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IT Management in Local Government: Engaged Problem Formulation

Research-in-Progress

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Abstract

The use of information technology (IT) is increasingly important for local governments (municipalities) in adhering to their responsibilities for providing services to citizens and this requires effective IT management. We present an engaged scholarship approach to formulating the IT management problems with local government – not for local government. We define such engaged problem formulation as joint learning and definition of a contemporary and complex problem by researchers and those who experience and know the problem. This engaged problem formulation process was carried out as an initiation of action research and design science research activities at multiple levels in Danish municipalities. In this paper we present the IT management problems identified in our study and discuss the engaged problem formulation process in relation to engaged scholarship and implications for action research and design science research activities.

Keywords: Engaged scholarship, IT/IS management, Action research, Design science research, E-government

Introduction

Information technology (IT) can provide local government with great opportunities for improving their interoperability, services, and efficiency (Eyob 2004; Ho 2002; Landsbergen Jr and Wolken Jr 2001). Local governments like municipalities are however expected to face numerous problems in their efforts of becoming more mature in terms of e-government (Al-Sebie and Irani 2005; Layne and Lee 2001; Moon 2002). While e-government should provide public value concerning outcomes, services, satisfaction and trust (Grimsley and Meehan 2007), significant management problems are evident by the high failure rate for e-government initiatives (Goldfinch 2007).

IT management, carried out by a chief information officer (CIO) or director of IT is instrumental in organizational exploitation of IT (Feeny and Willcocks 1998). The existing research literature on IT management, e.g., (Luftman and McLean 2004; Weill and Ross 2004) is however based on a view into commercial companies with little attention, if any, to the characteristics of public administration and local government. The political contexts involve a large number of stakeholders and multiple tasks and considerations for IT management (Bannister 2002; Grimsley and Meehan 2007). These characteristics of the political context indicate the IT management challenges may be different from those already known from commercial companies, as suggested by Caudle et al. (1991). However, in a comparison of the strategic priorities of public and private sector CIOs, Ward and Mitchell (2004) found no statistically significant differences in perceptions of the biggest challenges faced by their respective organizations. Later studies comparing the IT challenges in the public and private sector still suggest several differences in addition to many similarities and technical commonalities (Barzilai-Nahon and Scholl 2007; Scholl et al. 2009). Differences in IT management concerns across regions have also been found in a multinational study, suggesting national culture and economic development infer these differences (Watson et al. 1997).

The key management issues identified by Watson et al. (1997) are among other: strategic planning, IS organization alignment, information architecture, and competitive advantage. Gottschalk (2000) synthesizes previous studies to four management issue categories: business relationship, technology infrastructure, technology application, and internal effectiveness. These integration efforts of various IT management issues are important in providing an overview of the many different studies of this topic. Studies of IT management issues have for example been conducted for Australasia's largest organizations (Pervan 1998), Canadian information systems personnel (Hayne and Pollard 2000), International information systems management and their affiliates (Lai 2001), Taiwan's enterprises (Chou and Jou 1999), Nigerian (Badamas 2008) and Chinese companies (Chen et al. 2007). IT management issues in the public sector have received similar research attention in both general and country specific investigations (Caudle et al. 1991; Chang et al. 2000; Loukis and Tsouma 2002; Swain et al. 1995).

The investigations of key IT management issues can be used to evaluate how much information systems research is addressing key practitioner concerns (Szajna 1994). This concern, for the practitioner relevance of research, demands much attention in the information systems research community as well as other research communities such as management. Design science research and action research have been emphasized in addressing the concerns regarding the relevance of research for practitioners (Baskerville and Myers 2004; Hevner et al. 2004). Engaged scholarship is a recent general method for enhancing the relevance of research for practice (Van de Ven and Johnson 2006; Van de Ven 2007) highly relevant for information systems research (Mathiassen and Nielsen 2008). Engaged means "negotiation and collaboration between researchers and practitioners in a learning community; such a community jointly produces knowledge that can both advance the scientific enterprise and enlighten a community of practitioners" (Van de Ven 2007, p. 7). While "scholarship means something more than research, and engagement is the means for scholarship to flourish" (Van de Ven 2007, p. 9).

In this paper we first report on an investigation of the problems faced by IT management in municipalities through engaged scholarship. Developing a detailed understanding of the IT management problems in municipalities is an important task in addressing the high failure rate for e-government initiatives (Goldfinch 2007). We then also seek to make a contribution and show how we have conducted an engaged problem formulation activity. We argue our approach to problem formulation is a contribution relative to engaged scholarship in general and specifically also to both action research and design science research in information systems. Engaged scholarship (Van de Ven 2007) offers an overview of what it would entail to formulate a research problem. The engaged problem formulation can be understood as to situate, ground, diagnose, and infer the problem up close and from afar by engaging those who experience and know the problem (Van de Ven 2007). This is, however, without explaining this in any detail and without relating it to neither action research nor design science research. In action research the particular focus is on defining a problem with the client (Baskerville and Myers 2004; Mathiassen 2002; McKay and Marshall 2001), but

this provides too little explanation of how to deal with cross and multilevel organizational settings as in our case. In design science research the primary concern is to address a research problem (Hevner 2007; Hevner et al. 2004) leaving little concern for working with the clients' perceptions of what the problem may be taken to be. This will be further expanded in the following section.

This paper is structured as follows. The next section summarizes our research approach to engaged problem formulation and its related theory. Subsequently we present the preliminary findings from our case of IT management in local government. We then discuss these findings along with our engaged problem formulation approach. Finally we conclude with a summary of our preliminary results.

Research Approach

The research project as a whole follows what Mathiassen (2002) has called Collaborative Practice Research. The purpose of the research project has been agreed with the client organizations to be to improve IT management in Danish municipalities. Collaborative practice research offers a research methodology assisting us in connecting: the need to understand the current IT management practices, with the need to device artifacts to support IT management, and with the need to improve IT management in the municipalities. It also offers a structure for the research organization allowing the researchers and the IT managers to collaborate. It is a prudent choice of research methodology as we intend to advance research at the same time as we advance the professional practice of IT management in municipalities and we are thus in accordance with engaged scholarship with this concern for both research contribution and practical usefulness (Van de Ven 2007, p. 2). Engaged scholarship furthermore encompasses both action research and design science research as well as both quantitative and qualitative data collection.

Overall our research methodology is action research (Baskerville and Wood-Harper 1996; Baskerville and Wood-Harper 1998; Davison et al. 2004) as a general framing in which several research activities may be conducted (Mathiassen 2002). A particular concern in action research is how we explain the two cycles: the research cycle and the problem-solving cycle (McKay and Marshall 2001) as they are distinctly different in their knowledge interest and yet intrinsically related. To this we add more precisely the idea of engaged scholarship where a stronger position is taken with "a participative form of research for obtaining the different perspectives of key stakeholders (researchers, users, clients, sponsors, and practitioners) in studying complex problems" (Van de Ven 2007, p. 9). We need to address not only the area of concern for IT management in local government as well as the problems raised by IT managers, but we further need to address this on the backdrop of a complex network of stakeholders and design how these are represented in our understanding. We therefore emphasize on how to create the linkages between the research cycle (understanding the area of concern in the stream of research) and the problem-solving cycle (understand the problems in the stream of problem-solving) involving stakeholders. When we can explain this linkage we have a proper foundation for researching how relevant the stakeholders find the different solutions to problems.

Design science research (Hevner 2007; Hevner et al. 2004; Holmström et al. 2009; Iivari 2007; Peffers et al. 2007) is a similar research methodology. Design science research differs according to Van de Ven (2007) from action research in how it relates to the organization and its stakeholders. In design science research it matters how the research problem is established both in terms of how it relates to practice through relevance and how it relates to research through rigor. Design science research does not distinguish between the area of concern and the formulated problem. Whichever problem we choose to address has to be relevant to IT management in local governments and it has to be rooted in the research body of knowledge. Design science research is based on a Simonean idea of research and problem-solving (Hevner et al. 2004) where much interest is devoted to solving the problem and much less interest is devoted to defining the problem (Iivari 2007). In particular it offers little guidance on how to relate the defining of the problem to different involved stakeholders. It is thus difficult for design science research to attack wicked, ill-structured, and poorly understood problems, however pertinent the problem situation in IT management in local governments may be.

Schön has studied professional problem-solving in a wider perspective than Simon (Lanzara 1983; Schön 1983) and he argues the most important part of problem-solving is the formulation of the problem or in his terms, problem framing. The problem definition points to the solution and problem and solution are in this way intrinsically related. If we want to address ill-structured problem situations in research we will also have to approach problem formulation as part of the research. We need to step back from a given problem and scrutinize it critically before we

commit to a particular problem definition within an area of concern (in our case: IT management in local governments).

The involved stakeholders, influence how a problem is formulated (Van de Ven 2007). From a logical as well as an ethical standpoint the researchers are also just stakeholders and the researchers are rarely in full control of the problem situation (Avison et al. 2001) and of how problems are defined. Engaged scholarship is a collaborative form of research emphasizing how to obtain different stakeholders' perspectives. The research process should thus be conducted in such a way that we can situate and ground our understanding of a problem situation and we can diagnose and infer problem definitions through our interactions with the different stakeholders based on how they experience the problem situation (Van de Ven 2007, p. 9).

We take problem formulation to be an empirical research process and as a consequence collect and analyze empirical data as a significant part of the problem formulation process. What we take to be the problem(s) and how we thus formulate the problem definition(s) is emergent. If we plan this in detail, in advance, and if we take full control we cannot maintain that we are performing engaged problem formulation. What we can do in advance is forming the research organization and roughly outline the first activities. After that it is important to listen to and document the feedback from the involved stakeholders.

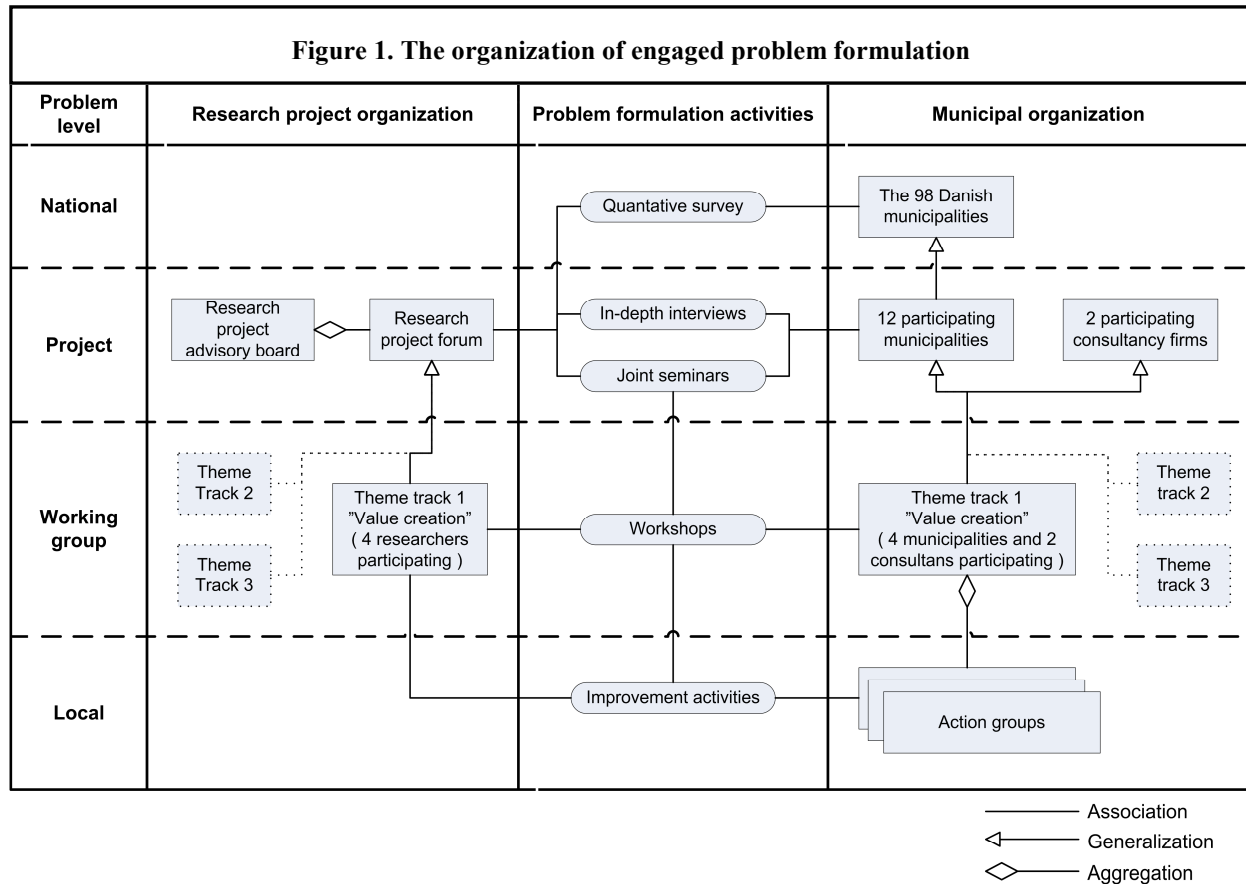
Case and Findings

The engaged problem formulation activities are carried out as part of a research project with a formulated goal of investigating digital service integration through effective management of IT in Danish municipalities. This project has a budget of €2.2 million and is running from January 2009 to July 2012. The project participants consists of 12 Danish municipalities, 2 IT consultancy firms with extensive public sector experience and 12 IS researchers from different departments.

The IT management problems of local government were investigated at four descending problem levels by the research project: national, project, working group, and local as illustrated in **Error! Reference source not found.** The research project organization is illustrated in the second column from the left in **Error! Reference source not found.** The figure furthermore includes the problem formulation activities carried out in the project in the third column along with the organization of the participating municipalities and consultancy firms in the fourth column. The relationships between organizational instantiations and activities are described in the figure as association, generalization, or aggregation.

Error! Reference source not found. shows the organization of engaged problem formulation in the research project. The problem formulation activity at the national level was an extensive quantitative survey of the CIOs in the 98 Danish municipalities conducted in May 2009. The problem formulation activity at the project level was in-depth interviews with CIOs, municipal chief executive officers (CEOs), and citizens service managers in 12 selected municipalities during 2009. Based on these two problem formulation activities a 1-day joint seminar was held with all the main stakeholders presenting and discussing the identified IT management problems. Following the joint seminar, the research project advisory board decided which three problem themes were to be pursued by three working groups. This advisory board consists of the 12 municipal CIOs, 2 representatives from the consultancy firms, and two of the researchers. Each of the three working groups involves representatives from the 12 municipalities with a particular interest in the working group's topic along with a representative from each of the two consultancy firms and at least two researchers responsible for the group. We limit this presentation to only include details from working group #1 titled "Value creation".

Four municipalities' CIOs joined working group #1 together with two consultants and four researchers. The participating municipalities range from 4,000 to 30,000 employees and thereby represent different perspectives on the scope of IT management. Three workshops have been held by the working group on: (1) problem definitions, (2) specific cases from the participating municipalities, and (3) the results of a study of the research literature related to the working group topic. The local level improvement activities are about to start. The researchers will in pairs participate in the improvement activities in each of the municipalities. The first iteration in each municipality will take an adapted technique for IT business case and try it out in small sessions with the CIO and her/his staff.



In the following each of the 4 problem levels are elaborated in terms of initial knowledge interest, involved stakeholders, data collection and analysis, analysis results, resulting problems, and how these problems were fed into the lower problem levels.

National Level

The initial knowledge interest was the current maturity of IT management in Danish municipalities and the challenges municipalities face when introducing IT in their administration and services. The CIOs in the 98 Danish municipalities were the involved stakeholders through a quantitative survey. The theoretical foundation of the survey was in the literature on maturity (Layne and Lee 2001; Siau and Long 2005), IT alignment (Chan and Reich 2007; Luftman 2000), and institutionalized organizations (Meyer and Rowan 1977). Questionnaires were sent out, completed and submitted electronically with the Rambøll Management product SurveyXact and had an 82% response rate. The collected data was analyzed in *IBM SPSS statistics* with the use of frequency and cross tables along with Chi-square and Gamma tests. The analysis revealed a majority of Danish municipalities are between level 2 and 3 on Siau and Long’s (2005) maturity scale, where citizens and companies through websites can get information, use self-service solutions, download forms, and other services. CIOs, furthermore, experience consistent agreement and support for their IT strategy among the central players in the municipal administration and the administration staff does not express resistance against the use of IT in the municipalities. However, the municipalities’ IT maturity is severely limited by: (1) modest reduction of traditional channels in the communication with citizens and companies, where digital channels are not considered as a replacement, but rather as supplementing existing forms of communication; (2) limited integration between the internal IT systems and the self-service solutions along with other public authorities’ IT systems; (3) limited IT value-measurement even though it is common to develop business cases for IT investments, and, 4) low interest in e-government among politicians in the municipalities. Hence, the problems identified at this level are the IT-management challenges of reducing non-digital services, systems integration, benefits measurement, and interest of politicians and employees. These problems were fed into the lower problem level through a detailed report documenting the survey results that was

distributed to the project participants and through a 1-day seminar with CIOs and other representatives from the 12 municipalities participating in the project.

Project Level

The initial knowledge interest was the same as the national level, however, with a particular focus on developing an in-depth understanding of the participating municipalities' IT-management problems in contrast to the more general understanding pursued at the national problem level. Additional stakeholders were therefore involved from 12 selected municipalities, including the municipal CEO, the citizen service manager, and the CIO. Overall, 36 semi-structured interviews were conducted, transcribed, coded, and analyzed in order to identify the major IT challenges in Danish municipalities. More than 600 individual challenges was identified and categorized into 5 general problem themes documented in a report distributed to the project participants. The 5 problem themes were presented and discussed at the 1-day seminar along with the results from the national problem level investigation. Hereafter the managing board decided: (1) value creation, (2) strategic execution and portfolio management, and (3) social alignment and communication, should be the problem themes pursued in the working groups.

Working Group Level

The initial knowledge interest in working group #1 on value creation was based on the problems identified through the in-dept interviews at the project level on value creation and based on the national level survey showing limited IT value-measurement. In working group #1 the topic was more elaborately described as "IT from cost to value creation in Danish municipalities". The topic was chosen by the CIOs because they currently have to face their CEOs on the issue of whether the municipalities are getting sufficient value for their IT investments and whether that can be documented. Three full-day workshops have been held. The first workshop addressed four potential problem definitions at the working group level. The four candidates were: an IT business case process for a municipality, stakeholder management techniques, business process innovation, and IT benefits realization. At the end of the workshop it was jointly decided to focus on an IT business case process. At the second and third workshop three CIOs presented how they worked with the form and contents of IT business cases and examples of business cases were studied. These experiences were discussed in great detail. At the second workshop the researchers had also coded the business case examples for differences and similarities. At the third workshop the researchers presented the results of a study of the research literature on IT value, on IT business cases, and on the government's business case model. The discussion at these workshops led the working group to a deeper understanding of the challenges faced by the participating municipalities. The workshop meetings have been audio-recorded. The researchers have also held de-briefing with each other to condense and reflect on the workshops. The de-briefings were also audio-recorded. These raw audio-recordings have so far been used in writing minutes from the workshop; minutes were communicated to all participants for comments.

This process informed by empirical analysis gradually led to a decision to narrow the problem definition to the question of whether a particular IT business case approach (Ward et al. 2008) could be adapted to Danish municipalities and then evaluated through improvement activities in a few municipalities.

Local

The improvement activities in the municipalities address the local problem level. The problem formulation at the local level is still in progress. The initial problem formulations at the local level stem from what has been learned through the workshops and the de-briefings at the project level. We know so far the four participating municipalities are different when it comes to how they are using IT business cases and how they want to use business cases in the future. These differences will have to be addressed to cater for the problems at the local level as they are perceived by the local stakeholders. The initial problems are:

- Municipality 1: A small municipality with 4,000 employees where the IT department has already some isolated experience with business cases. The IT department is pushing the application of IT in different department in cases where the business case is simple to understand for all stakeholders, but they have yet no experience with complex business cases.
- Municipality 2: A large municipality with 18,000 employees experienced in working with complex business cases. The IT department has a progressive IT policy where a minimal business case is first established and then other features, their costs and benefits are bundled with the initial business case.

- Municipality 3: A medium-size municipality with 6,000 employees that has a rather high local tax income. The municipality has IT as a main driver in providing service to citizens. The IT department has extensive experience with business cases and the challenge seems to be to create better overview and limiting details.
- Municipality 4: A large municipality with 30,000 employees that has very little experience in working with IT business cases. The stakeholders perceive a pressing need to begin on IT business cases at least for IT projects cutting across independent and autonomously governed departments.

Discussion

Local governments face numerous problems in their efforts of becoming more mature in terms of e-government (Al-Sebie and Irani 2005; Layne and Lee 2001; Moon 2002). IT management problems in the public sector are furthermore evident by the high failure rate for e-government initiatives (Goldfinch 2007). We have on this backdrop presented preliminary findings from an engaged problem formulation research effort on IT management in local government by involving different stakeholders at the national, project, working group, and local level. This investigation is thereby an addition to previous research of the challenges in public sector IT management (Caudle et al. 1991; Chang et al. 2000; Loukis and Tsouma 2002; Swain et al. 1995), with the case of IT management in Danish local government. Moreover, this investigation is also a contribution on how to approach engaged problem formulation in the context of action and design science research.

IT management problems in local government

The problems identified at the national level were the IT-management challenges of reducing non-digital services, systems integration, benefits measurement, and interest of politicians and employees. An early investigation of key IT management issues in the US public sector (Caudle et al. 1991), identify integration of technologies as the highest rated challenge. Systems integration seems a very persistent challenge in public sector IT management, which is not surprising considering the many different services supported by different IT systems in these often large and complex organizations. The interests of politicians and employees can also be related to educating elected officials, which was a high rated issue specifically at the county level compared to the federal and state levels (Caudle et al. 1991). However, in this study of Danish municipalities, educating elected officials appear reduced to the less ambitious goal of simply maintaining the interest of politicians and employees. Measurement of benefits has also been identified in a previous study of issues in US public IT management in term of measuring IS effectiveness (Swain et al. 1995). Planning was the most significant issue in the study by Swain et al. (1995), pointing in the direction of managerial above technical challenges in public sector IT. In a later study of issues in the Greek public sector, new IT human resources and extending use of office automation was identified as the most important (Loukis and Tsouma 2002), thus the highest rated issues varies across studies. In these earlier studies of public sector IT management issues, the reduction of non-digital services was not included. This suggest reducing non-digital services is a problem becoming more conspicuous when reaching higher maturity levels (Layne and Lee 2001; Siau and Long 2005) considering Denmark's high ranking in e-governmental readiness (UN 2008).

The problems identified at the project level were in collaboration with the municipal CIOs limited to the three most relevant, which were 1) value creation, 2) strategic execution and portfolio management, and, 3) social alignment and communication. Strategic execution and portfolio management along with social alignment and communication corresponds to the strategic planning and IT organization alignment issues identified as critical in the multinational study by Watson et al. (1997). Value creation can be compared to the lower rated issue in increasing understanding of IT's role and contribution (Watson et al. 1997).

The CIOs participating in the value-creation working group perceive the development of effective business cases as a key problem in municipal creation of value through IT. Value is thus predominantly defined from a municipal perspective and less from the state and citizens' perspectives. While IT business cases has been suggested as an effective tool for addressing public sector IT challenges (Gil-García and Pardo 2005), CIOs raised several concerns regarding what should be included in the business case and how it should be used. Previous research has in a similar way pointed to limitations of the business case for transformational and experimental IT investments (Ross and Beath 2002). In addition, the municipal CIOs argued centrally outlined business case models, such as the one developed by the Danish state, may be inappropriate to the different local government contexts. We therefore seek to

introduce state of the art in IT business case development (Ward et al. 2008) to the Danish municipal case of local government, while critically evaluating what problems it may address along with what new problems it may create.

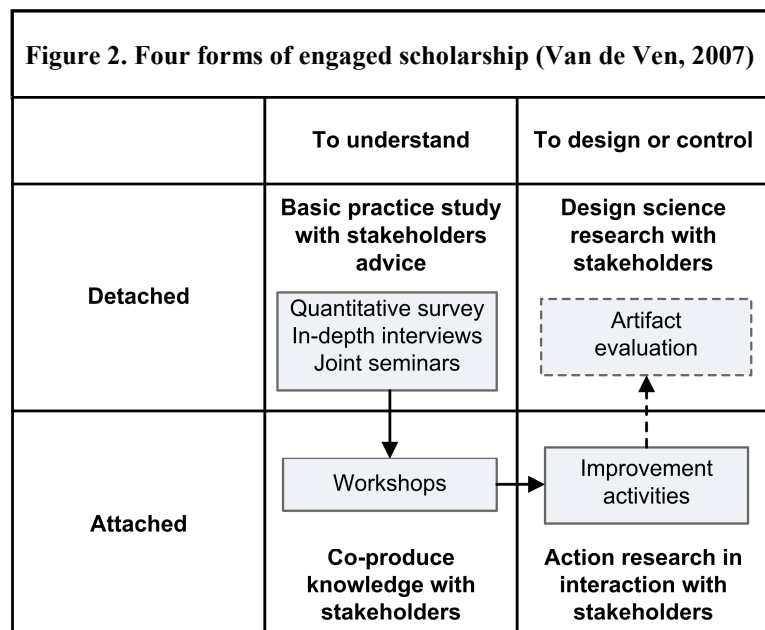
Engaged problem formulation

The approach to engaged problem formulation as we have described it above adds to our knowledge of existing research methodologies in the following ways. In this way the problem formulation approach is a contribution to the methods of our field (March and Smith 1995). In terms of Gregor's (2006) terminology it is a contribution to theory for analyzing and to theory for design and action.

How is engaged problem formulation different from action research? Action researchers at all time has emphasized it is the client's problem that has to be solved (McKay and Marshall 2001). Checkland makes the point it is very often a complex process to deal with ill-structured problem situations (Checkland and Scholes 1990; Checkland and Holwell 1998). Checkland avoids in his Soft Systems Methodology the pitfall of tight coupling between a defined problem and a solution by eliminating the need to formulate a problem. The problem situation is thus improved through the problem-solving process without an explicit problem definition. This illustrates well how action research processes are closely linked with problem-solving processes (Chiasson et al. 2008). We conduct engaged research which is more than just problem-solving and we are paying particular attention to what we as researchers should do in addition to solving problems together with clients. Stating the problems, documenting the problems, scrutinizing the problem definitions, and never taking a given problem for granted must be part of the research process. Action research per se has little to offer on how to organize the problem formulation process. We have therefore added both a research organization in levels and a leveled formulation process in the pursuit of a well-grounded problem understanding.

How is engaged problem formulation different from design science research? Design science research "creates and evaluates IT artifacts intended to solve identified organizational problems" (Hevner 2007, p. 77). In an analysis of design science research Iivari (2007, p. 53) claims it formulate problems largely based on theories and the existing body of knowledge. Placing too much emphasis on theory would create a tight relationship between a problem definition and existing theory. Hevner's (2007) rebuttal to Iivari refers to three interrelated cycles: relevance, design and rigour that all have to operate properly. Design science research does in that way account for relevance. Despite this, design science research seems to have little to offer on how to deal with problem formulation in particular if problems are wicked and ill-structured. Further, along the line of Iivari's argument it is not explained how problems get out of the drag from the rigor cycle (i.e., get away from existing theories). With the distinction between exploitation of existing knowledge and exploration of new possibilities (March 1991) we claim that relying too closely on exploiting existing knowledge may be effective in the short run, but may be less desirable in the long run as new opportunities are not explored. What we have shown is a more elaborate problem formulation process involving the stakeholders' different perceptions and treating these seriously. In addition, if existing knowledge is insufficient we engaged in an empirical research process to create more knowledge and use that in getting a firmer grip on relevance.

How is engaged problem formulation then engaged scholarship? The problem formulation approach is engaged scholarship as Van de Ven (2007) defines it, cf. section 2. First, we have kept track of different stakeholders at four levels. Second, we have recorded and documented their different interests, experiences, and views. Third, we have used this in a dialogue with the interested stakeholders to formulate the problems to be addressed in



the research collaboration. Fourth, we have gradually moved (see Figure 2) from the upper left where we place the quantitative survey and the in-depth interviews down to the bottom left where we place the workshops. We then moved into action research with the improvement activities. If we are then able to learn about the content and form of business cases in local governments we can again gradually detach our empirical process from the specifics of each of the four participating municipalities and do artifact evaluation in a design science research study. This is also a different way to use the four forms of engaged scholarship than how Van de Ven (2007) describes it. In our use the four forms become intrinsically related.

Why engaged problem formulation is also multilevel research? Researchers of organizations, management, and information system usage suggest studying a single level is severely limiting research (Burton-Jones and Gallivan 2007; Hitt et al. 2007; Klein et al. 1994; Klein et al. 1999). The argument can be condensed to issues at one level cannot be comprehended without paying some attention to the level above and vice versa. In the problem formulation process we have described the area of concern through descending levels of analysis. Each level had its own research design and these have also been intrinsically related, cf. Figure 1 and 2. What we have done is a form of multilevel analysis by descended four levels. Maybe in addition we are about to create an ascending multilevel analysis when we begin moving upwards again. If we treat the ascending levels with a similar empirical approach then we can perhaps do more than logical generalization and actually perform upwards empirical analysis after the improvement activities.

Ethics. Ethical considerations are pertinent to engaged problem formulation. The ethical dilemma has been addressed in action research from the very beginning (Rapoport 1970) hence the ethical framework has to be mutually acceptable. In our case it means that our problem formulation approach is open to all involved stakeholders and that the acceptance of the problem formulation is agreed in dialogue seeking to accommodate different interests in this. This does not reduce the ethical dilemma (Eikeland 2006), but we are aware that there are issue to be dealt with and that it matters who is controlling the process. In the terminology from Avison et al. (2001) we have in this case, had a formal contract governing the whole project with initiation by the researchers yet with a staged migration of power (initially with the researchers and then gradually moving to the municipalities and their CIOs).

Limitations. Our study of IT management in local government through engaged problem formulation have some limitations. The learning community developed for investigating this topic is dominated by the municipal stakeholders initially included in the study. Other influenced or influential stakeholders are included to a lesser extend and citizens are at this point not included at any of the problem levels. While a very inclusive learning community may offer more diverse and nuanced perspectives, it may also dilute the learning focus and impede the commitment to action and design science research activities at the local and working group levels. The inclusion and exclusion of stakeholders has been negotiated among the practitioners and researchers as it plays a vital role in directing the attention of the learning community. An additional limitation of the findings is due to the research in progress status. The interpretation of IT management problems in local government is still under development through engagement with stakeholders at the different levels. While a problem formulation activity may be finished at a specific problem level its interpretation is continuously developed through activities at the other levels.

Conclusion

We have reported from an ongoing research project where we have first and foremost committed to addressing what problems persist in local governments' IT management.

We have described how we have performed the process of engaged problem formulation. Inspired by Van de Ven (2007) we define engaged problem formulation as: *joint learning and definition of a contemporary and complex problem by researchers and those who experience and know the problem*. This activity is carried out by situating, grounding, diagnosing, and inferring the problem up close and from afar by engaging those who experience and know the problem at multiple levels. The goal of such activities is to jointly produce knowledge of this problem that can both advance the scientific enterprise and enlighten a community of practitioners. We have illustrated how we went through descending levels of problem definitions and how the formulation at all four levels have been grounded in empirical data collection and analysis. We have then discussed the findings and how they relate to the existing literature on IT-management problems for local governments. We have further discussed how our engaged problem formulation approach is a contribution to a better understanding of how we conduct engaged scholarship and how that informs both action research and design science research.

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