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Understanding the Success or Failure of Organizational ICT Integration: The Criticality of Managerial Involvement

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Abstract

This study explores how managerial involvement affects the success or failure of ICT-based change. Employees' use and non-use of new ICT were indicators for change success and failure, respectively. Based on thematic analysis, the findings accentuate the criticality of adequate managerial involvement with affected employees during ICT-based organisational change. This proved vital for the successful integration of new ICT and the development of new work processes and practices. The combination of absence of managerial involvement and expert control prevented employees who did not have previous ICT experience from developing new work practices that integrated tasks, work processes and the new technology. ICT experts were authorized to control the change process by a combination of managerial involvement and delegated managerial authority. Closeness to the technology and to managers/decision-makers combined with high levels of mutual involvement and ICT experience seem to be important factors for the success of ICT-based organisational change.

Key words: ICT-based organisational change, managerial involvement, change success and failure, use and non-use of ICT, situated learning

Introduction

ICT-based organisational change is successful when the new ICT is used as intended and a failure when it is not. Change is ambiguous and context-dependent (Hughes, 2011), and while ICT non-use in organisations often is attributed to resistance (Coetsee, 1999; Jian, 2007; Joshi, 1991; Lapointe & Rivard, 2005; Meissonnier & Houzé, 2010), it can also be caused by an inadequate change process and be context-dependent, rather than cognitively or emotionally based (Andersen, 2016). Change is emergent, dynamic and situated, and is realised through the development of new work practices that evolve through employees' everyday interactions with the new ICT (Orlikowski, 1996). Formal and informal arenas of integration of ICT and organisation are necessary, and change success presupposes a certain level of employee involvement. What has been less studied than technology acceptance and resistance is the role of managerial involvement in ICT-based organisational change and how it may facilitate ICT-use or contribute to ICT non-use. The goal of this study is to understand how managerial involvement – studied through the handling of predefined managerial responsibilities (adopted from Cooper & Zmud, 1990), affects the failure and the success of ICT-based organisational change.

This study represents newness in several ways. The study of ICT use and non-use as indicators of the success and failure of change is directly tied to the realisation of the added value potential of new ICT when well-integrated in the organisations' core activities. As such, the study of managerial responsibilities and different experiences of managerial involvement tied to this in a framework of situated change adds to theoretical insight about management as catalyst or inhibitor of ICT-organisation integration. It gives practical insights about both constructive and counterproductive managerial behaviours in ICT-based organisational change.

Research Context

This case study took place in three Norwegian power-grid companies from 2007 to 2010, situated in different geographical locations. Norway was the second European country after Great Britain to introduce market-based principles for the trade of energy. Increased competition caused a substantial decrease in revenues for the three companies, and only the most 'change-ready' and competent

employees were kept. Renewal through ICT-based solutions was key to increased efficiency. 'Power Data' (PD) was an enterprise resource planning (ERP) system, intended to integrate work processes across different employee groups, and replace the many overlapping systems used until that point.

The three organisations were homogenous. They had identical organisational structures, business areas, and employee groups – managers, planners and installers. The installers maintained and renewed the power grid, while the planners planned installers' operations. The installers performed manual, grid-related tasks outdoors, initially with a high level of autonomy. The planners had a permanent office base together with the managers. It was a group of planners from one of the three organisations that initiated PD, and then, with the approval of management, contacted the other two organisations. The development, acquisition, and implementation of PD was a split-cost project between the three. The participation of managers was limited as they lacked the necessary competence both regarding system functionalities and the integration of ICT and organisation – they thus chose to delegate this to the planners, deemed experts. All three organisations experienced partial change success and partial change failure, in that PD was underutilised or not used at all by the installers who, unlike planners, had little or no previous ICT experience.

This study explores the role of managerial involvement in the development of ICT use for the planners and non-use for the installers. Due to the similarities between the three organisations, the study is on the group level, studying employee groups across organisations rather than comparing the three organisations. Acknowledging that change is context-dependent and situated, as it is the use and non-use by the planners and by the installers respectively that are seen as the key indicators of ICT-based change success and failure, managerial responsibilities and behaviours will be investigated from how they are perceived and experienced by all three employee groups.

Theoretical Background

ICT-based change and organisational actors

The implications of the integration of new ICT in a workplace differ from the implications of the integration of other tools. ICT may change the way we think about work (Zuboff, 1988). ICT is at the

same time a concrete artefact and an actor which influence and is influenced by the cognition and actions of its users (Orlikowski, 1996). Applying Latour's (2011) actor-network theory within a frame of structuration theory (Giddens, 1984; Orlikowski, 1992) means that ICT is at the same time an operational work mechanism and a device that can be used for reinforcing or altering organisational structures. As ICT users and organisations mutually affect each other, ICT can contribute to increased autonomy, control and thus power to define organisational norms and routines for those who know how to use it and thus change the organisational power balance (Andersen, 2016).

The notion of the organisation as a position-practice system consisting of positions (roles, routines, tasks, norms etc.), individuals and practices (actions) (Bahskar, 1998) is useful for explaining actions and positioning vis-à-vis the new ICT and the new organisational order. Although organisational change may create uncertainty about roles and positions, and foster behaviours resisting change or that are non-altruistic (Saksvik et al., 2007), research shows how the reciprocal norm of fairness can motivate employees to exert major effort beyond self-interest for the benefit of the organisation rather than to secure their own level of control (Bosse & Phillips, 2016). Three properties guide actions (Hewson, 2010); intentionality – the will to act, power – the resources to act, and rationality – the cognitive capability to act. Organisational actors and groups of actors have different capacities and resources, and thereby different levels of influence in the ICT-integration process (Andersen, 2016). Different organisational groups may take on different positions, roles and actions in the process of ICT-based organisational change depending on these three properties. Here; these actions and their effects are judged by other organisational actors according to perceived intentionality, resources, and rationality to determine whether they have the intended effects or not. Judgement heuristics or behavioural assumptions allow actors to, by means of deduction of others' intentions, predict their actions (Metcalf et al., 2013). If the deduction of intention is faulty then predictions of actions will be too. This social cognitive process may thus contribute to the construction of wrong assumptions about intentionality, capability and rationality related to roles and positioning in ICT-based organisational change between different organisational groups, that may affect the success of ICT-organisation integration.

Critical Managerial Responsibilities During ICT-based Change in a Situated Change Perspective

The indicator of success of ICT-based change is employees' use of the new ICT. Therefore, change management needs to be studied in terms of how managerial involvement furthers or hampers the development of efficient user practices. Previous studies have shown that work practices that integrate ICT-use arise from emergent, dynamic and situated behaviours (Orlikowski, 1996), where learning takes place through improvisation (Ciborra, 1999). User practices develop through a continuous series of local adaptations and transformations; new practices and knowledge are built on old ones (Hutchins, 1991). Practices are routinized, consolidated and changed as they emerge through improvised decisions that shape the possibilities and limitations in the next stage of development (Ciborra, 1999; Higgs & Rowland, 2005).

Based on Lewin's (1952) freeze-unfreeze-refreeze model, Cooper and Zmud (1990) present a six-stage assimilation process-model of ICT-based organisational change. Assimilation is the intra-organisational process of new ICT integration (Cooper & Zmud, 1990; Fichman, 1999; Kwon & Zmud, 1987). Four of the six stages presented in the model correspond to important managerial responsibilities that should bring about targeted managerial action; 1) the identification of challenges prior to choice of ICT solutions; 2) training; 3) revision of organisational routines; and 4) negotiations to develop commitment to the new ICT. Despite its periodicity, the model points at key processes for practice-based integration of new ICT in organisations. The four identified managerial responsibilities can be seen as critical for the success of ICT-based change as dynamic, emergent, and situated. Acknowledging certain management behaviours as essential for the development of good user practices is not in conflict with the view of organisations as emerging systems and is therefore more an example of the complementarity of different axes of research in the domain of change management.

Previous research on healthy change processes (Saksvik et al., 2007) and healthy change management (Øyum et al., 2006) supports the relevance of these responsibilities. We know that managers' change-related behaviours are important for the alignment of organisational routines (Burnes & Jackson, 2011; Middleton & Harper, 2004; Whelan-Berry & Somerville, 2010), and research indicates that too little attention is paid to organisational alignment in studies on

technological organisational change (McNish, 2001). Placed in the situated change perspective, the study of managerial responsibilities can help understand why user practices develop in one employee group, and not in another. Managers' actions and non-actions are as situated as those of employees. Managerial involvement and employees' ICT use or non-use are therefore inherently interwoven.

Research Problem

In order to fill some of the knowledge gap on the role of managers' control over and involvement in ICT-based change, the research focus was to investigate the influence of the handling of the four preselected managerial responsibilities – the identification of challenges; training; revisions of routines; and negotiations – on the development of new ICT-based work practices. The new ICT was used by the planners, but not by the installers. As this study took place post-implementation, a choice was made to analyse planners', installers' and managers' narratives relative to the relationship between enactment of managerial responsibilities and the use or non-use of the new ICT. The users' situations, perceptions and comprehensions form the development of user practices in a perspective of situated change. Managers' self-reflections are also of value.

Method

Research Design

Studying the role of different actors in ICT implementation can be a challenge when it comes to theorising emergent situations, and then there is the problem of methodological individualism and methodological holism (Archer, 1995). Methodological individualism explains how ICT user practices develop through the actions of individual actors, thereby denying the authority of structures, including ICT. Methodological holism explains how ICT user practices arise from more than the efforts of individual actors, thereby denying the autonomy of individual actors. The morphogenetic sequence explains how structural factors can be isolated as a context (situation) for action in order to analyse how those factors (situations) shape actors' interactions and how the interactions reproduce or

transform the initial context, and exemplifies that holism and individualism are not mutually exclusive. Through the identification of the chronology of these social processes it is possible to explain internal relational dynamics; it is about exploring how structural and agential phenomena interact over time in a defined space. The case study was undertaken in line with bottom-up inductive thematic analysis, suitable for identifying, analysing and reporting patterns, such as processes, in qualitative data materials (Braun & Clarke, 2006). The data consist of 90 interviews, conducted from 2007 to 2009 in two adjacent periods, each lasting 18 months. All interviews were audio recorded and transcribed. In addition to data from interviews, the data material consists of handwritten memos and thirty field notes in the shape of thick descriptions through open-ended narratives based on naturalistic observations (Rallis & Rossman, 1998), collected from 2007 to 2010 during ten field visits. See Table 1 for an overview.

Insert Table 1 about here.

The differentiation between two periods of data collection needs explaining. The study originally set out to explore ICT user behaviours and the interaction between employees, the organisation and new technology. Sometime into the data collection, the installers' underutilisation of the new ICT became evident. There was thus a need to re-evaluate the focus of the study and to redesign the interview guides in order to ensure continued validity of data and findings (Guba & Lincoln, 1989). The data was analysed according to the six stages of thematic analysis as proposed by Braun and Clarke (2006). Thematic analysis is a flexible methodology in that it provides the opportunity to adapt methodological choices to the continuous development and changes in the study.

Data Collection

A semi-structured interview guide was developed, with open categories. The cases formed naturally based on real and existing challenges. Interview respondents were randomly chosen within each of the three companies and within the three groups. All interviews lasted 1-2 hours, were audio recorded with the consent of the respondents, and transcribed. The handwritten memos and field notes were

written subsequently to field visits where the purpose was to observe managers, planners and installers' work in their natural habitat and outside the interview setting.

Data Analysis

In a first phase of analysis, the interviews were read through several times while taking notes to obtain a high level of familiarity with the data material. An inductive approach, as in grounded theory, bridges description and understanding by valuing empirical data over theory (Glaser, 1992), while keeping theoretical sensitivity and constant comparison (Benoliel, 1996; Corbin & Strauss, 2008; Strauss & Corbin, 1998). It facilitates the move from the descriptive to a more thorough understanding of processes (Dawson & Buchanan, 2005; Brown, 1998). In a second phase, data was coded more systematically by reading through all the data once more, copying bundles of text pertaining to four meta-categories corresponding to the four managerial responsibilities: 1) The identification of challenges; 2) Training; 3) Revision of routines; and 4) Negotiations. The bundles of text were broken down into units of meaning and coded relatively close to the text. In phase three, the codes were sorted into potential themes representing the experiences of planners, installers and managers within each meta-category, and a move towards a more deductive approach where the theoretical framework on managerial responsibilities and the characteristics of ICT-based change were used to refine the themes. The notes from phase one were useful for this sorting. The result of this process was a thematic overview that summarised the essence of the data relating to the research problem. In phase four, the themes were further elaborated according to the four meta-categories. The degree of internal homogeneity within themes and external heterogeneity between themes steered this elaboration, ensuring that the themes were internally consistent and qualitatively different from one another. These themes were then re-checked by re-looking at the raw data and a return to an inductive approach. In phase five, the content of the themes was consolidated. During these stages and the movement back and forth between data and the theoretical framework the narrative of the analysis was written down.

The interviewees were careful to be neutral and balanced and continuously discussed their interpretations of the findings. Proper researcher field behaviour was agreed upon and adequate

measures taken; an important precondition for validity (Guba & Lincoln, 1989). The interviews were transcribed to ensure valid transition from oral to written language. Care was taken in the process of analysing the data and interpretations and conclusions were cross-checked with the reference group. This largely adheres with the criteria of trustworthiness postulated by Guba and Lincoln (1989). The theoretical underpinnings of the study were reviewed in order to identify potential hidden biases.

Findings

The findings combine planners', installers' and managers' narratives, organised according to the four selected critical managerial responsibilities during ICT implementation: 1. Identification of challenges; 2. Training; 3. Revision of routines; and 4. Negotiations. As PD itself is a structuring organisational actor, it was important in the analysis to consider the nature of ICT-based change and context in light of what the employees and managers expressed. In general, all articulated positive attitudes towards PD, either based on knowledge or expectations tied to task-technology fit, usefulness and efficiency of the system.

Identification of Challenges

The acquisition and implementation of PD was initiated and carried out by a group of planners. The choice and development of PD was thus problem-driven from the planners' point of view: *'We thoroughly mapped our problems with the existing solutions and why we needed a brand new one'* (planner); — for example: *'We need a larger integrated system that supports work processes, and we need to get rid of a bunch of small and overlapping systems'* (planner).

The installers, on the other hand, felt that the planners didn't sufficiently understand the challenges they faced in their day-to-day work: *'There is no organised way to discuss professional challenges, but we do think that this is a bothersome way to work—there are too many systems and too much data'* (installer). Having different challenges than the planners, the installers now experienced a poor fit between tasks and technology: *'It seems meaningless to enter the same data manually several times.'* (installer) and *'The work order system only works on standardised tasks, which often don't match field reality, and PD doesn't generate work orders—for that we have to enter data into yet*

another application. ' (installer). What was mapped was how the installers should work in order to optimise the planners' task flow: *'The installers weren't used to or had no culture for documentation, so the planners defined it for them.'* (planner). A more coherent workflow led to an increase in planners' autonomy, and of their organisational understanding at least of their own work. The installers' experienced a reduction in autonomy as the new systems controlled their work performance.

Managers were passive, which they regretted in retrospect: *'We should have been more present in the process—now we don't really have any overview of roles and responsibilities, and we thought the proposed solutions for registration were good; now we see that they aren't.'* (manager). This nonparticipation in the process was for a large part due to managers' lack of understanding of what a successful ICT-organisation integration demands. The delegation of responsibility to the planners was intentional and based on a naïve belief in the new ICT as independent of organisational phenomena, but this also hid the managers' lack of competence from the rest of the organisation.

Identification of challenges prior to ICT integration processes bridges the gap between core tasks, the workflow between them and the new technology. Here there were two different workflows, that of planners and that of installers, which needed to be coordinated as part of the ICT integration. This demanded substantial organisational insight. Managers delegated this responsibility to the planners, who were unable to see the installers' workflow. While the planners were able to customize the new ICT and organisation to their tasks, the delegation of authority led to a poor task-technology fit for the installers and reduced dialogue, both between themselves and with the rest of the organisation.

Training

The concept of "training" includes both formal and informal learning critical for the emergence of new work practices. PD was described by all as a complex system. The planners received targeted training in how to understand and use PD: *'All planners have had an introductory course and a follow-up course'* (planner) and *'I've had sufficient training in PD, and this training is really important for new users.'* (planner). The planners also had good opportunities for informal and situated training and

learning: *'When I feel the need to concentrate and focus more on PD and perhaps apply some new functionalities, I work from home—learning by doing.'* (planner) and *'We have a server with tips and advice regarding PD, but I think that's only for the planners.'* (planner). The planners enjoyed a plan, time, space and support for learning to use PD.

The installers did not benefit from the same resources: *'We haven't really received any training—only two sessions of half an hour each'* (installer). Further, the use of the computer was not adapted to the way the installers spent their workdays, outside or in the car: *'Bad signals are a source of irritation; the document disappears, and then we have to do it all over again.'* (installer), and *'The cars are impractical and too small. Also, the cars have no computer brackets, so we have to work with the computer on our laps'* (installer). The installers thus lacked space for learning to use PD as well as time, which affected learning possibilities: *'I usually register data at home in the evening on my own time; we don't have the time to do it after each job'* (installer). Finally, the installers experienced little system support: *'We don't use support; nine out of ten times they just tell us to turn the computer off and then back on again'* (installer).

Managers admitted that there was no training plan for the installers: *'We attempted to map the differences in the installers' computer skills, but in the end, we didn't do anything more about it.'* (manager). The installers were met with contrasting expectations from the managers and the planners. They were expected to use PD: *'Some are good, but most are not that good—they drag their feet, but they just have to learn to use it'* (manager). They were also expected to fail: *'The installers will impede efficient use of PD'* (planner). While the planners experienced managers as close; *'I can ask my manager about anything – he sits in the room next-door'* (planner), the installers experienced managers as absent; *'What's funny is the survey where I'm asked to give my opinion about the boss – I hardly know who he is'* (installer). Managers hold a responsibility for adapting employees' work situations so that they can engage in appropriate behaviours. From the part of managers, the findings indicate that this demands an understanding of 1) The demands and challenges inherent in employees' everyday work; 2) How learning takes place; and 3) Employees' need for competencies in order to use the new ICT as intended. Managerial involvement can facilitate these factors to further learning.

Revision of Routines

Planners defined new organisational procedures in parallel with the development of PD and incorporated them into PD's functionalities and applications in a way that responded to the challenges identified: *'We needed a reorganisation of work processes which better fitted the logic in PD – managers agreed with our suggestions'* (planner). Consequently: *'Our work flow is much more logical and efficient now – and we can make independent decisions based on the information in PD'* (planner).

The two most important changes following this reorganisation for the installers were the increase in field hours and the decrease in time for task performance. In addition to manual tasks, they were given new computer-based tasks. For example, they should enter field information and task-related data in a sketch version of PD, which then was edited by planners in the permanent version. The planners mistrusted the installers' abilities to document operations properly: *'I don't trust the documentation entered by the installers'* (planner) and *'The installers don't see the need for documentation'* (planner). It could, however, take up to one year before the planners updated 'the real' PD from the sketch version, which frustrated the installers. The installers' work routines were organised according to the workflow in PD but were not adapted to their tasks and work processes in the field. A consequence was a fragmentation of the installers' workflow.

Managers enacted their responsibility of routine revision through their dialogue and delegation of authority to the planners, but failed to do so for the installers due to managers' lack of awareness of how routines form work structures, processes and practices. This led to an organisational misalignment where the installers experienced a deterioration of their workflow as PD was not adapted to their tasks and work situation. They were therefore not able to develop appropriate work practices.

Negotiations

Negotiations are important both for the development of technology acceptance and for obtaining an agreement among managers and employees on new formal and informal organisational aspects such as roles, competence development and the organisation of work. Employees and managers needed opportunities for communication, coordination and readjustment. Planners were in a good position for

engaging in negotiations with managers. The installers were not: *'We were never informed of the reason why we changed systems or why things should be done this or that way'* (installer).

In the new organisation of work the installers should spend all their time outside: *'I usually eat lunch alone in the car; I almost feel it's frowned upon if I eat in the company canteen'* (installer). This removed opportunities for informal communication and negotiations: *'I miss the everyday interaction with other colleagues—now it's more difficult to ask each other for help, and when it's time for lunch, I'm probably out in the woods somewhere'* (installer), and to a further fragmentation of work processes and workplace relations: *'The manager doesn't know what I'm doing.'* (installer).

For managers, the visible aspect was who used PD and who didn't. Installers wanted more dialogue: *'More communication and interaction would be good'* (installer). In retrospect, many managers recognised flaws in the PD implementation process: *'The implementation of PD has led to a shift in the power relationship between planners and installers; this might be a hindrance for good use.'* (manager). The managers' lack of insight into critical organisational processes for successful ICT-organisation integration and their need to mask or compensate for this, led to the delegation of control to the planners, which excluded the installers from the dialogue. A result of this isolation was that the installers were not able to develop work practices coordinated with the rest of the organisation.

Summary of the Findings: Managerial involvement and the success and failure of ICT-based change

Planners and installers have different experiences of managers' involvement. For the part of the planners, managers' involvement corresponded to their needs. The planners experienced increased autonomy that permitted them to develop new and appropriate work practices for a successful ICT-organisation integration through the identification of challenges, training, revision of routines and negotiations. The combination of autonomy, and physical closeness and task similarity to managers, together with previous ICT experience, was a key aspect for this success. For the installers, managers' absence of involvement excluded them from the organisational ICT integration processes. The delegation of authority for organisational ICT-based change to in-house ICT experts (planners) led to a decrease in autonomy for the ICT novices (installers) because work processes became more

"prescribed" at the same time as they were isolated, had low negotiating power, and lacked previous ICT experience. To elaborate our understanding of the influence of managerial involvement on the success or failure of ICT-based change, the categories "presence of involvement" and "absence of involvement" conceptualised for this purpose as opposite extremities of managerial involvement are used. Based on the findings of this study, presence and absence of involvement can be conceptualised into three dichotomous and thereby naturally simplified behavioural expressions, as experienced by the planners and the installers respectively: 1) Available vs. unavailable; 2) Trustful vs. apprehensive; and 3) Holistic vs. piecemeal. These show how managerial involvement can be enacted differently for different employee groups in the same organisation at the same time. See table 2 for an overview.

Insert Table 2 about here.

Based on an initial lack of competence and understanding of processes that ensure a successful ICT-organisation integration, managers' actions and non-actions made it difficult for them to establish an adequate understanding of the organisation's total set of challenges regarding the organisational ICT integration. Managers' decision to delegate this responsibility to the planners resulted in the lack of an overall plan for competence building and for the integration of tasks, processes and people.

Discussion

The findings show how differential managerial involvement towards different employee groups with complementary workflows and different challenges may impede organisational ICT integration. With high relevance for both theory and practice – given the symbolic nature of ICTs (Zuboff, 1988) and the role played by ICT-based organisational change in the moulding of organisations (Latour, 2011; Orlikowski, 1992), there is a need to understand how these differences in involvement contribute to the success and failure of ICT-based change respectively, as well as the potential causes and pitfalls of the delegation of authority to technology experts. Comprehending the new ICT, having ICT experience and being in close interaction with managers can be empowering and facilitate navigation in the ICT-organisation landscape (Andersen, 2016).

Change-adequate managerial involvement as catalyst of successful ICT-based organisational change

The planners experienced managers as available and trustful, and as enacting the four critical responsibilities adequately (e.g. Cooper & Zmud, 1990); which is in line with the findings that change-adequate managerial involvement is intentional, resourceful and rational (Hewson, 2010). Principal elements that formed the basis for this involvement were that the managers had good insight into the planners' work situation, they relied highly on the planners' competencies and capabilities, and from their position they had a good appreciation of the organisational interdependencies and challenges of the planners' work. It is about acting on behalf of the organisation for collective goals, to control and distribute necessary resources for the development of viable work practices, and to have sufficient organisational insight and the cognitive capability to convert this insight into change-adequate involvement, which can be understood as one operationalisation of the reciprocal norm of fairness (Bosse & Philips, 2016). This led to elevated levels of negotiations in parallel with the identification of challenges, which resulted in high autonomy for the experts who could design the reorganisation of work. The findings show that new work practices that integrate core tasks and new ICT develop in the intersection between individuals, positions and practices – that is; through interaction between employees, technology and the organisation (e.g. Bahskar, 1998). Therefore, successful ICT-organisation integration demands mutual involvement of managers and employees beyond the mere execution of prescribed tasks, which was the case of the interaction between managers and planners. While managerial involvement must contain the master plan for the change process, adjust working conditions accordingly and follow-up the plan both individually and on an overall level to ensure organisational alignment (e.g. Cooper & Zmud, 1990; Burnes & Jackson, 2011;), employee involvement must include responsibility for learning, for the development of new and integrated work practices and of a new and improved workflow (Ciborra, 1999; Orlikowski, 1996). However; through this study it is evident that having the will to involve oneself is not enough; employees need sufficient resources and insight in ICT-based change to achieve integration of ICT and work processes.

Both managers and employees need to be involved simultaneously to achieve successful ICT-based organisational change (Orlikowski, 1996; Higgs & Rowland, 2005). This study has identified

some vital distinctions in what should characterise managers' and employees' involvements. Managers must have the will to act on behalf of the organisation, control the total pool of resources and adopt a rationality that comprehends different organisational and employee needs and thereby the distribution of resources. The demands for employee involvement are more on the individual and perhaps local collective level in that employees must engage in their own learning, administer their ascribed resources in a way that contributes to the success of change (developing new and integrated practices) and gain necessary organisational insight that connects them with their organisational environment. This way of understanding involvement on various levels exemplifies how organisational roles, positions and practices (Bosse & Philips, 1998; Andersen, 2016) may interact in ICT-organisation integration, as well as the importance of certain human properties (Higgs & Rowland, 2005). Adequate managerial involvement in ICT-based organisational change must therefore use power to empower, to distribute resources and build a rationality through interaction with the organisation so that managers and employees together are able to handle organisational complexity such as integrating different workflows. A process that starts with the identification of challenges and negotiations about the reorganisation of work, that has opportunities for informal learning and routine revision, and where managers and employees take on complementary responsibilities, increases the probability of successful ICT-based change. This also adds important nuances to the integration process proposed by Cooper and Zmud (1990).

Absence of managerial involvement: Inhibiting the development of new work practices

In this study, we saw that unavailable, apprehensive and piecemeal management behaviours during large-scale ICT-based organisational change created a managerial vacuum that could not ensure proper organisational alignment. The result of this vacuum was insufficient identification of challenges, training, revision of routines and negotiations (e.g. Cooper & Zmud, 1990). Contrary to the planners, the installers did not benefit from early-phase managerial involvement. They therefore had few opportunities to influence their situation and to build a comprehension of the new ICT.

The lack of simultaneous involvement of managers and installers prevented the development of new work practices that integrated task performance and the digitalisation of work. Lack of

managerial involvement blocked installers' involvement as a managerial vacuum arose, and critical actions tied to the identification of challenges, training plan, revision of routines and negotiations were not taken. As seen in the case of the planners; change-adequate managerial involvement handles these responsibilities in a manner that provides employees with the necessary flexibility for the development of new work practices. The findings indicate that a certain flexibility regarding task performance is vital and is created when the critical responsibilities are handled in the intersection between managers and employees – in line with the conception of learning and the development of new work practices through improvisation (Hutchins, 1991). Involvement is therefore inherent in change. There is no contradiction between intentionality and random effects (Metcalf et al., 2013). However, without the identification of challenges, training, revision of routines and negotiations, the installers were deprived of sufficient power as well as insight – given Zuboff's (1988) notion of the informing power of ICT. Due to the lack of involvement they were not enabled to blend with the new technology on an individual level, nor with the new organisation of work on a collective and organisational level – despite their intention to do so.

Unavailable managers for the part of the installers meant that they were not sufficiently seen nor recognised and that plans for learning, workflow coherence and opportunities for communication were either not developed or inaccurate – due to managers lack of competence and their seeming insecurity regarding this that prevented them from addressing these issues openly. Apprehensive management behaviours imply absence of trust and thus a decrease of autonomy, removal of learning arenas and an impossibility to adapt tasks and work processes to the new ICT – important elements of organisational alignment (Burnes & Jackson, 2011), as there is little room for improvisation and informal learning (e.g. Ciborra, 1999). The findings show how piecemeal management behaviours remove the possibility for overview, organisational level plans, organisational cohesiveness and creates a fragmentation of work processes and organisational relations, elements critical in organisational alignment (Middleton & Harper, 2005). This supports the importance of organisational alignment for the establishment of well-functioning organisational processes. Whether the installers have the intention to act upon and with the new ICT does not really matter, if they are not interacting

with managers whose involvement can support, push and coordinate the necessary and adequate development of new work practices.

Delegated managerial authority to technology experts

The new ICT became the centrepiece of the workflow in the new digital organisation in the sense that work processes were designed according to its logic. Managers delegated much of their authority tied to the change process, including their decision-making mandate, to the planners. The reorganisation of work initiated by the planners partly transformed the installers from autonomous workers who organised their own work day to employees who performed their tasks according to prescribed and system-steered work processes and schedules. This strengthens Zuboff's (1988) conceptualisation of the informing and automating aspects of ICT; the installers were automated but not given the chance to understand the inherent logic of the new ICT. Managers' lack of involvement vis-à-vis the installers permitted the planners to control the work situation, both for themselves and for the installers. For the installers, lack of managerial involvement made the development of new work practices challenging. Their task-technology fit was poor, the prescribed routines integrated badly with their workflow and their competencies were not upgraded. The installers thus did not have the resources necessary to develop new work practices that integrated ICT use, which supports the highlighted importance of a high-quality learning environment (e.g. Andersen, 2015).

Managers delegated important authority to the planners. The planners held most power over the new ICT and following the reorganisation of work, taking on an informal managerial role. This shows how practices and positions in organisations are malleable and easily influenced by new ICT. Although assumed by managers to have it, the planners lacked necessary managerial orientation when it came to organisational insight and seeing the organisation as a complex whole with its different employee groups, core tasks and processes. Both planners and managers underestimated organisational complexity and criticality of managerial involvement, as neither had the necessary competence regarding organisational ICT integration that led their reflections and actions beyond the technical functionalities of the new ICT in a way that engendered the entirety of the organisation.

Depending on their interaction with positions, individuals and practices as seen here (Bahskar 1998), ICT can either further or restrain the autonomy of organisational actors, depending on the actors' characteristics, on the ICT's degree of resourcefulness for them and on interactional outcomes. Intentional actions often have random effects and outcomes that affect different actors differently. In studies like this one, variations in the use of new ICT at work between different employee groups challenges our understanding of the antecedents of success and failure of ICT-based organisational change. People usually know their work, the organisation of work, their colleagues and the workplace fairly well. New ICT challenges these understandings as well as competencies, both on the meta-level and on the skills level.

Conclusion

This study shows the criticality of the simultaneous and interactional involvement of managers and employees for the development of work practices that integrate new work procedures and new technology in ICT-based organisational change. The absence of managerial involvement hampers such development in particular for those employees that lack previous experience with ICT. The absence of managerial involvement led in this case to a poor task-technology fit, a lack of training and support, inadequate work processes and absence of involvement for the part of the installers. For them, the replacement of managerial involvement with planners as change agents led to insufficient mapping of challenges, training, revision of routines, and negotiations. The findings show that in this organisational environment, it was difficult for the installers to acquire new skills, and workflows were fragmented, which affected both work performance and productivity negatively. Absence of managerial involvement combined with the planners' control led to negative group level differences and partly failure of the ICT-organisation integration.

The data indicate that there are in particular three factors that play a role in the development of work practices that integrate tasks, processes and new ICT: 1) Closeness to the technology; 2) Closeness to managers; and 3) Previous ICT experience. This means that the change process should engender procedures that ensure these three factors. There is likewise a need to know more about more

standard characteristics generally ascribed to new ICT and their impact on the understanding of organisations and those working there. This case study indicates that simultaneous involvement and interaction of managers and employees further integration of organisation and technology, while absence of managerial involvement and inadequate handling of critical responsibilities can lead to organisational fragmentation.

Contributions, implications and limitations

A noteworthy insight is the criticality of simultaneous involvement of managers and affected employees during ICT-based organisational change, the identification of critical managerial responsibilities during change, and insight into how different managerial involvement towards different employee groups in the same organisation can be counterproductive during ICT-based change. This contributes to the assumption that there are certain universal criteria in handling (ICT-based) organisational change independent of tasks and work organisation. The critical managerial responsibilities proved useful for explaining variations in use between experts and novices within the same organisation. Identifying the importance of simultaneous and interactional involvement across organisational hierarchies constitute important practical insights for managers about to engage in ICT-based organisational change. Digitalisation affects most industries and occupational sectors. These findings are therefore relevant for any change process handling ICT-organisation integration, including values and norms. The comparison between employee groups provided the opportunity to investigate both success and failure.

The goal of this study was to explore managerial behaviours that contribute to change success and failure. In order to build new practical knowledge, there was a need to combine different theoretical perspectives, and to apply existing theory in a new framework. This approach justifies the partly application of the stage model; the interest here was to operationalise and investigate managerial behaviours critical for ICT-based organisational change. For future research, a more systematic approach will add strength to the understanding of how to succeed with actual ICT-based change in organisations.

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Table 1. Distribution of interviews and field visits in the three companies X, Y and Z during phases 1-3.

Period	Employee category	Company			Total
		X	Y	Z	
Interviews, period 1: 1-18 months	Installer	6	6	6	18
	Planner	5	5	6	16
	Manager	3	3	3	9
Interviews, period 2: 19-36 months	Installer	7	6	7	20
	Planner	6	6	6	18
	Manager	3	3	3	9
Total interviews					90
Field visits, period 1	(1-18 months)	1	1	1	3
Field visits, period 2	(19-36 months)	1	1	1	3
Field visits, period 3	(37-48 months)	2	1	1	4
Total field visits					10

Table 2. Impact of presence of managerial involvement vs. absence of managerial involvement for planners and installers respectively in ICT-based organisational change.

Manager behaviour	Impact of lack of managerial involvement for the handling of critical managerial responsibilities during ICT-based change			
Installers	Identification of challenges	Training	Revision of routines	Negotiations
Unavailable	Neglecting work situation	No plan for formal and informal learning	Fragmentation of workflow	Excluded from negotiations
Apprehensive	Decrease of autonomy	Removal of learning arenas	The new ICT is not adapted to tasks and work processes	Low negotiating power
Piecemeal	Lack of overview and overall organisational understanding	Lack of plan for competence development	Lack of organisational cohesiveness	Fragmentation of work processes and relations
Manager behaviour	Impact of present managerial involvement for the handling of critical managerial responsibilities during ICT-based change			
Planners	Identification of challenges	Training	Revision of routines	Negotiations
Available	Good insight in work situation	Plan for formal and informal learning	Improved workflow	Included in negotiations
Trustful	Increase of autonomy	High quality learning arenas	The new ICT is adapted to tasks and work processes	High negotiating power
Holistic	Good overview and overall organisational understanding	Plan for competence development	Organisational cohesiveness	Integration of work processes and relations