

11-28-2018

# USER ATTITUDES AND SUPPORT IN HEALTH INFORMATION SYSTEMS IMPLEMENTATION – THE CASE OF THE DANISH SUNDHEDSPLATFORMEN

Emma Møller Jeppesen  
*IT University of Copenhagen, emma.jeppesen@paconsulting.com*

Katrine Klee Olsen  
*IT University of Copenhagen, kako@implement.dk*

Alexander Richter  
*ITU, aric@itu.dk*

Shahper Richter  
*Auckland University of Technology, shahper.richter@gmail.com*

Follow this and additional works at: [https://aisel.aisnet.org/ecis2018\\_rp](https://aisel.aisnet.org/ecis2018_rp)

---

## Recommended Citation

Jeppesen, Emma Møller; Klee Olsen, Katrine; Richter, Alexander; and Richter, Shahper, "USER ATTITUDES AND SUPPORT IN HEALTH INFORMATION SYSTEMS IMPLEMENTATION – THE CASE OF THE DANISH SUNDHEDSPLATFORMEN" (2018). *Research Papers*. 105.  
[https://aisel.aisnet.org/ecis2018\\_rp/105](https://aisel.aisnet.org/ecis2018_rp/105)

# USER ATTITUDES AND SUPPORT IN HEALTH INFORMATION SYSTEMS IMPLEMENTATION – THE CASE OF THE DANISH SUNDHEDSPATFORMEN

*Research paper*

*Emma Møller Jeppesen, IT University of Copenhagen*

*Katrine Klee Olsen, IT University of Copenhagen*

*Alexander Richter, IT University of Copenhagen & University of Zurich, aric@itu.dk*

*Shahper Richter, Auckland University of Technology, shahper.richter@aut.ac.nz*

## Abstract

*The implementation of Health Information Systems (HIS) has been heralded as bringing numerous benefits to the healthcare sector. When implementing a HIS, the attitudes of the various users (nurses, doctors, admin people) towards the HIS can be influenced by a number of different factors. User support has proved to be one of the most important ones. Most recently, Sundhedsplatformen, one of the largest public HIS in Denmark, is being implemented in 18 hospitals across Zealand. In this context, we conducted 21 interviews at one of the major hospitals, Rigshospitalet, and qualitatively coded them. This allowed us to explore three archetypical groups of user attitudes toward Sundhedsplatformen: ‘Dedicated’, ‘Frustrated’ and ‘Despondent’. Further, we identified manifestations of insufficient user support on different levels. We clustered these elements into three levels of support: ‘Individual’, ‘Technological’ and ‘Organisational’. Reflecting on the manifestations of insufficient user support enables us to achieve a nuanced and holistic understanding of user support as an important adoption factor and further how user attitudes can be addressed when implementing HIS.*

*Keywords: HIS, user attitudes, user support, implementation, user resistance, health*

## 1 Introduction

In order to increase efficiency and save considerable amounts of health expenditure (Hillestad et al., 2005), large scale implementations of a new generation of health information systems (HIS) are currently being undertaken in multiple countries (Nguyen et al., 2016, Waterson, 2014). These implementations have the potential to support clinicians, improving work quality and efficiency, but also to increase patients’ access to health services, remote care and continuity of services (Sligo et al., 2017). However, HIS implementations are often a challenging undertaking. In a meta study, Cresswell and Sheikh (2013) conclude that even though organisational issues surrounding technology implementations in health care settings are crucial, they have not yet received adequate research attention. Within this context it is important to examine and evaluate HIS implementations and suggest strategies that hospitals could follow to ensure better success rates (Yen et al., 2017, Cresswell et al., 2013).

Since May 2016, Sundhedsplatformen (SP), one of the largest public HIS in Denmark, is being implemented in 18 hospitals. SP has received a lot of attention in the media displaying furious, stressed, and concerned clinicians. Headlines like “Now, the Black Death will hit the Hospitals” (Jakobsen, 2017) have spurred a heated public debate surrounding the topic. Such harsh headlines illustrate how the introduction of SP is not just an IT project, but rather a catalyst for large scale organisational

change, as it dictates new roles, workflows and processes made to ensure standardisation in health treatment across the regions.

In this context, one of the most prevalent factors that delay or hinder the successful uptake of HIS is negative attitudes of the healthcare professionals that are the main stakeholders in such systems (Boonstra and Broekhuis, 2010, Altuwajri et al., 2011, Ngafeeson and Midha, 2014, Kim and Kankanhalli, 2009). For instance, Lapointe and Beaudry (2014) indicate that the first step to identifying how a user will behave towards a new information system over time, is to understand a user's attitude, which can be associated to behavioural manifestations. Thus, one purpose of this study is to gain an understanding of user attitudes towards SP. The associated research question is as follows:

*1. What are the different clinicians' attitudes towards Sundhedsplatformen?*

Taking our study further, we take a close look into one of the main influencers of user attitudes, user support, which can come from a number of different areas within the organisation (Lluch, 2011). Whereas a number of studies has showed the positive impact of user support on user attitudes (Coiera, 2009, MacFarlane et al., 2006, Callen et al., 2008), the implementation of HIS demands a sociotechnical perspective (Lluch, 2011, Herrmann et al., 2017). However, such an integrated perspective of the technological factors (related to the platform itself), organisational factors (related to the specific hospital context) and individual factors (that take into the different needs and beliefs of the users) that altogether facilitate or hinder the adoption is so far missing in literature. Therefore we ask:

*2. How does user support on different levels influence user attitudes?*

Our study contributes to a better understanding of user behaviour when facing an HIS implementation. Further, we are able to demonstrate how user support on different levels influences user attitudes (as an antecedent to behaviour). Summarizing these findings, we propose a framework illustrating interrelationships between different levels of support and the effect they may have on user attitudes towards HIS implementations.

Next, we discuss the current research in the domain of HIS implementation with regards to user attitudes and user support (Section 2), summarize our methodological approach (Section 3) and describe the case context (Section 4). We then present the results of our analysis, the emergence of user attitudes (Section 5) and the support levels that can in turn influence these user attitudes (Section 6). These results are discussed in relation to existing literature in Section 7 and the paper is briefly concluded in Section 8.

## **2 Related work**

Currently, large scale HIS projects are either being planned, starting up or have already finished in a number of European countries (Nguyen et al., 2016, Nilsson et al., 2016). HIS as a research field has grown in parallel, and has increasingly been focusing on the organisational and people aspects, as these have often been found as the cause of project failures (Lin et al., 2012, Cresswell and Sheikh, 2013, Antheunis et al., 2013, Nguyen et al., 2016).

In a study on technology-driven organisational change Markus (2004) finds that many IT-implementations are run as IT-projects with a parallel track of change management activities. She claims that merely adding a traditional organisational change program to an IT-project, and thereby trying to get the organisation to "fit" the IT, instead of having an integrated perspective. As a direct consequence, end-users may not use the technology, misuse it, not use it to its' full extent, or use the technology without capturing the expected benefits. Studies in other IS fields confirm this. For instance, knowledge-management-systems and enterprise social media have been found to face plenty of obstacles before finally being adopted in daily business life (Raeth et al., 2012), e.g. as their adoption depends on users' awareness of the potential use benefits (Richter and Riemer, 2013). Hence, careful attention must be paid to the end-users and the people side of IS implementations generally.

When it comes to HIS implementations, existing studies highlight the need for a mutual understanding, alignment and transformation between the technology, the users and the organisation before implementation begins (Cresswell et al., 2013, Ludwick and Doucette, 2009). In this context, Borycki

(2015) points to the common misconception that simply installing a new HIS will be sufficient to generate value. Further studies conclude that organisational dynamics, such as roles, tasks and work practices, are as important as technological design parameters when implementing HIS (Westbrook et al., 2007, Coiera, 2009, Herrmann et al., 2017). It is therefore essential to not try to get the organisation to adapt to the technology, as this can result in loss of expected value and suboptimal returns. Misalignment between HIS and workflows is further likely to lead to misuse of the system as well as negative user attitudes (Coiera, 2009, Lluch, 2011). Research addressing the people side of HIS is especially focused on negative user attitude, user resistance and non-adoption as this is often believed to be the cause of the absent project benefits (Bhattacharjee and Hikmet, 2007, Kellermann and Jones, 2013, Phichitchaisopa and Naenna, 2013).

In order to deal with user attitudes it is vital to look at the influencing factors causing it (Rivard and Lapointe, 2012, Laumer and Eckhardt, 2012). User resistance is closely linked with the way the clinicians and nurses use the HIS (Nilsson et al., 2016) as well as how it is championed by clinical leaders (Ingebrigtsen et al., 2014). In order to identify and explain factors causing the resistant behaviour of users, several researchers have developed characteristics of specific user groups. For example, Klaus et al. (2010) identified eight different groups of users. The groups' behaviour varies from non-resisting, impatient and complaining, to aggressive forms of resistance. Lapointe and Beaudry (2014) as well as Van Offenbeek et al. (2013) also studied user behaviour. Both studies integrate acceptance and resistance research in their user characteristics. Van Offenbeek et al. (2013) worked with a matrix, displaying the range from 'support to resistance' and 'acceptance to non-acceptance'. The four archetypes defined in this paper are 'supporting users', 'resisting users', 'supporting non-users', and 'resisting non-users'. Lapointe and Beaudry (2014) have constructed a matrix with 'mindset' as one dimension and 'compliance with IT usage policies' as the second. They propose five archetypical behaviours: Engaged, Resigned, Dissident, Deviant and Ambivalent.

In relation to this, Berg (2001) explains in his research that having too much focus on the 'roll-out' of a system, and not recognising that HIS-implementations are processes of mutual transformation, can lead to user resistance and suboptimal returns. For example this can especially be the case when it comes to end-user training, which has been previously identified as a major barrier to successful HIS implementation (Riley and Smith, 1997, Ludwick and Doucette, 2009). This can be subsumed under user support. A number of studies found that user support has a high impact on user attitudes (Coiera, 2009, MacFarlane et al., 2006, Callen et al., 2008). For example Patel and Kannampallil (2014) and Chen and Hsiao (2012) talk about individual level factors, (Cresswell and Sheikh, 2013) explore primarily organisational issues in dealing with HIS implementation and Coiera (2009) focus on technological factors. Empirical research that investigates HIS adoption from multiple perspectives is therefore a useful contribution to the wider Information Systems adoption literature (Oliveira and Martins, 2011, Tornatzky et al., 1990).

There are only few studies that engage deeper with an integrated view of user support in HIS implementation contexts. Based on literature overviews, Lluch (2011), Yen et al. (2017) and Gagnon et al. (2012) make some steps towards presenting a holistic sociotechnical perspective of user support required. However, to the best of our knowledge, there are no empirical studies which exemplify the integrated view of user support issues on different levels within the organisation. This is where our studies want to make a contribution.

### 3 Methodological considerations

This study is based on an interpretive field research that focuses on the situation at the Danish Hospital, Rigshospitalet, around five months after the implementation of SP in order to "...understand human thought and action in social and organisational contexts" (Klein and Myers, 1999p. 67). Data gathering for this study took place at Rigshospitalet, Copenhagen, which was part of the second wave of a serial implementation of SP starting in November 2016. Over a one month period, from March 30th to April 27th 2017, we conducted 21 semi-structured interviews. The selection criteria for our respondents was to secure a variety of roles including health professionals, IT-professionals and other

staff functions. Among health professionals, we wanted to secure representatives from all over the hospitals which is why we approached health professionals of different professions, of different ranks, of different clinics (medical, surgery and outpatients) and of different geographical locations. We approached respondents via phone or email. Everyone we approached agreed to participate in the study. Table 1 displays details of the respondents.

Table 1: Respondent details

|                          | Profession           | No. | Roles   |
|--------------------------|----------------------|-----|---|
| Healthcare professionals | Nurses               | 4   | Clinical Head of Nursing, Clinical Nurse                                |
|                          | Physicians           | 8   | Chief Physician, Specialist Physician, Junior Physician, Head Of Clinic |
|                          | Medical secretary    | 1   | Medical secretary   |
| IT-professionals         | IT-support           | 3   | Clinical IT-consultant  |
|                          | IT & project manager | 3   | IT-Consultants  |
| Hospital staff functions | Head of Department   | 1   | Head of Improvements department   |
|                          | Project manager      | 1   | Project Manager, Improvement Department                                 |

The average length of the interviews was 44 minutes. They were recorded and transcribed. The interview guides were divided into themes containing multiple open-ended questions (Bryman and Bell, 2011). Not all themes were used across all interviews, rather, the interview guides were used to open up interesting discussions and to uncover the attitudes of the participants. Throughout our research, we adapted the themes and questions in the interviews, in order to dive into our preliminary findings from earlier interviews. Our research was thereby continually guided by the data we collected.

It functioned as a systematic methodology for the construction of theory through the analysis of data (Walsham, 2006). The data-coding process comprised three phases: Open coding, axial coding, and selective coding (Corbin and Strauss, 1990). The open coding was an interpretive and iterative process in which we broke down our data into categories and subcategories (Corbin and Strauss, 1990). The primary open coding was based on issues or actions the interviewees were referring to in our data. In this way, the two first authors grouped and categorised topics or themes that were prevalent in multiple interviews. In order to ensure a high level of intercoder reliability, we started out by coding the same interview and compared our codes. In approximately 90% of the cases the codes correlated.

The first iteration of the open coding of our 21 interviews produced 1156 codes with 114 different coding categories. The 114 categories were then reduced to 22. However, our categories were at this point not descriptive enough. We, therefore, did an additional iteration of the titles of the codes, so that they explained in more detail the content of the quotes. Sequentially, we started our axial coding in which we found relationships between our sub-categories (Corbin and Strauss, 1990). We performed the axial coding through a mind mapping session, where the different codes were related in multiple constructions until relationships supported by several incidents were located. Deriving from our first mind-mapping session, we categorised our axial codes, so that they correlated with our research questions and the logical order of our paper. MAXQDA was used to support our coding process. Furthermore, we have included secondary data in the form of internal documents, articles, newspapers, podcasts, and the business case in our analysis. This enables us to reflect upon the situation that is playing out at Rigshospitalet after the implementation of SP that we will present in the following.

## 4 Sundhedsplatformen at Rigshospitalet

SP is a large-scale IT-project run by the Capital Region and Region Zealand and replaces 30 IT-systems in the hospitals of the two regions. 44.000 employees and an estimated 2,5 million citizens

will use the HIS when it is fully rolled-out in 2018 (Boye, 2016). The four main goals of the implementation of SP are: 1) ‘a better course of treatment’ (all professional groups work in the same system and have constantly updated data), 2) ‘involving patients’ (they can follow and play an active part in their treatments), 3) ‘easier work routines’ (reduced redundancy, single sign in, safety) and 4) ‘better planning and support for decision-making’ (automatic recommendations of medical treatment and examinations). SP’s functionalities range from patient administration, scheduling and requisition (as part of ‘the core system’) until options to grant patients access to their own data, nationwide integrations and access to the primary sector (e.g. homecare)).

The roll-out of SP to all the hospitals in the two regions had been executed stepwise in a serial implementation process. The program has a strict focus on the hospital(s) ‘going-live’ or about to ‘go-live’. The four weeks of extensive support following the go-live are called ‘hypercare’. In this phase management allocated extensive resources, e.g. there were super-users from other hospitals available to support the users. However as soon as the hypercare period ended, the program’s focus moves on to the next hospital planned to go live. There are no allocated resources to focus on supporting the hospitals where SP already has been implemented. After hypercare, CIMT (Center for IT Medico & Tele) is therefore obligated to handle all support of the system. Any errors or change request that might occur after hypercare must be reported to CIMT who then contact the program. Therefore, the program and CIMT’s support unit are interdependent. When hypercare ends, the hypercare super-user organisation is also absolved.

SP has attracted a lot of public attention and several different narratives have been playing out in the media. In this paper we seek to recognise the entire situation for its complexity and enhance multiple agendas and realities. To understand the complexity we have interviewed a broad variety of clinicians (different ages, ranks and clinical specialities), as well as representatives from CIMT and the staff functions at Rigshospitalet.

Rigshospitalet is the largest and most specialised hospital in Denmark, with approximately 12.000 employees. The hospital is organised into eight centres, covering 55 clinics and 200 sections. The hospital direction is serviced by five administrative staff functions. The so-called ‘Improvement Department’ supports the operations of the hospital by ensuring quality, patient security, optimising work processes, as well as prioritising large strategic initiatives. The coordination and internal project management of the implementation of SP are coordinated by the ‘Improvement Department’. However, the department does not have any decision power in relation to SP, it solely supports and advises the hospital's Directors as well as the eight centres’ Directors.

## 5 Analysis – User Attitudes

We begin by identifying characteristics of the user attitudes towards SP at Rigshospitalet. From our interviews we found three overall archetypes of attitudes towards SP among the clinicians at Rigshospitalet as illustrated in Figure 2.

An important finding is that the attitudes among the respondents change. All the interviewed clinicians expressed some degree of frustration towards the situation. But they did not start out being frustrated, rather there has been a movement in their attitudes, as most started out ‘dedicated to making it work’, but have slowly moved to a more negative attitudes. Even though some still are dedicated and in general positive, we find it interesting that all the clinical end-users to some extent are frustrated about SP. The changes in attitudes imply that there is a risk of more clinicians falling into more negative attitude groups. We believe that the frustration amongst the clinicians can be explained by looking at the support provided in relation to SP. We are aware, that user support is one factor among others to influence attitudes. Our data revealed how pre-existing factors such as professional culture, group attitude, IT-skills, age, experience with previous systems and/or SP also influence the individual clinicians’ attitudes. However, the importance of different levels of support showed significant relevance. The focus of this paper is therefore to a lesser degree on explaining the individual respondent's attitude, but rather look at underlying factors influencing user attitudes and attitude change and the support that can be provided at different levels to support the users.

|  |   |   |
|--|---|---|
| <p><b>Dedicated to making it work</b></p>              | <ul style="list-style-type: none"> <li>• Positive - See it as an improvement and optimistic about the future</li> <li>• Taking personal responsibility for making it work</li> <li>• Did a lot of preparation</li> <li>• Run a lot faster than before</li> </ul>  | <p>"I am the one they reach out to because I now have the knowledge and competencies. So they go to me instead of the super-users...I of course find it cool, I would like to be used in that way, because I know that it is to ask someone who can give them a straight answer or can report it to CIMT."<br/>(Clinical Head of Nursing Unit B)</p>  |
| <p><b>Frustrated but trying to stay optimistic</b></p> | <ul style="list-style-type: none"> <li>• Disappointed about the system they got</li> <li>• Feeling tired and demotivated</li> <li>• "Everything is more difficult now"</li> <li>• There is a lot of things that are not working – however they get things done</li> <li>• They slowly get to know the system</li> </ul> | <p>"We have met problems before and we will meet new ones again. I am not going to lie down. I can promise you that" (Chief Physician).<br/>"We actually were looking forward to it, because we would get everything combined in one system. [...] But now we are increasingly disappointed. It's not intuitive, and the things you have to go through in order to make it work are heavy" (Chief Physician).</p> |
| <p><b>Despondent</b></p>                               | <ul style="list-style-type: none"> <li>• Very frustrated and angry and /or sad</li> <li>• Much more critical than positive</li> <li>• Sundhedsplatformen has made it very difficult to perform their jobs</li> <li>• They have giving up and/or are resigning</li> </ul>  | <p>"There are a lot of Chief Physicians who struggle with it. [They are ] experienced in their field and they feel that their ways of working have been destroyed completely. If you have used 30 years on streamlining your programme in order to do as much as possible in a day, [...] it really destroyed a lot for them" (Junior Physician).</p>   |

Figure 1: User attitudes towards Sundhedsplatformen at Rigshospitalet

## 6 Analysis – Insufficient user support on different levels

The findings of this study show that insufficient support on multiple levels is causing frustrated users. Our grounded theory approach enabled us to unpack how insufficient user support manifests itself on three levels that in turn influence the user attitudes towards SP at Rigshospitalet. Following on with the selective coding approach, these elements were then categorised into three levels of support; Individual, Technological and Organisational.

### 6.1 Individual level

Our data has shown that the users perceive the individual support to have been insufficient, especially in terms of role clarity of the different professions in the hospital, and also the level of emotional reassurance that is provided to users while implementation takes places.

#### 6.1.1 Non-transparent role changes

Extensive and unwanted changes to work processes are central factors behind the frustration as the roles of the different users becomes less defined and clear in the SP. With SP tasks that were previously performed by medical secretaries are now the responsibility of the physicians: *"There has been a shift in functions where tasks have been taken from a lower paid group to a higher paid group, which can be said to be very unwise from an economical point of view"* (Head of Clinic). The administrative support has been taken away from the physicians increasing their workload. The system's demand for new ways of working has resulted in the clinicians using increasing amounts of time in the system, decreasing their available time for their core task of patient care. This has resulted in a decrease in production. A Head of Clinic explains his concern about the low productivity and lacking benefits realisation: *"Now we have to realise the benefits. But what have the benefits been? Our benefit is that our work is more time consuming, and we have had to spend budgets on hiring more people. ...We can't do that; it is simply not possible. The worst thing is that if productivity remains low, there is a risk that we are asked to fire good people. That is a death spiral – firing people because our productivity is too low"* (Head of Clinic).

The implementation of SP has also caused some clinicians to feel that their profession is being undermined. Power no longer lies only with the most knowledgeable clinicians, but increasingly also with the IT-skilled: *"You can't do your job without it also being done electronically. So, there is an extreme power in being good at this system, and there is a power in understanding how it should be developed further and the possibilities that lie within"* (Head of Clinical IT-Consultants).

In contrast to the physicians and medical secretaries, we found that the nurses have not endured the same extent of changes to workflows or roles. For them, SP has caused frustration because it has changed the patient interaction negatively: *“We have always had the patient is the centre of attention, [...] Now, in the outpatient clinics, it is the nurse and patient who are ‘kicked out’ of the room so that the physician can write”* (Clinical Head of Nursing Unit).

### 6.1.2 Emotional Apathy

The lack of emotional support for the clinician’s professions has led to emotional consequences affecting the user attitudes towards SP. A feeling of not being able to perform one's core task and deliver sufficient patient care using SP is what has created the most significant emotional consequences for the clinicians: *“The worst thing for people is that they cannot get their job done in time. There are a lot of people working for free right now[...] They are not going to keep doing this”* (Head of Clinic). Furthermore, an increasing sense of demotivation is spreading amongst the clinicians: *“I actually think that when we reached the implementation there was a fighting spirit and people were very motivated and everyone made a huge effort to make it work. It was really something that connected the department and increased motivation. That lasted for two months [...] Then around new years, you could just feel that people were sick and tired of working with it. Always having to search for functions and getting frustrated about it not working, missing something or not being able to finish a patient session”* (Junior Physician A).

In the worst cases, the implementation of SP has resulted in employees getting sick from stress: *“There are a lot of people who have become stressed. There are a lot who are fighting with each other because the time to do their job has decreased”* (Head of Clinic). Another emotional consequence is that there is a feeling of not being heard. This has caused a narrative ‘Us vs. Them’ both in relation to CIMT/the Capital Region and at times also towards the hospital management. The clinicians are working extremely hard to keep everything running using the new platform, however they cannot keep running at the current pace they are in: *“We are hanging on to the edge of the table right now, only holding on because of the extra work hours and additional hires”* (Head of Clinic).

## 6.2 Technological level

This level of support does not only cover hardware and software but also what prerequisites the user is equipped with to use the system in the best possible way. Our data has shown that the end-users at Rigshospitalet have received insufficient technological support since before the roll-out of SP and continue to do so after the implementation as well. Technological support covers aspects of training, perceived system functionality and need for local personalisation.

### 6.2.1 Incomplete Training

Before go-live the clinicians attended mandatory courses in the use of SP. The courses consisted of physical off-site classes as well as e-learning. However, across all our interviews clinicians expressed a great deal of dissatisfaction with these courses. The critique has been directed at both the teachers: *“It seemed like the people teaching the introductory courses didn’t know the system either”* (Junior Physician), as well as the material used in the courses: *“The big problem was that the walk-throughs of the system were not done in the real Sundhedsplatformen, because it was not finished at the time. So, we couldn’t practice, that was forbidden [...] I will say that it was disappointing at best”* (Chief Physician). This has resulted in the clinician's not being properly prepared for the implementation and thereby from the outset not having the necessary prerequisites for adapting easily to the system.

### 6.2.2 Unclear System Use

When SP went ‘live’ at Rigshospitalet the clinicians quickly realised the high complexity of the system. Across all our interviews, the respondents describe the system as being unintuitive: *“It reminds me of Windows from the mid 90’s. There are a lot of locked functions, you meet stops where you are*



*not naturally guided further, and there are some very rigid and unintuitive workflows in Sundhedsplatformen” (Junior Physician). One of the main reasons why the clinicians see the system as unintuitive is that “...you can do the same thing in many different ways in the system” (Chief Physician), meaning that there is not one clear answer as to how to perform a given task. The consequence of this is that “...the clinics have to remember so many different things [...] So it is cool to have a system that can do everything, but if you are not IT nerdy then you want to know that THIS is how I, for example, move a patient” (Head of Clinical IT-Consultants).*

### 6.2.3 Non-personalised system

Besides not being intuitive the clinicians experience is that there are lacking functionalities in the system: *“They have bought a system that is halfway finished. [...] they have not bought the entire thing. This cost cutting exercise just impacts the product we have gotten” (Specialist Physician). Many clinicians have been creating workarounds in order to be able to perform their jobs. The use of workarounds indicates that there are elements in the system that are not working, which need to be changed to fit local needs. The system is designed and built around the wish for standardisation across both regions. However, Rigshospitalet is highly specialised and treats the most complex patients. The clinicians are very dissatisfied with the standardisation package, as it hinders them in their everyday work: “It is kind of a one-size-fits-none because there are some things that you can register in the system that you don’t need and things that you need that you cannot get” (Junior Physician). The need for immediate local changes and customisation is something that concerns almost all interviewees: You need to listen to the clinicians’ problems and wishes for changes” (Chief Physician).*

To fulfil the need for local customisation and decentralise some of the administrative rights in the system the plan is to hire more of the so-called Builders. Builders are clinicians, who have had additional education from the Program and have administrative right to adapt and change the system. However, currently *“...the hospitals have defined that we will have several builders... But they can’t build anything that is not approved from above. They have to go through an education and a rigorous process” (Clinical IT-Consultant), meaning that while they are technically able to customise, any actual changes must be approved by the Program.*

### 6.2.4 Inadequate IT Help Desk

Another element in the context user support on a technological level is the quality of IT support provided to the users. Though there are many IT-support options we have seen that the quality of the support has not been optimal. The super-users that were present during hypercare did not have the optimal conditions for performing their role, as they had received no additional training: *“As a super-user it was extremely frustrating walking around having the same background as everyone else. I had exactly the same training, I just got it a bit before. So, in reality I was a bit worse than everyone else” (Junior Physician). The hypercare super-user organisation was dissolved at the end of the rollout phase and was supposed to be replaced by a permanent super-user organisation. However, during our interviews it became clear, that this permanent super-user organisation only exists on paper. The consequence for the clinical user is first of all that they do not have the possibility of getting on-site support from local super-users. Further, they do not know who to take SP related problems to.*

The official IT-support is located in the CIMT unit consisting of Clinical IT-Consultants. The view of CIMT has generally amongst the clinicians not been positive: *“It would make a huge difference if we had some actual and real support. I don’t see it as real at the moment. I see it only being there by name because it is rare that they can help us, and then you cannot talk about support” (Chief Physician C). The complaints about the CIMT support foremost deals with the long waiting times: “I don’t contact CIMT because I hear from my colleagues that it is a living nightmare...” (Medical Secretary). Further, the clinicians complain that the responses they get often are useless: “CIMT is very nice when we talk to them, but they cannot help with the problems we have. When I call them I am given a sweet talk, but nothing happens. When I report something, I get a standard response a week later. I cannot use that for anything” (Specialist Physician), as well as unsatisfactory: “When we call IT service,*

which I have done a lot, they say 'We will look at it in 2018 when we are done rolling out'[...] I find that demotivating" (Junior Physician). Many physicians have gotten to the point where they feel that they are not being heard because they are not getting the needed support from CIMT.

### 6.3 Organisational level

The technological support relies heavily on the underlying organisation and it is therefore important to consider the organisational structures and practices behind SP at Rigshospitalet. We identified the following areas of insufficient support that exist on this level, unfulfilled promises made to the users by management, the prevalence of an 'us' vs 'them' mentality, scarce resources and incompetent coordination amongst the different areas of the organisation..

#### 6.3.1 Unfulfilled Promises

However, we have seen that there is a discrepancy between the perception and reality of the permanent super-user organisation. The Head of Implementation at Rigshospitalet talks about the permanent super-user organisation as already being in place. Meanwhile, according to our interviewees as well as CIMT there are not yet dedicated super-user in all parts of the hospital, and as mentioned the permanent super-user organisation therefore only exists on paper. This is to a large degree due to the fact that there seems to be misaligned strategies across the different centers. The Improvement Department advocates for more homogeneity among super-users across the hospital to strengthen the super-user competencies: "...there are some centers with very skilled, on the beat super-users, and these centers can stay in front because they have opportunities and super-users enough. But then there are others centers who can hardly find any competent super-users and do not feel they have the time necessary to organise and train them" (Head of Implementation). It is important to underline that even though they advocate for an aligned super-user strategy across the eight centers, it is not a call for standardisation. The question of who to appoint as super-users and how to organise across clinics and departments should be up to the individual center since there are significant differences from center to center. However, in order for the support set-up to function having super-users in every center is vital.

#### 6.3.2 'Us' vs 'Them' mentality

A consequence of the misaligned strategies is that it is immensely hard for CIMT to support the end-users. Further it is difficult for the Improvement Department to secure organisational anchoring of improvements and adjustments to both the system and related information flows. One of the reasons for some centers not assigning super users could be that "...the super user term was diluted from the beginning because they had gotten so little education" (Head of Clinic) making it hard for the centers to understand the necessity of the permanent super users. As mentioned earlier, there is a feeling of "Us vs. Them" in the hospital towards SP, which is making it hard to create ownership for the system: "If you stand up and teach about the system then you are in the 'Sundhedsplatformen-Camp', and then you are a part of 'Them'. So, the super users will get a central role, but with the risk of becoming part of 'Them'" (Head of Clinical-IT Consultants).

#### 6.3.3 Scarce Resources

Head of Clinical IT-Consultants explains how the support set-up for the hospitals which have 'gone live' was not a part of the original plan: "It is striking when thinking about how important support is that originally it was never a part of the planned implementation - that someone actually had to provide help after hypercare. I think the intention was for the Program to immediately become part of the operating and permanent organisation. They just didn't. They moved on to the next hospital". She further explains how CIMT experience a lack of maintenance- and operating-function in the Program, since the Program solely focuses on the implementation process at the next hospital: "No resources (in the Program) are allocated to take care of the hospitals who are 'live' so to speak. It is a logistic challenge -" (Head of Clinical IT-Consultants).

#### 6.3.4 Incompetent coordination

The final organisational related finding is how there is a lack of coordination and collaboration between the many different units involved in the IT-support set-up. All units, except for The Program, provide some kind of support or service to the end-user at Rigshospitalet. CIMT's Clinical IT-Consultants have a formalised relation to the Program. CIMT receives reported errors as well as change requests from the clinical users, which they bring forward to the Program. The Program handles the requests and, in most cases, return to the user with answers or solutions. Nevertheless, the collaboration between the program and CIMT is not balanced. The Clinical IT-Consultants find it difficult to get hold of the Program, which is a challenge for CIMT. Because the Clinical IT-Consultants do not have administrative rights to change the system, but at the same time are responsible for providing support for the end-users, they are: "...caught between a rock and a hard place, and that is the most prominent organisational challenge" (Head of Clinical IT-Consultants).

In the relation between CIMT and Rigshospitalet, there are three actors the (non-existent) super-user organisation, the Student Team, and the Builders. CIMT and the Student Team at Rigshospitalet do not have a formalised collaboration agreement. They are aware of each other, and both wish to collaborate more. However, when talking to both the Clinical IT-Consultants and the Student Team, it seems, that it is not clear where their jobs overlap, where they compete, and where they can collaborate further. In addition, there will be an increasing number of Builders at the hospital, which the Clinical IT-Consultants need to find a way to coordinate and collaborate with as well. Currently, there is no formalised collaboration agreement between these entities either.

## 7 Discussion

### 7.1 Theoretical implications: Attitudes towards Sundhedsplatformen

This study extends previous research on user attitudes (Klaus et al., 2010, Lapointe and Beaudry, 2014, Van Offenbeek et al., 2013) by providing a characterisation of three archetypical groups of user attitudes towards SP identified at Rigshospitalet.

The first user group ("Dedicated to making it work") are proactive frontrunners, who put in extra effort and hours and take responsibility for making the system work. They believe that in the end SP will be a contribution, even though there is a long way to go. However, they are at the same time becoming increasingly frustrated. The second user group ("Frustrated but trying to stay positive") consists of people who are frustrated and increasingly demotivated due to the challenges caused by SP. They fear that SP will compromise not only their employee satisfaction but also the patient care. However, they are attempting to keep a positive outlook on the future. Apart from being deeply frustrated the users of the third group ("Despondent") feel let down, they are angry and hopeless to a degree where they have an intention to leave their jobs. They have no faith that SP will ever work sufficiently.

Our analysis shows that attitudes towards the system are characterised by frustration across all users, which can be seen as resistance (Lapointe and Beaudry, 2014, Ngafeeson and Midha, 2014). Further, when looking at organisational anchoring, we see a negative tendency. We have found that there exists a narrative of 'Us vs. Them' which seems to make it even harder to find super-users because they are at risk of being seen as one of 'Them'. We see a lack of organisational anchoring in the clinical leadership at Rigshospitalet, since several centers have not coordinated super-users and in some clinics (Currie and Guah, 2007). In line with Borycki (2015) it is clear that simply installing a new information system is not sufficient to generate value. To retrieve the full qualitative and financial benefits, organisational dynamics must be taken into account (Lluch, 2011). We have seen throughout our study that it is precisely this lack of consideration for organisational dynamics that has led to the lack of expected benefits such as increased production smoother work processes and higher employee satisfaction (Sligo et al., 2017, Herrmann et al., 2017, Nguyen et al., 2016).

## 7.2 Theoretical implications: Insufficient user support

Based on these findings, we propose a framework (Figure 2) illustrating multiple levels of support and user attitudes. The framework indicates that initiatives must encompass all three levels in order to be effective (Lapointe and Rivard, 2005, Herrmann et al., 2017). Moreover, lack of support on one level can have a cascading effect to the other levels.

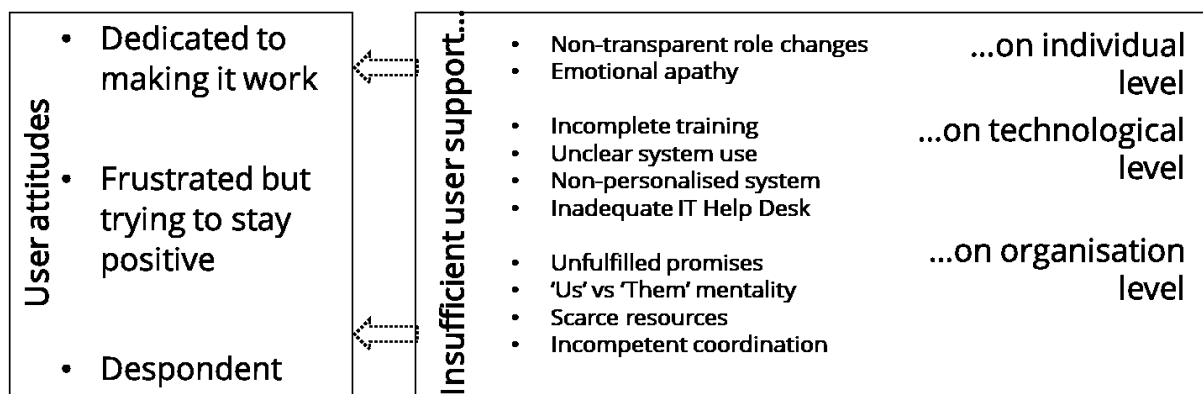


Figure 2: User attitudes and insufficient user support on three levels

Confirming recent research on HIS implementation (Patel and Kannampallil, 2014) we found at the individual level, insufficient attention and support of the individual's profession, roles, and ways of working. This has had negative emotional consequences leading to an increasing sense of demotivation and frustration among clinicians, resulting in a greater risk of clinicians becoming stressed or resigning. Moreover, similar to Cresswell et al. (2013) we found that lack of insufficient technological support has not only led to unhappy and unsatisfied end users but has also created undesirable workflows and workarounds. Ngafeeson and Midha (2014) suggest that it is this type of dissatisfaction that can lead to user resistance and for users to become part of the Despondent attitude group.

At the technological level, we found, in line with Lluch (2011), that the system is presently not being used to its full potential because the users do not have the training, skills, rights or time to use the system optimally. Moreover, Cresswell et al. (2013) present a linear lifecycle approach to supporting HIS implementation, however, this approach insinuates that the clinicians have an active role in designing the system that they then use. This was not done at Rigahospitalet, where the users were simply expected to take on an already designed system which was not customised to their specific needs.

At the organisational level, we find that the organisational structures, which are supposed to support SP at Rigshospitalet are not in place. The collaboration between IT-support units is not coordinated nor consistent. On top of this, a permanent super-user organisation has not yet been established, even though it is believed to be a central element in the support structure (Doolin, 2004, Aarts et al., 2004).

## 7.3 Theoretical implications: Multilevel perspective

Though comparable to our findings, the studies of Van Offenbeek et al. (2013), Lapointe and Beaudry (2014), and Klaus et al. (2010) are based on a single level analysis. However, when researchers obtain spurious relationships at a lower level (for instance a positive relationship between individual-level system usage and individual performance) and do not account for higher-level factors that influence the given relationship, a “contextual fallacy” (Burton-Jones and Gallivan, 2007) might occur. In our study, we have therefore strived to obtain a multi-level perspective on user attitudes and thus accounted for factors on an Individual, Technological and Organisational level. Each level helps us to better understand some aspects of user support, but does not provide a complete perspective (Lapointe and Rivard, 2005).

For instance, our study reveals how frustration amongst the users as well as the occurring changes in attitude is influenced by three levels of support. As seen above it is necessary to not only identify user

attitudes but also to search for the causes or explanations behind the attitudes. Bhattacharjee and Hikmet (2007) argue that in addition to individual factors, technology usage must also be taken into consideration. In their study, they present a theoretical dual-factor model of physician resistance and usage of HIS. However, according to Burton-Jones and Gallivan (2007) researchers should not only look at the individual level for an explanation of usage. They criticise the earlier mentioned dual-factor model (Bhattacharjee and Hikmet, 2007) for only encountering a single level and argue that technology usage and resistance belong solely to the individual level. They propose that the dual factor model, as well as many others, could be extended and improved by applying a multi-level perspective. They explain how a multi-level approach is suitable for examining the linkage and dynamics between different levels of an organisation.

It is important to note that the three levels of support are dynamic and interdependent. The organisational level serves as a foundation for the two other levels and entails basic support such as organisational structures, strategic initiatives, allocated resources, strategic awareness and the like. Building on this is, a technological level of support which consists of adequate system functionality, system training, IT-support and the like are dependent on being aligned with the organisational level. The individual level consisting of perceived professional support is dependent on the cumulated support from the two underlying levels, meaning that lack of support on the organisational level has a cascading effect on the two above lying levels.

When comparing our findings with related work, it becomes apparent that in relation to SP there has not been an understanding of the organisational dynamics, and it has therefore not been a process of mutual transformation between the technology and the organisation (Nguyen et al., 2016, Cresswell and Sheikh, 2013). This shows in the case of Rigshospitalet as the hospital is expected to adapt to SP and, as of now, the technology can only to a limited degree adapt to the organisation. The result of this is frustrated users as well as absent financial and qualitative benefits. Focusing on the dynamics and complexity of user attitudes, the findings of this study show how a multi-level approach is needed for a deeper understanding of the factors influencing attitudes. The study thereby contributes to existing research with a nuanced understanding of user attitudes towards HIS, by not only looking at the attitudes themselves but also on the influencing factors behind.

#### **7.4 Practical implications**

While temporary loss in productivity is considered acceptable in large scale HIS implementations (Menachemi and Collum, 2011), it still needs to be a serious consideration in this case. Even though SP will be fully implemented late 2017, there is still important work ahead. As of January 2018 the system operation, covering maintenance and further development, transfers from the Program to CIMT. The regions have bought all rights to further develop and customise the system (Head of Clinical IT-Consultants). Thus, a major process starts including assessment of change requests, prioritisations, further developing and changing the system, training users and builders, and much more. This process, in the same way as the implementation, demands an understanding of not only technical aspects but also organisational dynamics (Kushniruk et al., 2010). Moreover, it demands a high degree of user involvement from positive and engaged users, which is needed to make the system work to its full potential (Sherer et al., 2015). As this study shows, such users should not be taken for granted and need increased support to reduce the current frustration and demotivation. The findings of our study are thereby also relevant in relation to the continued work with SP.

To exemplify how our framework can be used, we will shortly explore the initiative of the permanent super-user organisation. The purpose of the initiative is to establish a network of dedicated users, who can retrieve and communicate SP related information, who can gain extra competencies in the system, and who thus can serve as local support to colleagues. However, as mentioned in our analysis, the initiative has not been successful. The reason for this can be explained by looking at the three levels of the framework: On the Organisational level, we see a lack of structures supporting the creation of the super user organisation such as misaligned strategies for super-users, an incoherent recruitment of super-users etc. The result is a super-user organisation that is incomplete and only exists in parts of the

organisation. The consequence at the Technological level is that it is extremely difficult for the clinical IT-support in CIMT to deliver sufficient IT-support to the end-user. The result at the Individual level is that the clinicians feel unsupported in several aspects of their work, feel ignored, and are increasingly becoming frustrated and demotivated. This exemplifies the cascading effect and interdependence of the support levels.

## 7.5 Limitations and possible future work

A limitation of our study is that the three levels of support are only a selection of factors influencing users' attitude. This means that sufficient support at all three levels does not necessarily equal a positive user attitude and hence a successful implementation of HIS. Another limitation is that our findings are based on 21 interviews with clinicians, clinical managers, IT-professionals and members of staff functions. However, the regional management and the hospital management have not been interviewed. This is important to note since they might perceive the situation differently than clinicians and IT-professionals and thus could have contributed with a nuanced perspective on our findings. Finally, our framework could be criticised for not including enough levels. We do not, for example, explicitly consider how the collective level regarding the groups' behaviour and attitudes (e.g. the department the clinical belong to) influence the attitude of the individual user. Since our analysis shows that the clinicians to a large extent are motivated by helping their colleagues, a collective level could add value to our framework. Further research is thus desirable and should aim to not only validate our framework but also incorporate other levels.

## 8 Conclusion

In this paper we proposed a framework illustrating the manifestations of insufficient user support on three levels and their collective impact on user attitudes. We hypothesise that initiatives addressing only one support level will most likely fail if the other levels are not considered. In line with Sligo et al. (2017) we highlight the importance of an ongoing and multidimensional understanding of user attitudes.

Rigshospitalet is currently in the post-implementation phase of SP. The media coverage of the implementation of SP has been polarised with clinicians and IT professionals criticising the situation, and regional management focusing on telling a more positive story. If the importance of positive user attitudes is overlooked and Rigshospitalet fails to create better support, our study suggests that there is a risk of more users becoming increasingly frustrated and in the worst case despondent. Seeing that strong attitudes are harder to change, the threat of misuse and non-use will increase in parallel to additional loss of benefits.

## Acknowledgements

We would like to thank Gerhard Schwabe, Ingrid Bauer, Mateusz Dolata, Andreas Engelmann, Andri Färber, Mehmet Kilic, Susanne Steigler, Liudmila Zavolokina, and Nicole Zigan from the Information Management Research Group at the University of Zurich for their insightful and useful feedback at a presentation of this paper during a research seminar in April 2018.

## 9 References

- Aarts, J., Doorewaard, H. & Berg, M. 2004. Understanding implementation: the case of a computerized physician order entry system in a large Dutch university medical center. *Journal of the American Medical Informatics Association*, 11, 207-216.
- Altuwaijri, M. M., Bahanshal, A. & Almeheid, M. 2011. Implementation of computerized physician order entry in National Guard Hospitals: assessment of critical success factors. *Journal of Family and Community Medicine*, 18, 143.
- Antheunis, M. L., Bates, K. & Nieboer, T. E. 2013. Patients' and health professionals' use of social media in health care: motives, barriers and expectations. *Patient education and counseling*, 92, 426-431.
- Berg, M. 2001. Implementing information systems in health care organizations: myths and challenges. *International journal of medical informatics*, 64, 143-156.
- Bhattacharjee, A. & Hikmet, N. 2007. Physicians' resistance toward healthcare information technology: a theoretical model and empirical test. *European Journal of Information Systems*, 16, 725-737.
- Boonstra, A. & Broekhuis, M. 2010. Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC health services research*, 10, 231.
- Borycki, E. 2015. The role of the IT department in Organizational Redesign. *Context Sensitive Health Informatics: Many Places, Many Users, Many Contexts, Many Uses*, 218, 132.
- Boye, M. 2016. *Sundheds-it standardiserer hospitals-behandling fra Ringsted til Bornholm* [Online]. Available: <https://www.version2.dk/artikel/sundheds-it-standardiserer-hospitals-behandling-fra-ringsted-til-bornholm-769526> [Accessed 8th June 2017].
- Bryman, A. & Burgess, E. 2011. Business research methods. 3 uppl. *Malmö: Liber AB*.
- Burton-Jones, A. & Gallivan, M. J. 2007. Toward a deeper understanding of system usage in organizations: a multilevel perspective. *MIS quarterly*, 657-679.
- Callen, J. L., Braithwaite, J. & Westbrook, J. I. 2008. Contextual implementation model: a framework for assisting clinical information system implementations. *Journal of the American Medical Informatics Association*, 15, 255-262.
- Chen, R.-F. & Hsiao, J.-L. 2012. An investigation on physicians' acceptance of hospital information systems: a case study. *International journal of medical informatics*, 81, 810-820.
- Coiera, E. 2009. Building a national health IT system from the middle out. *Journal of the American Medical Informatics Association*, 16, 271-273.
- Corbin, J. & Strauss, A. 1990. Grounded theory research: Procedures, canons and evaluative criteria. *Zeitschrift für Soziologie*, 19, 418-427.
- Cresswell, K. & Sheikh, A. 2013. Organizational issues in the implementation and adoption of health information technology innovations: an interpretative review. *International journal of medical informatics*, 82, e73-e86.
- Cresswell, K. M., Bates, D. W. & Sheikh, A. 2013. Ten key considerations for the successful implementation and adoption of large-scale health information technology. *Journal of the American Medical Informatics Association*, 20, e9-e13.
- Currie, W. L. & Guah, M. W. 2007. Conflicting institutional logics: a national programme for IT in the organisational field of healthcare. *Journal of Information Technology*, 22, 235-247.
- Doolin, B. 2004. Power and resistance in the implementation of a medical management information system. *Information Systems Journal*, 14, 343-362.
- Gagnon, M.-P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N. & Légaré, F. 2012. Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals. *Journal of medical systems*, 36, 241-277.
- Herrmann, T., Ackerman, M. S., Goggins, S. P., Stary, C. & Prilla, M. 2017. Designing Health Care That Works—Socio-technical Conclusions. *Designing Healthcare That Works*. Elsevier.

- Hillestad, R., Bigelow, J., Bower, A., Girosi, F., Meili, R., Scoville, R. & Taylor, R. 2005. Can electronic medical record systems transform health care? Potential health benefits, savings, and costs. *Health affairs*, 24, 1103-1117.
- Ingebrigtsen, T., Georgiou, A., Clay-Williams, R., Magrabi, F., Hordern, A., Prgomet, M., Li, J., Westbrook, J. & Braithwaite, J. 2014. The impact of clinical leadership on health information technology adoption: systematic review. *International journal of medical informatics*, 83, 393-405.
- Jakobsen, S. 2017. Nu rammer den sorte død hospitalerne. *Politiken*.
- Kellermann, A. L. & Jones, S. S. 2013. What it will take to achieve the as-yet-unfulfilled promises of health information technology. *Health affairs*, 32, 63-68.
- Kim, H.-W. & Kankanhalli, A. 2009. Investigating user resistance to information systems implementation: A status quo bias perspective. *MIS quarterly*, 567-582.
- Klaus, T., Wingreen, S. C. & Blanton, J. E. 2010. Resistant groups in enterprise system implementations: a Q-methodology examination. *Journal of Information Technology*, 25, 91-106.
- Klein, H. K. & Myers, M. D. 1999. A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS quarterly*, 67-93.
- Kushniruk, A., Borycki, E., Kuo, M.-H. & Kuwata, S. 2010. Integrating technology-centric and user-centric system testing methods: ensuring healthcare system usability and safety. *Studies in health technology and informatics*, 157, 181-186.
- Lapointe, L. & Beaudry, A. Identifying IT user mindsets: acceptance, resistance and ambivalence. System Sciences (HICSS), 2014 47th Hawaii International Conference on, 2014. IEEE, 4619-4628.
- Lapointe, L. & Rivard, S. 2005. A multilevel model of resistance to information technology implementation. *MIS quarterly*, 461-491.
- Laumer, S. & Eckhardt, A. 2012. Why do people reject technologies: a review of user resistance theories. *Information systems theory*. Springer.
- Lin, C., Lin, I.-C. & Roan, J. 2012. Barriers to physicians' adoption of healthcare information technology: an empirical study on multiple hospitals. *Journal of medical systems*, 36, 1965-1977.
- Lluch, M. 2011. Healthcare professionals' organisational barriers to health information technologies—A literature review. *International journal of medical informatics*, 80, 849-862.
- Ludwick, D. A. & Doucette, J. 2009. Adopting electronic medical records in primary care: lessons learned from health information systems implementation experience in seven countries. *International journal of medical informatics*, 78, 22-31.
- Macfarlane, A., Murphy, A. W. & Clerkin, P. 2006. Telemedicine services in the Republic of Ireland: an evolving policy context. *Health Policy*, 76, 245-258.
- Markus, M. L. 2004. Technochange management: using IT to drive organizational change. *Journal of Information technology*, 19, 4-20.
- Menachemi, N. & Collum, T. H. 2011. Benefits and drawbacks of electronic health record systems. *Risk management and healthcare policy*, 4, 47.
- Ngafeeson, M. N. & Midha, V. 2014. An exploratory study of user resistance in healthcare IT. *International Journal of Electronic Finance*, 8, 74-94.
- Nguyen, H. T., Eikebrokk, T. R., Moe, C. E., Tapanainen, T. & Dao, T. K. 2016. Exploring health information technology implementation success factors: a comparative investigation in Nordic countries. *International Journal of Healthcare Technology and Management*, 15, 326-351.
- Nilsson, L., Eriksén, S. & Borg, C. 2016. The influence of social challenges when implementing information systems in a Swedish health-care organisation. *Journal of nursing management*, 24, 789-797.
- Oliveira, T. & Martins, M. F. 2011. Literature review of information technology adoption models at firm level. *The electronic journal information systems evaluation*, 14, 110-121.
- Patel, V. L. & Kannampallil, T. 2014. Human factors and health information technology: current challenges and future directions. *Yearbook of medical informatics*, 9, 58.
- Phichitchaisopa, N. & Naenna, T. 2013. Factors affecting the adoption of healthcare information technology. *EXCLI journal*, 12, 413.



- Raeth, P., Urbach, N., Smolnik, S. & Butler, B. 2012. Corporate adoption of social computing: a process-based analysis. *Journal of Information Technology Case and Application Research*, 14, 3-27.
- Richter, A. & Riemer, K. 2013. The Contextual Nature Of Enterprise Social Networking: A Multi Case Study Comparison. *European Conference of Information Systems*. Utrecht, The Netherlands.
- Riley, L. & Smith, G. 1997. Developing and implementing IS: a case study analysis in social services. *Journal of Information Technology*, 12, 305-321.
- Rivard, S. & Lapointe, L. 2012. Information technology implementers' responses to user resistance: nature and effects. *MIS quarterly*, 36, 897-920.
- Sherer, S. A., Meyerhoefer, C. D., Sheinberg, M. & Levick, D. 2015. Integrating commercial ambulatory electronic health records with hospital systems: An evolutionary process. *International journal of medical informatics*, 84, 683-693.
- Sligo, J., Gauld, R., Roberts, V. & Villa, L. 2017. A literature review for large-scale health information system project planning, implementation and evaluation. *International journal of medical informatics*, 97, 86-97.
- Tornatzky, L. G., Fleischer, M. & Chakrabarti, A. K. 1990. *Processes of technological innovation*, Lexington books.
- Van Offenbeek, M., Boonstra, A. & Seo, D. 2013. Towards integrating acceptance and resistance research: evidence from a telecare case study. *European Journal of Information Systems*, 22, 434-454.
- Walsham, G. 2006. Doing Interpretive Research. *European Journal of Information Systems*, 15, 320-330.
- Waterson, P. 2014. Health information technology and sociotechnical systems: A progress report on recent developments within the UK National Health Service (NHS). *Applied ergonomics*, 45, 150-161.
- Westbrook, J. I., Braithwaite, J., Georgiou, A., Ampt, A., Creswick, N., Coiera, E. & Iedema, R. 2007. Multimethod evaluation of information and communication technologies in health in the context of wicked problems and sociotechnical theory. *Journal of the American Medical Informatics Association*, 14, 746-755.
- Yen, P.-Y., Mclearney, A. S., Sieck, C. J., Hefner, J. L. & Huerta, T. R. 2017. Health Information Technology (HIT) Adaptation: Refocusing on the Journey to Successful HIT Implementation. *JMIR Medical Informatics*, 5.