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Abstract:

"Is this the problem?": the question that haunts many information systems (IS) researchers when they pursue work relevant to both practice and research. Nevertheless, a deliberate answer to this question requires more than simply asking the involved IS practitioners. Deliberately formulating problems requires a more substantial engagement with the different stakeholders, especially when their problems are ill structured and situated in complex organizational settings. On this basis, we present an engaged approach to formulating IS problems with, not for, IS practitioners. We have come to understand engaged problem formulation as joint researching and as the defining of contemporary and complex problems by researchers and those practitioners who experience and know these problems. We used this approach in investigating IS management in Danish municipalities. In this paper, we present the approach to formulating problems in an engaged way. We discuss it in relation to ideas and assumptions that underpin engaged scholarship, and we discuss the implications for IS action research, design science research, and mixed approaches.

Keywords: Engaged Scholarship, IT Management, Action Research, Collaborative Practice Research, Design Science Research, Action Design Research, Problem Formulation.

1 Introduction

Information systems (IS) researchers investigate phenomena involving people, information, and systems, and they often formulate these problems as ones in organizational settings. Formulating problems plays a crucial role for grounding a research subject in reality and directly affects how one builds theory, designs research, and solves problems. Yet, researchers often overlook or pay little attention to formulating problems (Van de Ven, 2007, p. 71). A common approach to understanding and prioritizing problems involves simply asking managers about key IS issues in questionnaires (e.g., Luftman & Ben-Zvi, 2011; Luftman et al., 2012). One may conduct such issue studies using focus groups, interviews, or surveys to formally derive an industry-driven research agenda (Rosemann & Vessey 2008). The interest in formulating problems is more prominent in proactive research methods such as action research (Baskerville & Myers, 2004), design science research (Hevner, March, Park, & Ram, 2004), and action design research (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011). However, these proactive approaches provide some, but nevertheless limited, guidance for deliberately addressing whether the formulated problem is of the highest concern for the involved practitioners and for different organizational settings. In this paper, we show central limitations in formulating problems with the proactive research methods and discuss how researchers can overcome these limitations with engaged problem formulation.

Engaged scholarship overviews what it entails to formulate a research problem, which may be any problematic situation, phenomenon, issue, or topic that one choses as the subject of their investigation (Van de Ven, 2007, p. 73). We report on our research practice and experience with formulating problems and how it has involved both action research and design science research and how it relates to action design research. As such, we contribute to explaining research practice by 1) extending engaged scholarship; 2) involving both researchers' and practitioners ideas, experience, and perceptions; and (3) taking problem formulation beyond individual clients.

This paper proceeds as follows. In Section 2, we summarize the theoretical background on formulating problems in engaged scholarship, design science research, and action research. In Section 3, we describe our engaged problem formulation with IS management in Danish municipalities. In Section 4, we discuss our engaged problem-formulation approach in relation to IS action research, design science research, and engaged scholarship. Finally, in Section 5, we summarize our contribution and conclude the paper.

2 Related Research

We devised our approach to formulating problems based on engaged scholarship, design science research, and action research.

2.1 Engaged Scholarship

Engaged scholarship is a general approach for enhancing the relevance of practicing social and organizational research (Van de Ven & Johnson 2006; Van de Ven, 2007). After conducting a 20-year literature review of Scandinavian IS research, Mathiassen and Nielsen (2008) found that engaged scholarship has implicitly been used in many instances and that one can classify much IS research as "engaged". This classification is particularly the case when researchers' purpose has been to produce knowledge with relevance to practice and when their approach was proactive. Mathiassen and Nielsen conclude that engaged scholarship is highly useful for IS research. Van de Ven (2007, p. 9) defines "engaged" as "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". Engaged scholarship is an approach to research that invites the participation and perspectives of many different stakeholders when studying complex problem situations (Van de Ven, 2007).

Van de Ven (2007) furthermore distinguishes four different forms of engaged scholarship based on research perspective and purpose (see Figure 1), which includes design science research and action research in Figure 1's two right hand-side quadrants (Van de Ven, 2007, p. 271).

Research Question / Purpose

	To Describe/Explain	To Design/Control
Extension Detached Outside	Basic Science with Stakeholder Advice 1	Policy/Design science Evaluation research for Professional Practice 3
Intension Attached Inside	2 Co-produce knowledge with Collaborators	4 Action/Intervention Research for a Client

Research Perspective

Figure 1. Alternative Forms of Engaged Scholarship (Van de Ven 2007, p. 271)

Informed basic research (1) involves advice and feedback from key stakeholders and inside informants in formulating a problem (Figure 1). These studies should present evidence that ground a problem's nature and prevalence, its boundary conditions, and why it merits investigation. *Collaborative research* (2) involves researchers' and stakeholders' more extensively sharing the power and activities in formulating problems compared to informed basic research. *Design/policy evaluation research* (3) goes beyond describing or explaining problems as in the first two forms (informed basic and collaborative research) by also seeking to obtain knowledge of the efficacy or relative success of alternative solutions to applied problems. These studies formulate types of problems or archetypes that are more general than the particular problems faced by a practitioner in situ but still invite the participation of the affected stakeholders in this decision. *Action/intervention research* (4) diagnoses and treats a specific client's problem and differs from the other forms by addressing an individual client's problem by engagement with the organizational setting where it is situated. In these studies, a researcher may use whatever knowledge is available to understand the client's problem (Van de Ven, 2007, pp. 271-282).

When we apply the four forms of engaged scholarship to IS research, the distinctions in Figure 1 also hold for IS action research and for IS design science research (Mathiassen & Nielsen, 2008); and action design research is basically rooted in design research (3) while using the complementary strengths of action research (4).

Van de Ven (2007) notes that research efforts may involve more than one of the four forms of engaged scholarship and that one form may transition into another form in subsequent research projects. However, he does not present detailed prescriptions for exploiting the strengths of transitioning between forms in a single research project. Most mixed approaches take another stance on this issue. Action case unifies action research and the case study (Vidgen & Braa, 1997), and action design research unifies design research and action research (Sein et al., 2011).

Formulating problems is one part of a research approach (Van de Ven, 2007), but, we suggest, a significant one. One faces four common difficulties in situating, grounding, diagnosing, and resolving research problems when formulating them (Van de Ven, 2007, p. 73). *Situating* refers to deciding which stakeholders the research will serve and describing reality from their perspective. People frame problems: they do not exist objectively in the world. *Grounding* refers to avoiding using short cuts or heuristics that produce biased judgments when formulating a problem; a bias that can occur when one rushes or takes the process for granted. One may not recognize a problem's important dimensions such that one misses opportunities to advance knowledge of it. *Diagnosing* refers to applying models or theories to ascertain the specific nature of a problem in its context in a disciplined and open-minded manner, which is contrary to elaborating theories that are based on one's insufficiently diagnosing of a problem and its context.

Nevertheless, *resolving* a problem, even while grounded in reality, may not lead to creative theory that advances an understanding of the problem. Linking theory to reality requires inquiry beyond the situated information given so that one formulates the problem to have applicability beyond the situation in which one observes it.

In Sections 2.2 to 2.4, we elicit three approaches to formulate problems in action research, design science research, and mixed-approach research, respectively.

2.2   Action Research

In IS action research, one formulates problems based on defining clients' problems *with* them (McKay & Marshall, 2001). Checkland notes that dealing with ill-structured problem situations is often a complex process (Checkland & Scholes, 1990; Checkland & Holwell, 1998). Action research processes are closely linked with problem-solving processes (Chiasson, Germonprez, & Mathiassen, 2008), and it is a common concern to explain the research cycle and the problem-solving cycle (McKay & Marshall, 2001). The two cycles are distinctly different in their knowledge interest and yet intrinsically related; this relationship between the two cycles requires understanding both the practical area of concern in the research stream and the research problems in the problem-solving stream. This concern for formulating problems as the involved stakeholders perceive it is central to much action research (Rapoport, 1970) and central to the diagnosis to identify and define a problem (Hult & Lennung 1978). Yet, at the same time, action researchers need to maintain a particular concern for the research aspects and the theoretical anchoring of the problems (Davison, Martinsons, & Kock, 2004).

IS action research comes in several varieties, but they all focus on solving a client's problem. In dialogical action research (Mårtensson & Lee, 2004), one links the research cycle and the problem-solving cycle through one-on-one dialogues. These dialogues involve the action researcher and the practitioner having periodic meetings, which allows for reflective dialog based on the researcher's expertise in theoria and the practitioner's expertise in praxis. The client formulates the problem based on their experiences in the organization. A success criterion for the dialogical action research is then "that the practitioner considers the real world problem facing him or her to be solved or satisfactorily remedied" (Mårtensson & Lee, 2004, p. 519). The dialogical action research approach limits the problem formulation to the perspective of a single individual by situating the problem with only one stakeholder in a single organization.

In canonical action research (Davison et al., 2004), the question of "what is the problem?" plays a central role. This question appears in both a principle of a cyclic process and a principle of theory where it is taken to be the researchers' responsibility to ascertain the grounding (in Van de Ven's (2007) terms). In collaborative practice research (Mathiassen, 2002) the problem-solving strategy is again central in that it involves researchers "in practical problem solving" and in using key diagnosis techniques to learn what the practitioners consider to be the key problems. In conducting collaborative practice research, Iversen et al. (2004) selected their problem because they found it interesting and because it was pertinent to the client organization. There is a strong linkage between the client's problem and the research problem; and action research seeks to explicate that linkage (McKay & Marshall 2001).

The involved stakeholders influence how researchers formulate a problem (Van de Ven, 2007). From a logical and an ethical standpoint, action researchers are also stakeholders, and they are rarely in full control of the problem situation or of defining what the problems are taken to be because there may be several and diverse problems expressed (Avison et al., 2001). Engaged scholarship is, similar to collaborative practice research (Mathiassen, 2002), a general framing in which one may conduct several research activities. Collaborative practice research can help connect three aspects: 1) the need to understand current IS practices, 2) the need for device artifacts to support IS practitioners, and 3) the need to improve IS practice in organizations. Against this backdrop, we view formulating problems as an empirical research process and, consequently, propose empirical data collection and analysis as a significant part of how one formulates such problems.

Action research provides limited guidance for deliberatively answering whether a formulated problem is of the highest concern for the involved practitioners and the particular organizational setting. Action research may involve researchers' closely interacting with practitioners to solve problems that are very relevant to practice as in dialogical action research (Mårtensson & Lee, 2004). Where dialogical action research suggests that a problem and its formulation primarily belong to the practitioner's world, we suggest that the formulation belongs to many diverse stakeholders. The different research activities with close practitioner interaction in a single collaborative practice research project may address this (Mathiassen,

2002). In addition, we suggest formulating problems across the stakeholders' different knowledge interests, different organizational settings, and different activities in a research project.

2.3   Design Science Research

It matters in IS design science research how one establishes a research problem both in terms of how it relates to practice through relevance and how it relates to research through rigor. Design science research primarily focuses on addressing a research problem (Hevner, 2007; Hevner et al., 2004; Kuechler & Vaishnavi, 2008). Design science research "creates and evaluates IT artifacts intended to solve identified organizational problems" (Hevner 2007, p. 77), though the concept of "problem" may be peripheral (Kuechler & Vaishnavi, 2008). In an analysis of design science research, Iivari (2007 p. 53) claims that design science research formulates problems largely based on theories and the existing body of knowledge. As such, he claims that design science research implies too much emphasis on theory and creates a tight relationship between a problem's definition and existing theory. Hevner's (2007) rebuttal to Iivari (2007) refers to three interrelated cycles: relevance, design, and rigor, which all have to operate properly to account for relevance. Despite this, design science research seems to have little to offer on how to deal with formulating problems in particular if problems are ill structured. Design science research approaches do not explain how problems get out of the drag from the rigor cycle (i.e., get away from existing theories). Researchers who follow a design science research approach limit themselves in at least two ways: 1) they make a stable definition of the problem early before developing and evaluating the artifact, and 2) they address a class of problems, which do not link well with problems in an organizational context (Sein et al., 2011; Iivari, 2014).

Design science research is based on a limited view of what formulating problems entails. It is directly based on a Simonean idea of research (Simon, 1996) and problem solving (Hevner et al., 2004) in which one devotes more to solving a problem than to defining it (Iivari, 2007). Schön (1983) has studied professional problem solving in a wider perspective than Simon (1996) (see Lanzara, 1983; Schön, 1983), and he argues that the most important part of problem solving is formulating the problem or, in his terms, framing the problem. How one frames the problem points to its solution, and the problem and solution are in this way intrinsically related. Thus, to address ill-structured problem situations in research, one has to formulate problems with the problems as a central part of the research. The researcher needs to step back from a given problem and scrutinize it critically before committing to a particular definition of it.

2.4   Mixed-approach Research

Researchers have sought a middle ground between action research and design science research to overcome some of their inherent limitations and to cross-fertilize the two research approaches. Iivari and Venable (2009) argue that, from a theoretical point of view, action research and design science research are similar in many ways, but they further argue that their paradigmatic assumptions differ dramatically. Others take the view that design science research is a variant of action research (e.g., Järvinen, 2007). Despite these paradigmatic controversies, scholars have shown interest in overcoming the gap between action research and design science research (Sein et al., 2011).

In a sense, collaborative practice research is such an attempt even though it clearly comes from action research (Mathiassen, 2002). Collaborative practice research contains a design dimension in which scholars design artifacts to support practitioners in solving a particular problem and both practitioners and researchers evaluate them from the perspective of how well the artifact solves the problem. Collaborative practice research then links back to the action dimension where one may use the artifact in an intervention.

Design science research (Hevner et al., 2004) deals with complex problems that primarily belong to the world of the researcher with little concern for working with practitioners' perceptions of what the problem may be. Diverting from this view, Wieringa (2009, 2010) suggests that one should distinguish between practical problems and knowledge problems. Stakeholders can formulate a practical problem that expresses a difference between a perceived world and a desired world and find the criteria for evaluating solutions via analyzing the problem. Researchers and other stakeholders can formulate a knowledge problem that expresses a difference between current knowledge and what they would like to know, and the evaluation criteria do not depend on stakeholders' goals but on the value of knowledge relative to the body of existing knowledge. Practical problems and knowledge problems are nested in design science research (i.e., formulating a practical problem that one can decompose into several knowledge problems and practical problems) (Wieringa, 2009). Wieringa (2010) extends the design cycle (Hevner, 2004, 2007)

to embed the distinction between practical problems from knowledge problems into the guidelines for design science research.

Sein et al. (2011) formulate a more elaborate middle ground in the action design research approach. They view their action design research as a design science approach, but, since the authors have previously claimed that their approach is action research (Lindgren, Henfridsson, & Schultze, 2004), one can fairly classify it as being a mixed approach occupying a middle ground. Action design research addresses problem formulation in a more profound manner than design science research and seeks to unify design science research and action research overcoming central limitations (Sein et al., 2011). In action design research, there is a problem formulation activity with two principles and six tasks. One of these principles ("practice-inspired research") pushes the researchers to view problems in a practical setting as an opportunity to conduct research and produce new knowledge, to view problems in context, and to conduct research into a class of problem and not only a client's specific problem.

The thinking behind action design research seeks to close a gap, and it is similar to the thinking behind how we have formulated problems in the research project that we discuss in Section 3. Action design research clearly situates the problem in a context (in Van de Ven's (2007) engaged scholarship terms; see Section 2.1), grounding in an organizational practice, and using this understanding to diagnose what the problem may be. Sein et al. (2011) note that the situatedness, grounding, and diagnosing are explained in the example they use to illustrate action design research and even further explained in the preceding action research paper also reporting this example (Lindgren et al., 2004). We only criticize the action design research approach for not sufficiently elaborating the problem formulation to inform other researchers on how to perform it.

3   Narrative of Engaged Problem Formulation

We illustrate our research practice in engaged problem formulation with a narrative of a research project. Initially, we set out to investigate the integration of digital service through effective management of IT (information technology) in Danish municipalities (Rose et al. 2012). The Danish Council for Strategic Research funded the project with a total budget of €2.2 million, and the project ran from 2009 to 2012. The project participants comprised 12 Danish municipalities, two IT consultancy firms with extensive public sector experience, and 12 IS researchers from the political science department and the computer science department at one university (Table 1).

Table 1. Participants in the research project

Focus on IT	Organizations
Integration and management	12 Danish municipalities
Development and consulting	2 large Danish IT firms
Research	A university (computer science and political science department)

This narrative comes from our participation in the research project. The first author was a professor at the computer science department and a co-applicant for the project funding. The second author was hired to the project in 2009 after finishing his PhD study at the computer science department.

3.1   Problem Formulation at the Project Initiation

We used collaborative practice research (Mathiassen, 2002) to guide the research approach. The project plan involved different research activities for understanding, supporting, and improving IT management practices in the municipalities. The project's problem statement in the funding application reflected the research interest of the main applicant and project manager associated with the political science department. The funding applicants formulated this problem to reach a high level of e-government maturity (Layne & Lee, 2001; Siau & Long, 2005) by improving IT management. The funding application argued that IT management is a central challenge in achieving a higher maturity level and closely associated with the Danish digitalization strategy for the public sector for 2007-2010. More specifically, the funding application argued that IS research is familiar with these IT management challenges,based on a key issues study (Luftman & McLean, 2004). The funding application further decomposed the problem into issues such as IT alignment (Chan & Reich, 2007; Luftman, 2000) and IT governance (Weill & Ross, 2004).

With a clear sense of the problem's initial formulation, a group of the researchers developed a diagnostic survey based on the theories used in the project funding application. The researchers electronically distributed the survey with SurveyXact to the chief information officers (CIOs) in the 98 Danish municipalities with an 82 percent response rate. Based on analyzing the responses, the researchers refined and adjusted the problem to "the IT management challenges of reducing non-digital services, systems integration, benefits measurement, and interest of politicians and employees".

In parallel with the survey, a larger group of the researchers carried out semi-structured interviews (following Patton (1990)) with the CIOs, municipal chief executive officers (CEOs), and citizens service managers (CSMs) in the 12 municipalities directly involved in the project. They based the interview guide on the same theories as the survey, but it had a particular focus on developing an in-depth understanding of the participating municipalities' IT management problems in contrast to the more general understanding pursued in the national survey. Overall, the researchers conducted 36 semi-structured interviews, transcribed them, and coded them in NVivo, which resulted in their identifying more than 600 individual challenge statements. The researchers categorized the statements into 34 challenges that the researchers collaboratively conceptualized in five themes:

1. Digital citizen service and integration with administrative systems
2. From cost to value creation
3. Strategic planning and project control
4. Communication and alignment between IT and business, and
5. The IT organization and the role of the IT manager.

The researchers documented the findings from the survey and interviews in two reports that they distributed to all the research project's stakeholders. Based on the problem-formulation activities documented in the two reports, in 2009, the researchers held a one-day joint seminar with all the main stakeholders including the researchers and representatives from the participating municipalities and consultancy firms. At this seminar, the researchers presented and discussed the identified IT management problems with a particular focus on the five themes. Immediately after the seminar, the project advisory board decided to focus the project on three of the five problem themes (2, 3, and 4 from above). The project advisory board included the CIOs from the 12 municipalities, two managers from the IT consultancy firms, the research project manager, and the first author. A workgroup was established for each of the three themes and assigned a responsible senior researcher and a junior researcher. Two senior consultants represented the two consultancy firms in the three workgroups, while the 12 municipalities could participate in at most two workgroups based on their interests. Initially, the groups deliberated on the problem based mainly on research, and it spanned a large group of municipalities at a general level. Thus, the researchers had a high level of control at this stage with few disagreements in dividing workgroup participation. All the researchers also met in bi-monthly meetings to help the workgroups share knowledge and coordinate. In Sections 3.2 to 3.4, we focus on the workgroup on "from cost to value creation" or simply "value creation" for which we were responsible.

3.2 Joint Problem Formulation in a Workgroup

The workgroup on value creation involved two senior consultants, five researchers, and participating representatives from three municipalities each with 4,000 to 18,000 employees. We developed a study protocol for the research in the workgroup and later again for our engaging with separate municipalities. This study protocol detailed our plans related to the action research criteria concerning roles, documentation, control, usefulness, frameworks, and transferability (Nielsen, 2007). We organized the workgroup using experience from past empirical research based on close collaboration with practitioners. However, our previous research experience was from private software development companies and different from the large public organizations in this project. While much of our research had been on management from an IS perspective, it had mainly addressed software development at the supplier organizations and much less at the client organizations. We devised the problem formulation activities at the beginning of the project to help the workgroup move quickly into the action research cycle's problem solving. Yet, we would later experience a limited utility of this problem formulation in the later engagements with practitioners in the workgroup.

In the workgroup, we initially organized a full day workshop attended by six practitioners and four researchers to explore options and decide what collaborative improvement activities we should initiate. For each workshop, we distributed a detailed agenda to all the participants beforehand and the minutes

and slides from the presentations afterwards. Subsequently, the researchers debriefed for 30 minutes to an hour (Spall, 1998). We audio recorded everything but also kept notes in a research diary (Jepsen, Mathiassen, & Nielsen, 1989). In the first workshop, we presented four suggestions to problem solving by improving: 1) business case development, 2) stakeholder management, 3) project evaluation and benefits realization, and 4) process innovation. In addition to the third suggestion, one of the consultants presented a model for realizing benefits based on his past research and interpretation of the initial problem formulation in the project. We controlled what problem-solving suggestions the participants could choose and, in this process, developed an initial preference towards stakeholder management. Contrary to our expectations, most of the practitioners preferred to focus on business cases: they argued that we could incorporate all of the other subjects into such a focus. The first author noted this surprise in his research diary: "It was surprising to me that they so persistently pursued the business case subject…; all the time the discussion returned to business cases and how it could be done". Our initial reluctance toward focusing on business cases was based on an experienced difficulty in finding research literature that we perceived interesting or helpful in the problem solving. However, we decided that the practitioners' commitment was more important than these perceived difficulties.

In the second and third workshops, one and three months later (respectively), the municipalities and consultancy firms presented the methods, processes, and resulting examples from their work with IT business cases. We presented a comparative analysis of their methods including the standard business case method developed and pushed by the Danish central government. This analysis revealed large inconsistencies in what a business case could include, but it gave limited direction for us to construct an alternative method. The question "what is IT's value?" also emerged through discussions in the workgroup. We then analyzed the underlying value discourses in the interviews conducted with the three participating municipalities' CIOs and CEOs (from the project's initial problem formulation). The analysis revealed that the two roles shared similar views on value with a strong bias toward foundational values concerning efficiency and cost savings. However, more than half of their statements involved other meanings of "value", which suggests we needed a pluralistic view on value (Rose et al., 2015). Thus, contrary to our expectation of a workgroup doing rapid problem solving at the first workshop, these two workshops resulted in participants deliberating on and formulating even more problems. On this point, the second author noted in his diary:

> So far we have not solved any problems. Our efforts so far have only explored problems. We have uncovered the complexities with business cases and nuanced the problem…. I hope we soon can start initiatives addressing the complexities in developing business cases.

This diary entry revealed that the problem formulation from the beginning of the project helped us understand the problem situation but not in a way that was directly transferable to the engagement with the practitioners in the workgroup. The second author noted: "The differences in the municipalities' sense of purpose and approach to business cases that continuously was uncovered is frustrating the participants.". By the end of the third workshop, all of the participants agreed to solve problems in the individual municipalities, but we made no specific decisions or arrangements beyond the date of the next workshop two months later.

In the period following the third workshop, an unexpected insight made us postpone the planned fourth workshop and replace it with problem-solving activities in the three municipalities. The unexpected insight was the research paper "Building Better Business Cases for IT Investments" (Ward, Daniel, & Peppard, 2008), which the second author coincidentally identified in preparing for a lecture. Based on the paper, we developed a solution to the problems in terms of a first draft of a business case method for the Danish municipalities. The preceding problem formulation activities helped us appreciate the solution's contribution to the numerous complexities involved in municipal IT business case. In this way, the problem formulation shaped our awareness of the practitioners' concerns when we engaged the research literature. However, we still initially evaluated the method by transforming two of the business cases discussed in the previous workshops into the new method's proposed form before we presented and collaboratively applied it to a current project in each of the three municipalities. These engagements into problem solving generally resulted in positive feedback. As the CIO in one municipality stated: "I'm actually feeling like using this and we have some projects this spring". The second author reflected this optimism in a research diary entry: "The future prospects for the action research project are very promising as the stakeholders are stating a desire to change based on the presented method but also on their problematization of own current praxis". From this change of focus to the separate municipalities and the problem-solving attempts emerged new problems that were different from those of the preceding

workshops. One of these problems was related to ownership of benefits stated in the business case in the municipality. Ownership of benefits was not explicated in any of the three municipalities' current methods. Thus, to solve this problem, we proposed the business case developers specify named individuals in the municipal organization as owners of benefits, a substantial change of their current praxis that represented a new problem. We continuously improved the IT business case method in the periods between the encounters with the three municipalities.

The fourth workshop, which occurred eight months after the third workshop, focused on further developing the business case method and starting an initiative on benefits management. We decided to change the research focus to benefits management without deliberating with the municipalities in the workgroup. After the encounters with the three municipalities, we saw benefits management as a promising approach to address the problems in developing and using IT business cases. In the fourth workshop and the following fifth workshop two months later, the two consultants presented benefits management strategies and techniques based on insights from practice and we presented the same subject based on the research literature (e.g., Ashurst, Doherty, & Peppard, 2008; Ward & Daniel, 2006). However, the workgroup did not establish these suggestions as solving the research project's contemporary problems. Thus, similar to the second and third workshops, we also had difficulty establishing commitment to specific problem-solving initiatives in these later workshops. The fifth workshop in the winter of 2010 only attracted two participants from the municipalities and two from the consultancy firms in addition to four researchers. Despite our plans at the time, this workshop became our final one followed by a half-year period without direct encounters with the municipalities (which was also in part due to the second author's parental leave of absence).

3.3   Problem Formulation in Separate Municipalities

We had encounters with two municipalities from the workgroup in 2011 after the fifth workshop. In the study protocol, we noted that the municipalities in the workgroup could not present convincing cases of successfully realizing benefits when we requested such cases in conjunction with the fifth workshop. The examples they provided mostly involved expected and unrealized benefits. With no apparent problem-solving strategies, we saw a need to further our understanding of the problems about realizing benefits in the municipalities. Our preceding problem-formulation activities suggested that the most relevant problems were not situated in the IT department but in its relation with other parts of the municipal administration. With this in mind, we organized half-day meetings (exploratory group interviews (Frey & Fontana, 1991)) that, in addition to the CIO, involved the manager responsible for most IT-related benefits, which happened to be the chief financial officer in both municipalities. The meetings also included a project or department manager experienced in the municipality's organizational implementation of IT. With these meetings, we formulated problems with stakeholders that held different organizational roles in IT benefits realization and offered perspectives different from those exercised by the participants in the preceding research activities. However, we also included the municipal representatives that participated in the preceding workshops in the meetings to establish continuity from the preceding problem-formulation activities. The credibility we gained from our continued relationship with these stakeholders helped us explore the sensitive struggles with the other roles in the organizational change with IT investments in the municipality.

The two municipalities' involvement allowed us to contrast and learn from two different settings when formulating problems in IT benefits realization and use this learning to compare and contrast the problems. The two municipalities differed in how they understood the problems in IT benefits realization and how they understood different resolution strategies. Thus, to improve IT benefits realization in the municipalities, we focused on developing a visual representation of the problems, which the different stakeholders could share. However, it was also a starting point for describing the municipalities' different resolution strategies, which allowed the two municipalities to learn from each other through our mediation. These improvement activities contributed to our developing a second version of the IT business case method for Danish municipalities. We proposed a method guiding the municipalities' development and use of IT business cases as a boundary object between departments and for that to be continually negotiated with a particular focus on benefits realization. Our engagement with municipalities outside the workgroup and research project that continued after the project's closing seminar also shaped how we developed our business case method.

3.4   Transitions in Problem Formulation

We ended the project by revisiting the problems we formulated when we initiated the project by conducting another survey of municipal CIOs in Denmark and interviewing the CEOs and CIOs of the municipalities that participated in the project. We evaluated the business case method developed in our workgroup by involving other municipalities, national conferences, and questionnaires. In this way, the scope of our engagement with the municipalities and the activities associated with formulating problems first moved from a broad to a much more narrow focus involving individual municipalities. Following this transition, we again broadened our focus by moving beyond the municipalities in the research project with artifact evaluations and a national survey (see U-curved arrow in Figure 2).
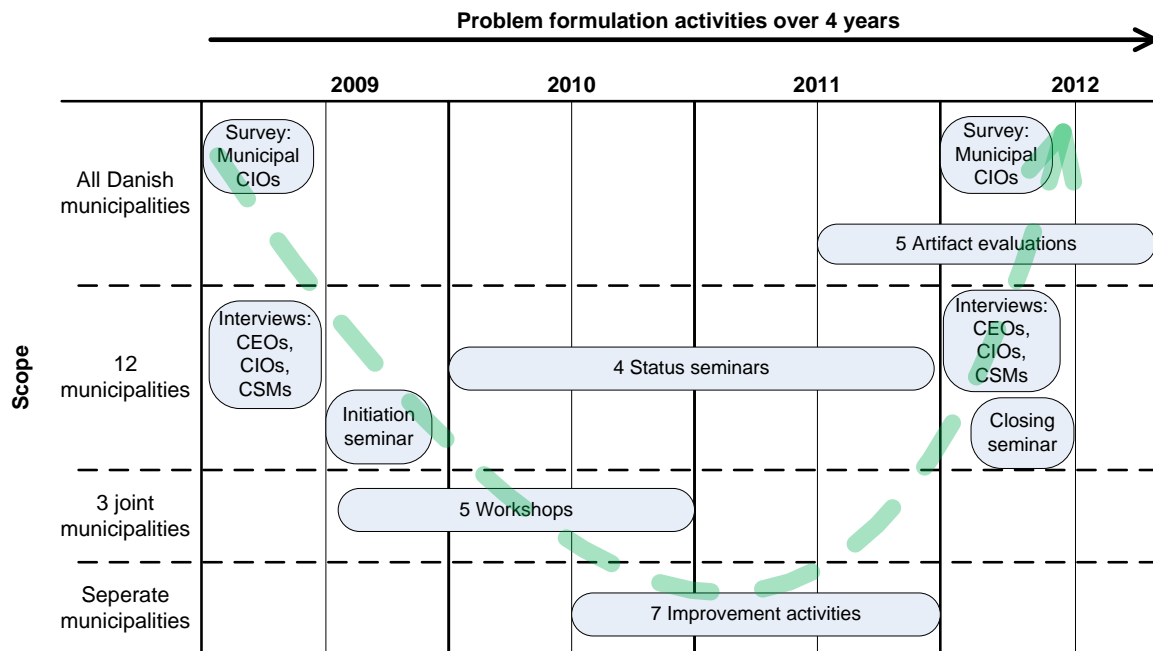

Figure 2. Research Activities that Supported Engaged Problem Formulation

Over the course of the workshops and improvement activities, we conducted status seminars involving all the project participants in which we presented and discussed with everyone the preliminary results (Figure 2). In this way, we shared knowledge with other researchers and municipalities, which allowed us to re-situate the problem formulations with other stakeholders over the course of the research activities.

The final survey of CIOs in Danish municipalities, which had a 54 percent response rate, revealed that realizing benefits had become the second highest priority in the municipalities' future efforts. The survey also showed a large increase in the CIOs' priority attributed to developing business cases and realizing benefits after completing IT-implementation projects. The final interviews with the CEOs and CIOs involved in the research project revealed four new problem themes: 1) establishing cross-municipal collaboration on digitalization and digital solutions, 2) moving the digitalization efforts beyond the administrative functions, 3) innovation and welfare technology for cost savings, and 4) higher demands on IT mangers' technological foresight and change-management capabilities. In the closing seminar, we presented the results from these two studies and the results from the three workgroups. We continued evaluating the business case method after the closing seminar with presentations of the method in seminars and in individual municipalities. As a result, we received much positive feedback, and several municipalities actually began using the method. Both municipalities that participated in the project but also municipalities that did not now use the method. We used this feedback from the evaluations in conjunction with the insights from our improvement activities on realizing benefits to develop a second version of the Danish business case method for municipal IT investments in the beginning of 2013.

4   Discussion

We focus here on our approach to formulating problems, which we explain in Section 3 through a narrative of our research practice—a practice that we can characterize as informed by engaged scholarship. As such, it is much more than just problem solving and involves many other aspects than just the approach (e.g., collecting and analyzing data collection). In this section, our focus remains on our approach to formulating problems. We start by relating our approach to existing literature, and we end this section by discussing our approach's implications for the would-be engaged researcher embarking on formulating problems.

In our approach, we paid particular attention to what we as researchers should do in addition to solving problems together with clients. Explicitly stating problems, documenting these problems, scrutinizing their definitions, and never taking a given problem for granted were an integral part of the research process. The ephemeral research organization involved different foci of analysis and formulation processes in pursuing well-grounded problem understanding. We show the details in our problem formulation in Section 3. Specifically, we show how we involved and explicitly addressed the stakeholders' different perceptions and situations. When existing knowledge was insufficient, we designed further empirical research processes to create more knowledge and use that to obtain a firmer grip on relevance and on how to understand the problems at hand.

Our approach to formulating problems adds to our knowledge of research practice. In Gregor's (2006) terminology, our approach contributes to theory for analyzing and to theory for design and action in our field. In Sections 4.1 to 4.3, we discuss three contributions to: 1) deliberately formulating problems, 2) the debate about interleaving versus a unified approach, and 3) existing forms of proactive IS research (action research, design science research, and action design research).

4.1   Deliberate Problem Formulation

Our approach focuses on keeping track of different stakeholders while recording and documenting their different interests, experiences, and views. We used these insights in a dialogue with the interested stakeholders to formulate problems to address. To ensure that problems are of the highest concern to the involved practitioners, one needs to systematically collect and analyze data reflecting their practice. Practitioners are key in deciding what the most relevant problems are, and one determines such problems over multiple iterations while approaching the concerns of the particular organization. The research process concurs with Van de Ven (2007) by situating and grounding an understanding of a problem situation. In this process, one diagnoses and infers the problem definitions through interactions with the different stakeholders regarding their experience of the problem situation.

The approach explicitly follows the idea of problem framing (Schön, 1983) when we constantly challenged whether we (along with the practitioners) had pursued and formulated interesting and proper problems. In this way, problem framing becomes "integral to deliberation in which parties together learn about fact, value, and strategy all together" (Forester, 1999, p. 7). Alongside Schön (1983), a primary criterion in the approach is whether a particular problem formulation (a framing) brings the enquiry forward and whether it assists in making sense of the problem situation and possible solutions. Our problem-formulation approach is empirical. Whenever faced with uncertainty and a vague understanding of a problem, we systematically collected relevant data and used it when quantitatively and qualitatively analyzing the problem situation. In many respects, we concur with Forester (1999) that sharing this data and analyses with different stakeholders in a joint process is beneficial.

Not only practitioners' concern for relevance but also researchers' concern for making interesting theory drive how one deliberately formulates problems. The problematization methodology (Alvesson & Sandberg, 2011) may be useful in formulating problems for making interesting theory that challenges our assumptions and existing research. Alvesson and Sandberg (2011) suggest trying to "[generate] novel research questions through dialectical interrogation of one's own familiar position, other stances, and the literature domain targeted for assumption challenging" (Alvesson & Sandberg, 2011, p. 260). From the experience with our approach, we add that it can and it should be a deliberate process of identifying and challenging assumptions underlying existing literature. However, working with the assumptions of practitioners in the problem formulation should also be integrated with the process. Thus, the evolution of practitioners' and the researchers' assumptions about a problem through deliberation is essential in jointly formulating problems.

4.2   Transitioning is more than Interleaving

We have exploited the different forms of engaged scholarship to formulate problems in a single research project. While Van de Ven (2007) notes that research efforts may involve more than one of engaged scholarship's four forms (Figure 1), he does not provide guidance for exploiting these different forms by interleaving between them in a single research project, and he makes no point about the difficulties of how to do this. In our approach to formulating problems, the four forms become intrinsically related but do not form a unified, mixed approach. Each form of engagement should maintain a distinct research design in the ephemeral research organization (see Figure 3). We claim only that it worked in our case, and we suggest that other research designs may well similarly benefit from explicit transitioning. We believe that we can overcome some of the limitations of action research and of design research by explicitly linking the research approaches through the problem formulation. This linking differs from the mix of research approaches (Mingers, 2001) in action design research (Sein et al., 2011). Action design research unifies action and design research in to a single method in part to overcome some of the shortcomings with formulating problems in design research (see Section 2). We suggest a unifying method is not the only way to link action research and design research. It is also possible to interleave between the different forms, but we also suggest that it should be done with explicit transitioning between research approaches through the problem formulation.

In our approach to formulating problems, we gradually moved (see Figure 3) from the upper left with the surveys, interviews, and joint seminars down to the bottom left with the workshops (transition 1 in Figure 3). We then moved into action research with the improvement activities (transition 2). We then gradually detached our empirical process from the specifics of each of the three participating municipalities and evaluated the artifacts as in design science research (transition 3).
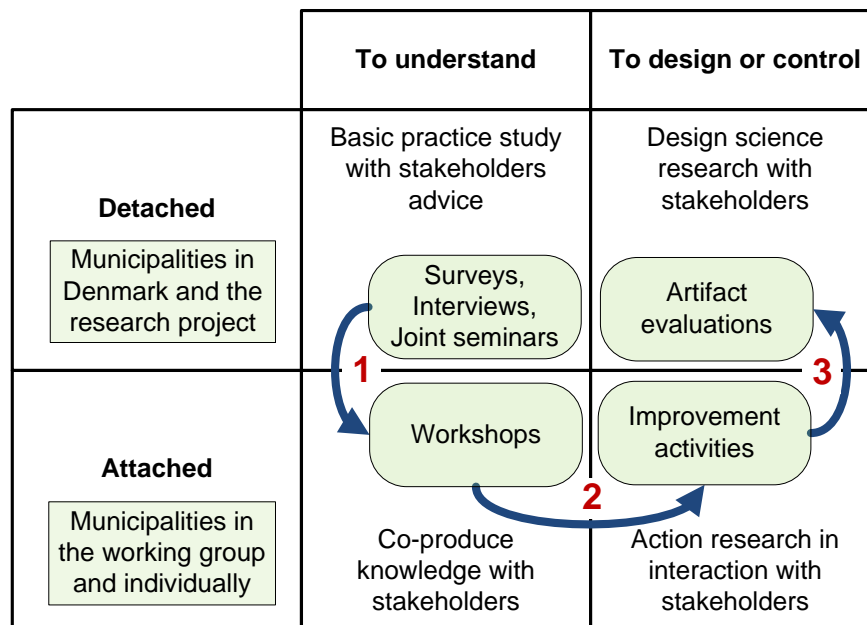

Figure 3. Transitions in our Problem Formulation

The transitions in the problem formulation brings knowledge from one form of scholarship to another by having stakeholders make the transitions jointly with the researchers (see Figure 3). We noted that practitioners can be highly involved in decisions about how to transition from the detached form to the attached form of understanding and from attached understanding to design/control.

The approach to formulating problems suggests that one must study a problem's situation and transition the form of scholarship in a context—a context that, at the same time, is also in part reshaped through the research activity. This particular need to formulate problems in a context coincides with Wieringa's (2010) criterion that relevance in design science research is context dependent, and it coincides with research approaches to study organizational processes in context (Pettigrew, 1990, 1997).

4.3 Proactive Approaches

Our approach to formulating problems (see Section 3) explains how to formulate problems in more detail than what we usually see in the proactive research approaches (action research, design research, design science research). We suggest that our explanation provides a background on which action researchers, design science researchers, and action design researchers can see: 1) how important it is to have a particular focus on problem formulation regardless of the underlying proactive research method, 2) how to deliberately formulate problems and transition between the proactive methods, and 3) how to elaborate and expand the empirical process in the formulation of problems and benefits of that regardless of which underlying proactive method.

Action research has much to offer on how to relate the activities of problem solving and research (see Section 2.2). Moreover, much action research guides researchers in diagnosing problems ahead of action planning (e.g., Susman & Evered, 1978), and canonical action research encompasses iteratively diagnosing problems (Davison et al., 2004). The focus remains, however, with the individual client or with the client organization and with a particular focus on change and intervention in that organization. Action research per se has little to offer on organizing how to formulate problems across different organizations, on different foci, and with different types of engagement. It also offers little specificity on how to actually formulate problems. Our approach is a particular way for a research project to span multiple organizational settings. It also illustrates how clients can choose to further engage in the formulation of problems and gradually become more and more involved in the process.

Design science research focuses on which problems to address (see Section 2). However, design science research offers little on how to formulate problems in detail. We illustrate an approach in which one formulates problems by involving different stakeholders through surveys, interviews, action research interventions, and artifact evaluations. Thus, we go beyond Simon's (1996) idea of research and problem solving (Hevner et al., 2004) that devotes much interest to solving problems and less to defining them (Iivari, 2007). We present an approach to formulating problems in line with how Schön (1983) outlines problem framing for the reflective professional. Perhaps the Simonean view that IS design science research takes is an unnecessary assumption.

We note action design research as a special case because it is a mixed approach between action research and design science research and because it seeks to overcome the shortcomings about formulating problems. Action design research has particularly extended well beyond the limited view on what a problem is taken by design science research (see Section 2) (Sein et al., 2011). We concur in our approach to problem formulation with the steps taken by action design research. These steps move away from the limited view in design science research of problems and their context.

Action design research offers a central activity called "problem formulation" that one can explain with two principles and several tasks. This explanation is at an overall level similar to what we present here, but only at the overall level. We suggest that the narrative we provide here is a much more detailed and elaborate way of focusing on formulating problems and that a detailed account is part of a deliberate approach to formulating problems. One can easily fit our experience with formulating problems into the thinking underlying action design research. We suggest that one can see our problem-formulation approach as a particular way to instantiate "problem formulation" in action design research. Our approach to formulating problems is perhaps most relevant when one needs to formulate problems across organizational settings, and it is as such a relevant way to follow in dealing with the abstract notion of a class of problems rather than just a single client's problems or a client organization's problem.

4.4 Implications

Our study has implications for how researchers in IS may understand and try to create work relevant to both practice and research. The problem-formulation process is a fundamental yet under-prioritized part of understanding relevance in IS research design. To address this concern, we propose three principles to engagedly formulate problems (see Table 2). We derived the three principles from our narrative in Section 3; however, one may practice the essence of engagedly formulating problems (the three principles) with different forms of proactive research in both small and large research projects.

Table 2. Principles for Engaged Problem Formulation

Problem dialogue	• Establish joint learning settings with practitioners and researchers informed by empirical inquiry into the problem's situation. • Uncover and critically assess the assumptions of practice and research underlying the problem's situation.
Problem deliberation	• Involve practitioners in decision making processes for assessing problems' relevance and priority of problems. • Assess the prevalence and relevance of problems with evidence from diverse situations.
Problem flexibility	• Allow an open problem space while closing in on the solution space. • Formulate and re-visit problems repeatedly in the research process.

These principles relate to existing research in several ways. Problem dialogue emphasizes establishing joint learning among researchers and those practitioners who experience and know a problem, and it has similarities with collaborative practice research (Mathiassen, 2002). However, joint learning involves uncovering and critically assessing the assumptions of practice and research that underlie the problem situation, which reflects a concern for making interesting theory in a similar way as with the problematization methodology (Alvesson & Sandberg, 2011).

Problem deliberation emphasizes involving practitioners in making decisions about problems' relevance and prioritization. Thus, problem formulation becomes a deliberation process in which parties together learn about fact, value, and strategy—a process similar to approaches for deliberative practitioners (Forester, 1999). Furthermore, in assessing problems' prevalence and relevance with evidence from diverse problem situations, one can use different forms of engaged scholarship (Van de Ven, 2007).

Problem flexibility suggests that researchers need to scrutinize problems critically before committing to particular definitions, designs, or solutions. Problem flexibility is closely connected to how reflective practitioners frame problems (Schön, 1983). Furthermore, engagedly formulating problems is not a distinct activity particular to initiating a research process; instead, it continues in different forms throughout the process. Engaged scholarship similarly emphasizes that one should iterate on problems with research design, theory building, and problem solving (Van de Ven, 2007).

These three principles (Table 2) may help IS researchers address the haunting question "Is this the problem?". While these principles capture the essence of engagedly formulating problems, one can find further insights pertaining to their theoretical inspirations in Section 2 and in this section's references. The overarching theoretical understanding of our approach to formulating problems builds on on engaged scholarship (Van de Ven, 2007). However, the principles of problem dialogue (Mathiassen, 2002; Alvesson & Sandberg, 2011), problem deliberation (Forester, 1999), and problem flexibility (Schön, 1983) involves theoretical inspiration combined with our insights from formulating problems ourselves.

5   Conclusion

In this paper, we present an approach to formulating problems. Inspired by Van de Ven (2007), we understand problem formulation as researchers' and practitioners' jointly researching and defining problems. The approach is based on our research practice with IS management in Danish municipalities to jointly produce knowledge of problems to advance research and enlighten a community of IS practitioners. We illustrate the approach with a narrative of engaged problem formulation and discuss how we transitioned through several problem definitions and how we grounded these in empirical data collection and analysis. Other researchers can use this paper to learn how to engage in a more elaborate problem-formulation process, which we propose is crucial in linking theory with practice. We further argue that three principles (problem dialogue, problem deliberation, and problem flexibility) guide the approach that would-be engaged researchers should use to guide how they design their own research.

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