Chapter 11

TAKING ORGANIZATIONAL IMPLEMENTATION SERIOUSLY: THE CASE OF IOS IMPLEMENTATION

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Abstract: Despite of the rapid technical development, failures in information systems implementation are common and it seems obvious that the implementation of inter-organizational systems (IOS) include all the same possibilities for failures as intra-organizational systems – and unfortunately even some more. In this paper, we present some empirically proven means for avoiding problems during the implementation of IOSs. Our argumentation is based on the idea of organizational implementation of information systems, where the phases before and after the technical implementation are considered to be the most critical ones. The data from a case study are used to illustrate and support the ideas presented.

Key words: Organizational implementation, inter-organizational systems, intra-organizational systems, supply chain, adoption

1. INTRODUCTION

There is a growing base of knowledge on how to develop computer-based information systems, and hundreds of different IS development methods. However, it is still a persisting problem that the systems developed are hard to implement, or that they do not serve the needs of their users, management and customers when finally taken into use. Although this persistence has been noticed early and reported constantly in an intra-organizational setting (e.g. Lyytinen & Hirschheim, 1987; Keil, 1995), it seems that the problems are piling up when moving to *inter-organizational*

setting (Rayport & Sviokla, 1995; Larimo, 2001; Morrell & Ezingeard, 2002). Why do then information systems still fail?

It seems that we – as a professional community of systems developers – tend to treat the systems as separate units from the work activities stressing the development of computer-based artefact much more than the development of work (Forsman & Nurminen, 1994). However, as soon as we change our scope from the computer artefact to the activity itself, the information system can be seen as a means of structuring and developing a social system (Nurminen, 1986) and in simplifying and automating business processes (Hammer, 1990; Davenport & Short, 1990). In this field of studies we have a vast body of literature that is stressing the importance of the social system, i.e., that the most serious problem is certainly not the production of artefacts but the reflection and the reconstruction of social structures, which the artefact is supposed to support (e.g., Beer et al., 1990; Clemons et al., 1995). The simultaneous impact of process and information systems design may be dysfunctional for the performance of the social system (e.g., Larsen & Myers, 1997), if poorly implemented. This is due to the fact that it is the implementation stages rather than design stages that determine the success of an information system and process improvement project, also in the long run (Sarker & Lee, 1998).

The majority of these challenges have to do with people, their roles, objectives and tasks, not computers or computerized processes. As a consequence, also the reasons for failures taking place in implementation projects are more often human than technical. As stated earlier, these problems change in nature in inter-organizational setting, because it adds an additional self-interested layer in between. The collision of the collaborating companies' social structures is one definite source of implementation failures.

In this paper, we discuss the problems encountered in implementing information systems and present means for avoiding the problems. We emphasize the inter-organizational setting and support our arguments with the results derived from a case study.

The case study was a two-year-project that was conducted in cooperation with two large companies from the global ICT-sector. The empirical data presented in this paper refers only to one of our case companies striving for more efficient and proactive procurement activity. Our case-company is throughout this article referred to as 'organization A'. The data gathering methods of the empirical part of the project included in-depth interviews (43 persons were interviewed from organization A and its partial supplier network), documentation created in and acquired from workshops (8 workshops), separate meetings with the representatives of the case companies (12 steering group meetings), and a web-based current-state

survey of (both of) the case companies The original sample size (n) was altogether 168 responses, from which 84 were accepted after data checking and validation. Effective response rate of the survey was 50 percent.

During the first year of the project, the research was focused on inter-company cooperation and the emphasis was on supply chains/networks that for organization A consisted of three suppliers, each from a different tier. The second year of the project emphasized the analysis of the internal operations and company-specific challenges of the companies. For Organization A, the scope was in developing an application for the supplier-network that is tightly coupled with their processes and PDM, and in providing the organization A with guidelines about how to best implement the application into use.

The rest of the paper is organized as follows. First, we our view on the implementation, i.e. describe the 'lenses', through which we explain the potential and perceived problems during implementation. In the following chapter we discuss the problems of implementation in intra-organizational settings, while making a distinction between small and medium sized enterprises (SMEs) and large companies. In the last chapter we discuss the differences of intra- and inter-organizational implementation, i.e. consider how the lessons learned from intra-organizational implementation apply to inter-organizational settings, and what other issues need to be taken into account.

2. WAYS OF LOOKING AT INFORMATION SYSTEMS IMPLEMENTATION

2.1 When is Implementation?

The life cycle of information system (IS) is commonly described as a sequence of phases usually starting from strategic plans (or decision to invest in IS(s)) and ending in the replacement of old systems with a new IS(s). When IS implementation is discussed in information systems research or practice, the term implementation may be used to mean different phases of the lifecycle. Commonly implementation is defined as a process that starts from requirements gathering and specification and ends when the system functions according to the technical specifications (Kling & Allen, 1996). We call this 'traditional' view as technical implementation, or software engineering view.

In practice, every implementation project must include at least four broadly defined phases: 1) Decision to implement, 2) specification and

building up of the technical system, 3) introduction into the organization, and lastly, 4) use and maintenance. In other words, our definition of implementation is broader than the technical implementation view, as we look at implementation as an *organizational change process* that aims to some kind of organizational change or improvement – preferably in a measurable way. In this respect our view resembles closely to that presented by Kettunen et al. (2002) and depicted in Figure 1.

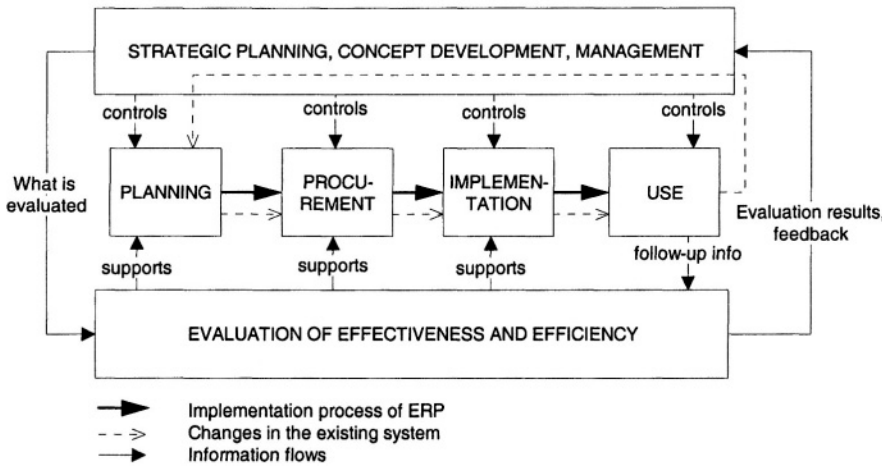

Figure 1. Information Systems Implementation Process. (Adopted from Kettunen et al., 2002).

The main points of the model (Figure 1) are: 1) the evaluation process that is carried out continuously during the actual implementation process (not only once after the implementation) and 2) the criteria of evaluation are derived from or defined on the strategic level.

On a more abstract level, our way of looking at the implementation process coincides roughly the notion of organizational implementation that according to Kling & Allen (1996, p. 269)

> ... means making a computer system accessible to those who could or should use it, and integrating its use into the routine work practices. … A long tradition of research shows that the quality of organizational implementation makes a difference in how effectively these technologies work for organizations.

The view taken on implementation also has other consequences: The criteria of implementation success are in practice defined while defining what the implementation consists of. When IS implementation is considered as a technical manoeuvre, we can measure the success of the implementation

process by comparing the functioning of the system to its technical specifications. When IS implementation is seen as an organizational change process, the criteria of evaluation must be elicited from practice, in which the system is applied. This, in turn, means that the evaluation of the system as a whole cannot be carried out before it is in productive use.

Even though the adopter (especially SMEs) must foresee some benefits in the future system in order to implement it, it does not mean that the implementation will take place (Morrell & Ezingeard, 2002; Ojala, 2001) – or that the expected benefits will be materialized even if the implementation is carried out (Markus & Keil, 1994; Larimo, 2001). However, dramatic improvements in the processes can be achieved as soon as they meet certain criteria. These criteria and the ways of carrying out the implementation process are in the focus of this paper, both in intra- and inter-organizational settings.

2.2 Why is Implementation Problematic?

The mainstream body of design literature emphasizes the use of non-contradictory utterances as a starting point for a design of an information system. It has been complemented during the last decades by an attempt to couple the rational design with customer needs by describing the systems as processes (Davenport & Short, 1990). Although these approaches are clearly challenged by the more social views on the ISs, such as socio-technical design (e.g., Mumford, 1983; Mumford & Beekman, 1995) that emphasize the importance of participation throughout the process (Butler & Fitzgerald, 1997), and even rapid redesign of the system after its initial implementation (so called reverse quality life cycle (Foreman & Nurminen, 1994). At its extreme, the users are developing the systems by themselves (Rantapuska, 2002) in a process where implementation, experimentation and design alternate.

Despite the emerging, alternative approaches, it is the rational process oriented IS design that forms the mainstream profession – the others are in practice merely considered complementary curiosities. Hence, it is easy to understand that our case organization, organization A, is building its systems primarily along the rational process design ideals, and why we start to discuss the role of implementation from this context.

There is a need to constantly evaluate the progress of IS implementation, because the system will change the existing situation. This is because the system will be a *representation of the real world situations,* and it will be *a suggested systemic solution to a problem situation of the real world.* Neither of these will make a perfect match with the real world, because they are, and will always be *representations* of the *existing* situation and *ought-to-be* –

situation. The origin of the problem is that most often the IS-artefacts are developed in a different domain than they will be used in, and too little time is given for the changes to emerge.

In Figure 2, the fundamental difference between the development of software and its organizational implementation (i.e. IS use) is made explicit using the concepts familiar from the Soft Systems Methodology (SSM) (e.g. Checkland & Scholes, 1990).

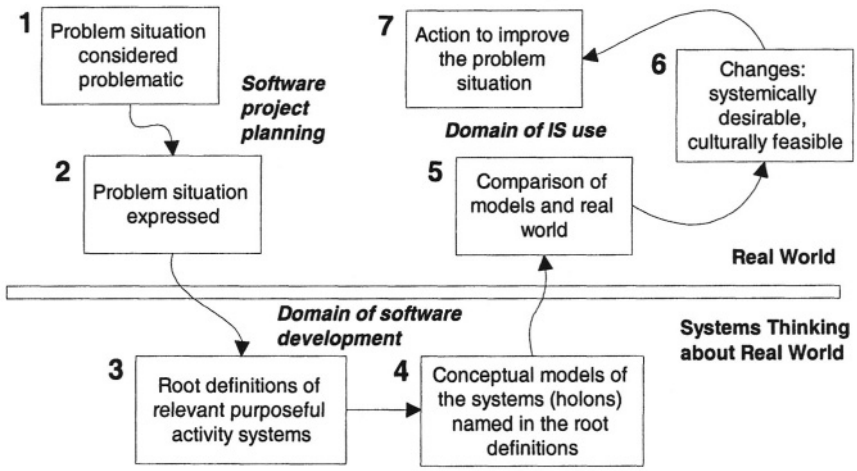

Figure 2. Conventional Seven-stage Model of SSM (adopted from Checkland & Scholes, 1990). The texts in *italics* do not belong to the original model (adopted from Reijonen, 2000).

The border between the "Real World" and "Systems Thinking about Real World" (in Figure 2.) can be seen as the barrier between two disciplines aiming at about the same goal. When the domain in the "Real World" is named as ISs development, and the domain in the "Systems Thinking about Real World" as software engineering, our message becomes rather clear. The descriptions of systems based on abstractions are necessary for building IT-based artefacts, but this does not mean that this abstract world would exist somewhere else than in the artefact and in its descriptions. According to Checkland & Scholes (1990) the question if systems are 'abstract' or 'real' causes much confusion in the systems literature. To emphasize this they state (ibid., 22):

> ... it is perfectly legitimate for an investigator to say 'I will treat education provision as if it were system', but that is very different from declaring that it is a system

We go even a bit further: In much of the literature or practice, the question about 'abstract' and 'real' is not acknowledged, but *the descriptions of systems are without consideration treated as truthful descriptions of reality, or more importantly the ought-to-be -reality.* Different views on reality also mean different views on just about every important aspect of application of IT. We maintain that adding resources to software development cannot significantly reduce the potential problems, but we must take measures more applicable in "real world".

To summarize, the phases before and after the actual software development phase, i.e. organizational implementation, must be taken seriously and resourced adequately. Even though this observation has been reported in about two decades (e.g. Swanson, 1988; Larimo, 2001), the "non-technical" aspects of implementation seem to continue to top the list of factors leading to less successful implementation projects (Larimo, 2001).

3. IMPLEMENTATION OF INFORMATION SYSTEMS

The factors affecting the success of an implementation process have been studied intensively throughout the years (e.g. Swanson, 1988; Lyytinen. & Hirschheim, 1987; Marble, 2000; Larimo, 2001). Despite of the technical development, the elderly nine-item list of critical factors by Swanson (1988) is rather representative conclusion of the results in this area of research:

1. Management commitment
2. User involvement
3. Value basis
4. Design quality
5. Mutual understanding
6. Performance level
7. Project management
8. Resource adequacy
9. Situational stability

Even though the importance of the above factors (and similar) is commonly accepted, the problem with these lists is that we can only say that the factors are important, but we cannot say how to make the implementation successful. In other words, the factors only point to activities and objects, which most often cause failures, but do not tell how to act in order to avoid them.

The factor type of research on IS implementation has mostly concentrated on implementation failures, not successes. This state of affairs has both practical and epistemological causes. From the practical point of view we should get rid of failures, and one way to try doing this is to find the

causes of failures. From the epistemological point view, the most we can after a successful implementation say is that all the factors have been adequately taken care of – and that's about all we can say. The usefulness of the factor lists is further diminished because none of the factors can be properly controlled and the relationships (and "level" if measurable) between the factors and their relative importance varies from context to context (Swanson, 1988; Marble, 2000).

Implementation of organizational changes, including those enabled or constrained by computer based information systems, is not a trivial task, but offers always a challenge to the organization. Next, we present implementation approaches that have been successfully applied in various organizations and situations.

3.1 Large Organizations – Learning Comes First

One general interpretation of the curve (Figure 3.) is that it represents the learning curve of organizational actors, i.e. the users of the implemented systems. This interpretation gets support both from a large body of empirical research, and from the fact that user knowledge is one of the most important variables that can change as the implementation proceeds. The learning process to use the information system to change the ways of work in real terms is most often a tedious, long-lasting journey. There are multiple parties with varying views, and the interactions with other activities are many, and despite the ample resources, change takes time to implement. Without going into the myriad of problems, we try to illustrate the state-of-the-art knowledge on the implementation of an IS within an existing large organization.

Whatever the change process is, 1) the top management must be involved and supportive. 2) The IS-development must have clear connection with the business development, with clearly expressed, measurable targets, to which the future users and the management can, and must commit. 3) The project itself must possess sufficient and qualified/competent resources dedicated for the project long enough. One of the biggest mistakes is to leave personnel management outside the project, as they are needed to ensure the fluent interaction between parties and to 4) help in designing new tasks for the roles. This is because in a large organization you have to get the change going and keep it rolling, otherwise the implementation will loose momentum and fall back to its previous state. (Pendlebury et al., 1998)

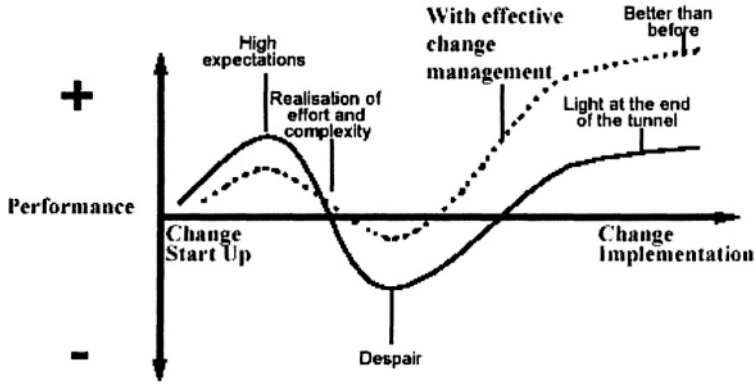

Figure 3. Performance Expectations Curve of Information Systems Implementation. (Pendlebury et al. 1998, 78; Clarke 1994, 78, 174). (Adopted from Larimo, 2001).

In Table 1, we use Beer et al.'s (1990) description on how to revitalize (i.e. To introduce permanent changes) an existing company's activities. They propose measures that have been confirmed by recent studies on business process development (e.g. Sarker & Lee, 1997). First, the intentional change (in Table 1 called 'Intervention') should start from modifying informal behaviour at the level of official social unit. This is to utilise the social coherence in order to achieve real change in the roles, responsibilities and relationships of the people. Only then should we start coaching, training, etc. at the individual level and make sure that the momentum remains by creating vision of the roles of the people in the near and long term future. It is also important to award good performance. Only in the last stage – after the social organisation is more-or-less stable- is the time to introduce the formal systems (Beer et al., 1990). However, this does not exclude the development of the system parallel to the organisational development. The key indicator of the success of change is the changed behaviour – only behavioural changes have the potential to performance improvement (ibid.; Pfeffers & Sutton, 1999).

Table 1. The Order of Changing Activities in an Organization (adopted from Beer et al., 1990).

Intervention seeks to modify	*Level of Focus*	
	Unit level	*Individual or group level*
Informal behavior	Redefinition of - roles - responsibilities - relationships	Coaching/Counseling Training Process consultation Team building
Formal design	Compensation systems Information systems Organizational structure Measurement system	Replacement Recruitment Career pathing Succession planning Performance appraisal

Let us contrast the above reasoning with the rational, process based design of IS: It supposes that the strategic IS planning (including investment payoff calculations etc.) and systems design have been carried out properly, and the aim of the organizational implementation is simple: To line out how, and by whom, the work tasks are carried out using the new system, and to train the actors these new standard procedures. This is actually just the opposite from the solution observed and suggested by Beer et al. (1990), who emphasize the importance of *designing the intervention, aiming at changing informal behaviour, before the design of formal systems.*

When these guidelines are compared with the approach applied in our case company, there is a clear mismatch. Organization A started from square 4, by developing the system first and having the users wait for the system to get finished. When the sketches were presented the suggested system was met by multiple ways of organising and conducting the business within the company. No organizational changes were achieved during the process, although a lot of learning on PDM & SCM integration took place. After the initial piloting, the case organisation returned to square 1, and found out that the implemented system will not work in the future organisation – as the internal organisation was not in a stable state.

3.2 Small Companies

In SMEs, the implementation faces different set of challenges from those of the large companies. By definition there is less people covering the same

domain than in large companies. This makes the change management easier. On the other hand this means limited resources in developing systems for the future in terms of finance and personnel. In the beginning of the project, we checked the situation in the studied partners and subcontractors of the case company with the survey questionnaire and found out that the larger the company the better equipped it was, but in general the studied companies were surprisingly well equipped and prepared for the change. Later we noticed the major concern to be the rather unrealistic expectations on the level of investment in implementing, educating and training the proposed PDM and procurement systems. Some of the companies explicitly mentioned that the integrated PDM/SCM-systems are beyond their financial resources, whereas domestic subsidiaries of foreign multinationals had these already in place.

In the earlier studies on the small company IS-implementation (e.g., Kettunen & Simons, 2001), it has been found that there is an inherent short supply of systems fit for a small company, especially in the field of PDM, SCM and ERP. The implementation time is considered too long, as Kræmmergaard et al. (2001) have shown, leading to a reduced set of functions. Similarly, the information systems' implied idea of hierarchy and control in PDM and ERP is against small business ideal (Lindgren, 2001; Kettunen & Simons, 2001). And as explained in the previous chapter, the know-how and attitudes towards change are different in many SMEs, as they are more stringent in their financial capacity.

From the IS-implementation point of view it is a significant problem for small companies that the development and project organizations are distinct, and the connection is broken down after the software is 'ready'. There is most often a need for a consultant, whose presence would ideally require weeks or months to describe the system properly. Because of the financial limitations this is seldom possible. This causes a problem, because the users are left alone with inadequate chances to change the task-technology combination to any direction.

Although participatory design and systematic participative improvement of activities are feasible paths for large companies, few small companies are familiar with these approaches. They rather tend to see IS-artefacts as solution tools at the expense of developing business processes and activities (Holopainen et al., 1999).

The remedies for the problems are also well documented. The existing processes must be developed and articulated by the users themselves. It is important, though, to avoid 'Analysis Paralysis'. This is to say that the ought-to-be future state should receive attention as well. This calls for IS-development and implementation skills in small companies – independently

whether the IS development and operation is taken care in-house or as outsourced service.

Another factor speaking for IS-development skills is the trend towards more systematic and organized work practices also in small companies. This has proved more difficult than anticipated in SMEs, but the problem has been adequately solved by simplifying and making concrete IS-development and implementation tasks (i.e., by using role games, see Torvinen, 1999) to introduce new practices. In any case, the process of IS-implementation must aim at creating and articulating the actual work activities. Thus, the description of an activity is not only a description for design, but also an instruction for the worker to follow (Kettunen & Simons, 1998; Aaltonen et al., 2002). Good targets for a process improvement are to simplify the process by reducing hand-offs (change of responsibilities), to coordinate the interim processes instead of end products for flexibility, and to minimize a customer's waiting time.

However, processes are seldom the only way to describe and develop an activity system, especially in the SME-context. Some activities are sustaining in their nature, and the worker is expected to keep the activity on track, or the system in a preferred state (Nurminen, 1986), in case something exceptional happens. This should be designed accordingly, not as a process.

The realization of the design and implementation are interconnected via a method. In most SMEs, guidelines for IS-project do not exist, or the methods are not applicable because of their complexity. There have been efforts to simplify especially the IS-design with lightweight methods such as ARIS (Halttunen et al., 1995 in Kettunen & Simons, 2001). Methods like this take also into account the connection to information architecture and implementation.

Finally, the most important implementation task is to make the objectives tangible for the SMEs. Tangible meaning that they should be derived from SME's preferred objectives, i.e., simple financial measures (Morrell & Ezingeard, 2002). These objectives will also serve as a starting point for the evaluation of achieved process improvement (see Figure 2). One conclusion is that only in case the necessary financial measures are met the more long-term objectives can be achieved.

4. IMPLEMENTATION EXPERIENCES FROM THE CASE ORGANIZATION

The literature on implementing inter-organizational systems is significantly more meagre than the literature on intra-organizational implementation. The studies on IOSs date back to the 80's, when the first

studies were performed. Then it became clear, that the success of a closed network is largely depending on the power constellations of the participants – equal partners are willing to establish joint ventures (e.g., inter-bank ATM networks), but otherwise it is the bigger party that is determining the IOS implementation standards. These observations are supported by Hackbarth & Kettinger (1997), and especially in Morrell and Ezingeard's recent case study in the UK (2002). They studied a part of a nexus of related companies of varying sizes. They found out that most of the benefits of trying to implement inter-organizational systems never realized, because the integration was not complete.

We can conclude that in inter-organizational setting we end up in a situation where also the problems are different: Large company complications are different from those of SMEs that attempt to achieve immediate, tangible and monetary benefits. Because it is also a trust and cooperation issue, the vested interests of all parties should be balanced at the network level. This means that we have rather many complicated issues to tackle on the road to successful implementation of inter-organizational systems.

To gain from the network, we should be prepared to meet the implementation success factors in each party and relationship. In other words, we should apply the implementation approach presented in this paper in each individual company, in each dyadic relationship, as well as at the level of the whole network. However, speaking in terms of probability – the odds are against the networked IS implementation success.

In a case of organization A, especially in the global setting, the implementation problems realized were as follows: Organization A had noticed a need to move towards networked model of operations, where its suppliers are increasingly expected to act independently and responsibly in their operations with organization A. As a result the concept and objectives of networked business model must be established between all the collaborating parties involved within the same network. The network participants, some of them competitors in other formations of firms, must share information with each other (availability of information), as well as allow visibility for others into their intra-company ISs.

Organization A had decided to create and implement a new IS, which optimally would aid the formation of firms to streamline their actions in real-time by providing supplier information by allowing access with limited views into organization A's ISs. The system would also establish and root desired processes, described in various process descriptions, into use with the available functionalities of the system. Additionally, the system would allow organization A to orchestrate its supply-web efficiently, as it would

maintain and control the system, and thus have access to all of the information available.

However, the creation and implementation of system faced problems because of both internal and external factors. Internally, organization A had not been able to freeze the design of the system 'to be created', as the development project had undergone multiple revisions, where the offered functionalities of the system were mostly reduced because of arisen problems. As a result, the system was not anymore able to hold onto the promises given to the intended users, which caused the targeted user group to somewhat lose interest in the project. Also, internally organization A was not able to adequately inform its suppliers about the characteristics, functionalities and benefits of the system, causing distortion in information in the field.

The IS was built to support the execution of work-tasks performed according to the process descriptions, but failed to take into account the fact that in the field the processes for executing different work-tasks, possibly because of long-term relationships between organization A and some of its suppliers, varies by suppliers. A factor often causing the implementation of ISs to fail results from the organizations failure to formally define the users roles and responsibilities, and the actual relationships of collaborating organizations' users.

The companies are different, have different objectives for cooperation, and emphasize trust on the relationship. Soon after the decision to engage to the development of IOS, there emerges a myriad of structural change issues that were shown to be critical in our case companies, and in the literature (Kopanaki & Smithson, 2002). In the conclusions, our means for avoiding implementation problems are summarized.

5. CONCLUSIONS

In implementing information systems it is crucial to remember that the implementation consists of two complimentary and partially overlapping activities, the technical implementation and the organizational implementation. In this paper we have argued that a proper organizational implementation, i.e. the integration of the IS in routine work practices, is one of the keys to more successful implementation projects. The organizational implementation gains even more importance in the case of interorganizational information systems as the number of separate, independent actors increase and several activity systems must be integrated. In accordance with this line of thinking and the empirical findings presented

earlier in this paper, we present three suggestions for organizations implementing IOSs.

1. Define, introduce and implement the new work practices first with the main actors and then implement the system in co-operation with the actual users. This approach is in line with the results presented by Beer et al. (1990), Pfeffer & Sutton (2000), and the reversed quality life cycle model (Forsman & Nurminen, 1994). This also helps in building trust with the most important partners of the network and calls for participation from the very beginning.
2. Articulate the objectives clearly, and derive the performance improvement targets from the business performance. Try to honestly communicate the costs of implementation that will be significantly higher than the development costs if done properly.
3. Do not try to integrate everything when proceeding to the information system design stage, and keep in mind that systems beneficial in one production system might not be as applicable in another (White & Prybutok, 2001).
   a) Rely on lightweight solutions for immediate, tangible benefits, e.g. by providing access to the original operative systems of the principal/hub company.
   b) An alternative solution would be to rely on a third party EDI or XML clearing house that is responsible of performing and maintaining the necessary conversions. This would require significant standard setting activity from the principal/hub company, but it can overcome some of the problem of multiple interfaces at the subcontractor contract manufacturer side.

It must be noticed that all of these procedures must be performed on the three levels of network: Within each individual company, in each dyadic relationship between the companies and at the network level. Simultaneously, the factors specific to large and small companies should meet the success factors described earlier. This clearly demonstrates the huge amount of work necessary for successful implementation of an IOS.

At the time of writing, we know that the technically oriented way of implementing an inter-organizational system in our case company was not a total success, and we do not yet know if the practice-oriented approach proposed by us will succeed. Our case organization has, however, decided to proceed in this direction in order to give its IOS a new chance.

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