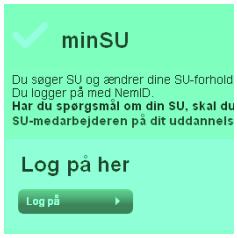

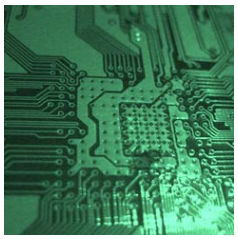

The effects of digitalisation of SU on the work of SU workers

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Supervisor: Professor Kjeld Schmidt, Department of Organization, Copenhagen Business School

Tabs 161,203 out of 182,000

Jonna Jürgensen

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Abstract

The purpose of the study is to investigate the process of digitalisation of SU in order to gain understanding on how e-government development projects may affect the workers. The research question is; "How has digitalisation of SU affected the work of SU workers?", and it is supplemented with a secondary research question; "Why has digitalisation of SU affected the workers as it has?". The researcher interviewed three SU administrators, and the head of the department and specialist consultant from the responsible authority for the digitalisation of SU. The results show that digitalisation has not improved the efficiency of the service or enhanced the empowerment of the worker. The reasons are due to difficulties with data integration between the SU systems, and lack of user involvement.

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Introduction

Problem area

The economical crisis requires cost-savings in the public sector services around the world (United Nations, 2010). The United Nations' report "E-government survey 2010" claims that cost-savings are best achieved by providing more efficient, transparent and accessible service for citizens. The Danish Minister of Finance, Bjarne Corydon states that also savings in the Danish public sector are required. This entails a declining number of public sector workers (Olsen, 2010). Statistics show that from the first quarter of 2002 until the second quarter of 2010 the public sector grew with 53,400 workers from 728,600 to 782,000. However, the number of full-time workers has decreased since, and in the third quarter of 2011 750,400 workers ("Tabeller i Statistikbanken," n.d.) or approximately 30 per cent of the entire workforce received salary for public sector duties ("Nyt fra Danmarks Statistik,"n.d.). In an interview with Politiken senior analyst of AE Frederik Pedersen states that it is not administrative staff who have lost their jobs, but workers in schools, eldercare and childcare, resulting in a decrease in welfare services (Olsen, 2012).

In responding to the demands for cost-savings, and for a more efficient and effective public sector, the use of information and communication technologies (ICT) in providing public sector services plays a prominent role (Greve, 2006; OECD, 2006). ICT has been utilized in government for more than 30 years (Andersen, Henriksen, Medaglia, Danziger, Sannarnes & Enemærke, 2010; Bekkers & Homburg, 2007; OECD, 2006), but particularly the rise of e-government from 2000 onwards is seen as a major facilitator in a technology-driven change in government (Andersen et al., 2010). Simply defined, e-government refers to governments' use of websites to provide government information and services to citizens and businesses (Layne & Lee, 2001).

According to the strategy for Danish e-government initiatives from 2007, Denmark is one of the leading countries in e-government development (The Danish government, Local government Denmark and the Danish regions, LGDK, 2007). The Danish e-government strategy sets better digital service and enhanced effectiveness as the overall goals of digitalisation. Better digital service emphasises the importance of self-service possibilities that enable creating a more accessible and service-minded public sector. According to the strategy, enhanced effectiveness is

required, as the number of public sector workers is diminishing; yet the demand for quality and transparency of service will continue to grow unrelenting. The idea is that digitalisation will take over routine tasks, thus releasing resources to be put to more demanding tasks. The 2007 strategy aims to preserve and improve the leading position in e-government development (LGDK, 2007). In 2010 the United Nations' e-government survey listed Denmark as number seven in e-government development. The survey focuses on how websites are used to deliver public services and expand opportunities for citizens to participate in decision-making (United Nations, Economic and Social Affairs, 2010).

To the author of this thesis the need for public sector e-government projects seems to be well argued; a more efficient, effective and cost-saving public sector where citizens are better served. Efficiency is defined as achieving the maximum result with minimal resources for instance by speeding up processes (Bouwman, van den Hooff, van de Wijngaert & van Dijk, 2005). Effectiveness refers to producing the result that is wanted or intended, for instance by improving quality and knowledge management (Bouwman et al., 2005). However, the achievement of these goals does not say much about the possible challenges encountered when transforming government services into e-government. This is a process that comes with significant challenges for systems, users and work processes. Elovaara and Mörtberg (2010) argue that e-government research has done little study on the implications of e-government on workers' performances and activities.

In 2009 e-government was introduced into the Danish state education grant and loan application process (statens uddannelsesstøtte, SU - the abbreviation will be used in the research). The decision is based on the government's strategy for digitalisation of the public sector. By introducing a mandatory online self-service for students the goal was to improve effectiveness of SU administration and to provide a more flexible client service. The digitalisation has indeed obtained some of the expected, positive results, e.g. a greater amount of automated application handling and shortened time for processing applications (Styrelsen for Statens Uddannelsesstøtte, 2011). In 2008, the share of automatically processed applications was 19 per cent of all applications, but by 2010, the amount was 65 per cent. Furthermore, SU administrators spend less time on processing applications. In 2008, 48 per cent of all applications were processed within 0-10 days. In 2010, the amount had grown to 56 per cent of applications (Styrelsen for Statens Uddannelsesstøtte, 2011). Nevertheless, despite the achieved end results the process of

digitalisation has encountered many difficulties (Nielsen & Slidsborg, interview, January 19, 2012; Winsløv & Jørgensen, 2009).

The purpose of the study was to investigate the process of digitalisation of SU in order to gain understanding on how e-government development projects may affect workers**.** However, the author wishes to emphasise that due to the limitations of the study, it is not possible to generalise the results of the study. The study is both descriptive and explanatory in nature. It will describe one case and provide explanations for the effects the digitalisation process has had on the work.

From the purpose of the study stated above, the researcher has formulated the following research question:

- How has digitalisation of SU affected the work of SU workers?

In order to gain more insight to the effects, the main research question is complemented with the following secondary research question:

- Why has digitalisation of SU affected the work of SU workers as it has?

In order to investigate the impacts of digitalisation of SU on the work, the researcher interviewed three SU workers from CBS and RUC, and also head of department Peter Nielsen and specialist consultant Belinda Slidsborg from the responsible authority for the digitalisation, Kontoret for Statens Uddannelsesstøtte (KSU). In order to understand what systems the SU workers use, the researcher observed two SU administrators 2,5 hours and 1,5 hours respectively. The author will discuss the digitalisation process through concepts of e-government, user involvement and information infrastructure.

Structure of the thesis

The thesis is divided in five main parts. In the first part, Methodology, the author will present the theory of science that will explain how the author understands the world and constructs knowledge about phenomena. This theory of science explains the research design and the methods used in the research. The second part of the thesis, Theory, will orientate the reader of the frame of reference of the thesis. This part discusses concepts of e-government, user involvement and information infrastructure that form the basis for the analysis. The third part will introduce the case of digitalisation of SU. The fourth part, Analysis, includes the analysis

where the author will discuss the findings and reflect on them in relation to the theories. In the fifth part, Conclusion, the author will conclude on her findings and provide perspectives for further studies.

1. Methodology

The following chapter begins by presenting the theory of science that describes the author's understanding of how the knowledge of social phenomena is constructed. The author will then discuss the research criteria in qualitative studies, as they have consequences on the consistency of the study. After presenting the criteria the researcher moves on and explains how she constructed the knowledge about the effects in digitalisation of SU and e-government projects. The knowledge construction affects which research design and data gathering methods are chosen. Finally, the author will discuss the limitations of the study.

1.1. Theory of science

The author of the thesis believes that our worldviews are socially constructed, i.e. they are formed through interaction with others. However, behind the socially constructed worlds are individuals' subjective interpretations, i.e. meanings attached to objects, events and interactions (Prasad, 2005). Crotty (1998) states that people construct meaning in different ways, even about the same phenomenon. This is referred to as interpretivism, and it is the philosophy behind the research question of this thesis. An interpretivist researcher is interested in making sense of the complexity of social worlds (Creswell, 2003). Bryman and Bell (2003) state that the focus of the researcher is to interpret subjects' social meanings from their own point of view, but as Creswell (2003) states a researcher's own background will shape these interpretations.

The researcher of the thesis understands worldview as a collection of views, ideas and beliefs of the world that guide how one thinks, operates and interprets phenomena. For instance the researcher appreciates people's experiences and right to decide which experiences to share. Appreciating people's interpretations of social phenomena determined the choice of qualitative interviewing, as it provides the participants with a possibility to express their interpretations of the things they evaluate are important. Qualitative interviewing was also chosen because the researcher believes it enables the social construction of knowledge. The interpretations of the interviewees definitely constructed the meanings of the researcher, and it might have been the case that the interviewer's questions or notifications constructed the interpretations of the participants.

1.2. Research criteria in qualitative study

1.2.1. Validity

Rasmussen, Østergaard and Beckmann (2006) state that the validity of a study refers to the cohesiveness of the entire study. Cohesiveness means that a consistent thread is found from the research question to the conclusion. This is assessed by studying whether the method chosen to collect the data is correct in relation to the problem and to the theoretical point of departure. Simplified, as Rasmussen et al. (2006, p. 134) state, validity assessment is to answer to question, "*Are we really measuring what we think we are measuring?*". Kvale (2007) emphasises that in order to ensure validation of a study a researcher is throughout the entire research process to check, question and theoretically interpret the findings. According to Stake (2005), triangulation of methods or sources of data strengthens the perceptions and validity of the researcher's interpretations.

1.2.2. Reliability

Rasmussen et al. (2006) state that reliability refers to the consistency of the data over time and different respondents. Kvale (2007) specifies that reliability refers to repeatability of the study at other times and by other researchers. According to Yin (2003), repeatability is only possible if a researcher has documented which procedures were followed during the process. Rasmussen et al. (2006) state that assessment of reliability focuses on how the data were collected and analysed.

1.2.3. Trustworthiness

Rasmussen et al. (2006) argue that the quality of a qualitative analysis is better measured by the term trustworthiness than the terms validity and reliability. According to the authors, credibility of the study augments the trustworthiness. Credibility of a study increases the more precisely a researcher clarifies the relation between the research problem and its frame of reference, and the relation between the design of the study and the exploration of the themes. This way the research becomes transparent to others who want to check whether the results of the study are credible.

In order to meet the criteria of trustworthiness the researcher will in the following section justify the research decisions taken and describe how the study was carried out. She will begin by providing a description of how she constructed knowledge about the process of digitalisation and how she 'translated' this knowledge into researchable concepts. She will also present the justifications for the research design and methods chosen, and also provide a detailed account of

how she conducted the qualitative interviewing. However, she argues that even though detailed information about how a study was conducted is provided, it does not guarantee that even the same researcher will later find precisely the same results. The researcher carried out the case study at a certain point of time and it is entirely possible that the participants' interpretations of the phenomenon have since changed. This is because individuals' interpretations of phenomena around them are individually and socially constructed, and thus always subject to alterations.

1.3. Knowledge construction in the research

In this study both deductive and inductive reasoning is used. Rasmussen et al. (2006) define deductive reasoning as an approach that moves from the general to the specific, and inductive reasoning as moving from the specific to the general. The researcher of the thesis argues that this study began with inductive reasoning, was followed by deductive reasoning, and then again inductive reasoning was used during data gathering. The research project began with a specific issue, as in the very beginning of the research project an SU worker told the researcher about problems she had experienced during digitalisation of SU. The author interpreted them as being challenging and worth investigating further. She then began to search for more information about the process and noticed that the documents she read (e.g. Deloitte Business Consulting, 2008a & 2008b) describe issues about the systems involved and the process of integrating them. The documents also describe the consequences of digitalisation on work tasks, responsibilities, competencies and information need.

The author argues that the issues found in the documents formed the basis for deductive reasoning, i.e. moving from the general to the specific. On the basis of the issues found in the documents, the researcher constructed the research problem, i.e. the complexity of digitalisation of SU. Following Rasmussen et al. (2006), the researcher developed a hypothesis: as digitalisation of SU is a complex task affecting end-users in many ways, the end-users have to be well informed and involved in the process. She emphasises that she did not formulate any research questions, even though Rasmussen et al. (2006, p. 66) argue that the research problem should be "(as a general rule expressed as a question)". The argument of the researcher is that the emphasis was going to be on the interpretations of the interviewees, not on her interpretations of the process of digitalising SU. She believes that the understanding of a specific issue is being constructed all the time, and any specific research questions in the beginning would delimitate this process to some extent.

The researcher then conceptualised the hypothesis into concepts of information infrastructure, implementation and user involvement and then gained more theoretical knowledge about these concepts through literature. Bryman et al. (2003) state that the hypothesis should guide researchers to determine how to collect data in relation to the concepts. As the focus was on end-users' experiences the researcher decided to qualitatively interview them. The researcher argues that her choice to use qualitative interviewing as a method provided the interviewees with a possibility to express their interpretations freely. After formulating the hypothesis the researcher conducted the first interview with two SU workers of CBS and learned more about the process. The interviewees told about the problems they had experienced regarding the use of the systems and the process of digitalisation, and the interviewer specified the issues into challenges in the use and development of information infrastructures, and in user involvement. These issues then guided towards a more precise literature search. It was in this phase the researcher realised that the process of digitalisation of SU is an e-government project. E-government as a concept was unknown to the researcher, and consequently she began to read literature about e-government and e-government projects. The researcher wants to point out that while reading studies on e-government projects she also encountered several other issues, e.g. difficulties in project management, time and budget constraints, and issues in risk management. However, the researcher gave these issues less attention than to the challenges in user involvement and information infrastructures, since the documents and the interviewees did not emphasise these other issues.

During the process, the researcher moved from general issues (theories) into a more specific direction. After the researcher had collected the data from the first interview and gained more theoretical knowledge about the process, she developed the initial research question. Based on the initial research question she conducted more interviews, analysed more documents and gained deeper knowledge about the complexities regarding both the e-government development projects and the process of digitalisation of SU, and finally the final research question was formulated. When interpreting the data the researcher revisited the theories that had guided the hypothesis and the formulation of interview questions. Her aim was to infer what kinds of implications the findings had on the theories, if any. Following Rasmussen et al. (2006), the researcher moved from the specific to the general again.

Even though the process described appears rather straightforward, the researcher admits that the process sometimes felt messy. Formulating the research problem did not 'just happen' on the

basis of what she had read and interpreted. The researcher draw models and pictures in order to understand how different theories, research design and data gathering methods were linked together, read literature extensively, sometimes followed a totally wrong thread, got confused and wrote drafts presenting the case in order to better conceptualise what the thesis was about. The researcher claims that the entire process followed the same thread, going back and forth, trying to ensure that a consistent thread was visible for her and the readers.

1.4. Research design

The main research design of the thesis is a case study, as the researcher investigated one specific case, the digitalisation of SU. According to Bryman et al. (2003), case studies provide an in-depth analysis of a case, which can be a single organisation, a person or an event. Stake (2005) distinguishes between three types of case studies: intrinsic, instrumental and multiple case studies. The first type focuses on gaining deep knowledge of a specific case and the purpose is not to understand a generic phenomenon or to build a theory. Instrumental case studies investigate a specific case in order to acquire deeper understanding of another issue. Finally, multiple case studies are instrumental case studies investigating several cases that may be similar or dissimilar. The researcher of this thesis argues that the research design is an instrumental case study, as the researcher investigated one case, digitalisation of SU in order gain understanding of how e-government development projects may affect workers. Stake (2005, p. 449) argues that case study researchers are not interested in informational questions as who, what and where, but they rather ask, "What can be learned *here* that a reader needs to know?". Yin (1981) states that case study researchers aim to describe a situation (descriptive study) or/and provide an explanation (explanatory study) for why certain events have occurred. The research is both a descriptive study as it aims to describe a certain phenomenon, and an explanatory study as the researcher is interested in asking why something is experienced the way it is. Stake (2005) argues that case study researchers use qualitative research methods, e.g. interviews, observation, coding and interpretation in order to capture the essence of the phenomenon experienced by the participants.

1.5. Method

1.5.1. Qualitative interviewing

The qualitative research method of interviewing was chosen for this study because the researcher was interested in individuals' interpretations of a certain phenomenon and believed the meanings were best captured face-to-face. As a qualitative interview is flexible, it enables the participants to express their meanings of the topics rather freely. Furthermore, it allows the interviewee to ask the participant to elaborate on his answers, or to summarise the interpretations in order to validate the answers. A qualitative interview also allows the researcher to understand how participants' knowledge is constructed socially, i.e. how different interpretations and meanings have affected individuals' interpretations. A qualitative interview as a situation constructs knowledge, as interpretations of participants affect the interviewee.

The researcher interviewed three SU workers from two universities, Copenhagen Business School (CBS) and Roskilde University (RUC). Two of the interviewees work at CBS, and the third participant works at RUC. The researcher knew the SU workers of CBS from her previous student work at CBS Admissions Office, as the offices were located in the same building and cooperated in many study administrative tasks. It was also one of these CBS SU workers who initially told the researcher about the difficulties of digitalisation. The interviewee from RUC consented to participate in the study, as the researcher contacted the university by e-mail. The researcher had arranged to interview two SU workers from RUC, but at the time of the interview one of the employees was unfortunately not present. The interviewer contacted the person later, but she was not able to participate within the time frame available to the researcher. All the interviews were conducted at the work places outside the office hours, since the interviewer wanted to ensure the participants would not be interrupted. In the beginning of the interviews the researcher presented the research problem and gave some background to the project and herself to ensure that the interviewees felt comfortable with the situation. She also told the that the interviews were going to be recorded. The researcher aimed to actively listen to what the interviewees said and asked the participants to elaborate their answers by follow-up questions if she did not understand or wanted more information. She aimed to gain a deeper understanding of the process of digitalisation of SU and its consequences.

The first interview was a group interview consisting the two SU workers at CBS. It lasted 60 minutes, was recorded and later transcribed. It was a semi-structured interview where the

interviewer had a list of topics she wanted to ask (Appendix 1). As mentioned earlier, the topics were formulated on the basis of the issues the documents of digitalisation described. The researcher did not use concepts infrastructure or implementation when asking questions, as these might have been concepts the interviewees were not familiar with. She used more colloquial language, e.g. the term "system" was used to refer to infrastructure when this topic was discussed. The researcher decided to conduct a group interview, as she felt she still had rather little knowledge about the digitalisation process and believed the interviewees would present different views. The argument for the decision to conduct a group interview was that this first interview could provide various directions in which to proceed.

The second interview was conducted with one worker from CBS. It lasted 70 minutes and was conducted while the worker was doing her work. The purpose of the interview was to gain more information concerning the information infrastructure. The interview was an unstructured interview, as the researcher had not prepared any interview guide or questions, as she wanted the SU worker to freely tell about her work and to show how she conducts her job. However, the interviewer asked questions of which many were direct questions, e.g. why do you do that, what does it mean, is it their responsibility, what do you think. The interview was recorded and transcribed.

The third interview was conducted with an SU worker from RUC, and it lasted 50 minutes. The interview was a semi-structured interview where the researcher had formulated specific questions. Semi-structured interviewing was chosen because the researcher wanted to make sure to get answers to certain questions. The questions were composed on the basis of the two previous interviews and on the basis of theories of infrastructure, system development and user involvement (Appendix 2). The researcher highlights that even though she had a list of questions, she also asked follow-up questions during the interview in order to clarify subjects the interviewee had brought up. This interview was also recorded and transcribed.

The fourth interview was conducted with KSU's head of department Peter Nielsen and his colleague specialist consultant Belinda Slidsborg. The researcher had composed a semi-structured interview guide with specific questions regarding US2000 (KSU's central system managing SU grants and loans), the process of digitalisation and the users (Appendix 3). She presented the topics in the order she wanted to discuss them, but Nielsen obviously had prepared for the interview, as he set another agenda for the interview. This suited the researcher well, and she then

focused on active listening and asking follow-up and specifying questions when she wanted the interviewees to explain something further. The interview took 60 minutes, was recorded and transcribed.

1.5.2. Observation

The researcher also observed two SU workers from CBS. Participants were observed separately, and the first observation lasted 2,5 hours and the second 1,5 hours. The purpose of the observations was to learn more about the systems SU workers use and what things they need to consider when processing SU applications. During the first observation the researcher wrote observations down while observing. She found this complicated, as she needed to be rather fast and as she felt the worker had to interrupt her work waiting for the researcher to keep up. Therefore the researcher decided to record 70 minutes of the second observation session. Observations occurred early in the process, as the researcher found she needed more information about the information infrastructure. When the researcher found she had gained sufficient knowledge about the information infrastructure, she did not find observations necessary anymore. She also argues that it is not necessary to understand the complicated work of SU in detail, but rather to get a general understanding of how the different systems work, and how they are connected.

1.5.3. Data analysis

Prior to the first interview the researcher had gained theoretical knowledge regarding the research problem and had formulated a hypothesis. The researcher argues that the analysis already began during the first interview, as the researcher noted some new things she had not read in the documents or found in the theories. The deductive reasoning then guided her to find more information about the topics the interviewees had brought up. After transcribing all the interviews the researcher began to categorise the data regarding the issues that the theories had presented. On the second reading she conducted more precise coding by splitting up the categories into more specific subcategories. The data analysis continued this way, and the researcher read the interviews several times in order to interpret the meanings of the interviewees.

1.5.4. Limitations of the study

The researcher acknowledges that interviewing only three SU workers implies problems in generalisation of the results. She contacted several educational institutions by e-mail, phone and visiting, but the workers politely declined to participate[1]. The main reason was lack of time. The author of the thesis respects people's right to determine which experiences they want to share. She believes this view guided her when she contacted the institutions in order to ask SU workers to participate in the study. When the workers declined to participate due to time constraints the researcher tried gently to convince them by explaining how long an interview would take and how much the researcher would appreciate their participation. As the workers refused again, the researcher accepted this and did not try to convince the workers again, since she wanted to show her respect for their decision. Evaluating the process in retrospective the researcher recognises she should have tried different methods. Sending e-mail is probably not the best way to try to convince people of the importance of a request. The researcher should have called or visited the institutions, as in this way her possibilities to negotiate would probably have been better. However, visiting does not always guarantee success; the researcher visited two of the institutions, but both times the workers declined to participate. At one point she had already made an appointment with a worker, but the worker had forgotten the interview and asked her colleague to participate, which she unfortunately did not want to do. The worker then asked the researcher to send a list of questions, which they could answer later, but the researcher believes this would not capture the workers interpretations as well as a qualitative interview would. The researcher does not wish to criticise the institutions, as she understands their reasons. This is also why she does not enclose documentation of the correspondence with the institutions, even though this may affect the trustworthiness of the study.

It is also important to remember that all interviews were conducted after the most problematic phase of digitalisation (phase 2, where the purpose was to integrate the different study administrative systems of the institutions with the system KSU is responsible of, and which took place during autumn 2010). It is likely that a year after the launch of this phase the SU workers

[1] The author contacted the following institutions: the University of Copenhagen, the University of Southern Denmark, Technical University of Denmark, IT University, School of Architecture of Copenhagen and Frederiksberg high school.

interpreted the difficulties from another point of view than they had done during the phase or even right after the phase. Another issue of relevance is that all interviews were conducted in Danish which is not the mother tongue of the researcher. However, the researcher has lived almost eight years in Denmark and speaks Danish every day. She told this fact to the interviewees in advance and just prior to the interviews she asked the interviewees to mention if they did not understand what she meant. The interviewer experienced once an interviewee had not understood her pronunciation.

1.5.5. Generalisation

Rasmussen et al. (2006) argue that it is not the purpose of qualitative studies to generalise. According to Flyvberg (2004), a case study can contribute to knowledge accumulation of a certain phenomenon. As mentioned previously, the purpose of this study is not to generalise the results to other e-government projects, and it is not even possible, since the researcher only investigated one particular case and interviewed five persons. However, the aim is to delve into the participants' perceptions and interpretations of a particular case and provide an in-depth understanding of the phenomenon. This aims to raise awareness of how e-government development projects may affect workers.

2. Theory

This part of the thesis will discuss the concepts of e-government, user involvement and information infrastructure. As discussed previously, the concepts originated from analysing documents of digitalisation and from the interviews.

2.1. E-government

The purpose of this chapter is to give an understanding of the concept of e-government. The author presents Bekkers et al.'s (2007) analysis of certain myths that prevail in e-government discourse. By doing so the author seeks to move away from traditional e-government research that is said to focus mainly on analysing the content of websites. As mentioned in the introductory part, Elovaara et al. (2010) argue that e-government research has focused little on the effects e-government has on workers' performances and activities. Grundén's (2009) study of the effects of e-government development on work situation and processes of the employees at a Swedish governmental agency is presented as an example of a study that focuses on the workers.

2.1.1. Definition

E-government has been widely discussed, but Halchin (2004), and Sefyrin and Mörtberg (2009) argue that no single, universally agreed upon definition of e-government exists. Rose and Grant (2010) claim that the definition of e-government has evolved, and it is not anymore viewed as the simple provision of information or services via the Internet. A view that for instance is presented by Layne et al. (2001, p. 123): E-government is the "government's use of technology, particularly web-based Internet applications to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies, and government entities". Anttiroiko (2010) calls this view of e-government hierarchical, input-oriented and single channelled and refers to it as Government 1.0. According to Anttiroiko (2010), e-government has evolved into Government 2.0, which includes a more interactive and community-centred government where citizens participate in content production and networking.

In the discussion of e-government its capacity to improve efficiency, effectiveness, availability, quality and transparency of the services of the public administration is emphasised (Andersen et al., 2010; Bekkers et al., 2007; Norris & Moon, 2005; Sefyrin et al., 2009). Moreover, it is believed that the use of e-government will restrain growth in public spending (OECD, 2006; Sefyrin et al.,

2009; United Nations, 2010). Norris et al. (2005, p. 70) claim that IT "makes work easier and more enjoyable; and extends workers' capacity to work".

Yildiz (2007) criticises existing e-government research for vagueness of the e-government concept and oversimplification of the e-government development processes. According to him, e-government research has mainly focused on the observation and evaluation of the output of e-government initiatives in the form of governmental websites. Furthermore Yildiz (2007) argues that e-government research contains much hype and promotional efforts that may prevent people from viewing e-government initiatives critically. He argues that e-government is developed in complex political and institutional environments, and therefore the definition and discussion should be more nuanced. Yildiz (2007) requests more investigation of the processes and participation patterns in e-government projects, which might help decision makers to make better decisions regarding e-government.

The author of this thesis argues that Bekkers et al.'s (2007) study of prevailing myths in e-government discourse provides the more critical view of e-government literature that Yildiz (2007) is looking for. Bekkers et al. (2007) analysed e-government projects conducted in the Netherlands, the United Kingdom, Denmark, Australia and Canada in 1994-2006. Based on the e-government policies, contents and basic beliefs of the countries, the authors argue that countries' e-government discourses embody similar myths. According to Bekkers et al. (2007), myths in e-government discourse highlight certain aspects of the e-government at the expense of other aspects. They acknowledge myths may inspire, but they can also distort the views on reality.

The first myth the researchers identified focuses on the beliefs of the goals behind e-government projects. The myth says that e-government will transform the government into a new and better one, as ICT will make administration responsive and client oriented with little effort. According to the myth, e-government fully exploits the resources of the government and thus makes the work of the administrative employees more efficient and effective. It is believed that a more efficient and effective public sector is able to better respond to the needs of the citizens. Bekkers et al. (2007) argue that since many of the investigated initiatives put emphasis on service delivery through citizen centric one-entry points, the focus has been on ensuring integrated electronic front office communication channels. The researchers argue that this complicates the integration and coordination between back offices of governmental organisations. Integration of services

requires information and knowledge sharing across multiple units, which may cause difficulties and power struggles due to differing goals and visions of the units.

The second myth regards the use and impacts of ICT. It shows a strong belief and optimism in the potential of ICT. Bekkers et al. (2007, p. 378) state the e-government initiatives studied are characterised by a belief that they enable "previously unthinkable things" to happen. The Danish initiatives the researchers studied include descriptions of how the new information society will develop into an open and decentralised society where information is not controlled. However, the researchers highlight that these descriptions hardly consider political, socio-organisational or institutional context when evaluating the effects of e-government. The authors emphasise that the effects of ICT are always context dependent, and the introduction of ICT is a political intervention that in various ways influences the actors involved.

The third myth is about the problems e-government claim to solve. According to the myth, governments use rational planning and management methods in order to solve possible problems. Governments make plans, allocate budgets, and develop and use technological applications in response to the identified problems. However, the researchers argue that the practice actually undertaken often differs from the plans. They point out that governments initiate e-government projects, which are then to be carried out by governmental organisations. This may cause the actual process to be different from the planned process. One reason the authors provide is that the challenges in standardisation and integration of back offices are often underestimated. Bekkers et al. (2007) point out that requirements for standardisation and integration may actually have reciprocal implications, e.g. intensification of existing dependencies.

The fourth myth believes that e-government possibilities lead citizens to become empowered consumers who know how to use the Internet to improve their position as a consumer of government services. This myth depicts the citizen as an intelligent, technologically empowered consumer who demands customised and excellent service from the public administration. Bekkers et al. (2007) argue that focusing on a service delivery view restricts the potential of the public administration. E-government is not only about delivering certain services, but its challenge is to develop participative forms of service.

Bekkers et al. (2007) conclude that existing literature of e-government initiatives show a discrepancy between the myths of e-government as an effective, omnipotent and citizen empowering machine and the reality. They discuss the usefulness of myths, but do believe in the

value of myths. The authors believe myths may show possibilities and mobilise actors to take part in innovation. However, they underline the importance of being critical in regard to e-government discourses. Further, they request more research into the discrepancy between the discourses and the practice of e-government.

Grundén (2009) studied an e-government implementation initiative at a governmental organisation in Sweden by interviewing administrative personnel, handling officers and managers from legal and traffic departments. A new electronic system was to be implemented in the departments. She interviewed the employees before the implementation and during the early phases of the implementation. Grundén (2009) analysed and discussed the projects from a social perspective in order to raise more discussion on the importance of how e-government projects impact work processes, situations and client relationships. Before the implementation the interviewees expected more changes in personal attitudes and in work culture than in technical solutions. Some interviewees were also afraid of increased workload. Changes in work processes were also expected, e.g. time saving, reduction in monotonous work tasks and consequently the need for less personnel. Most of the interviewees also emphasised the increase of transparency of the services, which could enhance customer satisfaction. The interviews conducted during the first phase indicated that increased demands for efficiency, both from the management and citizens could lead to a more stressful work situation. Implementing a new electronic system had caused big changes in work routines and roles at the legal department. Grundén (2009) concludes that e-government does not only increase electronic cooperation between public organisations, but it also increases demand for change of work processes, routines and competencies of the employees. During the implementation workers' sense making and coping strategies increased as they tried to handle the ambiguity the new electronic system caused. The work place had a strong tradition of providing courses and information about changes, and the employees felt they were well informed. They did however request more information and education related to their local work situation.

2.2. User involvement

Grundén's (2009) study shows that users need information and education regarding the impacts of e-government initiatives on their work processes. Indeed user involvement is argued to have many benefits, e.g. improved quality, understanding and acceptance of the systems. As digitalisation of SU is complex and affects many users, the author of the thesis argues that user

involvement is greatly needed. This chapter discusses the concept of user involvement and its importance by presenting Følstad, Jørgensen and Krogstie's (2004) study of user involvement in a Norwegian e-government development project from a manager's point of view, and Sefyrin et al.'s (2009) study of silence in a Swedish e-government project.

2.2.1. Definition of user involvement

User involvement is considered important for the successful development of information systems (e.g. Barki & Hartwick, 1989; Harris & Weistroffer, 2009). The terms user involvement and user participation are often used interchangeably, but Barki et al. (1989) request making a clear distinction between them, as they argue the concepts differ from one another. They state the IS field should follow the example of other fields (i.e. psychology, marketing and organisational behaviour), where user involvement refers to one's "subjective psychological state" (p. 53), meaning that a user is involved when he views the system as being important and personally relevant. The author of the thesis understands this as being mentally involved; so, if one thinks the system is of great importance he is involved, and if he does not find it important he is not involved. Later, Barki and Hartwick (1994) also describe how user involvement differs from user attitude. The definition of user attitude should also be influenced by the field of psychology, where the term refers to a person's affective or evaluative feelings concerning a system (Barki et al., 1994). Thus, on the one hand a user has some beliefs of a system and on the other hand some attitudes. However, the authors argue that concepts of user involvement and user attitude are intertwined. If a user believes the system will be of great importance to him, he is more likely to think positively about the new system.

Having explained user involvement, how is user participation then different? Barki et al. (1989) define the term user participation as behaviours and activities users perform during the systems development process. Harris et al. (2009) refer to this as hands-on experience. Ives and Olson (1984) distinguish between two forms of participation; direct and indirect. In direct participation all parties the system will affect are represented, whereas in indirect participation a few users represent all users. In both types a user has a possibility to express his views. The degree of user participation refers to how much influence a user has over the final system (Ives et al., 1984). Even though Barki et al. (1989) distinguish between the terms user involvement and user participation, they also believe these concepts are linked together. If a user has actively participated during system development his belief of importance and relevance of the system tends to be stronger. This is because the user will assess that his participation has made a

difference on the resulting system. Barki et al. (1989) underline that it is not only the degree of participation (little or great) that determines how the relationship between user participation and involvement is. Reasons for participation (non-voluntary – voluntary) and type of participation (indirect-direct) also affect the strength of the relationship.

The author of this thesis argues that Barki et al.'s (1989) view of the relationship between user participation and user involvement is unidirectional and too straightforward. In the analysis part of the thesis she will illustrate the problems with the relationship in relation to the case of digitalising SU. Furthermore, she does not believe the concepts should be separated, but argues they should rather be understood as different facets of one concept. This is what Harris et al. (2009) do when they do not distinguish between user involvement and user participation, but combine both the behaviours and activities of user participation, and feeling of importance and relevance of the system under the concept of user involvement. However, they do not specify how the concepts are intertwined. The author of the thesis understands user involvement as Harris et al. (2009) define it. She also believes the feeling of importance and activities have complex relations, which she will also discuss further in the analysis part.

Harris et al. (2009) reviewed 28 studies of user involvement from 1996 to 2009 in order to confirm or repudiate the importance of user involvement in systems development. They conclude a system's success depends on the users' possibilities of expressing their attitudes and making choices from predefined options. The possibility gives a feeling of a partnership and a sense of control over the outcome. Moreover, Harris et al. (2009) conclude that the more complex the system is, the more important it is to involve the users. The studies show that correct system requirements are better captured through sufficient user involvement. Management style is also of importance, as according to Harris et al. (2009), people-oriented managers who are viewed better at communicating with users, are especially needed in the initiation stage where uncertainty and fear of change is high.

2.2.2. Definition of a user

Barki et al. (1989, 1994) do not define a user. According to Harris et al. (2009), a primary user is a person who uses the systems, and a secondary user refers to a person who utilises the information the system provides through an intermediary. Sharp, Rogers and Preece (2007) add that system development includes multiple stakeholders. The author of the thesis understands a stakeholder as a person or an organisation who will be affected by a project, process or system

and who can affect the project. Elpez and Fink (2006) divide stakeholders into two groups: End-users that will be the ultimate users, and IS professionals who are responsible for delivering the systems.

In this thesis the SU workers are understood as the end-users. Students are referred to users. Stakeholders include:

- SU-workers (end-users)
- Students (users)
- KSU
- The Ministry of Finance
- The Ministry of Science, Innovation and Higher Education
- The management of SU administration of the institutions
- IT-departments and suppliers.
- User involvement in e-government

Følstad et al. (2004) conducted semi-structured interviews with 16 project leaders in eight e-government projects in Norway in order to gain more knowledge about how user involvement is done in development projects. He examined how user involvement is prioritised and how it could be improved. By e-government development projects the researchers refer to IT-based service and system development where the end-users are either employed by the government, or refer to citizens or businesses. According to Følstad et al. (2004), the development process is often characterised by political control, as public service IT projects often have rather tight schedules and budget constraints. The researchers state that e-government project development may be complicated because they are aimed at gaining efficiency and increasing client satisfaction, but at the same time they are required to serve all users. The development process is made even more difficult due to multiple users and stakeholders involved.

Følstad et al. (2004) explain that the purpose of the investigated projects was to improve systems in order to enhance access to information, coordination across government units, handling of local adaptations and service provision for the general public. By improving the systems the goal was to increase efficiency in services. The researchers identified the users as being both internal users, who are employed in the government and use the systems in their work, and as being external users, which would be citizens or businesses. In nine projects the end users were public

sector workers. The researchers further divided the users into core, regular, sporadic and technical users in regarding to which extent they utilise the systems. For core users the system is an important part of their work context. Regular users interact with the system in their everyday work, but their primary task is something else. For sporadic users the utilisation of the system is limited, and technical users are responsible for maintenance of the systems (Følstad et al., 2004).

In 12 project teams Følstad et al. (2004) discovered core user representatives, which was the most frequent kind of user involvement found. The researchers identified the tasks of the user representatives as writing and reviewing requirement specification, designing training courses and material, and testing the system prior to acceptance. However, regular and sporadic users were rarely represented in project teams, but in some projects they participated in workshops or information activities during the requirement phase. Most projects teams included technical users who were employed in the IT-department. Also local super users were given responsibilities in some projects. External consultants were also used in half of the projects in requirement, development and deployed phases (Følstad et al., 2004).

The researchers found that 14 project leaders acknowledged the importance of involving internal users as early as possible in the requirement phase. Especially this concerned the core users. Even though many leaders argued that the requirement phase was the most important phase when involving the users, they also recognised the importance of user involvement in later phases. Følstad et al. (2004) found that core users were also involved in evaluation, pilot testing and development of training courses. External users were mostly involved in the construction phase rather than in the requirements and deployment phases (Følstad et al., 2004).

Følstad et al. (2004) also studied how the leaders viewed the importance of user involvement. 14 leaders stated that user involvement is very important and two evaluated it as important. According to 13 project leaders, their projects had sufficiently involved the users, one of the 13 leaders argued that users had received too much attention, which had complicated the decision making process. The researchers also asked the leaders how they thought user involvement could be improved. The leaders requested allocation of sufficient time and resources, but also had other suggestions, such as putting greater emphasis on the value of the user involvement, user testing, more formal involvement of managers and a more formalised process for user involvement that clearly defines the roles (Følstad et al., 2004).

Følstad et al.'s (2004) study puts emphasis on the views of project leaders. The users were not asked how they experienced their participation. In contrast, Sefyrin et al.'s (2009) study puts emphasis on how the users in an e-government project in Sweden had experienced the process.

2.2.3. Silence in e-government

Sefyrin et al. (2009) argue how the discussion of saving public resources, improving quality and availability of public sector dominates the discourse of e-government. The authors claim that the dominant discourse is problematic in a sense that it does not consider how e-government affects the workers. Due to this "silence" the workers are not invited to participate in e-government projects, even though they are the central actors whose work will be affected. By ethnographic means Sefyrin et al. (2009) studied a Swedish public sector e-government implementation project, which affected 200 employees working with the administration of several public social insurances. They wanted to study the participation of the employees and how e-government was articulated in the project. The aim of the e-government project was to provide IT support for the employees in order to ease their work, minimise simple and repetitive tasks, and to automate as much as possible of the administrative process regarding one particular insurance, so the administrators could provide more support to the customers of the organisation. The project consisted of a project team, a manager, a client, a steering committee and a group of business analysts. Two administrative officers were included in the business analyst group as experts of the work processes and representatives of the administrative employees. Indeed, they provided prototypes of graphical user interfaces in order to analyse the existing work practices, which made their tacit knowledge on the practices central. Sefyrin et al. (2009) argue that without translating the tacit knowledge it would not be possible to automate the processes. Despite their participation as business analysts and their expertise regarding the work and work processes, Sefyrin et al. (2009) claim the administrative workers were only recognised as central actors to a certain extent. The researchers state that the workers were marginalised, since "others had laid the strategic plans for the project before the administrative officers were even engaged" (p. 266). Moreover, the workers were not included in the process, as they were not part of the steering committee, which decided the further development of the project.

The researchers find that two different e-government discourses were present. On the one hand the central role of the workers in the project was emphasised, and on the other hand the workers were not considered as a strategic resource and were thus not involved. Sefyrin et al. (2009) provide some reasons for the silence. They noticed that no one in the project team openly talked

about how the purpose of the project was to rationalise and automate the work processes and what consequences it might have. The project manager admitted when asked directly that the project would lead to downsizing of administrative workers and added that this is something that is not talked about, since it would not be good for the future of the project. Sefyrin et al. (2009) state that the business analysts understood the consequences of the project after a period of time. The researchers investigate what the silence signifies and present two different explanations. The first claims that articulating uncomfortable issues might lead to uncertainty, which could endanger the process. Therefore, project teams prefer postponing these discussions. The second explanation argues that due to the discourse of technological optimism, it is not legitimate to present opposing claims. The dominant e-government discourse presents e-government as a homogeneous and stable phenomenon, which, however, undermines the importance of workers in the discourse and practice of e-government. Contrary to this authors argue that e-government is a heterogeneous phenomenon that is always connected to practices and actions of the workers.

The author of the thesis argues that Sefyrin et al. (2009) give a rather one-sided picture of the silence. The silence is not only the grievance caused by the project team, the manager or the steering committee. The author of the thesis argues that administrative workers do have a possibility to raise their voices and ask for more participation. Sefyrin et al. (2009) lack an explanation of why the administrative workers, who were part of the business analyst group, after finding out that their voices were not heard responded rather passively. They mention that the employees joked about the situation. The author of the thesis is interested in the concept of silence in e-government projects, but asks for a more versatile explanation of why (if that is the case) the different participants remain silent.

2.3. Information infrastructure

Digitalisation of SU has increased demands on the users, developers and systems. SU workers are dependent on the systems they use in their work processes; they are not able to conduct their work if the systems do not operate.

In colloquial language a system refers to a programme that runs on a computer. Many integrated systems form an infrastructure. Infrastructures being large and complex places further demands on successful development. This chapter discusses the concept of information infrastructures. Ciborra and Hanseth (2000) define information infrastructure as integrated sets of equipments, systems, applications, processes and people dedicated to the processing of information.

The author will deepen the concept of information infrastructure by discussing the key features and their implications on infrastructuring, i.e. developing infrastructures. The process and challenges of infrastructuring are discussed in the end of the chapter.

2.3.1. Socio-technical and relational concept

Bansler and Kensing (2010) state that no general definition of an information infrastructure exists, though several attempts have been made. However, in information infrastructure research Star and Ruhleder's (1996) understanding of an information infrastructure is often cited (e.g. Bietz, Baumer & Lee, 2010; Edwards, Jackson, Bowker & Knobel, 2007; Ellingsen & Røed, 2010; Pipek & Wulf, 2009). Star et al. (1996) understand infrastructures as being socio-technical networks consisting of both the physical entities of an infrastructure and the actors. The socio-technical approach puts emphasis on understanding technology as networks of people, tools, organisational routines, documents and so on (Bijker & Law, 1992). Berg (1999) underlines that technologies and humans are closely interwoven and should therefore dealt with as a whole and not as distinct entities. Star et al. (1996) argue that an infrastructure is more than anything else a relational concept, meaning that an infrastructure is always linked to activities and structures.

Whereas Star et al. (1996) do not explicitly identify the organisational components of an information infrastructure, Broadbent and Weill (1997) depict an organisation's IT infrastructure as a pyramid that consists of IT components (hardware), shared services (software) and human IT infrastructure. According to Ciborra (2000), the pyramidal view of an infrastructure shows that the boundaries of an infrastructure are rather easy to draw. His argument is that boundaries of an infrastructure are drawn by identifying the reach, i.e. the activities and processes it influences, and scope, i.e. the type and variety of applications an infrastructure processes. Depending on the reach and scope, Broadbent et al. (1997) state that an infrastructure has different roles in an organisation: utility, dependence and enabling. The expected utility of the infrastructure is to achieve economies of scale, as the costs of processing and communicating information throughout the organization are reduced. The dependence view describes how the performance of current key processes depends on the infrastructure. The role of enabling refers to flexibility in achieving the organisation's long-term goals and quick development of new products (Broadbent et al., 1997).

Star et al. (1996), Hanseth (2000) and Ciborra (2000) recognise that an infrastructure is linked to activities, but they do not explicitly explain what they mean by activities. The author of the thesis

understands activities not only as the organisational practices that an infrastructure is aimed at supporting. If infrastructures are understood as socio-technical networks, it is also important to study the activities of the actors, i.e. how users interact with the infrastructures, how developers made the infrastructures, and how developers and users understand one another.

2.3.2. Embeddedness

Hanseth (2000) argues that as many infrastructures are built as a layer on top of each other, they are linked. Star et al.'s (1996) notion of embeddedness differs from the multilayered depiction of an infrastructure. According to them (p. 113), embeddedness implies that an infrastructure is "sunk into" other infrastructures, social arrangements and technologies. Bietz et al. (2010) specify that embeddedness means infrastructures have relationships with and dependencies on different systems, resources and other infrastructures. This makes infrastructures complex (Hanseth, 2000; Star et al., 1996). Adding to the complexity of infrastructures, Star (1999) states that infrastructures are constructed in multiple places and are later combined and recombined. Pipek et al. (2009) argue that since infrastructures have become integral in work tasks, employees do not normally pay attention to them, only when the infrastructures fail to work as they are designed to. This is coherent with Star et al.'s (1996) dimension of an information infrastructure of being transparent and invisible. They argue an infrastructure is transparent, as it does not have to be reinvented for each task. Thus users are not necessarily able to distinguish the different aspects of infrastructures (Star et al., 1996).

2.3.3. Installed base

Bietz et al. (2010) argue that embeddedness may be both a limitation and a resource. Star et al.'s (1996) concept of installed base supports this claim. Whether an infrastructure is built on top of each other or sunk into other infrastructures, the 'original' infrastructure still exists. Star et al. (1996) argue that infrastructures are always built on an installed base, which consists of artefacts, human habits, norms and roles (Edwards, Jackson, Bowker & Williams, 2009). Hanseth (2000) states that a large installed base attracts complementary products, which makes the standard more attractive. This increases the credibility of the standard, which again makes the installed base more attractive to new users (Hanseth, 2000).

As an infrastructure is built on an installed base, it inherits the strengths and weaknesses of the base (Star et al., 1996). This influences the development of the infrastructure (Ellingsen & Røed, 2010), and as Hanseth and Lyytinen (2004) state, it may limit future design decisions. Hanseth

(2000) argues that the new version has to be designed in a way that links the old and the new. As infrastructures mean different things locally (Star, 1999), the development requires time and negotiations between several users, developers, stakeholders and components (Hanseth, 2000).

2.3.4. Path dependency

Similar with the installed base is the concept of path dependency. David (1986) states that technological decisions once made affect the possibilities of the technology today. Hanseth (2000) distinguishes between two forms of path dependency. The first form is early advantage regarding the number of the users, which economists call network effects. The value of the technology increases the more people use it (Edwards et al., 2007; Shapiro & Varian, 1999). Hanseth (2000) argues that due to network effects a small network has only a very small chance of surviving. Furthermore, the more people use the technology, choosing an alternative will become too costly in money and time (Edwards et al., 2007). Edwards et al. (2007, p. 17) state that organisations and people might adapt to an inferior technology even though a better technology exists and argue that organisations and individuals rather "satisfice" than optimise. David (1986) provides a beautiful example of this phenomenon: the QWERTY keyboard. He states that although the QWERTY keyboard forces hands to jump upwards or sideways and puts more workload onto the left hand (at least when typing in English) it is still the dominant keyboard arrangement. David (1986) adds that a better alternative, the Maltron keyboard was introduced later, but it could not beat the QWERTY keyboard due to the network effects. Moreover, switching from the QWERTY standard to a new system would be an enormous coordination challenge, as so many people use the QWERTY arrangement, and it would be very difficult to agree on a new standard (Hanseth, 2000).

The second form of path dependency argues that early decisions regarding the design of the technology will influence future design decisions. Edwards et al. (2007) state that a technology development is always path dependent, as a technology is built on an installed base that affects the possibilities for further development. Moreover, they underline that the possibilities are not only constraining, but they might also be positive, i.e. in the absence of a certain technology some developments could never have taken place.

2.3.5. Lock-in

Hanseth (2000) states that once a technology has been adopted it becomes hard or even impossible to develop competing technologies. According to Shapiro et al. (1999), these lock-in

situations occur when various complementary and durable assets specific to a particular technology are integrated to the technology. Shapiro et al. (1999) argue that a lock-in situation is the norm, as the technology consists of various components and specialised training is always required for specific systems. Due to huge switching costs or coordination problems it is rather difficult to change from a standardised technology to another (Hanseth, 2000). Switching costs does not only refer to money, but it can also refer to the risks of getting a new system or to disruptions in operations. Shapiro et al. (1999) mention that for instance brand-specific training, information and databases are sources of switching costs. Brand-specific training requires time and effort, and the switching costs tend to rise with time, as personnel become more and more familiar with the existing system. Hardware, software, information and databases may also result in lock-in. Users with a large amount of information encoded in a certain format are vulnerable if new hardware or software is acquired. Hanseth (2000) argues that the hierarchical structure of organisations may complicate solving the coordination challenge, as organisations have many units and actors. Ciborra et al. (2000) agree with this view. They state that measure and control prevail in the hierarchical structure of organisations. Control is used to align information infrastructures to organisational strategies and create value. However, they argue against this view by stating that information infrastructures are difficult to control. The authors argue that information infrastructures "tend to 'drift'" (p. 4), meaning that they do not always meet the planned purpose. Edwards et al. (2009) crystallise Ciborra et al.'s (2000) view by noting that infrastructures are simultaneously viewed as solutions to every problem and an omnipresent problem.

2.3.6. Infrastructuring

The features of embeddedness, being built on an installed base, path dependency and lock-in affect how infrastructures are developed. In information infrastructure literature developing infrastructures is often referred to as infrastructuring. Ciborra et al. (2000) depict the development of information infrastructure as a puzzle, where systems, people and processes are to interweave and integrate together. Edwards et al. (2007) investigate how the development of an infrastructure always results in winners and losers. Winners are those whose quality of work is enhanced by the emerging infrastructure. These experiences of gain or loss will affect the motivation of organisations and individuals, and they will have consequences on the atmosphere in which an infrastructure is developed. An infrastructure development causes various experiences and responses, which need to be considered if the process is to be successful. It is

commonly acknowledged that developers and users often experience discrepancies in infrastructural development. According to Ribes et al. (2009), these tensions reveal the conflicting goals, purposes and motivations of participants. Infrastructural change and the tensions it causes require strong managerial and political skills. Star et al. (2006) underline that infrastructural development and maintenance require effort, a stable technology and good communication. Tensions should be seen as both barriers and resources to infrastructural development (Edwards et al., 2007). In infrastructuring standardisation and integration play a significant role.

2.3.7. Standardisation

Standardisation is essential to the development of infrastructures, as infrastructures consist of multiple different components (Hanseth, 2000; Pipek et al., 2009; Star & Bowker, 2006; Star et al., 1996). Standards are understood as tools or protocols that stabilise the various configurations (Star et al., 2006). Star et al. (2006) underline that each layer of an infrastructure is built on standards which differ from each other. According to the authors, infrastructures do not only standardise machines but people as well. Employees' discursive and work practices get standardised as they use different infrastructures. In infrastructure development there is no guarantee that the best set of standards will win. This is often due to network effects as was the case with the QWERTY keyboard. As systems gain network externalities and become standardised, the users of non-standard systems are at a disadvantage. However, as important as standards are, Star et al. (2006) emphasise the importance of customisation that allows individual users to tailor the infrastructure to meet their specific needs.

2.3.8. Integration

Another important thing in infrastructure development is the integration of existing systems (Sahay, Monteiro & Aanestad, 2009; Star et al., 2006). Standards play an important role in integration, as they are required in order to integrate different elements of infrastructure (Hanseth, 2000). Technically, integration refers to the degree of interoperability and interconnectivity among technical components, and at a certain level it relies on standardisation (Sahay et al., 2009). Sahay et al. (2009) argue that this traditional view values integration positively but places little attention to the unintended consequences of integration. The authors argue that infrastructures have political and institutional interests embedded in them, e.g. dominant actors may decide how the infrastructure should be. Therefore the authors request for putting more

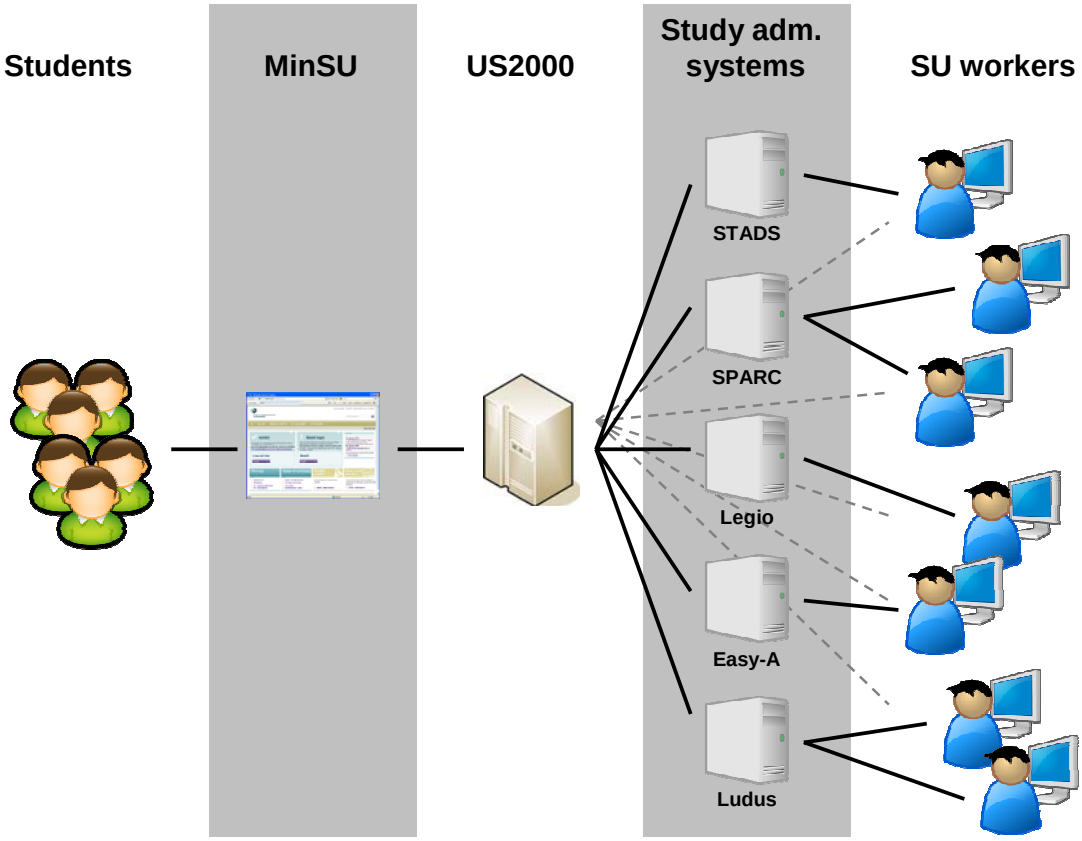
emphasis on political and institutional interests when developing infrastructures (Sahay et al., 2009).

Gateways often work well when integrating different infrastructures. Edwards et al. (2007) simplify the concept of gateways by referring to plugs and sockets that allow new systems to be joined to an existing framework. They explain that gateways are mechanisms that influence how an infrastructure evolves. In infrastructure development alternative systems compete with each other. This competition is resolved as one system becomes dominant, or by creation of a gateway technology that facilitates multiple systems to interoperate. Due to gateways it is possible to use multiple systems as if they were a single integrated system (Edwards et al., 2009). However, Ellingsen et al. (2010) are not fully convinced that the notion of gateways captures the practical challenges an integration of infrastructures faces. They claim that the common view of gateways as something strictly technical is too simplistic. According to them, integration also requires collective efforts, negotiations, and translation and interpretation of information, as the integration effort concerns a complex heterogeneous network. They argue that the users play an important role in mobilising and coordinating other actors. Therefore, as Edwards et al. (2007) state, standardisation and inter-organisational communication are important in the development of infrastructures. In this process gateways allow heterogeneous systems to emerge into networks. Furthermore they ask for a certain level of flexibility regarding technology. Flexibility allows for possibilities for different use of a specific system and experimentation of integrated systems.

3. Case description: Digitalisation of SU

3.1. System architecture

In this section the researcher gives an introduction to the systems involved in the digitalisation. The figure below provides an illustration of the systems after the integration which was part of the digitalisation.



US2000

US2000 is the SU system of KSU that has existed since 1995 (Nielsen). New functions have been added throughout the years. Prior to digitalisation, DTU, RUC, the University of Aalborg and the University of Southern Denmark were fully integrated with US2000. Nielsen states that prior to phase 1 the intention was to use the same protocol for transferring data (filudveksling) between the study administrative systems and US2000 that has been used with STADS since 1995.

Study administrative systems

The study administrative systems keep track of students, enrolments, leave of absence, withdrawals, taken exams, grades and ECTS points. The system forms the core of the study administrative personnel's work throughout the institution, and as stated previously it is the responsibility of study secretaries to ensure the data are correct in the system. Deloitte Business Consulting (2008b) refers to 12 different systems, but Slidsborg names five; STADS, SPARC, Easy-A, Ludus and Lection. The author will present SPARC and STADS, as they are the systems CBS and RUC use. In the end of the chapter US2000 will be shortly presented.

CBS is the only institution that uses SPARC (Study Programme Administration and Records). It was launched in 2007. The system was put into service earlier than planned, as the new Danish grading system required accommodations into study administrative systems. CBS study administrative personnel experienced difficulties in the beginning of the use of SPARC, as SPARC was not quite ready to be implemented. Prior to SPARC CBS used HSAS, and one of the challenges was to convert data from the old system to the new (Dilling-Hansen, interview, July 12, 2011). In November 2011 CBS decided to shift from SPARC to STADS. By shifting to STADS it is argued that CBS will obtain a more coherent system, which will be developed and maintained by the external STADS secretary (Dalhoff, 2011). STADS will be introduced during the autumn 2012, and the study administrative personnel are to learn to use the system during the spring and summer 2013.

STADS is used by Technical University of Denmark (DTU), the University of Aalborg, the University of Aarhus, the University of Southern Denmark, RUC, the University of Copenhagen, and Copenhagen University College of Engineering. STADS is centrally developed and run by STADS secretary. The development of STADS began in the beginning of 1990's, and DTU was the first institution to use the application in 1995. STADS has been developed since, but the core remains the same. Even though user tests have not been carried out, the STADS secretary believes that the users are satisfied (Deloitte Business Consulting, 2008b).

3.2. The digitalisation process

In this chapter the author will provide a short introduction to the Danish SU system and digitalisation process in order to present some challenges the process and the workers have encountered.

Every Dane over 18 years is entitled to a public education grant. Danish public (and most private) educational institutions are tuition free, so the main purpose of SU is to assist with living costs. SU is divided into two main support programmes; for students over 18 following a youth education, i.e. a general upper secondary, vocational upper secondary, and vocational education and training programme, and for students over 18 years enrolled in higher education programmes. In both cases, a student is to demonstrate his study activity. SU consists of a grant and a loan, but the loan is optional. The period of SU depends on the length of the studies, but it can be granted for up to six years (70 months). If a student has not finished his education within six years, he may apply for a completion loan (slutlån) for a year. In 2010, approximately 364,000 students received SU, with a total cost of DKK 13.7 billion (Styrelsen for Videregående Uddannelser og Uddannelsesstøtte, 2011).

The decision to digitalise SU is based on the 2007 strategy for digitalisation of the Danish public sector. The overall goal of digitalisation was to save DKK 50 million (Slidsborg, interview, January 19, 2012) by improving the effectiveness and efficiency of administration. Deloitte Business Consulting (2008a) writes that since students and employees are considered relatively IT-savvy digitalisation was evaluated to serve its purpose in SU field. The responsible authority for the implementation of digitalisation of SU is Kontoret for Statens Uddannelsesstøtte, KSU[2]. KSU operates under the auspices of the Ministry of Science, Innovation and Higher education.

The process of digitalisation of SU was divided into three phases. Phase 1, digitalisation was launched July 1st 2009. Digitalisation made it obligatory for students to apply for SU only via minSU. MinSU is a self-service portal where SU applicants find information regarding SU, and where they can apply and get guidance for the application process. It has existed since 2001. In the beginning of phase 1, students needed to acquire a pin code in order to apply. Later, a digital signature NemID was required. Prior phase 1, students applied for SU by sending a paper application directly to the educational institutions, but digitalisation has mostly eradicated this. Only dispensations, appeals and applications for scholarships for studying abroad are accepted on paper. According to the initial plan, KSU was in cooperation with SU workers to prepare the

[2] The author of the thesis points out that the name of the office changed in November 2011. Previously it was called SU-Kontoret and it operated under the auspices of the Ministry of Education. As it has not been possible to find the English version for Kontoret for Statens Uddannelsesstøtte, the researcher is referring to it as KSU.

students for phase 1 in spring 2009 (Deloitte Business Consulting, 2008a). KSU launched an information campaign in the media (Nielsen, interview, January 17, 2012), and the institutions informed the students on their websites and at SU offices.

Phase 2, data integration between different study administrative systems and US2000 (KSU's central system managing SU grants and) was planned to start July 1st 2010 (Deloitte Business Consulting, 2008a). However, the phase began later than planned, in October 2010, and it has encountered and still encounters major difficulties (Slidsborg). Data integration refers to transferring educational data between the study administrative systems and US2000. Educational data consists of information about enrolments, leave of absence and withdrawals. It is important for the success of data integration that students' educational data are correct, or else a student's grant may falsely be revoked. This is the responsibility of study secretaries. The difficulties encountered in data integration have mainly been technical or due to mistyped educational data in the study administrative system. An example of a technical obstacle is a failure to transfer a student's acceptance of a study place from a study administrative system to US2000. Another example of a technical failure is when a study administrative system does not accept a student's change of a study programme and throws the student completely off US2000. An example of mistyped educational data is when a student's study programme is wrongly registered, or the start and end dates of studies are wrong. The main responsibility for the success of phase 2 lies with the IT-departments of the institutions.

The practical implication of the second phase for the student has been that he is recognised immediately as an active student by minSU when he logs in, and that his educational data is visible in the application form. Educational institutions have different study administrative systems, for instance CBS uses SPARC as the only institution, and RUC has STADS. SPARC and STADS applications will shortly be presented later in the chapter.

Phase 3 was planned to begin January 1st 2011, but it started in September. This phase focuses on transferring study activity data (taken exams and ECTS points) between study administrative systems and US2000 (Deloitte Business Consulting, 2008a). Study activity data inform whether a student still is eligible for SU. During a normal study year a student obtains 60 ECTS. According to SU rules, a student can be one year (i.e. 60 ECTS) late in his studies. During 18 months a student should normally obtain 90 ECTS, but if he only has obtained 30 ECTS, he is not yet overdue, and thus still eligible for SU (Nielsen). Prior to this phase the institutions controlled

students' study activity by manually checking a file that KSU sent them every week. The workers' responsibility was to find the students one by one in the study administrative system and check whether the student had obtained the required amount of ECTS points. After checking the students the workers returned the result to KSU. KSU then wrote into a list how many ECTS points a student had obtained. The purpose of phase 3 is that the study administrative systems automatically check how many ECTS points a student has obtained and return a list of students who have not obtained the required points to US2000. The workers are then manually to process the students who do not fulfil the study activity rule and send them a letter. This is done every month. Students who have not received the necessary ECTS points are denied SU.

Digitalisation emphasises a more active role of an applicant, as he is to get a digital signature, apply online, read about the rules and follow his application on minSU. Prior to digitalisation an applicant received the reply and information about SU on paper, but now all the information is only found on minSU. The purpose of digitalisation is to diminish the routine tasks of SU workers, as no typing of applications, or manual checking of allowance lists (støtteliste) or approval of applications is required from July 1st 2010. This means that the workers can focus on more challenging tasks and assist students in SU rules and application process more extensively (Deloitte Business Consulting, 2008a). The digitalisation process has affected 2,500 SU administrators (Nielsen). As digitalisation has encountered several impediments, SU workers have been under a lot of pressure. Problems have been so severe that some employees have been in sick leave due to stress (Winsløv & Jørgensen, 2009).

Deloitte Business Consulting (2008a) emphasises four critical success factors for digitalisation of SU:

1. The first factor is to ensure sufficient technical prerequisites. KSU cooperates with the educational institutions to clarify how the study administrative systems are to adjust in order to meet the requirements for data integration. They also work on with the institutions to clarify who the responsible party for the process is, and what implications digitalisation has on work tasks and resources of SU administrators.

2. The second critical success factor is to ensure that the applicants use minSU. In cooperation with KSU, institutions are responsible for informing the applicants about the practical matters of applying and about the benefits of applying online (faster application

processing time, convenient access to information about SU, e.g. how many allowance months one still has).

3. The third factor is to ensure that the SU workers have the necessary competencies in order to handle digitalisation. They need to be informed about the digitalisation process, the consequences of it, how to use the systems on daily basis, and what possible bug reports (fejlrapport) they will encounter and how to solve them. Deloitte Business Consulting (2008a) recommends KSU to hold conferences and inform SU administrators on su.dk or SU-net of how to respond to the challenges digitalisation causes.

4. The fourth critical success factor is the internal and external organising of SU work. Internally the institutions are responsible for establishing processes that support effective SU administration and ensure collaboration between SU administrators and study secretaries. Study secretaries type students' educational data into study administrative systems. Data integration between study administrative systems and US2000 requires that educational and study activity related data are updated and correct. The management is to ensure that the study secretaries are knowledgeable about their more central role in the process of digitalisation. The institutions' IT-departments are responsible for successful data integration. Externally, Deloitte Business Consulting (2008a) recommends a strengthened collaboration between different institutions in order to share experiences. A great effort from the institutions and their management is required to make sure that digitalisation will succeed. It is, however, the responsibility of the management to communicate the digitalisation process and guarantee the necessary organisational changes.

4. Analysis

This part will present and discuss the findings in relation to the theories. The part has three main themes; e-government myths, the issues of user involvement and information infrastructure. The author will begin by presenting SU statistics from 2007-2010. She will then move on to discuss possible explanations to the tendencies that the statistics show by presenting findings on how the difficulties experienced have affected the efficiency and effectiveness.

According to Nielsen, digitalisation of SU has achieved some expected, positive results. He states that digitalisation of SU has improved service time drastically. The statistics show that in 2010 the Danish universities received 149,731 applications of which 63 per cent were processed within 10 days, whereas the percentage was 58 the year before. In 2008 prior to digitalisation 62 per cent of the applications were processed within 10 days. The statistics show two things; 1) digitalisation of SU has had almost no impact on the service time from the 2008 level, 2) during the introduction of digitalisation in 2009 the service time dropped. Furthermore, in 2010, 14 per cent of the applications took longer than 20 days to process. The year before the percentage was 13, and two years earlier it was 10 (Appendix 4). The statistics show that more applications take longer than 20 days to process than before digitalisation.

In 2010, CBS received 17,454 applications of which 82 per cent were sent via minSU. The year before the percentage was 77. The CBS workers processed 68 per cent of all the applications within 10 days in 2010, whereas the number was 69 per cent the year before. In 2008 CBS processed 71 per cent of all the applications within 10 days. In 2010 9 per cent of the applications took longer than 20 days to process. In 2009 this was 6 per cent (Appendix 5). Thus, digitalisation did not improve the service time.

RUC received 10,677 applications in 2010 of which 78 per cent were sent via minSU. The year before the percentage of the online applications was 62. The RUC workers processed 76 per cent of all the applications within 10 days in 2010, whereas the number was 70 per cent a year before. In 2008 73 per cent of the applications were processed within 10 days. Digitalisation has slightly improved the service time from the 2008 level, but like the universities in general RUC's service time dropped the year digitalisation was introduced. In 2010 5 per cent of the applications took longer than 20 days to process. In 2009 the percentage was the same (Appendix 6).

Processing time	Universities	CBS	RUC
Within 10 days			
2010	63 %	68 %	76 %
2009	58 %	69 %	70 %
2008	62 %	71 %	73 %
More than 20 days			
2010	14 %	9 %	5 %
2009	13 %	6 %	5 %
2008	10 %	6 %	6 %

The statistics show that RUC's service time has slightly improved after digitalisation was launched. Contrary to this CBS has not been able to serve its students more efficiently. The CBS workers provide two explanations; problems with digitalisation and a general increase in individual applications, e.g. dispensations and appeals. These take longer to process. The RUC worker also recognises that they receive more individual applications. It is not possible to conclude to which extent differences in service delivery are due to the problems with digitalisation, or to a general increase in individual applications, since RUC and CBS do not keep statistics on dispensations or appeals. However, given that both universities claim to receive more individual applications, but only RUC has improved service, it could be taken as evidence that problems with CBS' digitalisation has prevented them from reaching the same improvements as RUC.

In order to understand why efficiency gains differ, the author of the thesis will in the following chapter present the findings and discuss them in relation to Bekkers et al.'s (2007) myths. The chapter is divided into two parts. The first part begins by presenting the findings and discussing the myths in relation to the applicant. The second part discusses the myths in relation to the worker.

4.1. Myths of efficiency and empowerment – the applicant

The author will discuss the following of Bekkers et al.'s (2007) myths of e-government:

- governments becoming more efficient and providing responsive and client oriented quality services
- empowering the citizen in relation to an SU applicant

Even though no students were interviewed for the study, the researcher claims that the interviewees' observations of the process can be used to point out some challenges some students experienced. The author underlines that the purpose of the study is not to investigate how digitalisation has affected other users than SU workers. How the process of digitalisation of SU has been for some students is discussed here, since the problems they have encountered in the application process have affected the work of the SU workers. Furthermore, discussing the myths of e-government improving the efficiency of the services and empowerment in relation to the student provides a more nuanced description of these myths than only focusing on the worker. Bekkers et al. (2007) underline the importance to study the discrepancy between the discourses and the practice of e-government in order to get a more realistic picture of e-government projects.

4.1.1. Findings

As stated in the introduction part, efficiency refers to achieving the maximum result with minimal resources. Thus for the students efficiency regarding digitalisation of SU may mean two things: a convenient and easy way to apply for SU online anytime that is suitable for them, and faster processing of SU application and hence receiving the grant faster. The first phase of digitalisation of SU was launched in July 1st 2009 when applying via minSU was made mandatory. According to Nielsen and Slidsborg, the self-service possibility of minSU has made the application process more simple and convenient. Nielsen describes the application process through minSU rather straightforward; when the applicant applies for SU and has logged in minSU, the system recognises the applicant, the institution he is enrolled in, and the start and end dates of the studies. The applicant is then to answer four questions; whether he is living home or independently, whether he receives any other public allowances, whether he obtains any loan, and from when the student is applying for SU. It is not possible to send dispensations, appeals, or applications for scholarship for studying abroad via minSU. The student still needs to send or

bring these to the institution. Slidsborg argues that for those citizens who are not afraid of self-service possibilities, it is empowering to be able to use self-services anytime that suits one best. However, she also recognises that applying for SU online can be challenging for students who are young and unaccustomed with dealing with the public sector. They may never have even paid taxes, and therefore do not understand what terms like tax rate or tax-free allowance mean. Nielsen augments that KSU is often the first public authority these young people meet and therefore views KSU's role as teaching the applicants of how one should function in society. Slidsborg recognises that as some applicants are uncertain about practical things, the requirement to use minSU might in some cases put more load on the workers at institutions.

The CBS workers point out that during phase 1 the applicants did experience problems. The application process was not simple and straightforward, as it actually took a while before students were able to apply via minSU. They also argue that since the paper application option was abolished before minSU was functioning properly, many CBS applicants were required to write a letter stating that they were applying for SU. Later some students could not get access to the system, because they had difficulties in acquiring a pin code or NemID. The worker from RUC says that some students still think it is difficult to acquire a NemID, and that she shares this view. Nielsen explains that difficulties in gaining a pin code or NemID in the beginning were due to DanID's problems with delivering the codes as fast as they had promised. However, according to him, the first phase was all in all rather painless.

Both CBS and RUC were required to inform the applicants of the new application procedure, and all the SU workers view their role as helping the students as much and as well as possible. The RUC worker thinks her role is to help the students with their economy, and one of the CBS workers says that she always considers what would be the best option for the applicant. However, during phase 1, the CBS workers were not able to assist students sufficiently in the application process since a feature called skyggebillede[3] was not yet available. It should have functioned from July 1st. Skyggebillede allows an SU worker to follow the student when he is filling the application form, provide guidance through the process and give advice on how to deal with error messages. The worker from RUC does not mention any difficulties regarding the

[3] As the author does not know the English version for the concept, she is referring to the Danish word, skyggebillede.

skyggebillede, but only emphasises its importance in helping the students through an application process. She states that students may encounter error messages (fejlbesked) they do not understand, but she as an experienced worker is able to guide them. An example of a frequent error message is when a student is to accept his loan plan, but the system responds saying the loan amount is too large for a certain month.

Due to the problems with data integration (which was launched in July 1st 2010) the CBS workers were late with processing applications, which meant some students needed to wait for their grants. In order to apply for a loan, students need to be eligible for the grant. As the students did not receive any SU and thus could not prove they were eligible, the SU workers needed to write statements for the bank. The SU workers also experienced students being mad and frustrated. The RUC worker does not mention any major problems students experienced during phase 2, only minor ones. She provides an example of a problem by explaining how a change of a study programme can result in unnecessary problems for the student, as STADS can completely delete the student from the records. It is important to notice that RUC did not experience data integration particularly challenging, as they use STADS, and data integration between STADS and US2000 was already established in 1995**.** Nielsen acknowledges that data integration was more challenging for the institutions not using STADS. He states that data integration was a "relief" for STADS institutions.

The difficulties during phases 1 and 2 were not only technical, but the role of the workers and developers is of importance as well. KSU installed the function of skyggebillede during the summer 2009, a month or two later than initially planned. However, the CBS workers first noticed the function in October. The workers state they did not notice skyggebillede earlier, as KSU did not inform them of it. However, they also acknowledge responsibility and feel they should have actively kept looking for the function. The workers claim that KSU is not particularly good at informing the SU workers of new functions. The SU workers tell how they suddenly may find a new function, but do not understand its purpose or how to use it. The workers try to seek assistance, but think it is difficult to get hold of KSU, since they do not answer phones and are slow at replying to e-mails. The RUC worker agrees and states it can take for weeks before she gets hold of KSU. Nielsen acknowledges SU workers' difficulties with getting in contact with them. The main reason is that KSU lacks resources. Moreover, KSU thinks it is the responsibility of the institutions to solve the technical problems of data integration. However, as the institutions are not always capable of solving the problems they will

contact KSU again, which puts pressure on KSU's resources. Meanwhile a student's application is not being processed and he is to wait for his grant.

4.1.2. Discussion

E-government is said to provide efficient, available and quality services for citizens. It is clear that CBS and RUC students experienced some impediments during phase 1. Even though they were forced to apply online, they were not provided with the necessary technical prerequisites, i.e. pin code or NemID. Students also experienced problems regarding minSU**,** as it did not function sufficiently in the beginning. Phase 2 caused serious problems for some CBS students, as they could not receive SU in a quick manner, which was one of the goals of the project. The statistics show that the CBS students did not receive as efficient a service as the RUC students, which is a problem for the equality of the applicants. As a matter of fact the CBS students received a slower service in 2010 than in 2009.

The myth of empowering citizens presents the citizen as an intelligent, technologically empowered consumer. The reason to make SU application via minSU mandatory was based on a general assessment of students as being IT-savvy. Nevertheless, due to technical difficulties during phases 1 and 2 some applicants did not have the possibility to apply via minSU even though some of them probably were willing and IT-savvy enough to apply online. The author of the thesis understands empowerment of an applicant as enhancing and supporting his confidence in his own capacities and possibilities to independently apply SU online. She recognises the possibility of digitalisation for empowering students, but argues that empowering might be restricted due to technical challenges encountered. Thus, expecting empowerment, but being disappointed due to technical challenges, one can quickly turn to frustration. Furthermore, as long as it is not possible to send dispensations, appeals or applications for studying abroad via minSU, it limits the empowerment, as it requires the applicant to print and fill out certain forms and still makes him dependent on office hours.

4.1.3. Conclusion

Digitalising SU has had ambivalent results on the efficiency gains. According to KSU, digitalisation has meant faster service for the students. However, statistics show that the amount of students receiving their grant within 10 days is virtually unchanged after the digitalisation. Also, a larger part of the applications has processing times above 20 days. So, the efficiency gains have not been drastic, as Nielsen claims. The amount of applications processed within 10 days

only increased from 62 per cent to 63 per cent from 2008 to 2010. At CBS, digitalisation has not improved efficiency, and as a matter of fact CBS processed slightly fewer applications within 10 days after digitalisation. Also, the amount of applications waiting more than 20 days increased. In contrast to this, RUC's service time has improved more than the average. So it seems that this supports Bekkers et al.'s (2007) claim that e-government providing more efficient service is a myth.

The statistics show differences between the percentages of RUC and CBS. These differences could imply that digitalisation has been less challenging for RUC than CBS, since RUC has used the STADS standard for data integration since 1995.

According to Slidsborg, digitalisation has the potential to empower the applicants, however she and the RUC worker recognise that some students may find the online service inconvenient. This is supported by a Gallup poll conducted in 2011 which shows that 38 per cent of the young people between 18-35 years old think it is easy to use online self-services. However, the same research shows that 47 per cent in the age group of 39-59 think it is easy to use online services. The reason for the difference between the age groups is that the younger people have difficulties understanding the formal terminology present on governmental web sites (Gudmunsson & Larsen, 2011).

In 2007, before digitalisation was made mandatory, 52 per cent of all the university students applied SU online. The author of the thesis argues that this is a high percentage, as in 2011 only 2 per cent of all contact to the public sector in Denmark was made through digital self-service solutions (Kildebogaard, 2011). 52 per cent is a high percentage, since it was achieved by voluntary means. The percentage can be taken as evidence that the students actually felt it was more convenient to use the online option, and that they were serviced better online. The percentage is also high compared to the Gallup poll mentioned, where only 38 per cent of young people find online self-service easy to use. In this sense minSU can be said to have empowered the students.

However, the author of this thesis argues that as long as digitalisation does not support all types of applications, the student is not fully empowered. As mentioned, the feeling of empowerment can quickly turn to disappointment and frustration, when one's particular need is not met, and one is forced to fall back to a poorly supported manual application.

4.2. Myths of efficiency and empowerment – the worker

The author will now discuss Bekkers et al.'s (2007) myths of:

- governments gaining efficiency and effectiveness
- empowering the worker.

The author will present some work tasks and processes of the employees and then discuss how digitalisation has affected the effectiveness, efficiency and empowerment. As defined in the introduction part, effectiveness refers to producing the result that is wanted or intended. In the case of an SU worker it means processing SU applications as flawlessly as possible. It is not only effectiveness of an SU worker that is important, but also the efficiency. Thus, an SU worker is expected to process applications as flawlessly as possible within a certain time and with a certain amount of resources. The author understands worker empowerment as increasing a worker's power to affect his work processes. She believes that empowerment enhances job satisfaction and motivation.

4.2.1. Findings

Work processes

All the interviewed SU workers state that digitalisation has altered their work processes. The workers from CBS and RUC find that digitalisation of SU has made their work easier, since ordinary applications are processed automatically and they do not need to type them into the system. The worker from RUC thinks that the work has become more effective. The CBS workers acknowledge that digitalisation as such is "smart when it works". However, the SU workers evaluate that more challenging work tasks have increased. The worker from RUC states that they do not see any easy cases, and both she and the other CBS worker feel that now they "only have the problems left". This refers to problems with data integration and general increase of more challenging applications.

Applications on paper and typing have not completely disappeared after digitalisation. SU workers still receive applications on paper which they type into the system. After typing and processing a dispensation, appeal or an application for a scholarship for studying abroad the worker writes an applicant a letter and sends it via ordinary mail. The CBS workers find they write more letters now than before digitalisation. According to the workers, dispensations do not

concern problems encountered in applying online, but stem from problems in applicants' lives, e.g. depressions, eating disorders, social phobias etc.

SU workers also receive foreigners' applications and applications for handicap allowance and send them to KSU which handle them. The RUC worker states they copy these applications in the case they ever need to look into the application. She also adds they still use a lot of paper, as they prefer writing a more personal letter to an applicant whose application is for example rejected, than to use the more general form US2000 provides. The worker from RUC states on both her and her colleague's behalf that it was nice to have a physical application, which they could type in the system. She also thinks it was easier to inform an applicant of a possible mistake in the application, as she could fill a standard form pointing out the mistakes and sent it to the student. Now she needs to write an applicant a letter.

One of the central work processes is checking the control list (kontrolliste). The control list includes applications that require SU workers' attention. They can be applications for lengthening the studies or applying for a completion loan, or applications where something has gone wrong. The errors the list shows can be caused either by technical failures, mistyped educational data, or by a student if he for instance has applied for SU without being eligible (this happens especially during the summer when a student has applied for admissions, but has not been accepted yet, or has not accepted the study place yet). One of the CBS workers says that during phase 2 control lists could include "terrible problems", e.g. students registered wrongly and overlapping studies. The control list is retrieved from US2000, and SU workers are manually to check the list and correct the errors in the system. The worker types the applicant's CPR-number into the study administrative system and then compares the information of the student with the information that is shown in US2000. All the SU workers say that the control list can be long, especially during the summer, prior to a new semester. The CBS worker specifies, "during the summer the list can be 40-50 pages long, but during the boring winter months from quarter page to four pages". The RUC worker does not think the control list always functions optimally, since it is not possible to see that a faulty application is under process. As the worker does not always remember which application she has already begun to process, she sometimes opens the application just to notice she already has informed the applicant of the problem. The control list does not indicate that the application is half-processed and is now awaiting response from the applicant. This increases a worker's workload.

Problems encountered

The problems the students experienced during phase 1 increased the demands on the CBS workers. It is important to note that prior to digitalisation SU workers typed many applications into the system. When the students needed to write letters applying for SU due to technical difficulties, this did not necessarily increase the workload of typing. However, the difficulties put pressure on e-mail and telephones, which removed the workers' resources from processing applications.

The CBS workers point out that they have experienced many difficulties especially regarding data integration. As the CBS workers say, failures in transferring one student's data is not a problem, but if the system fails to transfer "3000 students' data, it is a big problem". It is especially right after bachelor and masters admissions (in June-August) the CBS workers experience most difficulties, as many new students are enrolled and apply for SU. During phase 2 the CBS workers were a month behind in their application processing. KSU asked them to explain why they had 1,200 unprocessed applications. The workers answered that they were not able to process them in time, as "everything was chaotic". Contrary to this, the RUC worker states that the data integration phase did not cause any severe problems, since data integration with STADS and US2000 was established earlier**.** She admits that data integration does not work flawlessly, as changes or mistyped data in STADS can have unwanted effects on SU. The CBS and RUC workers emphasise the need for a tight cooperation with study secretaries who are responsible for typing students' information into the systems. Also Nielsen says, "it is not beneficial to have study administrative workers who do not understand the consequences of their actions".

As institutions' IT-departments are responsible for integrating the study administrative systems with US2000, the workers have cooperated with IT personnel. However, the CBS workers do not feel that the help they have received has been sufficient. Since the last part of phase 2 nobody at the IT-department at CBS has been responsible for the integration, so the SU workers do not know whom to contact in case of problems. This has had detrimental effects on the effectiveness and efficiency. The worker of RUC says that they have cooperated with their IT-department which employs two workers only responsible for STADS. The IT department has assisted in phase 2, but the main responsible for data integration is the STADS secretary. She does not mention any difficulties with the cooperation.

Phase 3 (transferring study activity data from study administrative systems to US2000) was seven months delayed and was launched in September 2011. The RUC worker has not experienced difficulties in this phase. She says that study activity data was transferred digitally already prior the phase. However, according to Nielsen and Slidsborg, some STADS institutions have experienced problems, because STADS is not able to count how many ECTS points a student has obtained. They do not specify any reasons for the problem, but state that the University of Copenhagen which is a relatively new user of STADS, has experienced difficulties due to how they have registered their study programmes. The CBS workers have not experienced any major obstacles with phase 3. The biggest problem encountered has been SPARC's incapability to transfer study activity data from every study programme at the same time. Some studies are then not included in the list.

4.2.2. Discussion

The statistics showed that e-government increasing efficiency does seem to be a myth in the case of SU. The CBS workers' interpretations of the difficulties encountered provide some understanding of the statistics. The difficulties encountered were due to technical errors or human mistakes in data integration, and lack of sufficient support from the IT-department and KSU. One of the main reasons for the difficulties with data integration has been that CBS uses SPARC, which does not support data integration with US2000 as well as STADS. Data integration between STADS and US2000 was established already in 1995.

The degree of digitalisation is also one of the reasons why both CBS and RUC workers have not obtained further efficiency gains. Applications for dispensations, appeals and scholarships for studying abroad are not digitally supported, and the workers must open, process, and type the applications into the system, and then write a student a letter. Typing takes time and does not improve efficiency. The author of the thesis moreover argues that workers' own actions can also affect efficiency gains. The RUC workers copy all the applications they send to KSU. This takes time and does not help in reducing paper, which is considered as one of the benefits of digitalisation. The SU workers also show positive attitudes towards manual work. One of the CBS workers states that manual work does not always require that much and provides some variation during the workday. The RUC worker acknowledges she and her colleague are happy with writing letters, as it gives a more personal touch to the work. Even though copying and typing are not linked with efficiency, the author of the thesis argues that typing can also affect the workers positively. Digitalisation promised empowerment of a worker, as the worker was

required to conduct less routine tasks which are typically assessed rather monotonous and boring. As digitalisation encountered many obstacles, empowerment of the workers was not greatly obtained. However, conducting easier and more routine tasks may help the workers to cope with the difficulties they encounter at their work. Doing routine tasks can remind the worker of the 'good old days', which gives a feeling of comfort, security and control. Routine tasks can thus function as a motivator.

Grundén's (2009) interviewees experienced that increased demands for efficiency could cause more stress. The CBS workers say that they were close to "go down with stress" during the most chaotic time, autumn 2010. The workers had many difficulties with the system and lacked sufficient resources to deal with them. However, the CBS workers saw KSU's supervision of the efficiency gains as **"**both a bad and good thing, but mostly a good thing". According to her it is good because if the efficiency goals are not achieved, KSU will request that the institutions provide enough resources to achieve the goals. The CBS worker has a positive stand, as she feels someone does care, requires solutions and involves the workers –even though the workers do not think this is the best way to be involved.

4.2.3. Conclusion

It is not possible to conclude whether digitalisation of SU has improved workers' effectiveness, as it is not known how flawlessly the workers conduct their work. However, when digitalisation does not work, the workload of the workers increases, because they also have to deal with technical issues. Increased workload may imply difficulties in achieving flawless application processing.

The difficulties with data integration have had an adverse effect on the empowerment of the workers, as they are now dependent on someone else's expertise and time. However, the author of the thesis argues that digitalisation has possibilities to empower the worker, but this will only occur when the biggest challenges have been solved.

4.3. User involvement

In the following chapter the researcher of the thesis will discuss the issue of user involvement. She will start by identifying the different users and stakeholders that digitalisation of SU has affected. She will then move on to present the findings and discuss them in relation to the

theories. In the end of the chapter she will construct an understanding of how user involvement and user participation are intertwined and what implications this has.

Følstad et al. (2004) state that e-government projects are often characterised by political control. Digitalisation of SU was a political decision which was justified by cost-savings of DKK 50 million. The Ministry of Finance also imposed a tight schedule which KSU was to fulfil. Slidsborg states that the time schedule was not to be exceeded. The task became even more challenging when the Ministry made the budgetary cuts before digitalisation was even launched. This meant that the process of digitalisation was to be carried out with fewer resources within a tight schedule. This level of political control meant that KSU worked on a tight time schedule with few resources, prohibiting them from sufficiently involving SU workers in the process.

The decision to use the STADS standard in integration was based on already existing integration between STADS and US2000. It was convenient as seven universities already had the system. It was therefore also a political decision in which those institutions not using STADS were set aside.

In this research, the SU workers are understood as the end-users, as they are the ultimate user group which the digitalisation of SU has affected the most. Students are understood as users, since they utilise the functions of minSU. Stakeholders of digitalisation are many; besides the end-users and users, the Ministry of Finance, KSU, the Ministry of Science, Innovation and Higher Education, and the management of the different SU administrations. IT-departments and suppliers have also a stake in the process. By following Følstad et al.'s (2004) distinction between different user groups, the SU workers can be identified as core users, as they are not able to conduct their work without the study administrative systems or US2000 functioning properly. Students are understood as sporadic users, as their use of minSU is only limited. KSU (or at least some of its employees) is identified as a regular user, since the employees interact with US2000 daily when assisting the end-users in problem solving.

4.3.1. Findings

The SU workers do not think they were provided with enough information prior to the digitalisation or during the process. The CBS workers recall they were informed about digitalisation around November 2008. KSU held two seminars, of which one concentrated on

digitalisation and the other one on scholarships for studying abroad which was something new at the time. The RUC worker recalls that she and her colleague were only informed about what digitalisation means and how it will affect work tasks. The workers did neither receive any training prior to digitalisation, or any information about phase 2.

Nielsen acknowledges SU workers were not sufficiently informed prior phase 1. The main reason was time constraints. Prior to phase 1 KSU needed to focus on developing minSU so it was ready at deadline. The Ministry of Finance required KSU to be ready in time, as the second phase could not be delayed. Nielsen states that in order to keep up with the plan, KSU did not have time to involve the users. Nielsen says that KSU has as an "honest desire" to listen to users and accommodate the system to them, but KSU evaluated that it was not possible under the pressure KSU was.

Nielsen does not completely agree with CBS's criticism regarding the lack of information prior and during phase 2. He recalls that the IT-departments of KSU and CBS held meetings. Nielsen assumes that one of the problems might have been that CBS' IT-department did not discuss the process with the SU workers. Slidsborg also states that KSU held meetings with CBS and underlines that the institutions which do not use STADS were provided with the possibility to meet with KSU's IT-department. However, Nielsen recognises that the communication was not sufficient.

The CBS and RUC workers all emphasise that KSU is difficult to get hold of. The CBS workers recognise that generally KSU does the best they can to help them with difficulties. However, one of the CBS workers states she also has experienced arrogant attitudes. She says how she had tried to call KSU for days and when she finally got through she was told, "three callers just got through without waiting in line". She feels KSU does not believe that she really has had difficulties contacting KSU. During phase 2, KSU was a month overdue with replying e-mails and letters from SU workers. KSU informs the workers on its website of how far they are in replying e-mails and letters. The CBS and RUC workers were aware that KSU lacked resources, as some employees were just fired, and the impediments with digitalisation stressed KSU workers. The SU workers do understand the difficult situation of KSU, but at the same time they admit it was frustrating not to get any help. One of the workers says, "it was a really bad cocktail, when you do not get an answer to your problem, because we cannot call them, or because they do not react and you have a student who will not receive his SU in a month". Another problem

the SU workers have experienced is that KSU informs them about new functions after they have been functioning for a while. This was the case with the feature of 'skyggebillede' during phase 1.

Whereas the CBS workers mostly focus on the problems the digitalisation process has caused, the RUC worker emphasises the difficulties she and her colleague encounter regarding the daily use of US2000. RUC has many requests for KSU regarding how the system can be made better. They have requested for changes in the control list (as previously discussed), changes in how to process a completion loan, maternity allowance (fødselsklip) and supplementary allowance (tillægsklip). The RUC worker feels KSU does not listen to their requests, but understands this is due to time constraints and lack of resources. She also states KSU has bigger projects, which takes attention away from requests for improving the system. The RUC worker thinks it is bad, since thousands of students use the system and the workers do not always feel sufficiently prepared for the challenges. The RUC workers phone the other universities when they experience problems. She says that KSU hosts seminars for universities every other year where SU workers are invited to discuss what is new in SU field, the problems and do case exercises. She values the seminars and explains how they strengthen one's professionalism.

The CBS workers also value the help they gain from KSU. The CBS workers recall they discussed with a KSU worker during a seminar held in 2010. The conversation was of great importance to the workers, as they experienced someone listened to them and took the difficulties they had encountered seriously. They also felt that other institutions gave them recognition for their problems. Furthermore, the CBS workers also think it was interesting to hear other institutions' experiences, especially the ones which use STADS. They were told that no STADS institution had the same experience of digitalisation.

The CBS workers do not only think KSU did not listen to them but they also encountered difficulties from the management and the IT-department's side. Due to organisational restructuring the SU workers were appointed a new day-to-day head in September 2009. The workers recognise she "did what she could to help us" during phase 2. However, they also assess that the day-to-day head did not have sufficient knowledge about the SU systems, as she had had little to do with SU work before. As the day-to-day head was also busy with other things, the workers do not think they always got the support they needed. The workers have especially been dissatisfied with the manager who according to them shows little respect to the importance of SU

work. One of the workers recalls that the manager once called the SU office a "necessary nuisance".

The cooperation with CBS IT-department has also been full of obstacles. During phase 1 and the first part of phase 2 the IT-department had a person responsible for digitalisation whom the SU workers were satisfied with. However, due to organisational restructuring the worker got fired. The SU workers have since asked the day-to-day head to provide them with a name for a worker they can contact, but no one has been appointed to be accountable for solving the problems with digitalisation. The workers also explain that even though the IT-department has agreed on informing about any problems encountered in data integration (data is transferred between the study administrative systems and US2000 every night), the SU workers do not get the information. The workers also feel the IT-department does not prioritise the SU work enough, since when difficulties in integration have occurred the SU workers have experienced little attention to fixing the errors.

As other universities use STADS, the CBS workers feel being outside the good company. According to the CBS workers, STADS can so many things smarter than SPARC. They experience the others are on the main track. STADS institutions also have task groups where they can discuss their experiences and guide one another. Being outside of STADS cooperation has been difficult for the CBS workers. The workers do not really understand the justifications for CBS having its own study administrative system. According to the workers, CBS did not judge STADS sufficient enough to be able to handle different courses and study programmes the students were required to pay for. When STADS cooperation was initiated in the end of the 1990's, it was also judged too expensive, and CBS had at that time just developed its own study administrative system, HSAS.

The workers emphasise that they do cooperate with the other institutions, but sometimes it feels a bit peculiar to discuss with them, as they have different discourses. The CBS workers find it important that other universities recognise CBS as a university. In order to learn more about STADS and the experiences regarding its use, the CBS workers initiated their "own project" in December 2009. Since then they have visited the University of Aarhus, the University of Southern Denmark, the University of Aalborg, RUC, DTU and the University of Copenhagen. They have learned about the capabilities of STADS, which has helped them. The visits have also caused some negative, unexpected consequences, as the CBS workers understand what they are

missing and feel envy. The CBS workers have not told about their visits to the management, as they do not think it is necessary and also believe the management does not care to listen. They do not think the management is indifferent to them, but feel the management does not realise the importance of SU work for the students.

4.3.2. Discussion

Sefyrin et al.'s (2009) concept of silence is present in digitalisation of SU. Even though the SU workers are the end-users and thus the central actors in digitalisation, they were not invited to participate in the process. No one asked about their needs or requirements prior digitalisation, and no one was really interested in inviting them to participate in phases 1 and 2. Referring to Sefyrin et al. (2009), the process was characterised by technological optimism, i.e. digitalisation is a straightforward and easy process benefitting the SU workers' tasks and transforming the SU administration to an efficient machine within a short time. As KSU did not believe it could in an honest and open fashion involve the users and make a difference for their work, the silence was justified. It is also important to notice that it was KSU which defined the user involvement. The users were not even asked how they view user involvement or how they would like to participate.

Contrary to the administrative employees in Sefyrin et al.'s (2009) study the SU workers have raised their voices. This is what the author of the thesis understands as active participation, and it has taken many forms; contacting KSU, requiring help from the management and IT-departments, and cooperation with other universities. However, raising voices has not meant the workers have been involved. The CBS workers have been indirectly represented through meetings held between IT-department and KSU's IT personnel. The author of the thesis argues that the CBS workers have been isolated, as the problems they have encountered have not been taken seriously or prioritised, or their work has not been appreciated. In order to make sense and cope with the difficulties the workers initiated their own project where they can meet with other universities. Not mentioning the project to the management implies that the workers' wish to practice a similar kind of silence that they have encountered. Silence is a powerful tool, as it limits other parties of participating and becoming involved.

It is interesting to note that neither the workers nor the KSU representatives interviewed for this study brought up the downsizings that were a consequence of the digitalisation. The project goal was to achieve cost-savings of DKK 50 million, and reaching this goal must have required that

some workers were let go or allocated to other tasks. In accordance with Sefyrin et al.'s (2009) findings there seems to be a consensus that this subject is not talked about.

What is also interesting is that even though the RUC worker does not think digitalisation has been particularly problematic, she has a feeling of not belonging. She states that she and her colleague are rather anonymous at RUC, since they do not have particularly much to do with the studies nor with the university. Being isolated may mean the work of the SU workers is easily ignored, and thereby their tacit knowledge does not get enough attention. The RUC worker states they were only informed of how digitalisation will affect the work tasks. The author of the thesis argues that work tasks and work processes are different things. A work task can sound rather simple, but may include different work processes. Work processes determine the work to a greater extent than work tasks. Only referring to work tasks underestimates the complexity of any work. Moreover she argues that not understanding the work processes implies difficulties with developing or improving systems, as it is here the tacit knowledge lies. Inviting the end-users to participate in complex e-government development projects provides a good possibility to capture the tacit knowledge. Involvement connotes discussions and listening, which are needed in order to understand the complexity of the social worlds the end-users conduct their work in.

When the workers do not get sufficient help they have to find their own solutions to the problems they face. First they try to seek participation. If they are not invited to participate, the workers try other ways. The SU workers say that their work is "learning by doing". The author of the thesis recognises that many jobs are characterised by learning by doing. It can imply the workers are to manage alone, which can affect efficiency gains negatively, cause stress or decrease motivation. However, learning by doing can also be empowering and motivating, as a worker may achieve a feeling of control and of making a difference. Even though digitalisation has caused many problems, the workers also emphasise the good sides of their work. Finding good things in one's work during difficult times is a way to cope and accept the terms of the work.

In the digitalisation process the most severe problem has been the insufficient direct user involvement. The SU workers' attempts to actively participate have been ignored. User involvement also requires sufficient resources. Lessons learned are many, but since every project is different it is not certain that the lessons learned are applicable to the next project. Participants are always rationally bounded, meaning that it is impossible to know what the best decision will be and therefore people rather 'satisfice' than optimise. The SU workers ask for better

possibilities to get hold of KSU. According to one of the workers, the best solution would be to have a specific contact person at KSU. The many obstacles encountered during the digitalisation process have given KSU an idea to establish super user groups which include representatives from local SU administrations who have knowledge both about study administrative systems and SU. The idea is to strengthen the cooperation and communication between the end-users, KSU and suppliers of the systems. Slidsborg adds that one of the problems is that KSU does not know much about the study administrative systems, and the institutions have little knowledge regarding US2000. However, Nielsen recognises that strengthening cooperation is not easy, as it requires the involvement of people who have knowledge about many things; representatives from SU administration need to be people who know about SU work and study administrative systems, KSU's representatives need to understand about IT requirements and SU work, and suppliers should not only be experts in knowing how people work with one study administrative system, but in various systems.

4.3.3. Constructing the concept of user involvement

As mentioned in the theory part, the author of the thesis finds Barki et al.'s (1989) view of the relationships between user participation and user involvement unidirectional and too straightforward. Barki et al. (1989) argue that an active participation increases the degree of importance the system has to the user. If he has the opportunity to influence how the end product will be, he will take more ownership. The author of the thesis agrees with the claim. However, she claims the view focuses on a one-way relationship between participation and involvement; that the level of the participation influences the level of involvement. As such it does not say anything about whether the level of user involvement affects participation. The relevance of a system might also be of great importance to the user prior to system development and therefore the user values the possibility to participate in the process. If he is not able to participate, or invited to participate, it does not necessarily diminish the importance or relevance of the system. On the contrary, the importance of a well functioning system might be even higher if the users encounter obstacles which they believe could have been solved by sufficient participation.

For the author of the thesis user involvement is a complex concept. Referring to Harris et al. (2009), the concept of user involvement includes both the terms user involvement and participation. The author of the thesis sees these terms as closely intertwined. For her, user involvement refers to someone else involving the user. That someone else has the power to

determine the degree of involvement of the user. So even though the end-users try to actively participate, it does not guarantee that they will be involved in the process. Not being involved does not necessarily diminish the importance of the system. If the user is not involved, the importance and desire to participate may become even bigger. He will then seek other ways of participating in order to make sense of the system and cope with the challenges encountered. This is what happened with the SU workers. They tried to participate actively, but were not directly invited to the process. However, this did not diminish the relevance of the systems to their work or to them. They made sense of digitalisation by learning by doing. This helped them to cope with the difficulties they encountered.

4.3.4. Conclusion

Referring to Sefyrin et al.'s (2009), silence is also present in the process of digitalising SU. Both CBS and RUC workers were not directly invited to participate in the process, since KSU assessed it could not involve the end-users sufficiently due to time constraints and lack of resources. The workers were involved indirectly through representatives from IT-departments and the STADS-secretary. The workers did not think this was sufficient.

The CBS workers have also experienced silence from the management and IT-department's side. The problems they have encountered have not been prioritised and the work has not been appreciated. Silence can lead to isolation, as workers are not able to receive sufficient help from the responsible authorities or the organisation. Workers are then to look for help outside the organisation, or learn to solve the problems by themselves. In order to cope with the difficulties workers encounter, they need to make sense of the problems with the possibilities they have.

The author of the thesis also confirms Sefyrin et al.'s (2009) finding that the unpleasant side of digitalisation – downsizing – is not part of the discourse. The people interviewed for the thesis did not bring up this subject, despite it being a central goal of the digitalisation.

4.4. Information infrastructure

In this chapter the author will discuss the features of an infrastructure as being a socio-technical, embedded and path dependent concept. She will also discuss the integration process, and winners and losers in infrastructuring.

4.4.1. Actors

Digitalisation of SU has affected many of the physical entities and actors that form the SU information infrastructure. It has affected 2,500 workers within 1,500 different institutions. Institutions vary from elementary schools to universities, which entails different kinds of students, study programmes, courses, length of the studies, work tasks, processes etc. According to Nielsen, 60 per cent of the 2,500 workers work less than two hours each week with SU, which means they are not SU experts in the same sense that the CBS and RUC workers are. The RUC worker has worked with SU for 16 years, the CBS workers for 10 and 4 years. SU rules are complicated, and as one of the interviewees says the work is characterised by close supervision in order to ensure that the rules are followed and the students' applications are processed properly and no mistakes are made. The SU workers are not the only actors the information infrastructure of SU work consists of. Study secretaries, students, KSU, IT-departments, management and even DSB[4] impact SU work.

Handling SU applications has not always been the responsibility of the institutions. The RUC worker explains that when she began in 1995 all they did was process the applications and forward them to the central SU authority (KSU) which typed them into the system. Then it was decided to decentralise this task and the responsibility transferred to the institutions. However, administration of SU is far from the core purpose of the institutions, namely education, and the RUC worker explains that she sometimes feels more connected with the SU authority than with the university. The strong link between the workers and the authority responsible for supplying the underlying systems is a clear indication of an infrastructure. It is probably also an advantage when making changes like the digitalisation, since the users will be more loyal towards to the mission.

It is interesting to note that digitalisation has also turned the tide back towards centralisation. Now that the job of inputting applications in the systems has been mostly removed, the processing of difficult applications remains. This requires expertise, which is difficult to obtain and maintain if the worker is alone and does not do SU as a full time job. In the best practice analysis made by Deloitte Business Consulting (2008a) a recommendation was therefore made to the institutions to have bigger units, where workers could maintain expertise. However, Nielsen

[4] DSB is responsible for providing student discounts to public transportation

explains that there is resistance to this, as many institutions prefer the advantage of having assistance locally available.

Nielsen states that one of the challenges of digitalisation of SU has been the different student composition of the institutions. According to him, some of the high schools are 'privileged' in a sense that they have students who never or seldom interrupt their studies. They study the standard three years, and are all of similar age. This makes SU work easier than for instance at vocational schools which are more used to students who interrupt their studies just to begin another programme next week.

E-box is also connected to the SU information infrastructure. Since the digitalisation messages regarding SU are not sent by mail but sent to the students' E-box. This may include notifications about SU not being paid. The SU workers explain that students, who do not read these messages, sometimes complicate their work. If a student has not received his grant, he calls or sends e-mail to the SU office and asks for an explanation. The workers state that it in the end it is always the responsibility of a student to know the SU rules and read the e-box messages. However, the workers explain that they do everything they can to help a student.

4.4.2. Physical entities

The SU information infrastructure consists of multiple technological entities; minSU, the study administrative systems, US2000, electronic and paper applications, e-mail and Doc Share (the CBS study administrative personnel can share information regarding a student in order to enhance information flow). The list is even longer since in order to conduct SU work properly the workers are to a great extent dependent on telephones, printers, copy machines, computers etc. This emphasises the feature of an infrastructure as consisting multiple physical entities that are interlinked and dependent on each functioning sufficiently.

The CBS SU workers define SPARC as a starting point for SU. The workers have used SPARC since 2007 but still regard it as unstable; "it goes up and it goes down". The workers do not really understand the justifications for CBS having its own study administrative system. According to the workers, CBS did not judge STADS good enough to handle courses and programmes the students were required to pay for. When STADS cooperation was initiated in the 1990's, it was also evaluated too expensive, and CBS had just developed its previous study administrative

system, HSAS. In November 2011 it was decided that CBS would join the STADS cooperation later this year.

Digitalisation has required alterations to minSU, US2000 and the study administrative systems. Slidsborg states that only small alterations were required to minSU. MinSU was developed in 2001, and in the beginning not everyone could use the system, for instance students at post-secondary education programmes who applied for the first time. Nielsen explains that SU regulations had to be changed so these students could apply online without their parents' signatures.

US2000 was developed in 2000 to support decentralisation of SU administration to the institutions. Prior to the development of US2000 KSU was responsible for SU applicants who had problems with their grant. Slidsborg states that this caused bottleneck problems, as KSU did not have enough resources to take care of all the applicants. The RUC worker recalls that in the beginning they could only see what information KSU inputted about the student to US2000. Later the institutions were divided into authorised and non-authorised institutions. Authorised institutions, which both RUC and CBS were, had a permission to type the institution's SU code, and start and end dates of the studies of a student into the system.

An infrastructure is a socio-technical entity in which actors and systems are linked and dependent on each other to carry out certain activities. If a physical entity fails to function, it affects the work. If a worker does not have the necessary system knowledge, he is not utilizing the system's capacity. In both cases, the infrastructure is not fulfilling its potential. It is not only the actors and systems that are linked, but the actors are also dependent on one another. The CBS and RUC workers say how mistyped data cause problems for SU workers. The functionality of a system may also be dependent on another system. If a study administrative system does not work, the worker no longer able to verify information sent from US2000.

4.4.3. Embeddedness, path dependency and lock-in

The undertakings of phases 1, 2 and 3 are good examples of how complexities in infrastructures are ever increasing. Systems in the infrastructure have been tied closer together. During phase 1 no new integrations were made, but SU workers' reliance on minSU and E-box was increased, as they became the only channels available to communicate with the students. During phases 2 and 3 US2000 and the study administrative systems went from a state of relative independence with

each other to becoming closely connected. This entailed both integration and the need for greater dependency on each other.

Since US2000 was already part of an existing infrastructure it can well be argued that the study administrative systems were "sunk into" this infrastructure. Certainly this is the picture given by Nielsen and Slidsborg who explain how it was mainly the responsibility of the institutions to adjust their systems to communicate with US2000 in the way decided by KSU.

The concept of embeddedness says infrastructures are constructed in multiple places and are later combined and recombined. This is also applies to this case, although the amount of recombination has been minimal.

An example of reuse and path dependency is KSU's decision to base the technical integration on an old file standard from 1995. This standard was used in the early integration of US2000 with STADS, and was by KSU deemed feasible for the integration with the other institutions and study administrative systems. Nielsen admits that this was a mistake, as the standard turned out to be severely lacking when it came to supporting some of the study programmes and student types that the other institutions had. This caused problems and delays, and was solved by gradually supplementing the standard. Had KSU not chosen to depend on this old standard, it is likely that a more optimal and complete solution could have been created. This also shows how early decisions regarding the design of a technology will influence future design decisions.

In the case of CBS it is also possible to observe the significance of network effects. CBS has for a long time maintained its own study administrative system; first HSAS and afterwards SPARC. By now CBS has reached a position where they must acknowledge that network effects make it advantageous to switch to STADS. CBS workers say that they look forward to having the opportunity to share experiences with other institutions – as well as using a system that is maintained by a central authority with more resources available.

This study has not revealed the amount of lock-in CBS has with SPARC, but it is clear that the switching costs have been a deterrent from switching system until now. The development and maintenance of SPARC has required resources which CBS has provided. Study administrative personnel have gained expertise with SPARC, so by switching to STADS they will lose their system specific knowledge.

4.4.4. Integration and gateways

Issues regarding integration between the systems caused a lot of the grievances in the digitalisation process. Integration took place in phase 2, and both KSU and the workers agree that this phase was the most troublesome. Another indication of this is that CBS which had more trouble with integration, had the greatest service level decline in its application processing times.

Apart from agreeing on technical standards for data exchange, as discussed above, a major difficulty with integration is that end-user habits and work processes can be quite diverse across end-user groups and systems. Nielsen explains that a simple action like inactivating a student has very different meanings in a student administrative system and in the SU systems. In case of a student changing study programme it used to be an ordinary procedure in the administrative system to inactivate the student in the old programme and then enlist him in the new programme. While this procedure works well in these systems alone, it had unintended consequences after the integration with US2000. Inactivating a student sends a message to US2000, which immediately cancels the student grant, since an inactive student is not eligible. The student must reapply to receive his grant. However, changing study programmes is very common in some schools, and should not require the student to reapply.

To prevent these unintended cancellations KSU in the end had to add a gateway between the administrative systems and US2000. The gateway makes sure that a message of inactivity is only enforced in US2000 if no message of reenlistment is received within a certain time frame.

Nielsen gives further examples of how human gateways previously prevented unintended cancellations. Given a rigid interpretation, SU regulations say that students on some study programmes must obtain a certain amount of ECTS points during a month or a week – and that this applies even during summer vacation and Christmas holidays. SU workers – acting as human gateways – would make an evaluation of these criteria. If the student did not have enough points, they would, however, not necessarily cancel the grant. They would take into account factors like summer vacations before making the decision. After integration this decision would be made automatically by the student administrative systems. They could only perform decisions according to rigid interpretations, and since there where no longer any gateways, this lead to unfortunate cancellations.

Some of these problems stem from system developers, KSU and SU workers not completely understanding each other's fields. KSU has responded to this by planning to set up 3-party user groups. In accordance with theory, KSU has learned that inter-organisational communication is very important when an information infrastructure becomes more intertwined.

4.4.5. Winners and losers in an infrastructure

All changes will leave winners and losers, and this also applies to undertakings like the SU digitalisation. Since the purpose of the digitalisation was to increase efficiency, a consequence was that many SU administrations were downsized. Losers would therefore be those workers who were let go. Losers are also the institutions which did not use STADS prior to digitalisation. This would then regard CBS. Winners were those who at an early time got an understanding of the new system, and those who had the expertise to handle complex applications. The RUC worker can also be regarded as a winner, as she is at an institution, which before many others integrated with US2000. She has been along since the beginning and feels confident about the infrastructure.

It is interesting to note that the RUC worker states that KSU does not give priority to minor requests for change given by her and her colleague. The reason given is that they are busy with larger projects. The researcher of this thesis argues that this is an expression of conflicting goals. The goal of the worker is to have the system support her work processes, and since she uses these systems during most of her workday even small problems can turn into major annoyances. The goal of KSU is to provide system changes according to agreements with the Ministry, and to maintain stable operations without severe errors. That means that once KSU has delivered a system change according to schedule they have little incentive meet users minor request. Instead they will allocate resources towards the next major system change.

5. Conclusion

In this part the author will sum up the findings and provide ideas for further research.

5.1. Conclusion

The purpose of the study was to investigate the process of digitalisation of SU in order to gain an understanding on how e-government development projects may affect workers. The research question was the following: "*How has digitalisation of SU affected the work of SU workers*?" In order to gain more insight, the main research question was complemented with a secondary research question: "*Why has digitalisation of SU affected the work of the SU workers as it has*?".

The researcher qualitatively interviewed three SU workers from two universities, CBS and RUC, and head of department, Peter Nielsen and his colleague specialist consultant Belinda Slidsborg from the responsible authority for digitalisation, KSU. Furthermore, she observed two of the SU workers while they were conducting their work.

The researcher investigated literature regarding e-government development projects. Bekkers et al. (2007) have identified some myths surrounding e-government projects. One of the myths says that e-government fully exploits the resources of the government and thus makes the work of the administrative employees more efficient and effective.

One of the goals of the digitalisation was to improve the efficiency of SU work. The researcher found that digitalisation of SU has not improved the efficiency of the workers. The statistics show that prior to digitalisation 62 per cent of all the applications the universities received were processed within 10 days. In 2010, the percentage was 63. Furthermore, 10 per cent of the applications took longer than 20 days to process in 2008. The percentage had increased to 14 in 2010.

When looking at the numbers of CBS and RUC, the author found that their service times increased the year digitalisation was introduced (in 2009). After that, RUC has been able to improve its efficiency slightly, CBS has not. The reason for the difference is that CBS fought problems with integrating their proprietary study administrative system, SPARC, to US2000.

The researcher cannot conclude whether digitalisation of SU has improved workers' effectiveness, as it is not known how flawlessly the workers conduct their work.

The researcher also studied Bekkers et al.' (2007) myth of e-government empowering the citizen, but in relation to the worker. She understands worker empowerment as increasing a worker's power to affect his work processes and believes it enhances job satisfaction and motivation. The author found that the digitalisation of SU has not empowered the workers, since due to the difficulties they are now dependent on someone else's expertise and time.

Even though the purpose of the study was not to investigate how digitalisation has affected students, the researcher found that digitalisation indeed empowered the student. Before digitalisation was made mandatory, 52 per cent of all the university students applied via minSU. It is a high percentage when regarding that only 2 per cent of all the contact to the public sector occurred online in 2011. It is interesting that digitalisation has empowered the students more than the workers.

Grundén's (2009) study concludes that e-government increases demand for change of work processes, routines and competencies of the employees. One of the purposes of digitalisation was to diminish typing of applications and manual checking of allowance lists. The idea was that the SU workers should shift their focus towards more challenging applications. However, due to the difficulties with digitalisation the workers have not had the expected resources to process these applications.

Grundén's (2009) study also shows that users need information and education regarding the impacts of e-government initiatives on their work processes. This is supported by Harris et al. (2009) who conclude that a system's success depends on the users' possibilities of expressing their attitudes and making choices from predefined options. This possibility gives a feeling of a partnership and a sense of control over the outcome. The CBS and RUC workers think KSU has not sufficiently invited them to participate in the digitalisation process. The SU workers did not receive any training or information about phase 2. KSU acknowledges the problems and explains they occurred due to time constraints and lack of resources. Digitalisation was a political decision with a tight time schedule and budget constraints, which meant that KSU did not have sufficient resources to involve the end-users.

Sefyrin et al.'s (2009) study discusses the presence of 'silence' in e-government projects. Silence refers to not inviting the central actors to participate in projects, and to not articulating uncomfortable issues that might lead to uncertainty, which could endanger the process. Also, due to the discourse of technological optimism, it is not legitimate to present opposing claims. Both CBS and RUC workers were not directly invited to participate in the process, since KSU assessed it could not involve the end-users sufficiently due to time constraints and lack of resources. The CBS workers think the problems they have encountered during digitalisation have not been given priority by the IT-department or by the management. The researcher believes that silence can lead to isolation, since the workers are not able to receive sufficient help from the responsible authorities. The author of the thesis also confirms Sefyrin et al.'s (2009) finding that the unpleasant side of digitalisation, downsizing is not part of the discourse. The people interviewed for the thesis did not bring up this subject, despite it being a central goal of the digitalisation.

The theories of information infrastructure emphasise the socio-technical property of an infrastructure. The socio-technical aspect is visible in the process of digitalisation of SU. The SU infrastructure includes multiple, heterogeneous actors and systems, which were not completely understood by KSU. Digitalisation of SU is a good example of how complexities in infrastructures are ever increasing. Systems in the infrastructure have been tied closer together. SU workers' reliance on minSU and E-box was increased, as they became the only channels available to communicate with the students.

Path dependency has caused difficulties in digitalising SU. KSU decided to base the technical integration on an old STADS standard from 1995. KSU admits that is was a mistake, as the standard turned out to be severely lacking towards the new requirements. RUC has used STADS from the beginning, and has had only little trouble with data integration. The CBS workers describe data integration as "chaotic". The main reason for this has been that CBS uses SPARC. CBS has for a long time maintained its own study administrative system. By now CBS has reached a position where they must acknowledge that network effects make it advantageous to switch to STADS. CBS workers say that they look forward to having the opportunity to share experiences with other institutions.

5.2. Perspectives

Digitalisation of SU has affected 2,500 SU workers in 1,500 institutions around Denmark. The institutions differ from each other in many ways, and it is likely that digitalisation of SU has

affected the workers in more ways than discussed in this study. The researcher recognises that interviewing three workers and two representatives from KSU does not tell the entire story of the process.

Considering the fact that digitalisation of SU was launched almost three years ago, further research would still only be retrospective. Even more interesting would be to investigate an e-government development project as a longitudinal research using ethnographic means and qualitative interviews. A longitudinal research would provide deep insights in the entire e-government project.

References

Andersen, K.N., Henriksen, H.Z., Medaglia, R., Danziger, J.N., Sannarnes, M.K. & Enemærke, M. (2010). Fads and facts of e-government: A review of impacts of e-government (2003-2009). *International Journal of Public Administration*, *33*(11), 564-579.

Anttiroiko, A-V. (2010). E-governance: Benefitting from Web 2.0. Applications in the public sector. *International Journal of Electronic Government Research, 6*(2), 18-36.

Bansler, J.P. & Kensing, F. (2010). Information infrastructures for health care: Connecting practices across institutional and professional boundaries. *Computer Supported Cooperative Work, 19*(6), 519-520.

Barki, H. & Hartwick, J. (1989). Rethinking the concept of user involvement. *MIS Quarterly, 13*(3), 53-63.

Barki, H. & Hartwick, J. (1994). Measuring user participation, user involvement, and user attitude. *MIS Quarterly, 18*(1), 59-82.

Bekkers, V. & Homburg, V. (2007). The myths of e-government: Looking beyond the assumptions of a new and better government. *The Information Society, 23*(5), 373-382.

Berg, M. (1999). Patient care information systems and health care work: a sociotechnical approach. *International Journal of Medical Informatics, 55*(2), 87-101.

Bietz. M.J., Baumer, E.P.S. & Lee, C.P. (2010). Synergizing in cyberinfrastructure development. *Computer Supported Cooperative Work, 19*(6), 245-281.

Bijker, W.E. & Law, J. (Eds.). (1992). Shaping technology/building society. Studies in sociotechnical change. Cambridge: MIT Press.

Bouwman, H., van den Hooff, B., van de Wijngaert, L. & van Dijk, J. (2005). *Information & communication technology is organizations*. London: Sage Publications Ltd.

Broadbent, M. & Weill, P. (1997). Management by maxim: How business and IT managers can create IT infrastructures. *Sloan Management Review*, *38*(3), 77-92.

Bryman, A. & Bell, E. (2003). *Business research methods*. New York: Oxford University Press Inc.

Ciborra, C.U. (2000). In C.U. Ciborra, K. Braa, A. Cordella, B. Dahlblom, A. Failla, O. Hanseth, V. Hepsø, J. Ljungberg, E. Monteiro, & K.A. Simon (Eds.). *From control to drift. The dynamics of corporate infrastructures* (pp. 15-40). New York: Oxford University Press Inc.

Ciborra, C.U. & Hanseth, O. (2000). In C.U. Ciborra, K. Braa, A. Cordella, B, Dahlblom, A. Failla, O. Hanseth, V. Hepsø, J. Ljungberg, E. Monteiro & K.A. Simon (Eds.). *From control to drift. The dynamics of corporate infrastructures* (pp. 1-11). New York: Oxford University Press Inc.

Creswell, J.W. (2003). Research design, qualitative, quantitative, and mixed methods approach. London: Sage Publications Ltd.

Crotty, M. (1998). The foundations of social research, meaning and perspective in the research process. London: Sage Publications Ltd.

David, P.A. (1986). In W.N. Parker (Ed.). *Economic history and the modern economist* (pp. 30-49). Oxford: Billing and Sons Ltd.

Edwards, P.N., Bowker, G.C., Jackson, S.J. & Williams, R. (2009). Introduction: An agenda for infrastructure studies. *Journal of the Association for Information Systems, 10*(5), 364-374.

Ellingsen, G. & Røed, K. (2010). The role of integration in health-based information infrastructures. *Computer Supported Cooperative Work 19*(6), 557-584.

Elovaara, P. & Mörtberg, C. (2010). Cartographic mappings – participative methods. PDC'10.

Elpez, I. & Fink, D. (2006). Information systems success in the public sector: Stakeholders' perspectives and emerging alignment model. *Issues in informing science and information technology, 3*, 219-231.

Flyvberg, B. (2004). In C. Seale, G. Gobo, J.F. Gubrium & D. Silverman (Eds.). *Qualitative research practice*. London: Sage Publications Ltd.

Følstad, A., Jørgensen, H.D. & Krogstie, J. (2004). User involvement in e-government development projects. NordiCHI '04.

Greve, C. (2006). Public management reform in Denmark. *Public Management Review, 8*(1), 161-169.

Grundén, K. (2009). A social perspective on implementation of e-government – a longitudinal study at the county administration of Sweden. *Electronic Journal of E-government, 7*(1), 65-76.

Halchin, L.E. (2004). Electronic government: Government capability and terrorist resource. *Government Information Quarterly, 21*(4), 406-419.

Hanseth, O. (2000). In C.U. Ciborra, K. Braa, A. Cordella, B. Dahlblom, A. Failla, O. Hanseth, V. Hepsø, J. Ljungberg, E. Monteiro & K.A. Simon (Eds.). *From control to drift. The dynamics of corporate infrastructures* (pp. 56-70). New York: Oxford University Press Inc.

Harris, M.A. & Weistroffer, H.R. (2009). A new look at the relationship between user involvement in systems development and system success. *Communications of the Association for Information Systems, 24*, 739-756.

Hanseth, O. & Lyytinen, K. (2004). Theorizing about the design of information infrastructures: Design kernel theories and principles. *Sprouts, 4*(4), 207-241.

Ives, B. & Olson, M.H. (1984). User involvement and MIS success: A review of research. *Management Science, 30*(5), 586-603.

Kvale, S. (2007). *Doing interviews*. London: Sage Publications Ltd.

Layne, K. & Lee, J. (2001). Developing fully functional e-government: A four stage model. *Government Information Quarterly, 18*(2), 122-136.

Norris, D.F. & Moon, M.J. (2005). Advancing e-government at the grassroots: Tortoise or hare? *Public Administration Review, 65*(1), 64-75.

OECD, (2006). *OECD e-government studies Denmark*. Paris: OECD Publishing.

Olsen, M. (2012). Styrtdyk i offentlige arbejdspladser. *Politiken*, *128*(108), 1.

Pipek, V. & Wulf, V. (2009). Infrastructuring: Toward an integrated perspective on the design and use of information technology. *Journal of the Association for Information Systems, 10*(5), 447-473.

Prasad, P. (2005). Crafting qualitative research. Working in the post-positivist traditions. Armonk, NY: M.E. Sharpe.

Rasmussen, E.S., Østergaard, P. & Beckmann, S.C. (2006). *Essentials of social science research methodology*. Odense: University Press of Southern Denmark.

Ribes, D. & Finholt, T.A. (2009). The long now of technology infrastructure: Articulating tensions in development. *Journal of the Association for Information Systems, 10*(5), 375-398.

Rose, W.R. & Grant, G.G. (2010). Critical issues pertaining to the planning and implementation of e-government initiatives. *Government Information Quarterly, 27*(1), 26-33.

Sahay, S., Monteiro, E. & Aanestad, M. (2009). Configurable politics and asymmetric integration: Health e-infrastructures in India. *Journal of the Association for Information Systems, 10*(5), 399-414.

Sefyrin, J. & Mörtberg, C. (2009). "We do not talk about this" – Problematic silences in e-government. *Electronic Journal of e-Government, 7*(3), 259-270.

Shapiro, C. & Varian, H.R. (1999). *Information rules. A strategic guide to the network economy*. Boston: Harvard Business School Press.

Sharp, H., Rogers, Y. & Preece, J. (2007). *Interaction design. Beyond human-computer interaction* (2nd ed.). West Sussex: John Wiley & Sons Ltd.

Stake, R.E. (2005). In N.K. Denzin & Y.S. Lincoln (Eds.). *The Sage handbook of qualitative research* (3rd ed., pp. 443-466). Thousands Oaks, California: Sage Publications, Inc.

Star, S.L. & Bowker, G.C. (2006). In L.A. Lievrouw & S. Livingstone (Eds.). *The handbook of new media. Social shaping and social consequences of ICTs* (Rev. ed., pp. 230-245). London: Sage Publications Ltd.

Star, S.L. & Ruhleder, K. (1996). Steps towards an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research, 7*(1), 111-134.

Star, S.L. (1999). The ethnography of infrastructure. *American Behavioral Scientist, 43*(3), 377-391.

Winsløw, J. & Jørgensen, M.F. (2009). Koks i SU-systemet. Både brugere og ansatte græder. *HK Statsbladet, oktober.*

Yildiz, M. (2007). E-government research: Reviewing the literature, limitations, and ways forward. *Government Information Quarterly, 27*(3), 646-665.

Yin, R.K. (1981). The case study as a serious research strategy. *Science Communication, 3*(1), 97-114.

Yin, R.K. (2003). *Applications of case study research* (3rd ed.). London: Sage Publications, Ltd.

Electronic sources

Dalhoff, A. (2011). Studieadministrativt systemskifte på vej igen-igen? *CBS Observer.* Retrieved July 12, 2011, from http://cbsobserver.dk/studieadministrativt-systemskifte-paa-vej-igen-igen

Deloitte Business Consulting. (2008a). *Digitalisering af SU-administrationen. Undersøgelse af best practise i forbindelse med digitalisering af SU-administrationen.* Retrieved May 15, 2011, from Undervisningsministeriet. Uddannelsesstyrelsen Web site http://www.sustyrelsen.dk/udst/

Deloitte Business Consulting. (2008b). *Indførelse af øget dataudveksling mellem US2000 og udvalgte studieadministrative systemer. Udkast til hovedtidsplan.* Retrieved May 15, 2011, from Undervisningsministeriet. Uddannelsesstyrelsen Web site http://www.sustyrelsen.dk/udst/

Edwards, P.N., Jackson, S.J., Bowker, G.C. & Knobel, C.P. (2007). Understanding infrastructure: Dynamics, tensions, and design. Report of a workshop on "History & theory of

infrastructure: Lessons for new scientific cyberinfrastructures". Retrieved June 1, 2011 from http://hdl.handle.net/2027.42/49353

Gudmunsson, S. & Larsen, H. (2011). Kommuners netsider er volapyk for unge. Berlingske. Retrieved January 22, 2012, from Berlingske Web site http://www.b.dk/nationalt/kommuners-netsider-er-volapyk-for-unge

Kildebogaard, J. (2011). Kommuner indrømmer fiasko: unge fatter ikke digital selvbetjening. *Version2*. Retrieved January 22, 2012, from Version2 Web site http://www.version2.dk/artikel/kommuner-indroemmer-fiasko-unge-fatter-ikke-digital-selvbetjening-32054

Styrelsen for Statens Uddannelsesstøtte. (28.1.2011). *SU-styrelsens digitale selvbetjeningsløsning på SU-området* (presentation, no web site).

Styrelsen for Videregående Uddannelser og Uddannelsesstøtte. (2011). *SU-støtte & SU-gæld 2010*. Retrieved January 16, 2012, from Ministeriet for Forskning, Innovation og Videregående Uddannelser Web site http://fivu.dk/publikationer/2012/su-stoette-og-su-gaeld-2010/su-stoette-og-su-gaeld-2010

The Danish Government, Local Government Denmark (LGDK) and Danish Regions. (2007). *The Danish e-government strategy 2007-2010. Towards better digital service, increased efficiency and stronger collaboration*. Retrieved July 12, 2011, from Ministry of Finance Web site http://uk.fm.dk/Publications/2007/Danish%20e-governent%20strategy%202007-2010.aspx

United Nations, Economic and Social Affairs. (2010). *United Nations e-government survey 2010. Leveraging e-government at a time of financial and economic crisis*. Retrieved October 23, 2011, from UN Public Administration Programme Web site http://www2.unpan.org/egovkb/global_reports/10report.htm

Winsløv, J. & Jørgensen, M.F. (2009). Koks i SU-systemet. Både brugere og ansatte græder. *HK Statbladet* (9), 6-8. Retrieved June 1, 2011, from http://www.e-pages.dk/hk/274/6

Interviews

Dilling-Hansen, B., study secretary for programmes BA in information management and MSc in business administration & information systems, CBS. (2011, July 19). Personal interview.

Nielsen, P., head of department & Slidsborg, B., specialist consultant at Kontoret for Statens Uddannelsesstøtte (KSU), the Ministry of Science, Innovation and Higher education. (2012, January 19). Personal interview.

Web pages

Danmarks Statistik. (n.d.). *Nyt fra Danmarks Statistik. Arbejdstidsregnskabet 3. kvt. 2011*. Retrieved October 21, 2011, from Danmarks Statistik Web site http://www.dst.dk/Statistik/nyt/Emneopdelt.aspx?psi=640&show=2

Danmarks Statistik. (n.d.) *Tabeller i statistikbanken. Beskæftigelse i offentlig forvaltning og service (kvt.).* Retrieved January 17, 2011, from Danmarks Statistik Web site http://www.dst.dk/statistik/nyt/relateret.aspx?psi=1387

Undervisningsministeriet. Uddannelsesstyrelsen. (n.d.). *Afdelingen for uddannelsesstøtte.* Retrieved June 10, 2011, from Undervisningsministeriet Web site http://www.sustyrelsen.dk/udst/

Appendix 1: Interview guide, CBS

A semi-structured interview guide for interviewing the SU workers of CBS

Topics:

1. Infrastructure
    a. Users
    b. Systems (SPARC, US2000, minSU, training)
    c. Core processes – now/before
2. Implementation
    a. Process
    b. Experiences
    c. Participation
    d. Challenges

Appendix 2: Interview guide, RUC

A semi-structured interview guide for interviewing an SU worker of RUC

1. Background
    a. How many years have you worked with SU?
    b. How do you view you role? What do you think is the purpose of your work?
    c. Could you describe the optimal application processing?
2. Phase 1: Digitalisation – a student has to apply SU through minSU
    a. How would you describe the requirements KSU placed on you and your institution?
    b. How would you describe the information you received concerning how to best help the students if they encountered any problems in application process?
    c. What can you do to help the students?
    d. How do you think the students have experienced this phase?
3. Phase 2: Data integration between the study administrative systems and KSU's system US2000?
    a. How have you experienced the phase 2?
    b. How have you experienced the requirements KSU placed on you and your institution during the phase?
    c. How would you describe the information you received on the phase and the implications of it?
    d. How were you involved in design, development, testing? What were your expectations?
    e. How would you describe the cooperation with study secretaries (who are responsible for typing the information)? Can you think of any problem?

4. Phase 3: Integration of study activity control

    a. How have you experienced the phase 3?

    b. What have the requirements of KSU been for you and your institution?

    c. How would you evaluate the information you received on the phase?

    d. How were you involved in the phase?

    e. What was the role of the IT department?

Appendix 3: Interview guide, KSU

A semi-structured interview guide for interviewing KSU's head of department Peter Nielsen and his colleague specialist consultant Belinda Slidsborg. Topics:

1. US2000
    a. How long has the system existed?
    b. How long has KSU have the responsibility for the system?
    c. How has the cooperation with the supplier been?
    d. What are the strengths and weaknesses of the system?
2. Digitalisation
    a. How much time did KSU have in carrying out the digitalisation?
    b. How would you describe KSU's strategy?
    c. In which part of the process has KSU experienced most problems and what is KSU's evaluation of the reasons for the problems?
    d. Has KSU been successful during the process, and when and why?
3. Users
    a. How were the end-users involved in the process?
    b. How did KSU inform the workers about the process and its requirements?
    c. How do you view the critique the end-users have expressed?
    d. How does KSU view the users?
    e. What do you think KSU could have done differently and how?
    f. What do you think KSU has been successful or done well?

Appendix 4: Statistics, universities

Ansøgninger ialt i perioden 2007 - 2010 til Universiteter fordelt på ekspeditionstid - Antal

Støtteår (stot_aar)	1-10 dage	11-20 dage	21-30 dage	31-40 dage	41-50 dage	Over 50 dage	Ansøgninger behandlet i året ialt	Ansøgninger behandlet før støtteåret	Ansøgninger vedrørende støtteåret ialt
2007	79.191	32.223	5.770	2.104	1.567	2.142	122.997	5.988	128.985
2008	76.722	32.565	6.776	3.036	1.783	2.887	123.769	5.554	129.323
2009	77.650	38.681	8.802	3.831	1.830	2.537	133.331	6.372	139.703
2010	90.635	33.549	10.189	4.344	2.634	2.480	143.831	5.900	149.731

Ansøgninger ialt i perioden 2007 - 2010 til Universiteter fordelt på ekspeditionstid - Procent

Støtteår (stot_aar)	1-10 dage	11-20 dage	21-30 dage	31-40 dage	41-50 dage	Over 50 dage	Ialt
2007	64	26	5	2	1	2	100
2008	62	26	5	2	1	2	100
2009	58	29	7	3	1	2	100
2010	63	23	7	3	2	2	100

Source: SAS output, SU

Appendix 5: Statistics, CBS

Antal ansøgninger gennem minSU samt ansøgninger ialt i 2007 - 2010 til Handelshøjskolen i København samt digitaliseringsgrad

Støtteår (stot_aar)	Ansøgninger gennem minSU	Ansøgninger vedrørende støtteåret ialt	Digitaliseringsgrad for institutionen	Digitaliseringsgraden i gruppen af sammenlignelige institutioner
2.007	10.192	15.776	64,6	51,7
2.008	11.098	15.485	71,7	56,1
2.009	12.320	16.032	76,8	65,3
2.010	14.375	17.454	82,4	77,6

Rapporten omfatter institutionsnummer 0017

Ansøgninger ialt i perioden 2007 - 2010 til Handelshøjskolen i København fordelt på ekspeditionstid - Procent

Støtteår (stot_aar)	1-10 dage	11-20 dage	21-30 dage	31-40 dage	41-50 dage	Over 50 dage	Ialt
2007	70	26	2	1	1	1	100
2008	71	23	3	1	1	1	100
2009	69	26	3	1	1	1	100
2010	68	23	5	2	1	1	100

Rapporten omfatter institutionsnummer 0017

Source: SAS output, SU

Appendix 6: Statistics, RUC

Antal ansøgninger gennem minSU samt ansøgninger ialt i 2007 - 2010 til Roskilde Universitetscenter samt digitaliseringsgrad

Støtteår (stot_aar)	Ansøgninger gennem minSU	Ansøgninger vedrørende støtteåret ialt	Digitaliseringsgrad for institutionen	Digitaliseringsgraden i gruppen af sammenlignelige institutioner
2.007	4.067	9.438	43,1	51,7
2.008	4.553	9.267	49,1	56,1
2.009	6.070	9.755	62,2	65,3
2.010	8.319	10.677	77,9	77,6

Rapporten omfatter institutionsnummer 0004

Ansøgninger ialt i perioden 2007 - 2010 til Roskilde Universitetscenter fordelt på ekspeditionstid - Procent

Støtteår (stot_aar)	1-10 dage	11-20 dage	21-30 dage	31-40 dage	41-50 dage	Over 50 dage	Ialt
2007	76	20	2	1	1	1	100
2008	73	21	3	1	1	1	100
2009	70	25	3	1	0	1	100
2010	76	20	2	1	1	1	100

Rapporten omfatter institutionsnummer 0004

Source: SAS output, SU