

Implementing Healthcare Information Systems: Mirroring a Wide Spectrum of Images of an IT Project

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Linköping University Post Print



N.B.: When citing this work, cite the original article.

Original Publication:

Ulf Melin and Karin Axelsson, Implementing Healthcare Information Systems: Mirroring a Wide Spectrum of Images of an IT Project, 2014, Health Policy and Technology, (3), 1, 26-35.
<http://dx.doi.org/10.1016/j.hlpt.2013.11.001>

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Postprint available at: Linköping University Electronic Press

<http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-106368>

Implementing Healthcare Information Systems – Mirroring a Wide Spectrum of Images of an IT Project

Abstract

The main purpose of this paper is to discuss the spectrum of interpretations that can be related to the implementation and use of a healthcare information system (HIS). The empirical part of this paper is based on a qualitative case study of a Swedish healthcare provider, called “Alpha”, where a HIS was implemented. By studying how different actors interpret technological and organizational changes in a healthcare case, we mirror different images of the implementation project. Put together, this diversity of images provides an illustration of the complexity associated with the process of implementing a HIS. We apply an adjusted version of Orlikowski’s practice lens, with its roots in Structuration Theory, in order to study technology in organizations (focusing inertia, application and change). The implementation process of a HIS is much too complex to be judged as being either entirely positive or negative; instead it offers an illustration of the multi-faceted and reciprocal relation between IS and organization. This challenge literature on critical success factors. This study illustrates several images of HIS implementation and use. Highlighting images is one way to illustrate reluctance, support, complexity and power that are present in HIS implementation and use. This is one important contribution from this article. The complexity in the implementation is linked to healthcare organizations as professional bureaucracies, being highly politicized and institutionalized and to the IT artefact as an integrated HIS. Viewing images as rational myths is also discussed in this paper as an original approach to understand HIS implementation.

Keywords: healthcare information system, structuration theory, implementation, IT project, resistance, images, enterprise system

1 Introduction

This paper deals with the spectrum of interpretations that can be related to the implementation of a healthcare information system (HIS). Different images (cf. Morgan, 1986) of an implementation project as well as images of technological and organizational changes in a complex process are also illustrated. Integrated HIS are increasingly implemented globally in the care sector (Newell, 2011; Payton et al., 2011) and have much to offer in managing healthcare costs and in improving the quality of care (Fichman et al., 2011). Simultaneously, HIS implementation processes have been evaluated by many IS researchers. Heeks (2006) indicates that a majority of these studies highlights successful implementation processes, while failures to implement HIS are rarely discussed, even though HIS implementation can be perceived by “[...] *change resistant stakeholders as disruptive or even potentially life threatening.*” (Abraham and Junglas, 2011, p. 177). By analyzing previous HIS studies from a failure (and success) perspective, Heeks (2006) explores a gap between design of a new HIS and reality (present state) at a care unit. The gap can relate to different aspects; e.g. information, technology, processes, objectives and values, staffing and skills, management systems and structures. How this gap is handled seems to be a parameter that implies the level of success or failure in the implementation process (ibid.). This gap is therefore relevant to study – how it is shaped in terms of images of a HIS before, during and after implementation and use. This is the point of departure for this paper. A HIS has several characteristics in common with enterprise systems (ES) in general (cf. MacKinnon and Wasserman, 2009). An ES is, like a HIS, an answer to several problems with “ordinary” information systems (IS), such as low level of integration, disparate data formats and separated databases (cf. Davenport, 1998). A HIS is also often standardised and provided by a supplier on a market. In HIS, like other packaged IS, it is obvious that actions that constitute the IS are consequently separated from the actions that are constituted by the system (Orlikowski, 2000). HIS contains more or less standardized processes offered as “best practice” and a high degree of integration (cf. Wagner and Newell, 2004). Existing nuances in a healthcare context also provide a rich environment from which to learn more of existing IS theories and their application (Payton et al., 2011; Chiasson and Davidson, 2004). The healthcare context, being highly politicized and institutionalized (Newell, 2011), is also considered to be particularly problematic in terms of realizing the benefits of IS (ibid.) and still struggling with all kinds of development on a structural level (cf. Spil and Stegwee, 2001). This dimensions of the area makes it even more interesting to study the spectrum of interpretations that can be related to the implementation of a HIS outlined above.

In order to capture different images of the implementation and use of an HIS in this paper, the subjective and objective aspects of social structures, human actions, and IS (Orlikowski, 2000) will be

used as a point of departure to analyse the HIS case in a Swedish public health provider (called “Alpha”). Following this view, an IS is a social product of subjective human interpretation (Barley, 1986) and action, and they have a constitutive role. An IS embodies interpretative schemes, provides coordination facilities and is deeply implicated in linking social action, structure and interaction. By using a generative practice lens for studying technology in Alpha, we will examine the institutional, interpretive, and technological conditions which shape the on-going constitution of different structures and vice versa (Orlikowski, 2000). Using the practice lens, with its roots in Structuration Theory (ST) makes it possible to capture the dimensions of institutionalization, interpretation and interaction characterizing the specific empirical domain (Barley, 1986; Newell, 2011; Spil and Stegwee, 2001).

The purpose of this paper is to discuss the spectrum of interpretations that can be related to the implementation and use of a HIS. By studying how different actors interpret technological and organizational changes in a healthcare case, we mirror different images of the studied implementation project. Put together, this diversity of images provides an illustration of the complexity associated with the process of implementing a HIS. The paper contributes with understanding of HIS complexity by discussing these simultaneous images using structuration theory. Increased understanding of HIS complexity has both theoretical and practical implications, as discussed in the concluding section of the paper.

The paper is arranged in the following sections; we discuss the theoretical background in section two. We do this by viewing HIS as a special case of ES. We also discuss research on IS implementation and change. In the third section we describe the research approach, followed by the case description in section four. The case is analyzed and discussed in the fifth section, where we draw attention to images of the project and the HIS. The paper is concluded with contributions and further research.

2 Theoretical Background

Here HIS are introduced together with implementation and change in a general IS context, and a practice lens of technology.

2.1 Health Information Systems

The strategic importance of integrated HIS, as introduced above, is obvious since it is used as a tool to improve services and decrease medical mistakes (Mantzana et al., 2007). Simultaneously, HIS implementation processes have been evaluated as such in many recent studies (e.g Kohli and Kettinger, 2004; Jensen and Aanestad, 2007a; Sallas et al., 2007; Sunyoung et al., 2008) and also earlier studies on e.g. computer tomography (CT) scanners (Barley, 1986). Heeks (2006) indicates that

a majority of case studies about HIS implementations highlights successful implementation processes, while failures to implement HIS are rarely discussed. By analyzing previous HIS studies, Heeks explores a knowledge gap regarding what we can learn from failures (ibid.).

Evaluating success is a challenging activity in this context. There are many authors suggesting and discussing critical success factors (CSFs) (e.g. Gil-García and Pardo, 2005; Øvretveit et al., 2007). Berg (2001) claims such CSF lists to be problematic since success can be judged in many dimensions; such as effectiveness, efficiency, organizational attitudes and commitment, employee and patient satisfaction. This makes the situation very complex and CSF lists often offer a more simplified solution. In order to illustrate the complexities of HIS implementation processes, Berg (ibid.) investigates three myths related to such processes; implying that HIS implementation is a technical realization of a planned system in an organization, that it can be left to the IS department, and that the implementation including the required organizational redesign can be planned (ibid.). By scrutinizing these myths, he concludes that HIS implementation instead is a mutual process where organization and technology influence each other (further elaborated below). The management of a HIS implementation process also implies a balancing act between organizational change and using the HIS as a change agent (ibid.). Identifying and discussing the spectrum of interpretations that can be related to the implementation and use of a HIS, as in this paper, is one way of trying to broaden the scope regarding simplified sets of CSF and investigate situational aspects further.

An important aspect when discussing HIS implementation is to acknowledge the involved actors' expectations and perceptions. It is not feasible to announce an implementation a success without stating from whose perspective it is successful, cf. Berg (2001). Actors can belong to a certain profession; e.g. physicians, nurses, medical secretaries or an organizational unit; e.g. a hospital ward or a health centre. It is, thus, important to identify involved actors in the beginning of an implementation project (Mantzana et al., 2007) and also to assure that the actors are involved and informed (Kohli and Kettinger, 2004). A professional group's reaction upon the implemented HIS is, among other things, influenced by the way the HIS is perceived to improve work situations or whether the HIS is interpreted as a control system (ibid.; Jensen and Aanestad, 2007a). The role of medical professions is also highlighted in a study of three implementation processes (Lapointe and Rivard, 2006). They claim that the success or failure of an HIS depends on whether physicians accept or resist its implementation (ibid.). Sallas et al. (2007) present an assessment approach that focuses on users in context. The study indicates that focusing on users in context is a way to avoid or minimize negative reactions upon IS implementation among highly skilled professionals like physicians (ibid.). Jensen and Aanestad (2007b) use a sense-making perspective to study how professionals react upon implementation of new HIS. They argue that managers must clarify the needs, values, and preferences of the users in order to understand how professionals interpret and respond to HIS implementation.

This is line with a widened perspective on the reluctance to use HIS among medical professionals reported by e.g. Lapointe and Rivard (2006). The present study follows the perspective on resistance highlighted by Lapointe and Rivard (2005; 2006), that resistance is interesting and useful in order to understand implementation of HIS and its reciprocal relationship with actors and structure. A systematic analysis of different models of resistance is elaborated on by Lapointe and Rivard (2005). In the images highlighted below, resistance is one dimension among others.

Enterprise systems are enterprise-wide application packages that tightly integrate enterprise functions (Davenport, 1998). Such systems have some aspects in common with integrated HIS like the one studied in this article. Khoubati et al. (2006) argue for the healthcare sector's need to integrate applications organizational-wide, which is in line with our view of integrated HIS. ES, as well as HIS, are created in different steps: the development of the system, the modification of the system, and the use of it. The point, partially following Orlikowski (2000), is that the ES is constituted in at least two steps: by the supplier and by the system implementer, followed by constituting user action.

2.2 Information Systems – Implementation, Change and Structures

The relation between IS and organization is full of nuances and contradictions. We investigate the multi-faceted and reciprocal relation in line with Barley (1986), Howcroft et al. (2004) and Orlikowski (2000), moving away from an over-simplified understanding of it (Markus and Robey, 1988; Robey and Boudreau, 1999). The role and influence of IS in organizations (Orlikowski and Robey, 1991; Walsham, 1993) and the emergence and improvisation is important to investigate when trying to understand IS implementation. Exploring the institutional context is also important when trying to understand HIS and its relation to organizational structures, processes and outcomes (cf. Berg, 2001). There can be many reasons for implementing an HIS, not only to improve medical care quality. To gain and retain legitimacy can be even more important (cf. Meyer and Rowan, 1977). Structuralist perspectives focus on human action and have a potential to help us understand emergence and change in technologies and the use of it (cf. Barley, 1986). IS, as a technology, is developed through a social and political process resulting in structures embedded in the present technology. Following that, the use of technology is heavily influenced by users' interpretation of the functionality and by: “[...] *images, descriptions, rhetorics, ideologies, and demonstrations presented by intermediaries such as vendors, journalists, consultants, champions, trainers, managers, and ‘power’ users.*” (Orlikowski, 2000, p. 409).

The *images* mentioned above can be regarded as *rationalized myths* (cf. Meyer and Rowan, 1977). Claims put forward from intermediaries (e.g. journalists and consultants) are often persuasive and users tend to take them for granted (Orlikowski, 2000). Technologies never become “complete” or

fully stabilized (ibid.) and identical technologies can lead to different consequences (Barley, 1986). We analytically regard technology as being possible to redefine and modify meaning of. Properties and application of technology can also be modified after initial development. It is usually common that users that have similar work, common training, shared socialization, and on-the-job experiences, enact similar technologies in practice. That technologies-in-practice may become institutionalized and tends to predetermine prescriptions for action. Technologies-in-practice may also impede change (ibid.). Different images (cf. Morgan, 1986) of an implementation project as well as images of technological and organizational changes can be regarded as a connection between thinking and action within organizations. Understanding images carried by members of an organization can be a platform to help us find new ways of organizing, to understand and change perspectives and create shared understanding (ibid.). Images is also linked to metaphors by Morgan (ibid.) and used to create powerful illustrations of e.g. organizations as machines. Metaphors can also be a way of not seeing since they are based on certain ways of thinking.

By using a practice lens for studying technology in the case study, we examine the institutional, interpretive, and technological conditions which shape the on-going constitution of different structures within Alpha. This lens, and the adherent perspective, is primarily based on Giddens's (1984) ST. Structuration is viewed as a social process that involves the reciprocal interaction of human actors and structural characteristics of organizations. Structures are viewed as having two sides (the duality of structure), enabling and constraining human action. At the same time structures are products of human action. When humans act in organizations, they also create and recreate the elements of social interaction: meaning, power, and norms. Power is linked to structures of domination by resources. Moral sanction is linked to structures of legitimation by norms. Interpretive schemes are "stocks of knowledge" and form the core of mutual knowledge in the production and reproduction of interaction. Interpretive schemes also serve as a constraint. Meaning, power, and norms are dependent on technology. Elements from ST enactment (cf. Weick, 1969) will be discussed in terms of using three different types (Orlikowski, 2000); 1) inertia (no evident change in process, technology or structure occurred), 2) application (some change has occurred in one or more of process, technology and structure), and 3) change (change in one or more of process, technology and structure occurred) (ibid.). The three types of enactment are based on the conditions, actions and consequences.

3 Research Approach

The empirical part of this paper is based on a case study of Alpha where a HIS was implemented. The case study was conducted during 2008 to 2011. We had the opportunity to study three care units on site which had recently got the HIS implemented; two public health centres (one located in a city

centre [C] and the other located in a suburb [S]) and a hospital clinic. We also studied the Care Process Centre (CPC) which managed the project. CPC is Alpha's central, strategic, resource for organizational, quality and IS development and maintenance of care supporting processes. The case study is based on 26 interviews within Alpha as well as studies of documents. Examples of documents are Alpha's website information to patients, internal project documentation, budgets, external evaluation reports, and media's coverage of the project. The different, multiple, sources of empirical data as well as the data collection techniques were used in order to get a more varied and truthful view of actors' perspectives, the implementation and use of the HIS. Data and method triangulation (Klein and Myers, 1999) is used as an attempt to generate a rich picture of descriptions and impressions of the implementation process, its institutional context and technology in practice. Two interview rounds were done, one initial and one with follow-up interviews. The interviews (Table 1) were audio recorded and the average interview lasted for one hour. Additional notes were also taken covering impressions and opinions of the studied actors. Qualitative interview guides were used, with a mix of pre-defined open and open-ended questions, topics and informal communication (Patton, 1980). On-going, upcoming, themes generated by the context and by the interviewees were also included (e.g. when an interviewee mentioned new dimensions in the implementation process, not mentioned before). Some of the interviews also consisted of system studies (Table 1), when the interviewee/system user demonstrated a certain characteristic or pattern of use linked to their work in the system.

Table 1. Interview/respondent information

Data collection	Unit	Role	Data collection	Unit	Role
Interview	CPC	Organization developer Project leader CPC Manager	Interview and system study	Health centre [C]	Nurse Physician Assistant nurse 1 and 2 Medical secretary; Nurse, health centre manager District nurse; Nurse; Health centre manager
Interview and system study	Clinic/surgery	Physician 1 and 2 Assistant nurse and administrative coordinator Medical secretary	Interview	Clinic/ward	Assistant nurse and admin. coordinator; nurse Physician, Assistant nurse and admin. coordinator
Interview and system study	Health centre [S]	Nurse, responsible for first patient contacts Medical secretary	Interview and system study	Health centre [S] (cont.)	Physician, health centre manager Nurse, health centre coordinator

This work corresponds to central concepts and ideals in interpretive and qualitative research, such as interpretation, pre-understanding and the use of multiple methods for data generation (Walsham, 1995). The interpretative tradition in the IS field is suitable here because of the kind of research purpose and questions raised; e.g. how the actors in Alpha struggle, both strategically and in daily work, with the HIS and how they enact and interpret the system and the organizational change. Orlikowski's framework has been used as a guide for analyzing the interviewees' interpretations of the HIS and as a part of an iterative process of data collection and analysis (Walsham, 1995).

4 The Case of an Integrated Health Information System

The HIS implementation is studied in a large Swedish organization providing medical care. Alpha is a democratically run organization and their task is to promote public health according to the needs of the population in the region. Local healthcare is organised into three geographical areas. Specialist healthcare operates from ten centres positioned county wide. Alpha has 11.000 employees. Alpha operates 40 care centres and four hospitals, which includes highly specialized medical healthcare.

The Swedish IS vendor Cambio has developed the HIS Cosmic that is marketed as a fully integrated and organizational-wide system under the slogan “One journal – one system for all healthcare”. Cosmic has about 10.000 users in Alpha, reaching from four different hospitals, regional and local healthcare units, administration, etc. Cosmic includes both a back-office system (e.g. supporting the storing of medical drugs prescribed, laboratory test results, and statistics) and a present artefact, at desktops, when patients are meeting physicians, nurses and secretaries (e.g. having a dialogue of medical records in care situations). Alpha purchased the HIS, consisting of several application modules for healthcare, e.g. patient administration and clinical care support, from Cambio. An important functionality in Cosmic is the integrated Electronic Medical Record (EMR) built around a common database (cf. MacKinnon and Wasserman, 2009). Alpha had earlier bought other applications from Cambio, which was a reason for choosing this vendor again. The project was initiated in October 2005. After a planning and preparation phase, a pilot study started in February 2007, which was followed by a roll-out phase in 2008. The implementation project, officially, ended in December 2008 when all care units within Alpha had implemented the HIS. The project was run by CPC which completed the project on time and below budget. The implementation project’s purpose was to define and implement new processes and corresponding system support. Key aspects in the project were accessibility, security and efficiency. The HIS comprises a widely integrated EMR for all care units in Alpha which implied an important change compared to the prior situation. The project was characterized as the largest change project that Alpha had ever initiated. For the local healthcare centres the integrated HIS replaced existing local IS solutions for medical records. The centres located at the hospitals in the region did not have any EMR before, so digitalized medical records were new for them. They have had disparate IS before, handling e.g. schedules and lab results, but no integrated IS.

5 Analysis and Discussion

In the two sections below we analyze and discuss the empirical findings in order to mirror various images of the studied implementation project. The explored diversity of images provides an

illustration of the complexity associated with the HIS implementation process. Then we apply an adjusted version of Orlikowski's (2000) practice lens for studying technology in organizations.

5.1 Images of the Project and the HIS

The studied project and HIS implementation were given many different meanings by the actors we have been in contact with. In what way the meanings differ, partly depends on how closely involved the individual actor has been in the HIS implementation project, in project management, in CPC, or in organizational development activities in general at Alpha. The meanings also depend on each respondent's personal associations and experiences of IS in general and EMRs in particular.

Several of the images (i.e. a way of thinking and seeing, cf. Morgan, 1986) (summarized in Figure 1) relates to the project in the role of image-builder for the organization and significant actors in it. Prefixes such as "visionary", "impress", and "paradigm shift" indicate intentions of wanting to be a forward-looking, modern organization supported by a modern HIS and processes (cf. Abrahamson, 1996). Image-building processes are important for the self-image within the organization as well as in situations where there is a need to reposition Alpha against other public or healthcare organizations. Several aspects also affect the scope, i.e. the volume, of the project. This concerns the entire range from being a huge (the largest) project in Alpha's history to what, from an individual employee's and HIS user's perspective, can be seen as "yet another change of IS". At the same time as the project is considered to be forward-looking and proactive by some respondents, it is also interpreted as an "imposed project" or a "consequential project" by others.

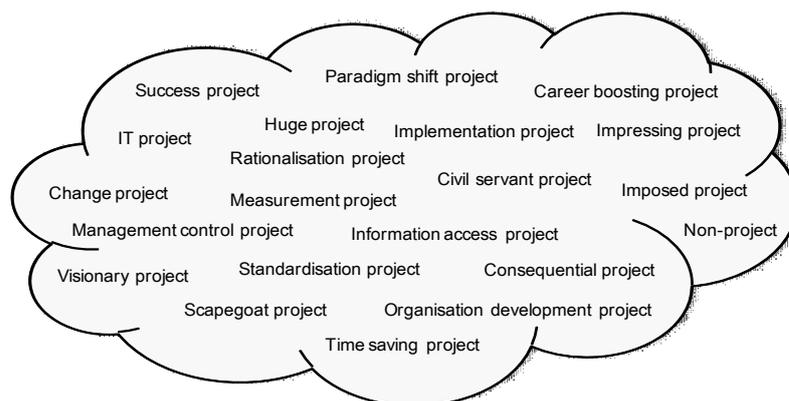


Figure 1. *The many images of the studied project*

It is seen as an imposed decision made as a consequence of past actions (such as previous decisions to implement several modules from the same vendor). Thus, earlier made IS implementation choices have already mapped out the direction for this implementation and alternative routes, to the one now

chosen, were few, if existing at all. Alpha has also stated that they are not willing or even capable of acting in the role of a system architect or integrator.

“[...] and we cannot pay the wages and we are not sent to keep on with it. This is what software vendors are good at and get to work.” [Interview, CPC Manager, January, 2009]

The choice of a standard solution from one or a few vendors is based on the above intentions. The choice to proceed with several HIS modules from the same vendor as earlier implemented modules, rather than choosing other solutions, is also motivated by education, skills and resource reasons.

The implementation of Cosmic is also justified by the need for employees to be able to move from “old, paper-based routines” to the integrated use of IS for multiple tasks. Remarkable many of the images above also touch upon the organizational dimension of the HIS implementation in terms of management, standardization and rationalization (i.e. to reduce costs, save time, etc.). Such increased opportunities for administrative functions within Alpha to plan, coordinate and follow-up healthcare activities are possible thanks to the HIS implementation (including increased information access, measure data, etc.). These opportunities are expressed in many of the identified project prefixes. This is a reason for the expressed image of the project as being a “civil servant” project. Concerns are reported by medical staff that the control over healthcare will increase due to the HIS. Explicit health related aspects (e.g. increased quality of healthcare) have not been as common as the organization related images in our empirical data. In contrast, expected negative effects on quality of healthcare have frequently occurred. The project and the system have been given the role as “scapegoat” – not least in media coverage of the process. It seems less delicate to assign an artefact negative attributes and to be an excuse for weak administrative processes or lack of leadership than to criticize the organization of care processes, actors and administrative processes. If we look at the “non-project” label (Figure 1) this aspect represents an image of the project as “yet another change of IS” as one nurse at a health centre expresses and interprets the implementation. For her it was the third EMR that was implemented in a rather short time. This time more integrated and complex – but still another system. This image challenges the view of the project as a “huge project” from an overall organizational perspective and a CPC project management perspective.

5.2 Types of Enactment and Institutional Aspects

In the analysis of types of enactment and institutional aspects of the implementation process and the HIS as such, we illustrate our analysis by giving examples of the different dimensions based on Orlikowski (2000). We use the main types of enactment (inertia, application and change) as a basis when structuring our analysis. If we take a look at the different types of consequences (processual, technological and structural) (ibid.) we refer to the different changes (if any) that is a result of the

technology-in-practice. The *processual consequences* refer to changes in performance and outcome of work practices; the *technological consequences* refer to changes in the technology available to the users; and the *structural consequences* refer to changes in structures of a larger social system. The technical conditions are the same for every type of enactment in our analysis. We have therefore omitted this in Table 2. Technical conditions are the HIS available for all users in Alpha.

Table 2. Case Analysis - Enactment - Conditions, Actions and Consequences

Type of enactment	Interest in using the technology	Interpretive conditions	Institutional conditions	Technology-in-practice	Processual consequences	Technological consequences	Structural consequences
<i>Inertia</i>	Low	Limited technical knowledge among different professional groups	Hierarchical Individualistic	Limited (perfunctorily; not rarely) use of the HIS	Minor (duplication of work occurs)	None	Reinforce and preserve status quo concerning some routines
<i>Application</i>	Moderate to high	Moderate technical knowledge (users) More detailed technical knowledge (super [power] users)	Hierarchical Individualistic Collaborative	Collaboration Collective problem solving Individual productivity Process support	Increased effectiveness in communication and care Improved collaboration Increased effectiveness in problem solving	Adaptations to the tool Change in the tool	Reinforce and enhance status quo
<i>Change</i>	Moderate to high	Moderate technical knowledge (users) More detailed technical knowledge (super users)	Collaborative	Collaboration and collective problem solving Individual productivity Process support Improvisation	Redefined work distribution Shift in type of collaboration	Change in the tool Adaptations to the tool	Transform status quo

In the case we have identified *inertia* as one type of enactment. There is limited technical knowledge among different professionals (assistant nurses, nurses and physicians); even if physicians tend to express their norms and values more often regarding the HIS in use based on medical competence.

“Somebody should measure the time we spend in front of the hourglass everyday... it must be 15 minutes each day, for each physician in the organization.” [Interview, Physician, September, 2009]

The far-reaching role of medical professions highlighted by Lapointe and Rivard (2005; 2006) is echoed also in this implementation study. The HIS role in physicians spending more time managing patient records in front of the computer is also present in the study by Lapointe and Rivard (2006). The images of the success or failure of the present HIS depends on strong professional groups and e.g. whether physicians support or resist its implementation (ibid.; Jensen and Aanestad, 2007a, b) and which rationalized myths that are spread in the organization and its environment.

Several running commentaries in the regional media have also been published, exposed for and discussed by personnel at the different healthcare units at Alpha.

“Cosmic is dangerous for the patients” and “Cosmic jeopardizes the patients’ security and creates a bad working environment” (Regional Newspaper, October, 2008)

This is an illustration of the HIS as potentially life threatening (cf. Abraham and Junglas, 2011; Lapointe and Rivard, 2006). This is also an example of external actors (journalists) that have an influence on the users norms, interpretation and use (Orlikowski, 2000, p. 409 f.) of the present HIS. We can also see that strong stakeholders use media as their mouthpiece when expressing their views and thoughts of Cosmic, putting pressure on the project management team. These images are as a part of the rationalized myths (Meyer and Rowan, 1977; Powell and DiMaggio, 1991) and also a question of power distribution. Such myths are persuasive and users tend to take them for granted. The immediate interpretation of Cosmic has often been that the system is “slow and complex, containing too many clicks”; but when we continued the dialogue a more multi-faceted view emerged. The overall picture is that the system is quite usable. Shared meanings (rationalized myths) are in line with a sociological understanding of institutions and the relation to IS use. What is interesting in the present case is also that comments like this and rationalized myths started even before the HIS was rolled-out in the organization. It started already in the pre-implementations phase based on limited pilot testing. In some sense the resistance started before the real implementation project begun, and also partially in media. This is a complementary results compared for example with Lapointe and Rivard (2005) that identifies that the resistance starts when an implementation starts. If we take a look at the technology-in-practice category within inertia we have identified, in some sense, a limited use of the HIS. Our identification is that: “[...] users choose to use their new tool rarely and perfunctorily, and show little or no interest in integrating its use into their ongoing work practices” (Orlikowski, 2000, p. 421). Perfunctorily use was identified in the case study concerning handling letters of referral where users use the system, but use the old paper based routines in parallel even one year after system implementation. This is motivated by the users (assistant nurses) as a way of keeping track of the referral flow, in order to physically identify the letters in the mailbox to construct personal security and handle stress. The use of the HIS in terms of frequency is not limited; the use is mandatory regarding basic functionality (e.g. using the note function in the medical record).

The institutional conditions, within the inertia category, surrounding the HIS are rather regulated and work tasks are related to professional groups. In line with Orlikowski’s (2000) experiences we have identified a rigid career hierarchy having an influence on the user of the HIS in the daily work. Hospitals have strong technical and strong institutional controls (Scott, 1998) which explain this situation as well as the division of labour. Some changes in division of labour occurred when physicians use the note tool in order to (very brief) document diagnoses in the EMR modules, instead of voice dictation and handing over transcription to medical secretaries. However, this change in division of labour is not an organizational phenomenon; it is more up to the individual physician to decide. It is also a question of norms, a question of age and a question of how one interprets one’s roles in Alpha (valid both for the physicians and the medical secretaries).

In the case study we have identified IS use providing refinement of existing actions. Examples are: to schedule patient-physician meetings, to issue letters of referral, to prescribe medical drugs, and to document in a medical record. The *application* of the HIS provides an overall process support across unit borders not provided before and a workflow based functionality. The overall interpretation of the case is that the interest in using the technology is moderate to high. It is moderate among most of the users interviewed. They usually regard Cosmic as “yet another tool” – but more complicated. Several users identify the structural potential in the system. The interest in using the technology is higher among the super users. They are trained to be ambassadors and to support early and daily use with a more detailed technical knowledge compared to the average user.

The institutional conditions are identified in the hierarchical, individualistic and collaborate level. The hierarchical and control dimensions are commented above regarding inertia. Personal (individualistic) productivity gains are identified e.g. regarding the fact that several people do not have to search, or even hunt, for the paper based medical record anymore. However, the opposite is also identified (productivity loss) regarding e.g. physicians searching for information and getting an overview of a lot of material in the HIS (compared to the earlier fast “dip into” the paper based file containing a certain patient’s medical record). The HIS implementation, as analyzed above, also have an overall efficiency intention (in terms of direct medical care, administration of medical care and overall management of the healthcare units). The collaborative dimension is present in the integrated character of the HIS. The system provides the opportunity to work over healthcare unit boundaries (e.g. to solve problems together) that have not been the case before (without the EMR) (i.e. a processual consequence). This has proven to make communication and collaboration among actors easier (in terms of providing patients with e.g. medical care overviews, previous appointments, letters of referrals, and lab tests).

Changes in the HIS (a technological consequence) has also been made during upgrades of the system. This has been partially based on comments and requests from users and super users within the organization and also based on the vendor’s knowledge and general ES development process. At the same time, users have adapted to the HIS regarding for example the language used for several functions and routines implemented in Cosmic. Even if some changes are identified in the processual and structural consequence category (application and change enactment below), the overall impression is that Cosmic reinforces and enhances status quo. It is, so far (also in follow-up interviews from 2010), more a technological innovation than an organizational one. Using Orlikowski’s terms (2000) it is considered to be more reinforcement, or modest transformation, than substantial transformation.

Alpha has the interpretation of the HIS as a technology that never becomes “complete” or fully stabilized, even if they choose to treat the system as temporary stabilized when finishing the implementation project. The project management team at CPC launches an initiative labelled as a

“second wave” that is supposed to deal with modifications of the system after initial development (Orlikowski, 2000) in order to change processes and activities connected to the use of the system. This is made in order to achieve substantial organizational change. Challenges connected to the so called “second wave” can be that the technology-in-practice (ibid.) has become institutionalized and tends to predetermine prescriptions for action in the organization. Technology-in-practice may impede change (ibid.) and the objectives from CPC associated with the initiative can create a “new wave of inertia” or even resistance to change. These challenges are in line with a view of a multi-faceted and reciprocal relation between IS and organization (Howcroft et al., 2004; Walsham, 1993).

The third type of enactment (ibid.) is labelled *change*. Here people choose to use new technology to “[...] substantially alter their existing way of doing things. Such enactment results in transformation of the structural status quo, and significant modifications to users’ work practices as well as the technological artefact.” (Orlikowski, 2000, p. 423). The fact that Cosmic is a standardised HIS leaves not much space for improvisation, emergence or customization (cf. Orlikowski and Robey, 1991; Walsham, 1993) of the system as such, for most users in Alpha. The strong technical and institutional controls present at hospitals and care centres can also impede change (cf. Scott, 1998). New or developed/changed ways of working have, however, been identified. Some of these new ways of working are related to the functionality concerning the EMR.

“It is so easy to do the same action as before [when you have all the history and information available in the HIS]; when you actually need to do a new examination of the patient. It should not be too easy...” [Interview, Physician, September, 2009]

The balance between routine and reflection is an important aspect in the expression above. The physician thinks that it is too easy to take certain actions when the HIS is in use. The physician takes one example when the system deals with this complexity in a proper way; every medical drug is prescribed separately from a list of a patient’s earlier use – it is not possible to prescribe more than one drug without signing each time. This creates time for valuable reflection – rather than to get into a rut.

Redefined work distribution has been identified to some extent between physicians and medical secretaries (mentioned above). We have also identified that particular healthcare units needs to document e.g. patients’ medical status thinking of the fact that everyone in Alpha can get access to it, read it and even base their decisions on that piece of information. This means that documentation by a certain unit is done for the benefit of other units. This also means that there is a distribution of (documentation) work among units. Achieving change can also be restrained by the images of the project with prefixes as “measurement”, “management control”, “standardisation” or “rationalisation” expressing resistance from medical professionals (Lapointe and Rivard, 2006). These interpretations exist among nursing staff within Alpha and create a gap between administrators and medical

professionals concerning motives, objectives and norms surrounding the implementation, use and effects of Cosmic. This is also a question of power between medical professionals and administrators identified also by e.g. Lapointe and Rivard (2005); administrators threatening the power of medical professionals through the new integrated HIS with all possibilities to monitor, control, and manage resources (like with any integrated IS, such as enterprise systems). In general our case study also identifies that administrators are more positive towards the new HIS than medical professionals. This is in line with previous studies (e.g. Venkatesh et al., 2011) stating that new HIS are considered as supporting for administrative activities like monitoring and potentially threatening the power of the medical professional groups (Jensen and Aanestad, 2007a, b; Venkatesh et al., 2011). We have also commented upon the fact that collaboration among different units has been facilitated by the HIS. It is hard to classify if this is an example of increased collaboration (application) or a shift in type of collaboration (change), though.

6 Conclusions, Limitations and Further Research

An enterprise-wide HIS implementation engages and sometimes provokes! But there also supporters. This is illustrated in the present case study. Different actors have their *interpretations, images and opinions* about both the IS, organizational changes to come and the results of it on several levels (their own work practice, their organizational unit, Alpha as an entire organization and e.g. the patient). Some express positive interpretations and expectations, based on individual or group values and norms; the healthcare practice will be more effective, more accessible and safer. Other actors or groups of actors fear the system implementation, the system as an artefact and the organizational changes it will bring and are reluctant. Professionals and groups have their attitudes, media provides other views of the process, and patients might have yet other interpretations. The present HIS is interpreted as everything from a scapegoat to a saviour for healthcare, and a way of being modern (cf. Abrahamson, 1996) on an organizational level. The spectrum of interpretations and images that can be related to the implementation and use of a HIS has been a main theme in this paper, and is an important contribution from this research. The case study analysis illustrates several *images* that can be regarded as *rationalized myths* (cf. Meyer and Rowan, 1977). Such images are important expression of the medical professions' (Lapointe and Rivard, 2006) view of the HIS and its implementation. Such images heavily influence the success or failure of an HIS (ibid). The results from the case study confirms the results from previous HIS studies like Lapointe and Rivard (2005; 2006) and Jensen and Aanestad, 2007a, b), but also expand the body of knowledge through the focus on discussing images from a structuration theory perspective. The present study also shows that the

resistance and the rationalized myths starts even *before* the full scale implementation process begun, which for example not is highlighted in the study by Lapointe and Rivard (2005).

The case study is also an illustration and analysis of the *complexity in HIS implementation* linked to healthcare organizations as professional bureaucracies, being highly politicized and institutionalized (cf. Newell, 2011). At the same time elements and pockets of diversity in healthcare processes are present in the organization regarding patients, disciplines, treatment options, and delivery processes (Fichman et al., 2011) challenging a standardized HIS. The tension between the routinized work and the need for flexibility magnifies the complexity surrounding HIS implementation and use and the situational nature of it (ibid.). This tension is also highlighted in general IS studies and studies focusing integrated IS in terms of enterprise systems and labeled as an organization's administrative paradox (Melin, 2010).

In this article we have used the main types of enactment (inertia, application and change) as a basis when structuring our analysis and illustrated the different types of consequences (processual, technological and structural) based on Orlikowski (2000). By providing multiple images of the implementation process, the project and the artefact, we have aimed to focus the challenges that a large-scale implementation process in the healthcare sector has to manage. Identifying and acknowledging images can be a way to handle the gap between design and reality in HIS implementation projects, mentioned by Heeks (2006). This has several practical and theoretical implications. These diverse images have to be identified, acknowledged and constructively dealt with from a practical perspective – and not dismissed as dysfunctional and destructive (Lapointe and Rivard, 2005; 2006). Jensen and Aanestad (2007b) also argue that it is important clarify the needs, values, and preferences of the users in order to understand how professionals interpret and respond to HIS implementation. However this is a challenge on a strategic level, as well on a tactic and operative level of an organization. The challenge concerns implementation strategy and pace, information and communication, norms and values within groups and individuals, of conditions and expected consequences, as well as the relation between organizational and IS change. Theoretically we need to identify and use perspectives, frameworks and ways of being sensitive in order to capture multiple and temporal images of implementation processes, artefacts and structures. Our use of structuration theory as a meta-theory is an attempt to focus such dimensions that are well known and reported in IS literature (Orlikowski and Barley, 1991; Orlikowski and Robey, 1991). When identifying diverse images, the involved actors are focused. In order to succeed with this kind of implementation projects, concerned professionals have to be involved (Montzana et al., 2007) and informed (Kohli and Kettinger, 2004). By acknowledging various images of the HIS implementation actor awareness is also reached, which is an important aspect according to other studies in the HIS field (Jensen and Aanestad, 2007a, b; Sallas et al., 2007).

The implementation process of a HIS is much too complex to be judged as being either positive or negative – it is an illustration of the multi-faceted and reciprocal, complex relation between IS and organization (cf. Howcroft et al., 2004; Walsham, 1993) which is illustrated through the images in the present article. Our findings show that the images of the implementation process and the HIS depend on what dimensions that are in focus, which professionals that are interviewed, and when (cf. Berg, 2001). Our results therefore challenge the normative definitions of standardised IS providing a kind of “shortcut” to operational excellence (cf. Wagner and Newell, 2004). Multiple images of the project as well as the artefact as such (e.g. as a scapegoat and a saviour) show the span of interpretations in Alpha. This challenge presentation of CSF’s, the reasoning of what best practice design is (ibid.) and rational approaches towards system implementation and change in general, based on e.g. a technological imperative (Markus and Robey, 1988). These findings also have managerial implications; from a project management perspective it is important to acknowledge different images of a project, discussing e.g. impressions of shortcuts vs. long-term change. Time is an important factor challenging the norms of trying to realize short term benefits of HIS (cf. Newell, 2011). In the case study there is also evidence that more radical change on a structural level (Spil and Stegwee, 2001) is not a result of the HIS implementation so far.

This paper uses a single case study approach in order to in-depth explore a HIS implementation process. This is a research design decision that of course has both pros and cons. We have been able to follow this implementation case closely and longitudinally and, thus, gained good access to Alpha. However, further case studies will be performed in order to validate our findings. A possible next step is to analyse the links from this project to the national policy level; a Swedish action plan for e-health has been launched recently. To focus on the institutional logics (Currie and Guah, 2007) and the policy implementation from a national level to a regional and local level can also be rewarding. Analytically, institutional theory (Meyer and Rowan, 1977; Powell and DiMaggio, 1991) can be used as a more distinct platform to further analyze the empirical data or adaptive structuration theory (AST) (DeSanctis and Poole, 1994) as a way to be even more specific about technology changes, for whom and for which process this makes a difference. There are also several dimension of resistance in the empirical data that can be highlighted and studies more carefully in line for example with Lapointe and Rivard (2005). In the present analysis the interpretation of empirical data is guided by a particular theoretical lens, with its merits and shortcomings.

References

- Abraham, C. and Junglas, I. (2011). From cacophony to harmony: A case study about the IS implementation process as an opportunity for organizational transformation at Sentara Healthcare, *Journal of Strategic Information Systems*, 20(2), 177-197.
- Abrahamson, E. (1996). *Management Fashion*, *Academy of Management Review*, 21(1), 254-285.

- Barley, S.R. (1986). Technology as an Occasion for Structuring: Evidence from Observations of CT Scanners and the Social Order of Radiology Departments, *Administrative Science Quarterly*, 31(1), 78-108.
- Berg, M. (2001). Implementing information systems in health care organizations: myths and challenges. *International Journal of Medical Informatics*, 64, 143-156.
- Chiasson, M. W., Davidson, E. (2004). Pushing the contextual envelope: developing and diffusing IS theory for health information systems research, *Information and Organization*, 14(3), 155-188.
- Currie, W.L. and Guah, M.W. (2007). Conflicting institutional logics: a national programme for IT in the organisational field of healthcare, *Journal of Information Technology*, 22(3), 235-247.
- Davenport, T.H. (1998). Putting the Enterprise into the Enterprise system, *Harvard Business Review*, 76(4), 121-131.
- DeSanctis, G. and Poole, M.S. (1994): Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory, *Organization Science*, 5(2), 121-146.
- Fichman, R.G., Kohli, R. and Krishan, R. (2011): The role of information systems in healthcare: current research and future trends, *Information Systems Research*, 22(3), 419-428.
- Giddens, A. (1984). *The constitution of society: outline of the theory of structuration*, Polity Pr., Cam.
- Gil-García, J.R. and Pardo, T.A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Government Information Quarterly*, 22(2), 187-216.
- Heeks, R. (2006). Health information systems: Failure, success and improvisation. *International Journal of Medical Informatics*, 75, 125-137.
- Howcroft, D., Newell, S. and Wagner, E. (2004). Understanding the contextual influences on enterprise system design, implementation, use and evaluation (Editorial), *Journal of Strategic Information Systems*, 13(4), 271-277.
- Jensen, T.B. and Aanestad, M. (2007a). Hospitality and hostility in hospitals: a case study of an EPR adoption among surgeons. *European Journal of Information Systems*, 16(6), pp. 672-680.
- Jensen, T.B. and Aanestad, M. (2007b). How healthcare professionals “make sense” of an EPR adoption. *Information Systems Management*, 24, 29-42.
- Lapointe, L. and Rivard, S. (2005): A Multilevel Model of Resistance to Information Technology Implementation, *Management of Information Systems Quarterly*, 29(3), 461-491.
- Lapointe, L. and Rivard, S. (2006): Getting physicians to accept new information technology: insights from case studies, *Canadian Medical Association Journal*, 174(11), 1573-1578.
- Khoumbati, K., Themistocleous, M. and Irani, Z. (2006). Evaluating the Adoption of Enterprise Application Integration in Health-Care Organizations, *Journal of Management Information Systems*, 22(4), 69-108.
- Klein, H.K. and Myers, M.D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems, *Management of Information Systems Quarterly*, 23(1), 67-94.
- Kohli, R. and Kettinger, W.J. (2004). Informing the clan: controlling physicians’ costs and outcomes. *MIS Quarterly*, 28(3), 363-394.
- MacKinnon, W. and Wasserman, M. (2009). Integrated electronic medical record systems: critical success factors for implementation. In: *Hawaii International Conference on Information Systems (HICSS-42)*, IEEE Computer Society, January 5-8, Big Island, HI, USA. doi: 10.1109/HICSS.2009.264
- Mantzana, V., Themistocleous, M., Irani, Z. and Morabito, V. (2007). Identifying healthcare actors involved in the adoption of information systems. *European Journal of Information Systems*, 16(1), 91-102.
- Markus, M.L. and D. Robey (1988). Information Technology and Organizational Change: Casual Structure in Theory and Research, *Management Science*, 34(5), 583-598.
- Melin, U. (2010). The Enterprise System as a Part of an Organization’s Administrative Paradox, *Journal of Enterprise Information Management*, 23(2), 181-200.
- Meyer, J.W. and Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony, *American Journal of Sociology*, 83, 340-363.
- Morgan, G. (1986): *Images of Organizations*, Sage Publications, Newbury Park.

- Newell, S. (2011). Editorial: Special section on healthcare information systems, *Journal of Strategic Information Systems*, 20(2), 158-160.
- Orlikowski, W.J. (2000). Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations, *Organizations Science*, 11(4), 404-428.
- Orlikowski, W. and Baroudi, J. (1991). Studying Information Technology in Organizations: Research Approaches and Assumptions. *Information Systems Research*, 2(1), 1-28.
- Orlikowski, W.J. and D. Robey (1991). Information Technology and the Structuring of Organizations, *Information Systems Research*, 2(2), 143-169.
- Øvretveit, J., Scott, T., Rundall, T.G., Shortell, S.M., and Brommels, M. (2007). Improving quality through effective implementation of information technology in healthcare, *International Journal for Quality in Health Care*, 1-8.
- Patton, M.Q. (1980). *Qualitative Evaluation Methods*, Sage Publications.
- Payton, F.C., Pare, G., Le Rouge, C.M. and Reddy, M. (2011). Health Care IT: Process, People, Patients and Interdisciplinary Considerations, *Journal of the Assoc. for Information Systems*, 12(2/3), i-xiii.
- Powell, W. and P. DiMaggio (1991). *The new institutionalism in organizational analysis*, University of Chicago, Chicago.
- Robey, D., and Boudreau, M. (1999). Accounting for the contradictory organizational consequences of information technology: theoretical directions and methodological implication. *Information Systems Research* 10, 167-185.
- Sallas, B., Lane, S., Mathews, R., Watkins, T. and Wiley-Patton, S. (2007). An iterative assessment approach to improve technology adoption and implementation decisions by healthcare managers. *Information Systems Management*, 24, 43-57.
- Scott, W.R. (1998). *Organizations – Rational, Natural, and Open Systems*, 4th Ed., Prentice Hall, N.J.
- Spil, T.A.M., Stegwee, R.A. (2001). Strategies for Healthcare Systems, In: Stegwee, R.A, Spil, T.A.M. (Eds.), *Strategies for Healthcare Systems*, Idea Group Publishing, 1-11.
- Sunyoung, C., Mathiassen, L. and Nilsson, A. (2008). Contextual dynamics during health information systems implementation: an event-based actor-network approach, *European Journal of Information Systems*, 17(6), 614-630.
- Venkatesh, V., Xiaojun, Z. and Sykes, T.A. (2011). 'Doctors do too little technology': a longitudinal field study of an electronic healthcare system implementation, *Information Systems Research*, 22(3), 523-546.
- Wagner, E.L. and Newell, S. (2004). 'Best' for whom?: the tension between 'best practice' ERP packages and diverse epistemic cultures in a university context, *Journal of Strategic Information Systems*, 13(4), 305-328.
- Walsham, G. (1993). *Interpreting Information Systems in Organizations*, John Wiley, Chichester.
- Walsham, G. (1995). Interpretive case studies in IS research: nature and method, *European Journal of Information Systems*, (4), 74-81.
- Weick, K. E. (1969). *The Social Psychology of Organising*, Addison-Wesley, Reading, Mass.