



RESEARCH ARTICLE

How a professionally qualified doctoral student bridged the practice-research gap: a confessional account of Collaborative Practice Research

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Abstract

Information Systems (IS) is a profession-based discipline that constantly seeks new ways to bridge the practice-research gap. These efforts include enacting scholar-practitioner roles across institutional boundaries, developing and disseminating new knowledge, and engaging professionally qualified doctoral students. Against this backdrop, we provide a confessional account of 10 years of Collaborative Practice Research (CPR) between Anna, an IS practitioner, and Lars, an IS researcher. The collaboration was initiated when Anna, while working full-time, engaged as doctoral student with Lars as supervisor. Combining social process modeling with theories of change and learning, we show how Anna and Lars responded to the experienced challenges and opportunities, how Anna's action strategies developed as she grew into becoming a practitioner-researcher, how the collaboration impacted the practice context, and, how the research resulted in traditional publication outcomes. On the basis of these analyses, we discuss how to engage professionally qualified doctoral students within the IS discipline. In addition, we offer lessons on how CPR can help bridge the practice-research gap as a path towards becoming a practitioner-researcher.

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Introduction

As a reflection of its intrinsic relationships to professional practice, the Information Systems (IS) discipline debates how to build links between research and practice (Moody, 2000), conduct rigorous research of practical relevance to industry (Benbasat & Zmud, 1999; Davenport & Markus, 1999), evaluate the applicability of new knowledge (Rosemann & Vessey, 2008), and engage professionally qualified doctoral students (Klein & Rowe, 2008). These debates suggest it is complicated and challenging to bridge the practice-research gap. One major reason is that practice and research constitute related, but quite different forms of knowledge that are seldom understood and appreciated by the other part (Van de Ven, 2007). As a result, practitioners and researchers are typically rewarded based on results that are perceived as having little value to the other part. While some argue that these institutional arrangements make it impossible to bridge the practice-research gap (Kieser & Leiner, 2009), this paper is based

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on the premise that it is both important and practically possible to develop meaningful research collaboration across the institutional boundaries that separate industrial practice from academic research (Wasserman & Kram, 2009).

As a contribution to our understanding of how to bridge the practice-research gap, we provide a confessional account (Van Maanen, 1988) of 10 years of Collaborative Practice Research (CPR) (Mathiassen, 2002) between Anna, an IS practitioner, and Lars, an IS researcher. While working full time as manager of Ericsson's Software Process Improvement (SPI) efforts in Gothenburg, Anna engaged as doctoral student at Gothenburg's IT-University in late 2001 under supervision of Lars. This led to a series of CPR projects into her own practice as SPI manager at Ericsson, involving her colleagues in the SPI group, and aiming at improving SPI practices and outcomes. Although we also discuss the research outcomes of these efforts, our focus is on the following research question: *How can CPR help professionally qualified doctoral students bridge the practice-research gap within the IS discipline?* Hence, our emphasis is on how we used CPR to organize and leverage our different backgrounds and roles to develop new knowledge, improve practices at Ericsson, and eventually grow Anna into a contributing practitioner-researcher.

CPR (Mathiassen, 2002) is dedicated to studying professional practices within the IS discipline emphasizing how practices are shaped by and shapes the local organizational context in which they unfold (Pettigrew, 1990). CPR is based on close collaboration between practitioners and researchers and the objectives are to understand the professional practices under investigation, to develop new ways to support these practices, and, eventually to improve current practices through various forms of intervention. Hence, the dominant approach (Chiasson *et al*, 2009) in CPR is action research; but, CPR also draws on various forms of field studies as well as design science research to develop new artifacts. The advantage of this pluralist approach (Mingers 2001; Chiasson *et al*, 2009) is that it allows researchers to adopt multiple and competing perspectives on practice thereby supporting the different knowledge interests involved in understanding, supporting, and improving professional practices. Quite a number of CPR studies have been reported in the literature investigating, for example, SPI practices in a telecommunications provider (Börjesson *et al*, 2006), use of metrics in a large software organization (Frederiksen & Mathiassen, 2008), and requirements practices in a small provider of software services (Napier *et al*, 2009). There are, however, no detailed accounts of how CPR can help professionally qualified doctoral students bridge the practice-research gap.

The paper is based on confessional writing (Van Maanen, 1988) as an expression of our reflective approach to IS research (Mathiassen, 1998). Reflective practitioners write about their experiences and engage colleagues in reading, discussing, and jointly developing

texts to increase learning (Jepsen *et al*, 1989; Bolton, 2005). Anna initiated these reflections by inviting Lars to investigate our collaboration, to confront each other's interpretations, and to explicate lessons for ourselves and others with an interest in bridging the practice-research gap within the IS discipline. We have combined social process modeling (Newman & Robey, 1992) with theories of change (Weinberg, 1997) and learning (Argyris & Schön, 1996) to analyze extensive documentation of how we practiced CPR into SPI practices at Ericsson. The resulting analyses focus on how we responded to experienced challenges and opportunities, how Anna's action strategies developed as she grew into becoming a practitioner-researcher, how the collaboration impacted the practice context, and, how the research resulted in traditional outcomes reported elsewhere (Appendix).

As a result, we discuss how to engage professionally qualified doctoral students within the IS discipline. In addition, we offer lessons on how CPR can help bridge the practice-research gap as a path towards becoming a productive practitioner-researcher. Although we accept blind spots and a positive bias towards our research outcomes as natural ingredients in the account (Van Maanen, 1988), we posit that confessional writing like the one presented in this paper can help the IS discipline uncover important insights into research practices as complements to traditional publications and ideological debates over challenges and opportunities involved in bridging the practice-research gap.

Theoretical background

The practice-research gap

Van de Ven (2007) argues that to bridge practice and research within a discipline, one must accept that practice and research constitute related, but quite different forms of knowledge. Practice knowledge can be codified as methods and standards, but it is often tacit and tightly linked to local contexts. In contrast, research knowledge is always explicit, it follows specific codes of representation expressed through editorial practices in academic journals, and it strives towards providing general insights into practice. As practitioners engage in IS research they are confronted with these differences and challenged to bridge the gap between the opposing characteristics of local and general applicability of knowledge and between practical relevance and scientific rigor of research outcomes (Benbasat & Zmud, 1999; Davenport & Markus, 1999).

Moody characterizes the IS discipline as applied with a focus on applications of information technology rather than technology itself (2000). As such, it has two primary objectives: the theoretical objective of increasing knowledge to help us understand why and how things happen in a particular area of interest; and, the practical objective of improving professional practices to support use of information technology in society. While there are several inward looking and important debates within the IS discipline over research paradigms and methods,

Moody argues that the issues of how to build practice-research links and establish practical credibility are of equal importance. Unfortunately, there are major disconnects, for example considerable parts of IS research is not driven by practical needs; practitioners tend not to read IS journals; and, practitioners do not build on academic knowledge to solve problems (Moody, 2000, p. 353). As a way forward, Moody suggests to learn from other disciplines like medicine to strengthen practical applicability without abandoning our currently strong position as a rigorous research discipline. Moody's general concerns are reflected in discussions among IS scholars (e.g., Benbasat & Zmud, 1999; Davenport & Markus, 1999). They are also representative of broader concerns of how to develop and support scholar-practitioner roles (Wasserman & Kram, 2009) and how to align the interests of diverse stakeholders (Starkey & Madan, 2001) in the context of business and management research.

One particular focal point in the debate is on leveraging doctoral programs as a solution to the perceived practice-research gap. Hay argues that executive doctoral programs can develop 'boundary-spanners who move between the worlds of academia and business to generate two outcomes – new theoretical knowledge and organizational results' (2003, p. 376). Similarly, Klein and Rowe discuss how to engage professionally qualified doctoral students to improve the practical relevance of the IS discipline. Instead of wasting such valuable resources within our doctoral programs, they suggest we adjust 'program contents and student supervision to take advantage of their practical knowledge, while at the same time maintaining academic standards' and 'recognize ways that professionally qualified doctoral students may be able to boundary-span and publish research results in forms that are appreciated by the professional community' (2008, p. 676). In effect, doctoral programs that are tailored to accommodate the strengths of professional practitioners will not replace students' professional background with an academic mindset, but instead maintain it as an important complement.

Against this backdrop, we found it interesting to reflect systematically over our experiences during the considered 10-year period as we used CPR to help Anna

grow into a productive practitioner-researcher within the IS discipline.

Transforming professional practices

To analyze what happened as we became engaged in CPR studies, we adopt a pluralist approach to develop richer and more reliable insights (Mingers, 2001). As summarized in Table 1, our analytical framework combines Newman & Robey's social process modeling (1992) with Weinberg's model of reactions to change (1997) and Argyris & Schön's organizational learning theory (1996).

Newman & Robey's model (1992) focuses on the antecedent conditions, the sequence of events, and the outcomes of social processes within organizations. The antecedent conditions and outcomes establish the boundaries within which the model identifies key events involved in the observed process. The events are organized into relatively brief encounters in which the trajectory of the process is challenged, and subsequent longer episodes that unfold until the next encounter. The model has proven useful as a way to establish the chronology and understand key interactions involved in complex social process within the IS discipline, including studies of analysts and users during systems development (Newman & Robey, 1992), organizational implementation of complex IS (Cho *et al*, 2008), and, telehealth innovation in rural contexts (Singh *et al*, 2010). We have used the model to establish the boundaries of our collaboration and a timeline of key events.

Weinberg's model (1997) describes how professionals, confronted with change ('a foreign element'), go through certain stages in trying to move from current practices ('old *status quo*') towards new practices ('new *status quo*'). Responding to change, the professional might reject the foreign element, accommodate it into current practices, engage in transforming current practices, and practice new ways of working and interacting. These responses might over time lead to a new *status quo* or back to the old *status quo*. The process is rarely linear and incremental. Typically, it involves chaotic periods of resistance and frustration in which the professional struggles to accept the foreign element and transform old practices. Weinberg's model has previously been used to investigate

Table 1 Framework for analyzing transformation in professional practices

Perspective	Purpose	References
Social process of antecedent conditions, sequence of encounters followed by episodes, and outcomes.	To establish the boundaries of the collaboration between Anna and Lars and a timeline of key events.	Newman & Robey (1992); Cho <i>et al</i> (2008); Singh <i>et al</i> (2010).
Stages involved in changing professional practices.	To understand Anna's reactions as her professional practices were challenged and changed through the collaboration with Lars.	Weinberg (1997); Mathiassen <i>et al</i> (2003).
Action strategies and governing variables involved in professional learning.	To understand how Anna's action strategies and governing variables shaped and were shaped by the collaboration with Lars.	Argyris & Schön (1996); Stein & Vandenbosch (1996).

transformation of professional IS practices (Weinberg, 1997; Mathiassen *et al*, 2003). The foreign element that entered into Anna's practices at Ericsson was academic research and even though professionally qualified doctoral students were nothing new to Lars, each new student brings a different set of problematic situations. Here, we are interested in understanding Anna's reactions as her professional practices were challenged and changed through the collaboration with Lars.

We also draw on Argyris & Schön's theory of how professionals transform their action strategies and the variables that govern their behavior (1996). A professional practice is based on certain action strategies (prototyping to improve system quality and ensure user acceptance; or, risk management to adapt projects to changes in context). However, these action strategies are not freely chosen from a general portfolio of options. Instead, they reflect deeply rooted governing variables (rely on others; be open to change) that are embedded into a professional's organizational context and personal belief system. In many cases, organizations attempt to change professional practices by substituting old action strategies with new ones in response to perceived problems or challenges. Such single-loop learning will, however, have limited effect because it leaves the underlying governing variables unchanged (Argyris & Schön, 1996). Hence, Argyris and Schön argue that effective transformation of professional practices requires double-loop learning, in which governing variables as well as action strategies are challenged. Drawing on Argyris & Schön's organizational learning theory (1996) and previous studies that have applied their theory to IS research (e.g., Stein & Vandenbosch, 1996), we are interested in understanding how Anna's increasing involvement in research impacted the action strategies and governing variables of her professional practice.

Research design

Confessional writing

Drawing on Van Maanen's approach to confessional writing (1988), we provide a self-reflective and self-revealing account of our joint CPR experience over a 10-year period. Self-reflection and writing about personal experiences is an integral part of being a reflective practitioner (Jepsen *et al*, 1989; Bolton, 2005). In writing accounts from ethnographic field studies, researchers can adopt a confessional style as opposed to realist or impressionist styles (Van Maanen, 1988). Confessional accounts serve to demystify fieldwork by revealing how research is practiced. As a result, such accounts are highly personalized and can 'appear in separate texts and provide self-explanatory and self-sealing accounts of how the author conducted a piece of research reported elsewhere' (p. 75). Typically, such accounts offer a 'character-building conversion' view on how authors' perspectives and practices transformed during the research. Still, the accounts most often end up supporting

the research outcomes that authors may have published elsewhere. 'The implied story line of many a confessional tale is that of a field worker and a culture finding each other and, despite some initial spats and misunderstandings, in the end, making a match' (p. 79). By design, therefore, incompleteness of data, blind spots of interpretation, and a positive bias towards related research publications are ingredients in confessional accounts. Despite these limitations, such accounts serve the purpose 'to lift the veil of public secrecy surrounding field work' (p. 91).

As a form of action research, CPR (Mathiassen, 2002) involves ethnographic fieldwork in which the actors are immersed over an extended time period into unfamiliar cultures (Agar, 1986). In CPR, though, researchers are not simply outsiders observing a particular culture. Rather, researchers and practitioners engage collaboratively to bridge the gap between a practice culture in which problems are addressed and a research culture in which the academic inquiry is rooted (McKay & Marshall, 2001; Mathiassen, 2002). Hence, outside researchers are typically familiar with the research culture, but unfamiliar with the culture in the organization under study; similarly, inside researchers and practitioners are typically unfamiliar with the research culture, while the practice culture constitutes their everyday working environment (Bartunek & Louis, 1996). Although confessional writing is common in sociology and anthropology (Van Maanen, 1988), we only found one confessional account in leading IS journals (Schultze, 2000). However, that study represents a particular type of confessional account based on Behar's (1996) notion of vulnerable writing, in which authors' personal reflections are interlaced with the actual ethnographic material as an intrinsic part of the main publication. In this paper, we draw on Van Maanen's original notion of confessional writing as a complement to traditional research publications and posit that IS research can benefit from such accounts as one approach to help bridge the practice-research gap within our field.

Reflective analyses

As insider, Anna provided us with action experience and access to data at Ericsson while Lars, as outsider, added reflective and analytical capabilities independent of the culture and traditions at Ericsson (Bartunek & Louis, 1996). On the basis of unlimited access to the extensive documentation of Anna's engagement into research and practice over the considered period, we based our reflective analysis on the data sources summarized in Table 2.

We combined autonomous and communicative reflexivity (de Vaujany, 2008) to analyze these data. Autonomous reflexivity afforded each of us the opportunity to develop and strengthen our personal interpretations of the data decoupled from discussions with the other, whereas communicative reflexivity allowed us to engage in elaborate conversations about the data, their interpretation, and our experiences. Autonomous reflexivity was based on individual reading and annotation of the

Table 2 Data sources

<i>Data source</i>	<i>Explanation</i>
Direct involvement	Anna had a leading role in the 11 research studies and related practices presented in this paper (Appendix).
Minutes of meeting	Formal notes from 25 steering group meetings related to the improvements and industry-academia collaborations considered in this study.
Personal meeting notes	Anna's personal notes from 25 steering group meetings related to the improvements and industry-academia collaborations considered in this study.
Presentation material	Material from 15 presentations related to our collaboration and given by Anna at Ericsson and at the IT-University during the considered 10-year period.
Project documentation	Complete documentation (i.e. project plans, project decisions, project notes, data stored in tools, internal surveys) of the 10 improvement projects considered in this study.
Participatory observations	Anna was personally engaged in all 10 improvement projects (e.g., through work meetings, interactions with engineers, presentations to management, one-on-one consultations, and informal conversations over lunch and coffee breaks) and had direct access to how problems were perceived and discussed and how results from improvement initiatives were evaluated and used.
Publications	The entire portfolio of research papers published by Anna including the Ph.D. dissertation (a selection of 11 of these is presented in Appendix).
Research notes	More than 200 pages of notes taken during the considered research, for example motivations for doing the study used to promote it internally at Ericsson, design of interviews and surveys, complete interview and survey results, processes and tools that were evaluated, and accounts of barriers and evaluations of results from each intervention.

Table 3 Retrospective questions asked between Anna and Lars

- How did Anna view the industrial benefits of collaboration with academic research before starting the Ph.D., during the Ph.D., and after defending the Ph.D.?
- Which key events impacted Anna's perception of the potential interaction between academic research and industrial practices?
- How did Anna react to collaboration with and engagement in academic research before starting the Ph.D., during the Ph.D., and after defending the Ph.D.?
- Which variables governed Anna's professional practices before starting the Ph.D., during the Ph.D., and after defending the Ph.D.?
- How did Lars view the possibilities to leverage and further develop Anna's professional knowledge during the research collaboration?
- Which elements of theory and research methodology did Lars consider important for enabling Anna to develop into a practitioner-researcher?

data material and resulted in draft versions of focused data analyses that were subsequently scrutinized and developed through communicative reflexivity. Our communicative reflections were further stimulated through retrospective questioning between us (Table 3). Questions were systematically asked by each of us directed towards the other to take differences in interpretation into account. Differences in interpretation were reconciled through discussion, by carefully reviewing the original data sources (Table 2), and by consulting with colleagues at Ericsson.

Combining the two modes of reflective inquiry led to many discussions and iterations, and it helped us limit the impact of the incompleteness and bias that is typical for confessional accounts (Van Maanen, 1988). We achieved similar effects by drawing on the pluralist analytical framework (Mingers, 2001; Table 1), by triangulating between the rich data sources (Patton, 1987), and by paying particular attention to basic

principles for interpretive research (Klein & Myers, 1999). Hence, we followed the principle of multiple interpretations to allow each of us to develop and share independent and personal interpretations of the process; we followed the principle of dialogical reasoning to be sensitive to contradictions in our interpretations and between our preconceptions and actual findings; and, we followed the principle of suspicion to constantly be sensitive to the biases involved in developing a confessional account.

On the basis of these practices, our data analyses proceeded in three iterative steps. First, we used Newman & Robey's (1992) social process model to establish the antecedent conditions, the sequence of key events, and outcomes of our research collaboration. By combining key events in our data with the stages in Weinberg's change model (1997), we identified four encounters that marked important transitions in Anna's practices. These encounters reflect changes in Anna's ability to deal with the foreign

element, that is her ability to understand, contribute to, and ultimately leverage the research community as an important part of bridging the practice-research gap. Table 4 summarizes the encounters in Anna's professional transformation, the episode following each encounter, and the related stage in Weinberg's change model. Second, we drew on the structuring of this process into four stages to develop a comprehensive account of practice-research interactions during our collaboration, that is which publications had been published and how these related to problems and changes in practices at Ericsson (Appendix). Third, we used Weinberg's change model (1997) and Argyris & Schön's theory of organizational learning (1996) to analyze Anna's reactions to change and the transformation of her action strategies and governing variables (Figure 1 and Table 6).

A confessional account

The CPR process

Antecedent conditions: In 2000, Ericsson Gothenburg faced several problems within software development. The problems remained despite a feeling among man-

agers and engineers they were understood and possible to solve. The president for Ericsson Mobile Data AB in Gothenburg, Åke Johansson, wanted to address this situation through closer collaboration with academia. In 2001, an agreement was made between Ericsson and the IT-University (ITU) in Gothenburg including sponsorship from Ericsson of CPR projects and supervision from ITU of a number of professionally qualified doctoral students working at Ericsson.

Encounter 1: Enrolling as Ph.D. student. Anna engaged as Ph.D. student with Lars as supervisor in late 2001 while continuing to work full time at Ericsson. This arrangement was made practically feasible by agreeing that Anna's practice as SPI manager would be the subject of her Ph.D. study.

Episode 1: Engaging. The three main objectives of Anna's Ph.D. were to 'understand how implementation of software processes can contribute to successful SPI', 'provide and implement improved guidelines for how SPI change agents can act to facilitate successful process implementation', and 'contribute to the body of knowledge on SPI with a focus on implementation of software processes' (Börjesson, 2006a). CPR fulfilled the dual goal of improving practice and contributing to theory. Anna had a strong sense of key challenges in SPI and we started immediately to engage in SPI discussions, analyze experiences, and reflect on challenges and practices within Anna's SPI group. These activities gave Lars an introduction to SPI within the Ericsson context and they resulted in increased understanding about the distribution of change agent effort (Appendix row 1) and a first research publication (Börjesson & Mathiassen, 2003). The experience made Lars realize that he had to work closely with Anna to direct her towards rigorous research practices. However, Anna did not see the value in

Table 4 Observed encounters and episodes related to Weinberg's stages (1997)

Encounter	Episode	Weinberg stages
Enrolling as Ph.D. student (Late 2001)	Engaging (2001–2004)	Old status quo
Positioning the research (Mid-2004)	Experimenting (2004–2006)	Chaos
Defending Ph.D. dissertation (Early 2006)	Integrating (2006–2007)	Integration and practice
Establishing research centre (Early 2007)	Performing (2007–2010)	New status quo

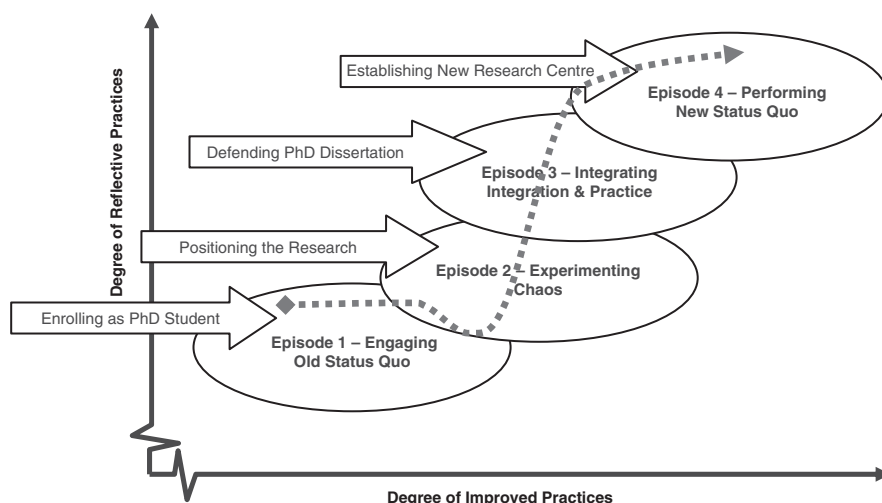


Figure 1 Anna's reactions to change (Weinberg, 1997).

explaining how research was done and struggled a lot with the requirements for publishing at academic conferences. Still, this early publication gave the Ph.D. project a kick-start with significant overlap between Anna's practice and research.

Anna's engagement as researcher had immediate effects: access to new SPI competence through close collaboration with Lars; broadening of Anna's knowledge based on the SPI literature; and, increased attention to SPI among Anna's SPI team and the managers and engineers affected by SPI at Ericsson. The SPI team wanted to understand and learn more, but the time to do so was limited. Therefore, in early 2003 Anna started an SPI forum within the team supported by Lars and based on action learning (Marquardt, 1999). The participants met on a monthly basis to learn, discuss, and reflect on SPI and related theories, models, and methods that could facilitate successful process implementation (Appendix row 2). This led to a number of immediate results. For example, the team studied Pries-Heje & Tryde's workshop model for SPI (2001), and the model was applied to improve code reviews in a software project. As a result, code review participation increased with 53% and satisfaction with code reviews increased with 38% (Börjesson, 2006b). Tangible results were, however, still considered more important than understanding and learning.

During this period, Lars took advantage of his visiting research position in Gothenburg to visit Ericsson 3–4 times a year to engage in the SPI-related activities, to coordinate with Ericsson managers, and to collaborate with Anna on research papers. His goals were to understand the SPI context at Ericsson, to contribute to practical problem-solving with Anna and her SPI colleagues, and to supervise Anna's research. To engage Anna in the academic community, he also facilitated her participation in the doctoral consortium at European Conference of Information Systems in 2003. However, despite such attempts to integrate Anna into the academic community, Anna was provoked by the academic profession's emphasis on developing and positioning new knowledge in the research literature and she continued to view research as a major challenge.

Encounter 2: Positioning the research. After the initial CPR projects with contributions to both practice and research (Appendix rows 1–2), Anna started to focus her Ph.D. on 'Making SPI Happen'. We had a first publication along these lines at the European Conference on Information Systems in 2004 (Börjesson & Mathiassen, 2004a). This study provided detailed analyses of change agent and software engineer commitment across several SPI projects and it discussed different approaches to making SPI happen based on process push and practice pull. Also in 2004, we published our first journal paper (Börjesson & Mathiassen, 2004b). Anna was, however, still skeptical about academic values and the publications did not come naturally (Appendix rows 3–4). In May 2004, we had intense discussions about the knowledge interests of

academia vs those of industry without arriving at a joint agreement on how to manage overlapping and divergent interests.

Episode 2: Experimenting. It had become clear to Anna that it required new skills and a lot of effort to perform research and write academic papers, and she often engaged Lars in discussing academic traditions for documenting new knowledge and the values and practices involved in the research profession. In addition, it was challenging for Anna to find time to do research (i.e. read papers and books, conduct data analyses, write papers) while also being SPI manager at Ericsson.

Anna did, however, stay committed to her Ph.D. project and in 2004 we started a CPR project focusing on implementing a new change request process (Appendix row 5). Well aware of the challenges change agents face, we included two skilled SPI team members and started to develop a new change agent approach – the guerrilla tactic. Following this tactic, change agents visited reference group members, who did not appear satisfied, discussed with them how to proceed to make them committed, and subsequently accommodated these ideas into the project. The change request process was successfully implemented according to the initial time plan and the study was published at an international conference in 2005 (Börjesson *et al.*, 2005) and subsequently in a journal in 2006 (Börjesson *et al.*, 2006). For the first time, Anna took independent academic leadership without involving Lars as researcher and experienced how a well prepared CPR project facilitated making change happen in practice.

In early 2005, Anna changed position and started to work more with the Ericsson R&D global SPI team. Inspired by the local SPI forum, she initiated an Ericsson global SPI forum with change agent participants and the same goal as the earlier local SPI forum in Gothenburg. This initiative ended up diffusing several change agent tactics and during the evaluation in 2005, 90% of the participants believed the global SPI forum had developed their professional skills and they wanted to continue the forum.

During this period, Lars continued to visit Anna at Ericsson twice a year, at this point focused on collaborating on research papers and supervising Anna's dissertation work. Anna also visited Lars three times for 3–4 days at his new university in the U.S. These intense meetings away from Ericsson provided ample opportunity to discuss Anna's research and helped her position the dissertation. During one visit in 2005, as Anna started to prepare her multi-paper dissertation for defence, she presented Lars with the idea of writing the summary chapter for a practitioner audience. Lars disagreed with this approach and argued that the purpose of the dissertation was to allow Anna to present and defend her research approach and contributions in front of an audience of academic scholars. This led to a series of (often heated) discussions. In the end, Anna decided to target the dissertation towards academia,

and then to develop a separate presentation of results for practice.

Encounter 3: Defending Ph.D. dissertation. The many CPR projects and related publications (Appendix rows 1–5) made it possible for Anna to synthesize her research into a coherent dissertation. This process helped her appreciate core academic values and to see how they could positively impact practice. In January 2006, she successfully defended her Ph.D. in Applied IT with the title ‘Making Software Process Improvement Happen’ (Börjesson, 2006a). Anna now viewed research as a potential enabler, rather than just a challenge.

Episode 3: Integrating. The Ph.D. dissertation (Appendix row 6) was condensed into a practice friendly power point presentation with 10 research contributions (Table 5) and Anna presented it internally at Ericsson for different groups of change agents, managers, and senior engineers. These presentations raised the awareness on how to make SPI happen and increased the attention to SPI issues in general within Ericsson.

This inspired Anna to engage in new CPR projects. In late 2005, an Ericsson management team faced knowledge problems related to new software development techniques. Anna and a senior ITU researcher therefore started a new CPR project (Appendix row 7). Twenty senior line and project managers participated in a specially developed university course to learn about model-driven software development together with 20 third-year students (Börjesson *et al*, 2007). The project

developed a new education technique, Practitioner Integrated Learning (PIL), and 80% of the participants believed their knowledge in model-driven development had significantly increased as a result of the course. The course was further developed and repeated in 2007 and 2008 and the acquired knowledge was applied in software projects at Ericsson.

In parallel with the PIL project, Lars recommended Anna to engage with a research colleague who was involved in appreciative inquiry (Cooperrider & Whitney, 2005). There was a potential to increase SPI success by focusing on what engineers did well instead of mainly focusing at solving their problems. This resulted in a research group of four colleagues (including Anna) who applied appreciative inquiry to a software project at Ericsson (Appendix row 8). Requirements management was improved and several important lessons were learned about SPI and appreciative inquiry (Börjesson *et al*, 2007; Holmberg *et al*, 2009). A senior Ericsson change agent later joined and the research group continued to drive CPR projects to increase Ericsson’s ability to improve (Baaz *et al*, 2010). For Anna, it was now a challenge to communicate and explain academia values to other colleagues. At this point, Lars was still appointed as visiting researcher in Gothenburg and he could therefore visit Anna at Ericsson twice a year. Our interactions were focused on exploring options for new research initiatives at Ericsson.

Encounter 4: Establishing research center. In mid-2005, we started to discuss how collaboration between Ericsson

Table 5 The 10 research contributions in Anna’s Ph.D.

Research contribution

1. Software organizations can improve SPI change agents’ knowledge through action learning efforts. Such efforts tend to increase implementation success.
2. The combination of high process push and high practice pull tends to result in high implementation success whereas other combinations tend to result in lower success.
3. SPI initiatives exposed to criticism and feedback are likely to experience chaos. This chaos should be recognized as an important opportunity for improvement. SPI initiatives experiencing chaos tend to have higher process implementation success in the end than those that proceed unnoticed.
4. SPI initiatives lacking agile capabilities cannot effectively sense and respond to new employees as organizational mergers take place. Lack of agile capabilities tends to affect implementation success negatively.
5. SPI change agents’ distribution of effort over the phases of the IDEAL model affects implementation success. SPI initiatives spending more effort during deployment tend to have higher process implementation success than those spending less.
6. Dedicated SPI initiatives supporting one engineering project tend to have higher implementation success than generic SPI initiatives supporting several engineering projects.
7. SPI initiatives executing several iterations, in which practitioners are exposed to change in ways that make them understand how the new process will impact their daily work, tend to have higher implementation success than SPI initiatives with no iterations.
8. SPI change agents can use an agile guerrilla tactic to cross the chasm by successfully connecting to early majority adopters. SPI change agents using the guerrilla tactic tend to be successful in implementation of new or modified processes.
9. The traditional Capability Maturity Model (CMM) mindset assumes a rather stable environment and has become a super tanker in today’s dynamic business environment. SPI initiatives practicing the CMM mindset tend to have low SPI implementation success in dynamic contexts.
10. SPI initiatives using a motorboat tactic based on an agile mindset tend to have higher SPI implementation success than SPI initiatives using the super tanker tactic.

and ITU could be improved. Anna continued developing these ideas with executives at Ericsson and ITU. As a result, the Software Architecture and Quality Center (SAQC) formed in 2007 including a 4-year CPR partnership between ITU and Ericsson (Appendix row 9).

Episode 4: Performing. The SAQC set-up resulted in several new CPR projects such as software measurements (Staron *et al*, 2008) and model-driven development (Pareto *et al*, 2009). The findings from these projects were communicated through project participation, posters, and employee presentations. Engineers and researchers had in this way established relationships to enable collaboration, develop research, and improve engineering practices through CPR. Throughout these efforts, Lars continued to visit Ericsson twice a year with a focus on the SAQC and on facilitating coordination with ITU.

In 2007, Anna experienced severe problems with manager and engineer participation in ongoing improvement projects. Anna contacted Lars and we started to investigate the situation (Appendix row 10). Anna collected and compiled data, and we analyzed why these problems occurred. Our analysis resulted in a journal publication (Sandberg & Mathiassen, 2008) in which we identified four slow-down behaviors ('don't show-up', 'say nothing', 'answer late', and 'great, but not now'). This framework helped Anna increase participation in a number of improvement projects and she communicated the findings in Ericsson's employee journal in early 2009.

At this point, we started to discuss how Anna's collaboration with academia had evolved over the years, how it had impacted her and her colleagues, what effects this had had on practice, and what conclusions could be drawn from these experiences. This paper is the result of these discussions (Appendix row 11).

Outcomes: Anna's research has addressed practical problems in software and SPI practices at Ericsson and it has contributed to improve these practices and to establishing the SAQC (Appendix). The research has also been documented in a series of academic conference and journal publications and in a Ph.D. dissertation on how to make SPI happen in practice (Appendix). Anna had, in this way, become a practitioner-researcher with ongoing contributions to the IS discipline.

Reactions to change

In Figure 1, we summarize and visualize how Anna reacted to becoming engaged in research based on Weinberg's change model (1997). Initially, when Anna enrolled as Ph.D. student in late 2001, she did not foresee the degree to which she would be confronted with new challenges and the frustration this would cause her. However, with support from Lars, she managed to make academic progress (i.e. publish papers), while still addressing Ericsson's SPI challenges (Appendix Episode Engaging). After a period, Anna came to understand the new skills and effort that were required to be academically

successful. However, despite Lars' efforts to integrate her into the research community, the foreign element introduced into Anna's working life, that is the task to develop a Ph.D. dissertation, led her to primarily question the underlying values of the research profession. As a result, she remained a practicing SPI manager, an Ericsson insider, who had engaged in collaboration with an outside researcher. To Anna, this was a period of chaos with lots of frustration and resistance. Still, drawing on Anna's orientation towards making results and Lars's supervisor experience, we kept starting and concluding successful CPR projects:

I was extremely frustrated over the emphasis on data quality rather than on creating results. I already knew most answers based on years of practical experience. It was difficult to see the value of time-consuming data collection and detailed analyses to arrive at something I already knew. (Anna, reflecting on spring 2003)

Anna was well organized. She transferred her skills as manager of SPI projects directly to manage our research collaboration, she was already thorough in collecting measurement data, and she constantly transferred SPI theory to her unit at Ericsson. (Lars, reflecting on autumn 2003)

Later, Anna improved SPI practices at Ericsson as she came to know of new SPI methods and theories (Appendix Episode Experimenting). In parallel, she managed to publish papers and she was now in a position to synthesize her research into a Ph.D. dissertation. During this period, she worked closely with Lars at his university in the U.S. three times for 3–4 days. Although these focused visits helped her position the dissertation, she still wanted her summary chapter to target practitioners. Lars was opposed to this idea, and after many discussions Anna agreed to target her Ph.D. for an academic audience. The subsequent Ph.D. defense gave Anna academic self-confidence and was immediately followed by new CPR projects (Appendix Episode Integrating). Anna continued to practice research not only to publish, but also as a means to improve practices at Ericsson. She had accepted the foreign element, that is, academic research, and started to integrate what she had learned as a way of working and improving practice. In early 2007, we were involved in establishing SAQC, a new research center that allowed Ericsson to perform several CPR projects outside Anna's expertise in SPI. Anna had at this point reached a new *status quo* where she not only used research as a means to improve practice; she also helped others become engaged in research-based innovations at Ericsson. Anna was no longer just an SPI manager, an insider from Ericsson. In addition, she had become a researcher with roots in the academic community and she leveraged this role to inform and improve her traditional role as SPI manager. Resistance and frustration had been replaced by conviction and satisfaction as Anna engaged in CPR projects with new

Table 6 Anna's action strategies and governing variables

Stage	Exemplar Action Strategies	Governing variables
Engaging	- Engaging in CPR projects with Lars and Ericsson colleagues - Striving to improve SPI - Learning with help of learning techniques designed for industry (action learning)	- Result orientation - Give answers - Do - Speedy results - State opinions and ideas - Make few mistakes - Suppress negative feelings
Experimenting		
Integrating	- Engaging in CPR projects with new academia colleagues - Striving to improve industry-academia collaboration - Learning designed for industry-academia collaboration (i.e. PIL)	- Result orientation - Ask questions and give answers - Reflect, understand and learn - Qualitative results - State facts - Make new mistakes - Analyze negative feelings
Performing		

collaborators from both industry and academia (Appendix Episode Performing).

I see how thorough analyses and presentation of data stops people questioning whether findings are valid. I see how I can explain findings better and gain support by drawing on theory. I see how collaborating with researchers helps develop both practical and theoretical results. (Anna, reflecting on spring 2007)

Practicing CPR

In Table 6, we summarize how Anna's involvement in research engaged her in CPR and transformed her action strategies and governing variables. In the Engaging and Experimenting stages, Anna strived to improve SPI by engaging in research with Lars and her industry colleagues (Appendix Episode Engaging and Experimenting). She adopted some new action strategies (Argyris & Schön, 1996) rooted in CPR and action learning (Börjesson, 2006b) to deal with SPI challenges and to provide answers and create results – key governing variables developed during her professional career. It was important for Anna to state her own opinion and make few mistakes. During these stages, Anna managed to improve professional

practices, but only slightly her reflective practices (Figure 1). Argyris & Schön (1996) argue that such single-loop learning only has limited effect on professional practices because they leave the underlying governing variables untouched.

I was always eager to take new actions to improve practice. I did not mind changing a method or a tool, but it did not occur to me that my practices were governed by deeply rooted values and that reflecting upon and transforming these could have positive impacts on my role as SPI manager and change agent. (Anna, reflecting on spring 2008)

In the Integrating and Performing stages, Anna strived to improve SPI by enabling industry-academia collaborations, engaging new colleagues from academia in CPR projects, and using new learning techniques (Börjesson *et al*, 2007). She used additional action strategies rooted in PIL (Börjesson *et al*, 2007) and appreciative inquiry (Holmberg *et al*, 2009) and she collaborated with experienced researchers to improve her research as well as professional practices. Anna's governing variables had started to transform as she actively embraced academic

values during the writing of her dissertation. The intense discussions between us on how to synthesize the individual research papers into a coherent dissertation had initiated a double-loop learning process in which it became increasingly important for Anna to understand, learn, state facts, reflect, and question assumptions. Anna still focused on improving practices, but reflections started to play a major role in making sense of, and not merely resolving, the messy problems she constantly faced at Ericsson (Figure 1). Anna was inspired not only to answer questions, but also to ask questions; and, she was more focused on making new mistakes and analyzing negative feelings rather than making few mistakes and suppressing negative feelings. As a result, Anna developed her own understanding of how difficult industry problems could be addressed based on collaboration with researchers from academia.

At this stage, research had become an integral and important part of Anna's professional activity. She created opportunities for collaboration between colleagues and other researchers and she often contacted me with new ideas on how to research problems at Ericsson. (Lars, reflecting on autumn 2008)

Discussion

We engaged in writing this confessional account as part of our reflective practices (Bolton, 2005; de Vaujany, 2008). Enjoying our collaboration and realizing that academic and industrial practices will remain different, we wanted to pause, look back, and draw some lessons. In the following, we discuss key insights from our analyses of Anna's engagement as a professionally qualified doctoral student. We also discuss lessons on how CPR (Mathiassen, 2002) can help such students bridge the practice-research gap as a path towards becoming a practitioner-researcher.

Engaging professionally qualified doctoral students

Following the ambition of confessional writing to demystify fieldwork by revealing how techniques are practiced (Van Maanen, 1988), our most important contribution is the account of how Anna as an IS practitioner gradually engaged in research and interacted with Lars over a 10-year period. This account provides important practical insights into the challenges and opportunities for bridging the practice-research gap within the IS discipline. Anna was part of a doctoral program at Gothenburg's IT-University that afforded practitioners from industry the opportunity to pursue a Ph.D. while still working full time. Anna therefore remained a practitioner throughout the process as she developed her capabilities as researcher by studying SPI literature and research methods, and by participating in seminars at the university, in international conferences of relevance to her study, and in doctoral consortia within the IS discipline. Different from most traditional Ph.D. programs, Lars was assigned as supervisor from the very start of Anna's engagement, and her involvement in the

academic research community was guided by Lars and tailored to the specific needs of her line of inquiry.

Klein and Rowe suggest the development of professionally qualified doctoral students follow a two-pronged strategy (Klein & Rowe, 2008). As a first strategy, it is important 'to take advantage of their practical knowledge while at the same time maintaining academic standards' (p. 676). Most importantly, Anna's practical knowledge was leveraged by adopting CPR to make her professional practice as SPI manager at Ericsson the focus of her research. The obvious strengths of this approach were that Anna created considerable overlap between research and practice, she had unlimited access to data, and she was able to develop results that were of relevance to practice. On the other hand, our analyses show how Anna initially struggled to understand and commit to academic research traditions and values. Arguably this engagement in the academic community might have caused fewer challenges if Anna had been more closely engaged in interactions with other doctoral students through formalized course-work. Therefore, the high degree of overlap between practice and research afforded optimal conditions for taking advantage of Anna's practical knowledge; but it strained our relationship that there were no other formalized mechanisms besides Lars' role as supervisor to ensure academic standards were maintained.

As a second strategy, Klein and Rowe suggest embedding methodological training 'to recognize ways ... to boundary span and publish research results in forms that are appreciated by the professional community' (p. 676). We saw in Anna's case that her research targeted professional practices based on CPR and she published her first paper in the practitioner journal *IEEE Software* (Börjesson & Mathiassen, 2004b). This foundation became formative for her continued development as practitioner-researcher with several CPR projects and other publications in *IEEE Software* (Appendix). Still, Anna's methodological training was instrumentally oriented towards her line of inquiry and this may further have fueled her ongoing struggle to understand, accept, and leverage the academic research community. Also, one of the conflicts we experienced was over the profile and presentation of her multi-paper dissertation (Episode Experimenting). Anna wanted to target practitioners while Lars insisted that the audience should be academic researchers. Anna followed Lars' instructions, but she also developed a separate presentation for her colleagues at Ericsson (Table 5). Following Klein and Rowe's recommendation, it might have been worth the effort exploring alternative approaches to presenting practitioner-researcher dissertations instead of conservatively following the traditions of the academic discipline.

Compared to Wasserman & Kram's exploration (2009) based on interviews with scholar-practitioners, our account provides detailed, longitudinal insights into how two scholar-practitioner roles were shaped and interacted over time as a practitioner engaged in

doctoral studies under supervision of an established scholar-practitioner. Specifically, the account illustrates the dynamic role of the scholar-practitioner: in one extreme is the scholar role within the impermeable boundaries of academia; in the other extreme is the practitioner role within the impermeable boundaries of industry; and, in between is a spectrum of scholar-practitioner roles enacted over permeable boundaries. Anna started out in a practitioner role, but her engagement as doctoral student and the close relationship to Lars created permeable boundaries between her practice at Ericsson and academic research. The shift in roles towards a practitioner-researcher was further stimulated through a series of CPR projects that each constituted a space influenced by norms and traditions from both industry and academia. Our analyses show that Anna's shift involved challenges and only became manifest over several years. During her Ph.D. studies (the Engaging and Experimenting stages, see Table 6 and Appendix) Anna mostly dealt with the academic world by relying on her strengths as a practicing professional. The profound changes in Anna's action strategies and governing variables took place after her Ph.D. (the Integrating and Performing stages, see Table 6 and Appendix) as she shifted from being a practitioner with research skills to being a practitioner-researcher with the ability to leverage academic knowledge, approaches, and values as an intrinsic part of her professional practices.

During the same period, Lars enacted his scholar-practitioner role as an experienced academic researcher with a strong interest in understanding, supporting, and improving IS practices in industry (Mathiassen, 1998, 2002). Against this backdrop, Lars spent considerable efforts engaging in and understanding Anna's situation as SPI manager at Ericsson, interacting with Anna's managers and SPI colleagues and contributing as active participant to several CPR projects (Appendix). Lars' interactions with Anna also changed significantly over the 10-year period. During the Ph.D. study, his primary role was that of the supervisor, assisting Anna in learning to do rigorous research into practice while at the same time being the main guarantor that academic standards were met. In the years that followed after the Ph.D., his relationship to Anna changed to that of a colleague engaged in joint research and participating in Anna's ongoing efforts to engage colleagues and other researchers with an interest in CPR studies at Ericsson.

Our approach relied on specific institutional arrangements. Anna was enrolled as Ph.D. student at ITU while working full time at Ericsson; Lars was her supervisor from the very start of the process; and, Lars tailored her study of theory and research methodology to her particular needs. This arrangement focused the process on research from day one and it afforded us huge flexibility. At the same time, however, Anna was never socialized into a group of other professionally qualified

doctoral students and her exposure to senior researchers was largely limited to Lars. As a result, Anna's transformation into a practitioner-researcher was heavily biased towards industry with quite narrow ties to the academic world. A traditional Ph.D. program with Anna as full-time doctoral student would hardly have been a feasible alternative. In addition to having serious financial implications, such an institutional arrangement would make it less straightforward for Anna to integrate her experiences as SPI manager at Ericsson into her research agenda. However, Anna could have benefitted from being part of an executive doctoral program (Hay, 2003). These programs organize professionally qualified doctoral students into cohorts based on a part-time arrangement where each student, as in Anna's case, remains full-time professionally engaged during the entire study. If Anna had conducted her CPR study in such an institutional environment, she would have been supported by formalized courses in theory and research methodology, and, she would have become socialized into a close community of researchers and peer students with an interest in bridging the research-practice gap.

Our approach also relied on a particular form of engaged scholarship, CPR (Mathiassen, 2002). Engaged scholarship (Van de Ven, 2007) provides ideal opportunities for professionally qualified doctoral students to build on and further develop their background and knowledge. Instead of generating new knowledge in the lab and subsequently packaging and diffusing it into practice, engaged scholars adopt an interactional approach in which professional and research practices contribute to each other's growth through different types of activity. By embracing qualitative as well as quantitative methods and process studies as well as variance studies, engaged scholarship offers ample opportunity to transcend the traditional dichotomies within the IS discipline of core *vs* diversity, rigor *vs* relevance, and positivist *vs* interpretive (Mathiassen & Nielsen, 2008). Still, as a form of action research CPR has particular characteristics that proved helpful in our collaboration: we gained first-hand, contemporary knowledge about SPI by inquiring directly into Anna's ongoing professional practices at Ericsson; we gained deep practical insight into SPI by helping Anna and her colleagues address experienced problems; we leveraged our complementary skills by distinguishing between the role of the outsider researcher and the insider practitioner and researcher (Coghlan, 2001); and, we established a broader and ongoing research collaboration between Ericsson and ITU by increasingly involving other practitioners and researchers in new CPR projects.

Practicing CPR

As a second contribution, our account provides detailed and practical insights into the challenges and opportunities practitioners face as they adopt CPR. These insights complement the generic presentation of CPR (Mathiassen,

2002) and traditional presentations of research designs based on CPR (e.g., Börjesson *et al.*, 2006; Frederiksen & Mathiassen 2008; Napier *et al.*, 2009). Drawing on existing CPR theory and the analyses of our collaboration, we suggest the following lessons for how practitioners can engage in CPR as a path to becoming a practitioner-researcher:

Pay attention to dual goals. From Anna's engagement as Ph.D. student in 2001 and throughout the process, CPR helped her develop boundary-spanning capability between industry and academia (Hay, 2003) and offered a framework for understanding the intrinsic relationships between her IS practices and academic research. The dominant action research approach of CPR helped us constantly think in terms of dual goals of improving practices and building scientific knowledge and organize our activities into interacting cycles of practical problem-solving and academic research (McKay & Marshall, 2001; Chiasson *et al.*, 2009). This basic principle of integrating professional practice and academic research challenged us to constantly negotiate a useful balance between improving practices at Ericsson and increasing Anna's ability to engage in reflective and academic practices (Figure 1).

Identify overlapping activities. Even though Anna was an effective manager when she engaged as Ph.D. student in 2001, it was a daunting commitment because she continued to work full-time. We therefore applied CPR to focus our research collaboration on Anna's practice as SPI manager at Ericsson. Throughout the process, we selected practical problems that Anna and her colleagues faced as basis for our research (Mathiassen, 2002). This allowed Anna to create considerable overlap between her professional and academic activities, it allowed her to ground her research in extensive contextual knowledge about SPI at Ericsson, and, it helped her commit resources to research and deliver practical results in return.

Explore different knowledge forms. Practice knowledge is often tacit and tightly linked to local contexts while research knowledge is explicit and expressed in formal publications (Van de Ven, 2007). Drawing on the dual goals of CPR, Anna developed knowledge that was useful at Ericsson through local problem-solving and she used that as a basis for publishing generally applicable contributions to research. This, in turn, led to local knowledge with higher credibility as the dual goals of CPR were fulfilled through contributions of relevance to Ericsson as well as to new theory through scientific publications (Appendix). Hence, rather than considering the different knowledge forms in industry and academia as barriers, we explored this diversity to develop different types of results and publications.

Confront competing values. Following Weinberg's change model (1997), Anna went through a period of frustration and resistance as she confronted the competing values

of academic and industrial practices (Figure 1). While she had approached the first CPR projects without serious reflections on the relationships between practice and research, our joint discussions on how to position and communicate the dissertation demonstrated the importance of being aware of the competing values involved. In that particular case, Anna focused on the dual cycles of CPR (McKay & Marshall, 2001; Mathiassen, 2002) and developed a balanced position, in which she defended the dissertation as a contribution to the academic discourse while at the same time communicating key findings as a contribution to practice (Table 5).

Establish pipeline of projects. Although the defense of the dissertation in 2006 led Anna through the chaos face of transforming professional practices (Weinberg, 1997), it was the subsequent years of activities (2006–2009) that allowed her to develop and sustain a pipeline of research projects and integrate research into her professional practices. It was through these activities Anna reached a new *status quo* as practitioner-researcher (Weinberg, 1997). This process of continued professional transformation was enabled by CPR (Mathiassen, 2002) and it involved continuous collaboration with the leadership at Ericsson as part of the contractual set-up for new research projects.

Practice double-loop learning. Anna improved practices at Ericsson (Figure 1) by adopting new action strategies, but improvement in reflective practices required her to transform governing variables. Changing action strategies was something Anna did quite easily (e.g. start running CPR projects and organizing SPI forum), but changing governing variables took both time and a lot of questioning (passing the chaos stage). However, the change of governing variables was required to increase Anna's reflective capabilities and to develop her role as an effective innovator at Ericsson. Hence, following Argyris & Schön (1996) we learned that Anna initially adopted CPR and developed several individual research contributions mainly based on single-loop learning. It was during the writing of a coherent academic dissertation and subsequent new CPR projects she transformed governing variables through double-loop learning (Table 6).

Conclusion

Drawing on Van Maanen's approach to confessional writing (1988), our account offers a 'character-building conversion' view on how Anna's perspectives and practices transformed during her engagement in CPR and her collaboration with Lars. Also, as is most often the case, our account is supportive of the research outcomes that were published elsewhere (Appendix) over the course of the considered 10 years. The account therefore suffers from blind spots of interpretation and a positive bias towards the resulting research publications. However, we minimized these effects by triangulating between the rich data sources (Table 2), by following basic principles of interpretive research

(Klein & Myers, 1999), and, by applying social process modeling (Newman & Robey, 1992) and theories of change (Weinberg, 1997) and learning (Argyris & Schön, 1996) as complementary interpretive lenses (Table 1).

We found it rewarding to engage in this critical reflection (Bolton, 2005) to better understand challenges and opportunities related to bridging the practice-research gap within the IS discipline by applying CPR to engage a professionally qualified doctoral student. As a result, we suggest that confessional writing as illustrated here can help our discipline uncover important insights into fieldwork practices as complements to traditional publications of research outcomes. In fact, the kind of knowledge created through confessional writing through its unique abilities of self-reflections and self-revealing

serve as yet another enabler to bridge the practice-research gap.

Still, what we have learned about bridging the practice-research gap within the IS discipline is restricted to a single case and to particular persons. Following CPR principles (Iversen *et al.*, 2004), it is therefore important to stress the specific characteristics of the research context to help others evaluate the transferability of our findings and lessons to other contexts. Most importantly, our research collaboration unfolded in a large corporation in which the leadership actively encouraged and sponsored research collaboration with academia; Anna was highly motivated to engage as professionally qualified doctoral student; Anna's practice as SPI manager was well aligned with Lars' research interests; and, Lars had previously applied CPR to supervise other professionally qualified doctoral students.

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References

- AGAR MH (1986) *Speaking of Ethnography*. Newbury Park, CA: Sage Publication.
- ARGYRIS C and SCHÖN D (1996) *Organizational Learning II – Theory, Method and Practice*. Addison-Wesley, Mass.
- BAAZ A, HOLMBERG L, OLSSON HH, NILSSON A and SANDBERG BA (2010) Appreciative lessons learned. *IEEE Software* **27**(4), 72–79.
- BARTUNEK JM and LOUIS MR (1996) *Insider/outsider Team Research*. Sage Publication, London.
- BEHAR R (1996) *The Vulnerable Observer: Anthropology that Breaks Your Heart*. Beacon Press, Boston.
- BENBASAT I and ZMUD RW (1999) Empirical research in information systems: the practice of relevance. *MIS Quarterly* **23**(1), 3–16.
- BOLTON G (2005) *Reflective Practice: Writing & Professional Development*. Sage Publication, New Delhi.
- BÖRJESSON A (2006a) Making software process improvement happen. PhD dissertation, IT University of Gothenburg.
- BÖRJESSON A (2006b) Improve by improving the improvers. *International Journal of Business Information Systems* **1**(3), 310–338.
- BÖRJESSON A and MATHIASSEN L (2003) Making SPI happen: the IDEAL distribution of effort. *Proceeding of the 36th Annual Hawaiian International Conference on System Science*, pp 328–337, IEEE Computer Society Press, Los Alamitos, CA.
- BÖRJESSON A and MATHIASSEN L (2004a) Making SPI happen: the road to process implementation. European Conference on Information Systems, Turku, Finland.
- BÖRJESSON A and MATHIASSEN L (2004b) Successful process implementation. *IEEE Software* **21**(4), 36–44.

- BÖRJESSON A, MARTINSSON F and TIMMERÄS M (2005) Crossing the chasm in software process improvement. In *Business Agility and Information Technology Diffusion* (BASKERVILLE R, MATHIASSEN L, PRIES-HEJE J and DeGROSS J, Eds), pp 111–128, International Federation for Information Processing, Atlanta, Georgia.
- BÖRJESSON A, MARTINSSON F and TIMMERÄS M (2006) Agile improvement practices in software organizations. *European Journal of Information Systems* **15**(15), 169–182.
- BÖRJESSON A, PARETO L, SNIS UL and STARON M (2007) Continuing professional development by practitioner integrated learning. In *Companion to the 22nd ACM SIGPLAN Conference on Object Oriented Programming Systems and Applications Companion*, pp 897–907, Montreal, Canada, <http://dl.acm.org/citation.cfm?id=1297846>.
- CHIASSON M, GERMONPREZ M and MATHIASSEN L (2009) Pluralist action research: a review of the information systems literature. *Information Systems Journal* **19**(1), 31–54.
- CHO S, MATHIASSEN L and NILSSON A (2008) Contextual dynamics during health information systems implementation: an event-based actor network approach. *European Journal of Information Systems* **17**(6), 614–631.
- COGHLAN D (2001) Insider action research projects: implications for practicing managers. *Management Learning* **32**(1), 49–60.
- COOPERRIDER DL and WHITNEY D (2005) *Appreciative Inquiry: A Positive Revolution in Change*. Berrett-Koehler, San Francisco.
- DAVENPORT TH and MARKUS ML (1999) Rigor vs. relevance revisited: response to Benbasat and Zmud. *MIS Quarterly* **23**(1), 19–23.
- DE VAUJANY F-X (2008) Capturing reflexivity modes in IS: a critical realist approach. *Information & Organization* **18**(1), 51–72.
- FREDERIKSEN HD and MATHIASSEN L (2008) A contextual approach to improving software metrics practices. *IEEE Transactions on Engineering Management* **55**(4), 602–616.
- HAY GW (2003) Executive PhDs as a solution to the perceived relevance gap between theory and practice: a framework of theory-practice linkages for the study of the executive doctoral scholar-practitioner. *International Journal of Organizational Behaviour* **7**(2), 375–393.
- HOLMBERG L, NILSSON A, OLSSON HOLMSTRÖM H and SANDBERG BA (2009) Appreciative inquiry in software process improvement. *Software Process Improvement and Practice* **14**(2), 107–125.
- IVERSEN J, MATHIASSEN L and NIELSEN PA (2004) Managing risks in software process improvement: an action research approach. *MIS Quarterly* **28**(3), 395–433.
- JEPSEN LO, MATHIASSEN L and NIELSEN PA (1989) Back to thinking mode-diaries as a medium for effective management of information systems development. *Behaviour and Information Technology* **8**(3), 207–217.
- KIESER A and LEINER L (2009) Why the rigour-relevance gap in management research is unbridgeable. *Journal of Management Studies* **46**(3), 516–533.
- KLEIN HK and MYERS MD (1999) A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly* **23**(1), 67–94.
- KLEIN HK and ROWE F (2008) Marshaling the professional experience of doctoral students: a contribution to the practical relevance debate. *MIS Quarterly* **32**(4), 675–686.
- MARQUARDT M (1999) *Action Learning in Action: Transforming Problems and People for World-class Organizational Learning*. Davies-Black Publication, Palo Alto, CA.
- MATHIASSEN L (1998) Reflective systems development. *Scandinavian Journal of Information Systems* **10**(1–2), 67–118.
- MATHIASSEN L (2002) Collaborative practice research. *Information, Technology & People* **15**(4), 321–345.
- MATHIASSEN L, ANDERSSON I and HANSSON K (2003) Service provision in a software technology unit. *Journal of Information Technology* **18**(3), 195–210.
- MATHIASSEN L and NIELSEN PA (2008) Engaged scholarship in IS research – the Scandinavian case. *Scandinavian Journal of Information Systems* **20**(2), 3–20.
- MCKAY J and MARSHALL P (2001) The dual imperatives of action research. *Information, Technology & People* **14**(1), 45–59.
- MINGERS J (2001) Combining IS research methods: towards a pluralist methodology. *Information Systems Research* **12**(3), 240–259.
- MOODY DL (2000) Building links between IS research and professional practice: improving the relevance and impact of IS research. *International Conference on Information Systems*, Brisbane, Australia.
- NAPIER N, MATHIASSEN L and JOHNSON R (2009) Combining perceptions and prescriptions in requirements engineering process assessment: an industrial case study. *IEEE Transactions on Software Engineering* **35**(5), 593–606.
- NEWMAN M and ROBEY D (1992) A social process model of user-analyst relationships. *MIS Quarterly* **16**(2), 249–266.
- PARETO L, ERIKSSON P and EHNEBOM S (2009) Concern visibility in base station development – an empirical investigation. In *Model Driven Engineering Languages, 12th International Conference, MODELS 2009* (SCHUERR A and SELIC B, Eds), Lecture Notes in Computer Science, Vol. 5795, pp 196–210, Springer Verlag, Denver Colorado, USA.
- PATTON MQ (1987) *How to Use Qualitative Methods in Evaluation*. Sage Publication, Newbury Park, CA.
- PETTIGREW AM (1990) Longitudinal field research on change: theory and practice. *Organization Science* **1**(3), 267–292.
- PRIES-HEJE J and TRYDE S (2001) Diffusion and adoption of IT products and processes in a Danish Bank. In *Diffusing Software Product and Process Innovations* (ARDIS MA and MARCOLIN BL, Eds), pp. 17–34, Kluwer Academic Publishers, Boston.
- ROSEMAN M and VESSEY I (2008) Toward improving the relevance of information systems research to practice: the role of applicability checks. *MIS Quarterly* **32**(1), 1–22.
- SANDBERG BA and MATHIASSEN L (2008) Managing slowdown in improvement projects. *IEEE Software* **25**(6), 84–89.
- SANDBERG BÖRJESSON A, PARETO L and ARTS T (2011) Agile collaborative research – action principles for industry-academia collaboration. *IEEE Software* **28**(4), 74–83.
- SCHULTZE U (2000) A confessional account of an ethnography about knowledge work. *MIS Quarterly* **24**(1), 3–42.
- SINGH R, MATHIASSEN L, ASTAPOVA E and STACHURA M (2010) Sustainable rural telehealth innovation: a public health case study. *Health Services Research* **45**(4), 985–1004.
- STARKEY K and MADAN P (2001) Bridging the relevance gap: aligning stakeholders in the future of management research. *British Journal of Management* **12**(supplement S1), S3–S26.
- STARON M, MEDING W and NILSSON C (2008) A framework for developing measurement systems and its industrial evaluation. *Information and Software Technology* **51**(4), 721–737.
- STEIN EW and VANDENBOSCH B (1996) Organizational learning during advanced system development: opportunities and obstacles. *Journal of Management Information Systems* **13**(2), 115–136.
- VAN DE VEN AH (2007) *Engaged Scholarship: A Guide for Organizational and Social Research*. Oxford University Press, Oxford.
- VAN MAANEN J (1988) *Tales of the Field: On Writing Ethnography*. The University of Chicago Press, Chicago.
- WASSERMAN IC and KRAM KE (2009) Enacting the scholar-practitioner role: an exploration of narratives. *Journal of Applied Behavioral Studies* **45**(1), 12–38.
- WEINBERG GM (1997) *Quality Software Management volume IV – Anticipating Change*. Dorset House Publishing, New York.

Appendix

Table A1 Selected research publications, related action strategies, and impact on practice

<i>Research publication</i>	<i>Practical problem</i>	<i>Action strategies</i>	<i>Practical results</i>	<i>Research collaboration</i>
<i>Engaging 2001–2004</i>				
1 Börjesson & Mathiassen (2003)	Too much effort was spent on defining new processes at the expense of making the new way of working happen in practice.	Anna and Lars engaged in analyses and discussions with key SPI colleagues. Anna gave several presentations explaining the importance of focusing on deployment within SPI.	Change agents paying more attention to deployment activities as they came to understand how the distribution of their time affected implementation of improved practices.	Anna had a strong sense of key challenges in SPI and the team had been collecting data on its activities for some time. Anna was more interested in informing academia about the challenges industry experienced and how these could be resolved.
2 Börjesson (2006b)	Many theories and models of how to make change happen in practice were unknown for SPI change agents.	Anna started a local SPI forum based on action learning and supported by Lars.	Change agents understanding more SPI theories and models and how to apply these to improve ongoing SPI projects.	SPI practitioners became more involved and got a better understanding of SPI research. 'Do' and 'create result' were considered more valuable among SPI practitioners than 'understand' and 'learn'.
<i>Experimenting 2004–2006</i>				
3 Börjesson & Mathiassen (2004a)	SPI change agents often found it hard to stay focused on improvement projects until a new process was implemented in practice.	Anna and Lars developed the notions of process push and practice pull to analyze implementation outcomes across SPI projects.	Change agents and engineers staying more focused throughout deployment until improved practice were implemented in practice.	Anna did not only have to identify data sources but also explain how these were used and analyzed. For Anna, it was a hassle to develop publications for good conferences as this required paying more attention to research approaches. Anna and Lars successfully adapted the theoretical notions of push and pull to inform the analyses.
4 Börjesson & Mathiassen (2004b)	Change agents did not fully understand the different forces involved in successful implementation.	Anna and Lars discussed how different SPI implementation approaches in combination affected SPI success.	Change agents paying more attention to why and how implementation of new processes would succeed.	Anna appreciated developing publication for practitioner-oriented journal focusing on relevance rather than rigor.

5	Börjesson (2006a, b)	A development organization urgently needed to implement a new process with related tools for change request handling.	Anna included two skilled SPI team members in a CPR project to develop a new guerrilla tactic for change.	A new change request process and tool was implemented and used in practice according to initial time plan.	Anna experienced how a well prepared CPR project facilitated making change happen in practice while at the same time leading to academic publication. Two SPI team members became directly involved in a CPR project from start to finish.
<i>Integrating 2006–2007</i>					
6	Börjesson (2006a)	Low appreciation of how academic research could drive SPI improvement within Ericsson.	Anna presented research contributions for numerous groups of change agents, managers, and senior engineers within Ericsson.	Improved SPI awareness and increased commitment to SPI research at Ericsson.	Anna was forced to defend how she had executed her research in front of an academic audience and not only a practitioner audience (which she had seriously considered as an alternative approach to writing the dissertation). Through this process, Anna came to appreciate that by doing something thoroughly and rigorously, it increased the quality of the findings.
7	Börjesson <i>et al</i> (2007)	Senior industry line and project managers did not learn latest state-of-the-art approach to model-driven development.	Anna and Lars Pareto developed a new education technique called Practitioner Integrated Learning (PIL) for Ericsson managers.	Increased knowledge among line and project managers on model-driven development. Facilitated implementation of model-driven development in practice.	It had become natural for Anna to collaborate with academia to address industrial challenges. Some of the researchers Anna started to work with had little experience in interacting with industry practice. So these collaborations were driven by mutual learning within research.
8	Holmberg <i>et al</i> (2009)	A development unit needed to improve its way of working with requirements handling.	Anna engaged in SPI research with new research colleagues to learn how appreciative inquiry can increase SPI success.	Improving requirements handling in one large development project.	Through encouragements by Lars, Anna started to explore new ways to interact with academia to solve industrial challenges. It remained a challenge to coordinate pressures from practice with researcher availability.
<i>Performing 2007–2010</i>					
9	Sandberg Börjesson <i>et al</i> (2011)	Industry and academia did not fully understand when, how, and why joint collaborations worked well and when it did not.	Anna assisted in the set-up and management of a research collaboration center, SAQC, between Ericsson and ITU.	Improved industry-academia collaboration and improved industry practices and academia publications as a result of CPR projects.	Anna engaged in explaining for her colleagues the benefits of collaborative research. The challenge was to establish suitable opportunities for both researchers and senior practitioners to engage in collaborative projects.

Table A1 Continued

	<i>Research publication</i>	<i>Practical problem</i>	<i>Action strategies</i>	<i>Practical results</i>	<i>Research collaboration</i>
10	Sandberg & Mathiassen (2008)	Anna found that a number of SPI projects made far too slow progress.	Anna contacted Lars and they started to analyze the experienced problems with managing progress in ongoing SPI projects.	Improved tactics for ensuring participation and engagement in improvement projects.	Anna organized this focused project to tackle a challenge in managing SPI projects. Data were readily available, and the collaboration focused on developing a theoretical framing and interpreting data.
11	Mathiassen and Sandberg (this publication)	Anna and Lars had found the research collaboration within Ericsson rewarding but did not understand how it had developed and why.	Anna and Lars started to analyze and reflect on how Anna's involvement with academia had evolved and progressed over the years.	To be analyzed	Anna and Lars organized the research as a joint project. Considerable effort was spent on theoretical framing, exploiting the many data sources, and ensuring rigorous analysis. A decision was made to first aim for publication in an academic outlet and later to develop a lesson learned paper for practitioners.

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