad, 1997).

In this research we hope to extend the application of range of intervention (RI) theory not only to data quality (Ongstad, 1997), but to the establishment of total IS quality using our model. The objective is to present a logical relation between the range of the intervention process and our model.

2.4.1 Range of Intervention Theory

In this section we present a summary of the range of intervention model. The conceptual model was produced by the institute of medicine titled Range of Intervention (figure 2). This model was designed to explain the spectrum of possible interventions in the treatment of human disease (Merzed et al. 1994). Ongstad (1997) directly applied it to the spectrum of risk factors identification and problem prevention in the treatment of data quality. We are going to apply it to the prevention of information system quality problems in this section. The basic principle in

the range of intervention model is that problem prevention is generally more inexpensive and more effective from a total system standpoint than the cost of treatment afterwards.

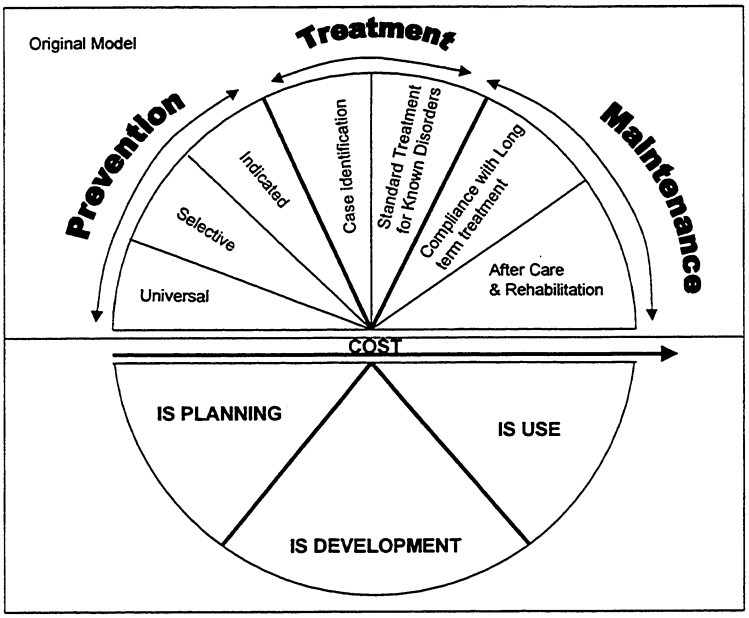

Figure 2. Institute of Medicine Range of Intervention (Modified version).

Interventions range across three primary categories: prevention, treatment, and maintenance. Prevention encompasses actions taken to forestall adverse outcomes, treatment encompasses action taken to deal with existent problems, and maintenance involves actions taken to prevent reoccurrence of past problems. The cost of intervention increases as intervention moves towards maintenance. A problem avoided is less expensive than a problem to be corrected after it has occurred. Applying this to IS quality, we allege that the cost of correcting IS quality problems increases as we move into the use-situation.

We argue that IS business and organizational quality problems prevented during planning are less expensive than the cost of correction during the use-situation. In utopia, we will deal with all problems (medical, IS quality, etc) through prevention. In reality intervention will range across the spectrum. "The more practical goal then is to push as many problems as we can to the left (into the prevention range) through a proactive process that attempts to understand the process at work, assess the risk factors present in the environment, and create interventions to decrease risk and therefore the potential for adverse results" (Ongstad, 1997, p. 5).

Prevention and IS Planning: Preventive actions are those interventions taken prior to the appearance of a problem. They specifically address issues and needs that, if not addressed, will result in problems. Similarly, failure to carry out IS plans can cause lost opportunities,

duplicated efforts, incompatible systems and wasted resources (Raghunathan and King, 1988; Lederer and Salmela, 1996). We can further argue that more resources will be wasted if the broad view of quality is not considered during the planning. This broad view of quality covers the business and the organizational view of quality. To prevent problems with business and organizational quality during development and more especially during use-situation they have to be planned during the IS planning.

Treatment and Development: Treatment interventions are probably the most well known. These are interventions in order to return the patient to a more or less acceptable status. Similarly, IS developments are actions taken to develop the plan IS to a more or less acceptable status. Both treatment and development make use of tools, methods, and processes. In medicine, while treatment might be considered (sometimes) as a failure to prevent the problem, in IS development it is actually a good omen if the plan systems are implemented (i.e. developed). However, if business quality requirements are not specified during planning we considered them as a potential problem that will be more expensive to eradicate from the system once it is adopted.

Maintenance and Use-situation: Maintenance is a term use in the epidemiology field and in the IS field with a narrow interpretations. In epidemiology maintenance goes in two direction, long term treatment, and aftercare or rehabilitation. The thrust is to ensure that previously discovered problems and the interventions taken to correct them are continually in force so as to prevent recurrence. In IS quality terms, this will be the process of continuous evaluation, and the process of reporting the newly discovered use-quality to IS developers and on special occasions to senior and top managers as illustrated in the IS quality process model figure 1.

3 CASE OVERVIEW

3.1 Description of Case Company: Partek and Parcomp Oy Ab

Partek is an engineering company that is a world leader in load handling with strong mineral-based business in the Baltic Sea region. The company's roots are in Finland. Partek was established in 1898 in Pargas (i.e. Parainen), on the southwest coast. Today Partek has operations in some 30 countries. With the current structure net sales amount to over FIM 12 billion (USD 2.5 billion) 76% of which is generated outside Finland. The Group employs nearly 12,000

people. Partek has three major business areas: load handling, forest machines and limestone base products.

Parcomp Oy Ab is one of the group of sister companies under Partek. It is 100% Partek owned, but it is an independent service company. At present Parcomp has focused on managing and controlling the Partek client information network, on developing network services and on guaranteeing the usability of the network. Other services are end user support, and facilities management and consulting in IS-projects. Parcomp has eight offices in different locations in Finland with a total staff of 53 persons. Parcomp's net sales in 1997 were about 32 Mmk.

3.2 Establishing the Hyperion Project.

The project is called Hyperion. The project was initiated about four years ago by the senior management of Partek. They want to have a better reporting system because the previous financial and reporting application system was too old and almost at the end of its life cycle. Therefore, there was a need for a new financial application system. Before the Hyperion was bought several financial applications were tested by Parcomp staff, after which they chose two applications, namely Hyperion software and another one. These two applications were deemed to be the most suitable applications for financial reporting in this case.

Finally Hyperion was selected for group financial reporting in Partek cooperation (i.e. for the whole Partek group) because around the same time Partek merged with Sisu. Sisu is also a Finnish company about the same size as Partek. The decision to change to Hyperion was simple because Sisu, which is now one of Partek's group of sister companies, already uses Hyperion.

3.3 A Brief Description of the Package: Hyperion Enterprise

Hyperion Enterprise is a financial management application for complete global consolidation. It includes management reporting and analysis, financial reporting, forecasting acquistions and disposals, product line analysis and statutory consolidation. The Hyperion system has several modules, and it requires heavy customization before it can be used.

This application is the cornerstone of the Hyperion Software Corporation and its financial management software suite. Hyperion Enterprise consolidates data from diverse general ledgers and other systems to provide a single, global view of information. It delivers ad hoc access to financial information for decision-making and contains reporting requirements in each country of

operation. The application organises data into a business model that reflects the way the company operates.

4 METHODOLOGY

In this study the research method is case study. A case study examines a phenomenon in its natural setting and employs multiple methods of data collection to gather information from one or a few entities. Case study has been selected as the research method for four reasons (Benbasat et al, 1987, Yin, 1988).

Firstly, the research problem deals with a why and a how question, more precisely, how is IS quality established in organizations. Secondly, a deeper understanding of the fuzzy practical nature of IS quality is needed. Thirdly, control or manipulation of the events is not necessary, and lastly, the problem of interest does not have a single, acceptable, clearly defined theory. Instead, there are several frameworks which try to explain the phenomena. Therefore, a case study is quite appropriate for exploration; it gives the opportunity to capture the knowledge of the practitioners, and develop practical frameworks from it. From the practical frameworks, new theories or new concepts can be developed (Benbasat et al, 1987, Yin, 1988).

In selecting the pilot case company an organization that has implemented a quality process in the planning and developing of their information system was searched for by the first author. Furthermore, fairly big organizations were considered first as potential case companies, in the hope of finding stakeholders that would fit into each phase of our conceptual framework (Figure 1). Our pilot case company meets these criteria and the second author is an insider whose interest helps very much in securing the cooperation of our pilot case company.

The data for the study were collected mainly through personal interviews by the first author; however, a few documents were also collected to support the interview materials. The objective is to test and validate the interview questionnaire because the authors hope to conduct other case studies using an improved questionnaire. It turned out that the findings from the pilot study were substantial. The questions were designed to explore the implementation process in three phases outlined in our model (IS planning, IS development, and IS use, see figure 1).

The questionnaires were semi-structured. All the interviews were tape-recorded. Facts that could not be obtained through the interviews were sought and obtained through project documentation or other sources. These facts were latter validated through interviews. Altogether, five people were interviewed for the pilot study, only two of them belong to the

management category and are therefore responsible for the IS planning. Another two were grouped into the IS development category, and the last person was located in between the management and the developers. The users were not interviewed for two reasons. The first and most important reason is that they have just started using the system. Secondly, it would not be very easy to get access to the users; for example, they are located in different cities.

The unit of analysis is the quality process the organization uses. There are some accepted quality standards today, for example, the ISO 9000-3 and CMM. These standards usually promote a process for the achievement of high IS quality. The process outlined in theory is usually not directly implemented in practice. In fact, many organizations have their own IS quality processes, which are usually a combination of many standards. Our objective is to examine how our pilot case company proceeds from one phase to another. In validating the responses we transcribed the recorded tapes after having listened to them several times.

The findings from our pilot study were reviewed by the two authors to verify that our findings complied with the views given in the interviews. The findings were also discussed with some of the interviewees to improve our understanding of the IS quality. Our findings were also reported to the pilot company in writing.

4.1 Findings

The findings will be presented according to phases in the quality process (QP) model (figure 1.) First we shall present the finding connected with the planning phase, followed by the development phase and finally the use phase.

4.1.1. IS Planning

A key finding was that IS quality should be planned during the IS planning. Four of the interviewees strongly believe that it is very important that management specify the IS business or organizational quality in this project. Only one interviewee thought that management does not have to specify the business quality for the developers because the developers probably know the business and organizational quality much better. The interviewee's reason is that IS developers are not pure technicians any more and they understand business issues quite well nowadays. However, he was the only one out of five that thought that IS developers could replace the IS planners during IS quality planning. We take the view of the other four because the business

vision and strategy are not always obvious, and therefore only the business people can specify the business objectives.

In this project business and organizational qualities were easy to specify because the IS project will be partly used by senior managers and financial reporters in the Partek corporation. Therefore, the senior management is more concerned about it than usual. The outlined and documented business and organizational qualities have been stated earlier on, see section 2.1.1 above.

We asked if top and senior managers should specify the business and organizational quality dimensions if they are not directly connected to the system. The general answer was *No*. All the interviewees also noted that *senior managers have not been specifying the business or organizational qualities in the previous projects*. However, they all suggested the need for a framework to assist the top and senior management in carrying out the business quality planning. One of the developers interviewed puts it this way: *top management should have some framework to do this*. They also noted that *it would go a long way in helping the developers, especially toward the development of technical qualities that support the business qualities*.

When we asked if senior management has always been conducting business and organizational IS quality planning. Four of the interviewees pointed out two things. One: *that senior management conducts something like IS quality planning but they don't call it IS quality planning*. Two: *senior management had not thought about it in detail as we were discussing it, but may be they should think about it in more detail*. On the other hand, one interviewee thought that *especially top management does not discuss IS business qualities at all in any form*.

When we asked the question about the stakeholders in the IS quality planning, they all pointed out that *during the IS quality planning meeting, one important stakeholder should be the IS quality manager or an experienced IS developer*. The most common reason was that he might be able to give advice on whether the business or organizational quality might be achieved with the present technology or not.

All the interviewees also noted that *documentation of the agreed business and organizational quality in clear terms is one important output of the quality planning*. The interviewees also pointed out the difficulties associated with the implementation of the plan. They said that *it is about the most difficult part of the process. Furthermore, senior management is not so interested in monitoring the implementation of the quality plan at any phase*. We are of the opinion that more research is needed on the implementation of the IS quality plan during the

development process. One suggestion is that the IS quality manager should see to the implementation of the IS quality plan at all phases.

4.1.2 IS Development and IS Use

In this IS project the Hyperion application package was not developed from scratch. The Hyperion modules or skeleton was bought, so that Partek simply needs to build on it to its own taste. Some kind of quality must have been already built into the system modules. However, when we asked what technical qualities were considered, the general answer was that *the system was heavily tested before they made the decision to buy it.* Examples of what were tested included, the functionality of the database, the ability to modify the system, the ability to add new functionality, etc. The Hyperion software met most of these requirements.

When we asked if there were other detailed technical requirements the systems did not have at the time of purchasing, the common opinion was *yes*. For example, *most of the calculation was done in USD because the software has been developed in the USA. For the software to be used in Europe and other countries outside USA and Europe with over 20 currencies this is going to require major modification. Furthermore, different countries have laws that state how financial reports should be arranged which differ from country to country. In addition, there are other small details that require significant reworking.*

Altogether about six people were involved in analyzing the technical quality of the Hyperion. These people were representatives from Parcomp, Partek group reporting personnel, and one business subgroup of Partek. They allocated a lot of resources to testing the application. In their opinion it was possible to determine the technical quality of the Hyperion through rigorous testing. Whatever they considered lacking was specified for the Hyperion company to update. Some parts of the system were taken into use a year ago.

When we asked how the technical quality issues were documented, we discovered that there is no precise documentation. After the system was bought and taken into some kind of use, any complaints were sent to one of our interviewees who collected the complaints and forwarded them to the Hyperion software for updating. The updated version was sent to Parcomp, who updated the user applications. The e-mail complaints are kept for about a month or two before they are discarded. One of the interviewees noted that *most of the documentation is built into the system so there is no need to keep other documents*. We were informed that the *system was tested each time an updated version was delivered and the user also evaluated it.*

We also tried to find out how they did the evaluation, and how many times it was done. We were informed that *it was done formally at least three times*: o*nce before the annual closing meetings, once before the budget meetings, and at certain other times when there was thought to be a need.* Nevertheless, the users are still using the system and reporting the problems they encounter with it.

All our interviewees pointed out that the evaluation has contributed greatly towards the acceptance of the system, especially by the simple users. They are happy to contribute to the project, since they are using the system to generate reports for senior managers. One of our interviewees quoted a user as saying that *we have been able to make changes to the Hyperion.*

5 DISCUSSION AND CONCLUSION

The process of system selection and implementation in this project does not follow the conventional method. However, there are significant relationships with our model. There was a considerable discussion among several stakeholders before they made the decision to purchase the system. One lesson in this project was that the business and organizational views of IS quality were clearly stated. This is an encouraging finding, because that is what we suggested in the IS quality planning model to the practitioners. We were not surprised to find out that IS business and organizational quality planning is not a common practice but it is rather easy to specify here because the top and senior management will use the system.

Another important finding is that everyone agreed that there is a need for a framework to guide top and senior managers in conducting the IS business quality planning. We also discovered that more quality dimensions were found during the use situation. Although the system has been heavily tested and many important quality dimension and changes have been identified, more use-qualities were discovered during the use phase. We were also able to ascertain in this pilot study that the three definitions of quality suggested in our model work well in this case. All our interviewees thought that it would work in practice, because it seemed useful in this project.

We think that the evaluation process could be improved because only the users are constantly reporting problems with the system. However, system evaluation goes beyond user problems, it includes other dimensions that the user cannot determine. One important issue in this study is how the organization has implemented the concept of service quality, as illustrated in the model (figure 1). Users do not clearly differentiate between the service the IS is providing through the

IT department and the IS as a product. The method used for reporting problems (e-mail in this project) proved to be very useful. At least the technical representative is able to communicate these problems to the developers.

One problem that was identified during the interview is the implementation of plans. Senior managers did not give enough attention to the implementation processes. In this pilot study it was easier because the financial vice-president was involved somehow with the project.

In conclusion, we confirm that multiple definition of quality is needed in an IS project. We have identified at least three dimensions that will be useful in most large IS projects. We also found out that different stakeholders are needed during the IS planning and development stage to identify the various quality dimensions. It is obvious in this case that neither the IT department nor the user can specify all the quality dimensions in an IS project.

It is very important for senior or top management to clearly specify the business and organizational quality dimension in an IS project. This is the case especially, in large IS projects with significant strategic importance to the business and the whole organization. As one of our interviewees put it: *maybe they have some vision of how the business is going to change, and in my opinion, I think this is the most important thing for them to say when we are starting a new IS project because the system is going to be used for five to ten years.* Finally, we submit that perhaps top managers should realized that IT/IS is constantly becoming a part of the strategic dimension of tomorrow's organizations, and therefore IS related activity is no longer of secondary importance, but primary.

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