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a longitudinal case study in a Danish local government

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Key decisions regarding new information infrastructure; a longitudinal case study in a Danish local Government

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Abstract

This working paper outlines the research design of an on going longitudinal study in Aalborg local government from 2008-2011. Inspired by Flyvbjerg's research methodology on single case studies (Flyvbjerg 1998), the PhD research is doing an in-depth case study on how information infrastructure is negotiated locally through complex processes. The scope of the study is the decisions and policymaking concerning the implementation of the digital communication and archive solution in Aalborg Local government (www.oes.dk). The research goes back to pioneer studies of Kraemer, King, Kling, Danziger et al. from the so-called 'Irvine school, 1970-94'. These studies will serve as a starting point for understanding the interplay between organizational and technological change. Research of the Irvine School stresses that in most situations, the actions of management are instrumental in determining the success and failure of innovation efforts (Kraemer and Danziger 1982). Consequently, this research will carry out an in-depth analysis of the actions of management. The study focuses on how the managers interpret and negotiate a new technology into their local government. Following, which key actors of the local government have the power to dominate the negotiation and by which means/arguments are they in charge of this power?

Key words: E-Government, local government, decision-making, 'The Irvine School'

Introduction

Aalborg is the fourth-largest city in Denmark, however the local government of Aalborg is the third largest with approx 200.000 inhabitants and a total area of 1.144 km² in 2007.

The local government has since 2007 gone through a major change process during the municipal reform in Denmark in 2007. The reform has brought 4 smaller local governments under one local government in Aalborg. This change has forced the local government to develop and look for new digital infrastructure solutions.

Meanwhile, at a national level in Denmark, thirty-five initiatives have been decided as the

Digital strategy towards 2012 (www.modernisering.dk). Implementation by legislation is the rule for some of these solutions in the local government, but the vast majority of solutions in the local government are implemented by choice.

At the moment one of these initiatives is in the process of being chosen in Aalborg Local government. The solution is called "The digital communication and archive solution" and has been specified and agreed at a national level since 2007. From July 2009 to December 2009 local governments in Denmark are able to choose, to be among the first, to implement this new digital solution.

The digital communication and archive solution enables public and governmental institutions to send digital documents to citizens and businesses through a secure application. It also serves as an example of a solution, which is about to be negotiated through various layers of the Danish society and finally (possibly) becoming a tool used by citizens and local governments employees across the nation. Furthermore, this solution possibly will play a key role in the building of the Danish digital infrastructure. A key infrastructure part, which agreeably has been decided on a national level, but in the years to come, faces the crucial processes of being negotiated and fitted into the local embedded and contextual dependent infrastructure of a local government.

Consequently, from a local government perspective, an in-depth analysis of the negotiation from an external strategy to an internal concrete plan of implementation is required. The purpose of the overall study is to develop a greater understanding on how a new digital solution is decided and (possibly) implemented into the infrastructure of a local government in Denmark.

This working paper gives a brief overview of a proposed theoretical framework and displays considerations on how to apply it in the context of Aalborg local government. Furthermore it presents key methods and a research design.

Theoretical framework: the Irvine School, 1970-94

The Irvine School of research and instruction in information systems was born in the early 1970s with a series of studies in American local governments. The Irvine school was distinct in its focus on the social and organizational implications of information technology. Over more than twenty years, the Irvine school developed and employed empirical research methods to study automation in a wide display of organizations. (Kraemer 1987; King 1989)

A central concern of the Irvine School was a concern with policy implications.

Earlier research at the Irvine School was based on the expectation, that the environmental circumstances would be the dominant factors in shaping use of the technology. Nevertheless, research showed that in most situations the actions of the intra-organizational management were instrumental in determining the success or failure of innovation effort.

In the Urbis project (Kraemer, King et al. 1977), for instance, it was the expectation that the workers would feel suppressed by the computers. The expectation was that the workers would feel the computers as an instrument of administrative reform, but in reality the research showed the workers liked the computers and the new power structures. (Danziger and Kraemer 1986; King 1989)

The research concludes that information technology has never been an instrument of only administrative reform; rather, on an intra-organizational level, it has been used to reinforce existing administrative and political arrangements. As the introduction of computers merely reinforces the existing power structures, the actions of management turned out to be a central research area, in the understanding of the success and failure of IT implementation, for the Irvine school. (Bretschneider 1986)

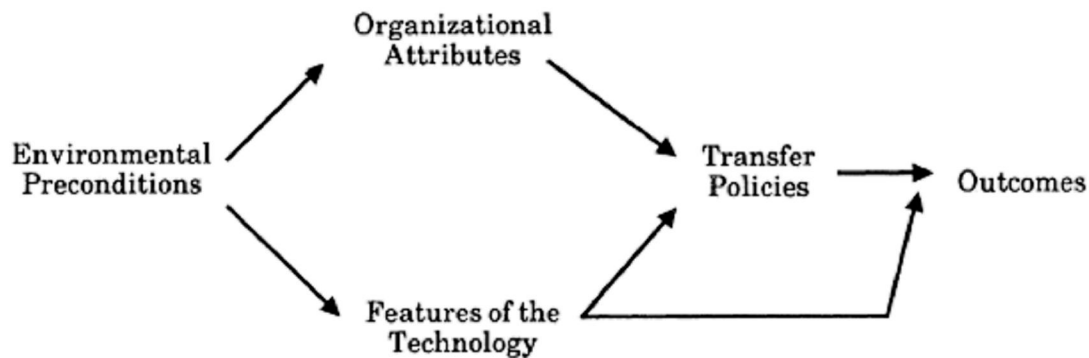
According to Kraemer and King, prescriptive literature was full of admonitions about the importance of management in effective use of information technology. (Kraemer and King 1986) However, the empirical work on the role of management and the usefulness of management policies were lacking. (Kraemer and King 1986) The Irvine School research revealed the crucial role of management action in determining the courses of automation, even in the case where major environmental changes were present. Moreover, they showed that there were distinct patterns of management action that yield different outcomes. Rather than evolving through stages of growth, the Irvine studies showed that computing evolves through states that are less deterministic and more dependent on the judgment of management. (King 1989)

The Irvine School made several contributions to the policy literature some of them were:

- 1) Keeping up with technology is strongly associated with the productive use of technology

- 2) The mobilization of political support for computerization efforts is essential to continued success
- 3) Certain policy problems such as centralization vs. decentralization have no inherent resolution
- 4) Conventional approaches to training do not bring positive results in user performance.(Kraemer and King 1986)

To understand the interplay between the technological change and the social change King and Kraemer introduced a research framework King and Kraemer (Kraemer and King 1986) to examine factors influencing implementation and use of computer models that had been successfully institutionalized as part of a federal policy-making. The study concluded that the most important influences on successful modelling were the means to do modelling and the desire of bureaucrats and politicians to use model-generated information. Furthermore the research showed that the availability and promotion of computer models alone was insufficient to generate use, whereas their political saliency was critical. Thus, where the means to do modelling was weak, but the desire to use model was strong, the government agencies invested heavily in the creation of new modelling efforts. (Kraemer and King 1986)



(King and Kraemer 1986)

This model highlights the mix of circumstances and policies that appears to be working together in accounting for IT policy success.

- 1) Environmental Preconditions: This aspect contains the availability of financial support for

implementing new IT solutions. Furthermore the institutions bureaucratic flexibility or rigidity toward adoption of new IT solutions. In addition, the motivation to use new analytical techniques towards reliance on data based arguments in making proposals and arguing for IT solutions.

- 2) Organizational attributes: The characteristics of both the system developer and user organizations, including the professional reputation and qualifications of the organizations' technical staffs.
- 3) Features of the Technology: The sophistication and complexity of the technology itself. The data it requires, the hardware/software infrastructure upon which analysis depends, and the relative ease of use of the solution package
- 4) Transfer Policies: The strategies and policies followed by vendors and local governments to move the digital communication and archive solution and their supporting infrastructure from the development laboratory to the using organization.

The dynamics of computing

The Irvine school, furthermore, introduced a more basic framework for understanding the dynamics of computer use and the dynamics of computing. The basic framework consists of three steps:

1.Introduction and conquest
2.Experimentation and expansion
3.Competition and regulation

(King and Kraemer 1985)

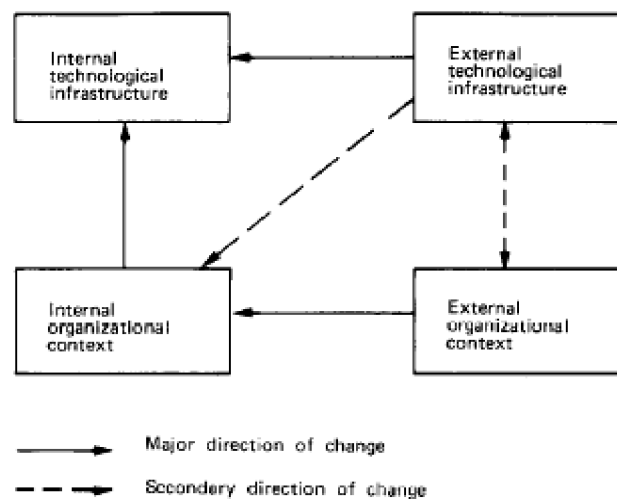
Institutions in the introduction and conquest state are recent adopters with little computing capacity and staff experience. This level has problems generating support for the technology, communication with users and responding to users need. The primary payoffs are in speed and accuracy of operations and cost avoidance. (King and Kraemer 1986)

Institutions in the experimentation and expansion state, are adequate adaptors with moderate computing capacity and staff experience. They have relatively few operational or user problems. The primary payoffs arise for further integration of applications into organizations operation and from primitive application to planning and management.

Institutions in the competition and regulation state are early adopters of computing with large, sophisticated computing capacity and technical expertise in a single central installation and many sophisticated applications serving many departments. Effectiveness payoffs derive from applications of computing to planning, management and control.(King and Kraemer 1986)

King and Kraemer proposed that higher levels of problems with computing occur in organizations that have more experience with computing (the third state), since those levels also reflect higher demands from existing computing systems and limited resources, even though some benefits are also observed.(Kraemer and King 1986) Each stage has specific policy needs associated with it, for example, in the final stage; few operational benefits from computing emerge, though some benefits form earlier implementation of planning systems may be realized. At the same time, moderate to major problems exist in staffing and responsiveness, but little difficulty is associated with organizational support. (Kraemer and Perry 1989)

In addition to proposing three overall stages to address dissimilar policy issues, King and Kraemer introduced a model of understanding dynamics of pathways between internal technological infrastructure, internal organizational context, external technological infrastructure and external organizational context. (King and Kraemer 1985)



Based on their empirical research the model suggests that organizational context will be more influential than technological infrastructure in determining the growth and use of computers in the organizations. The research showed that many organizations still used batch application, even though they ran them under modern computing hardware.

Moreover, the research suggested that organizational demand forces control the speed of change in computing in organizations.

The King and Kraemer model assumes that the primary change in computing are the continual shifts in the political and economics fortunes of organizational actors who recognize and exploit changes in computing technology opportunities in order to accomplish their personal and institutional objectives within the constraints of organizational resources.(King and Kraemer 1985)

The King and Kraemer model pays less attention to the technological infrastructure, and concentrates instead on the prevailing political/economic decision-making patterns within the organization. Technological change is recognized as a factor in making new opportunities available to the organization, but many such opportunities arise from a variety of sources (for instance new markets to exploit). Technological change is only one of several change factors affecting the political/economic equilibrium of organizational decision-making. The primary driver of change becomes the organizational demand for exploitation of new opportunities, of which computing is only one. (Kraemer, King et al. 1977; Kraemer and King 1986)

Accordingly, key research questions in this study are; how the managers interpret and negotiate the digital communication and archive solution in the environmental preconditions of Aalborg local government? Which organizational attributes (key actors) of the local government have the power to dominate the negotiation and by which means/arguments are they in charge of this power? To what extend does the actual features of the digital communication and archive solution allow or constrain certain arguments? Accordingly, to what extend are the locally negotiated policies capable of complying with the environmental preconditions, the organizational attributes and the features of the technology?

Theory applied

Since the Irvine School research, the technology has changed from computers as processing machines to computers as networked society and workplaces. The context between an American and Danish local government may also differ a great deal. Nevertheless, the core dynamics of computing, the focus on the actions of the management and the social models of policy making created in the 1980s can be very valuable starting points in today's context. For instance, the different levels suggested by King and Kraemer derive from research in the 80s where computers were becoming a central technology in most local governments in America. In modern research, new technologies can be viewed as separate waves, each potentially manifesting the same or similar stages as identified by King and Kraemer. (Bretschneider 1986)

Consequently, this study will draw upon general findings from pioneer studies in a modern research design based in Aalborg local government.

Today, the local governments are striving to keep up with new technology. Preliminary research on this thesis (Interview_1 2009) show that managers often feel they are late movers in a contest where they should be early adopters. Furthermore the mobilization of political support has become even more eminent in the Danish context after the municipal reform (effectuated in January 2007) and the strategy of digitalization 2007-2011. Trying to solve IT problems within the centralization vs. decentralization debate and conventional approaches in training new IT solutions are in addition still a common problem.

The use of frameworks from the Irvine School propose the identification of the classes of factors, which are influential in achieving success, in the decisions and implementation of a new IT solution in Aalborg local government. In addition, the research will be able to highlight the mix of circumstances and policies that appears to be working together in accounting for IT policy success.

The research framework, proposed by King and Kraemer, has been rewritten to fit a framework for the study on the genesis and implementation of the digital communication and archive solution in Aalborg local government:

- 1) Environmental Preconditions: In the Danish context, the degree of pressure from national and regional levels to implement initiatives from the strategy of digitalization will be considered a precondition. Another environmental precondition in this specific case, the

strong autonomy in the history of Aalborg local government, as a consequence, in 2008, not a single initiative from the national strategy considered an implementation target.

- 2) **Organizational attributes:** This aspect will focus on the orientation of the main users towards policy acceptance, rejection or new interpretations of the policy. In the particular context the system has already been specified and developed by a vendor, consequently, the system development in Aalborg local government is more of a social character and different levels of learning through user involvement in the decision and implementation process.
- 3) **Features of the Technology:** In Aalborg local government the actual features of the digital communication and archive solution is essential in several ways. The implementation requires and additional change of many other embedded infrastructures such as the digital security levels.
- 4) **Transfer Policies:** Policy transfer refers to the process by which key actors from Aalborg local governments borrow policies developed at a national level and develop programs and policies in their own setting. An additionally, in the building of new information infrastructure, this aspect concerns to what extend the new programs and policies in comply with the environmental preconditions, the organizational attributes and the features of the technology.

The research of King and Kraemer showed that many organizations still used batch applications, even though they ran them under modern computing hardware. Their research suggested that the organizational demands forces control the speed of change in computing in organizations.

This finding is particularly interesting in the case of the digital communication and archive solution in Aalborg local government. Hence, the question of whether or not to adopt and use new technologies will be answered on more complex grounds than whether or not the technology exists. King and Kramer conclude that the technology must exist, at least rhetorically, to make the question sensible to the local government, but the degree of adoption will depend on the nature of the organization at that time.(Kraemer and King 1976; King and Kraemer 1986)

In the study of Aalborg local government, this means that the rhetoric of trailing the digital communication and archive solution for now can be observed as a goal from external contexts. This is an external goal, which may be adopted into the internal organizational context, if key actors see this as an objective.

For the local government of Aalborg, organizational goals are not assumed static and consensual. More accurately, goals are, in terms of King and Kraemer, in a state of constant flux as new opportunities emerge for the key actors. (Northrop, Dutton et al. 1982; King and Kraemer 1986) Consequently, the research questions raised in this working paper becomes essential to follow during a longitudinal study. Where goals and objectives seem to change constantly; how are these essential choices made during the decision and (possible) implementation of the digital communication and archive solution?

Methods: A longitudinal case study in Aalborg Local Government

The findings reported from the Irvine School were based on empirical research conducted into computing use in complex organizations over 20 years. Most of the research on local governments was conducted by the URBIS group at the University of California, Irvine. The Irvine school had multiple perspectives for viewing the interaction of technology and organizations. A dominant characteristic was its empirical orientation, especially *in vivo* studies on living organizations in the field, as opposed to *in vitro* laboratory studies (Kraemer, King et al. 1977). The Irvine School's broad interest in understanding the ways in which technology was adopted and adapted and the effects of technology use on subsequent organizational behaviour entails a focus on change over time. Various projects have been carried out. Some shorter project from two to three years (The Noah project, the desktop project) and some cover longer time frames over 10 to 20 years (Globalization of information technology project or the URBIS project). (King and Kraemer 1986) Consequently, King and Kraemer argues that longitudinal study can be costly and time consuming, but is necessary for answering difficult questions about the interaction of technology and social entities. King and Kraemer also argue that research should depend on historical research. This compromises data collection to some extent, but it opens for investigation issues and events that show great promise for informing an understanding of the process of change. (King and Kraemer 1994)

Following the tradition of the Irvine school the study in Aalborg local government will be based on both a historical and a longitudinal approach. This implies a thorough data collection and document study on the history on Aalborg local government. Following, qualitative methods such as interviews, observations and feedback sessions with key organizational actors. The essential elements of historical and longitudinal approaches, in this study are the development of a coherent explanatory framework of the genesis and implementation process in Aalborg local government.

The particular choice of Aalborg local government is based on its history as a vastly self-governing local government. A strong autonomy and a focus on developing locally designed digital infrastructure surrounds an interesting research area, accessible for studying the complex process of deciding and implementing a national initiative into an exiting digital infrastructure

The Irvine School used a mixture of qualitative and quantitative methods both across and within particular studies. Due to the size and scope in this project, a longitudinal single case study will be carried out. This study will, furthermore, primarily be based on qualitative research methods.

The choice of a single case study in Aalborg local government is, in addition, inspired by the works of Bent Flyvbjerg, who in *Power and Rationality* (Flyvbjerg 1998) conducts a very detailed and longitudinal case study in Aalborg local government on city planning.

Flyvbjerg argues that there are several misunderstandings regarding a single case study as a research method. First he argues that predicting theories and universals do not exist in the study of human nature and society. The concrete and contextual knowledge, consequently, is more important and valuable than futile attempt of finding predictable theories and universals. (Flyvbjerg 1998) Secondly, Flyvbjerg argues that a single case study frequently can be used to generalise knowledge in the field, as a supplement or alternate to other methods. In addition the case study is useful in hypothesis-creation, but is not limited to there research activities. (Flyvbjerg 1998)

This research will carry out research through four data sources which will be employed in various combinations to take advantage of their different strong potentials and to supplement each other in their weak areas.

Document studies	A thorough study of the documents used and
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	<p>created in the process of the decision to invest in the digital communication and archive solution will be made. First of all this study can help determining the chronology of the case, secondly the narratives of the decision makers can be followed over time.</p>
Interviews	<p>The interviews are held in Aalborg Local governments over a time of two years and three interview rounds. First interviews with managers are held concerning the future decision process concerning the digital communication and archive solution. Secondly, the managers are interviewed again in the process of deciding the proposed implementation. Finally the managers and employees are interviewed during the implementation process.</p>
Participating observations	<p>Participating observations will be held with employees both before the decision process and during the implementation process.</p>
Feed-back	<p>During the longitudinal study three times the data and conclusions that the research finds, will be put forward, to be evaluated in different practical contexts. The feed back from this process hopefully will sharpen the thesis in a practical level.</p>

Research design

In 2007, the Danish Agency of governmental affairs launched an EU tender on the establishment and implementation of a cross-governmental digital communication and archive solution. The digital communication and archive solution will allow public and governmental institutions to send digital documents to citizens and businesses through a secure application.

The project on establishing, specifying and designing the digital communication and archive solution from a national level has had a quite problematic genesis. After two years the present EU tender was redrawn due to both specification, regulatory and vendor problems. In May 2009, however, a final vendor was chosen and the local governments are now in the process of deciding whether or not to implement the solution. (www.oes.dk)

The Longitudinal case study is divided into three phases in the local government following the genesis of the decision, the proposed implementation and the development of an explanatory model.

ID	Task Name	Start	Finish	Duration	2009												2010												2011										
					jun	jul	aug	sep	okt	nov	dec	jan	feb	mar	apr	maj	jun	jul	aug	sep	okt	nov	dec	jan	feb	mar	apr	maj	jun	jul	aug	sep	okt	nov	dec	jan	feb	mar	apr
1	PHASE I- GENESIS	25-05-2009	01-01-2010	160d	[Red bar]																																		
2	Preliminary documentary studies	25-05-2009	17-07-2009	40d	[Green bar]																																		
3	History and organisation of Aalborg local government	25-05-2009	31-07-2009	50d	[Green bar]																																		
4	Key actors identified	25-05-2009	11-09-2009	80d	[Green bar]																																		
5	Interviews with key actors – Round One	09-09-2009	29-12-2009	80d													[Green bar]																						
6	Documentary studies on discourses from the genesis process	14-09-2009	29-12-2009	77d													[Green bar]																						
7	PHASE II - PROPOSED IMPLEMENTATION	01-01-2010	01-10-2010	196d													[Red bar]																						
8	Interviews with key actors – Round two	11-03-2010	11-05-2010	44d													[Green bar]																						
9	Participating observations with employees using DCAS	16-02-2010	10-08-2010	126d													[Green bar]																						
10	PHASE III – EXPLANATORY MODEL	01-10-2010	29-04-2011	151d																									[Red bar]										
11	Interviews with key actors – Round Three	11-10-2010	17-12-2010	50d																									[Green bar]										
12	Feed-back session with key actors	11-10-2010	14-12-2010	47d																									[Green bar]										
13	Participating observations with employees using DCAS	06-12-2010	22-02-2011	57d																									[Green bar]										
14	Developing explanatory model	26-11-2010	03-05-2011	113d																									[Green bar]										

Phase I - The Genesis: Follows the time of the decisions to implement the digital communication and archive solution. This phase will contain a historical data collection of Aalborg local government. This phase also finishes the identification of key organizational actors and carries out the first round of interviews with those identified.

Phase II ó Proposed implementation: If the decisions are made, the implementation process will start the first of January 2010. From that point this research will do a second round of interviews with key organizational actors. Subsequently, participating observations with the users of the digital communication and archive solution will be carried out.

Phase III ó Explanatory model: Phase three will contain feedback sessions, preliminary evaluations and the development of an explanatory model. Based on the historical and organizational context, the explanatory model will try to extract learningø and understandings form the process of deciding and implementing a new digital solution into a local government.

Conclusion

This working paper introduces a longitudinal case study in Aalborg local government from 2008-2011. It describes the proposal to follow the decisions and the consequences of decisions concerning a new national initiative labeled the digital communication and archive solution.

Inspired by the methodology of Flyvbjerg (Flyvbjerg 1998) a longitudinal single case study is designed containing document studies, interviews, participating observations and feedback session. The working paper introduces two theoretical frameworks; first a framework, which emphasizes the classes of factors that are influential in achieving success in the decisions and implementations of new IT solutions. During four variables (environmental preconditions, organizational attributes, features of technology, and policy transfer). This proposed framework permits the research to bring light to the mix of circumstances and policies, which appears to be working together in accounting for IT policy success. Secondly, a framework adopted from òdynamics of computingö. Based on the relationships between internal organizational contexts, internal technological infrastructure, external organizational context and external technological infrastructure the framework underline the significance of the power structures in the internal organizational context.

By preferring these frameworks, this working paper emphasizes the value of tracing the literature back to the pioneer studies of òthe Irvine Schoolö to form a starting point in a modern day research on computers in local governments. The working paper concludes by presenting a research design containing three phases. In the genesis phase, it is argued that even before the implementation, the proposed change is upsetting the political/economic equilibrium of the organization. In the genesis and the implementation phase the research aim to contribute with knowledge on how and why key organizational actors, through negotiation or raw power, can re-establish the political/economic equilibrium of the changing organization, at least for a while. (King and Kraemer 1986; Flyvbjerg 1998) In the explanatory model phase the research aim to make its contribution in line with both the proposed theoretical tradition as well as the empirical reality in Aalborg local government. Hence, learningø and understandings will be extracted and negotiated in feedback sessions with key actors and employees.

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