Implementation of a weakly structured system as a case of digital transformation – a study of an emergency response training organization

Vladislav V. Fomin
Vilnius University
vladislav.fomin@knf.vu.lt

Cecilia Hammar Wijkmark
Western Norway University of Applied Science
cecilia.hammar.wijkmark@hvl.no

Ilona Heldal
Western Norway University of Applied Science
ilona.heldal@hvl.no

Abstract

This long-term (10-year) exploratory case study investigates the implementation of a weakly structured IT system (WSS) in the Swedish agency responsible for safety education. Guided by the analytic lens of the Trifecta model of organizational regulation, we sought to examine the mutually shaping effects of novel IT, the practices, and the organizational rules, while maintaining a focus on the role of 'ordinary employees' – the trainers in charge of the education process. The case reveals which elements or actions or the lack of thereof aided or curbed the implementation process. The findings contribute to the ongoing discussion on the nature and meaning of the digital transformation (DT) process, illuminate distinctive features of WSS, and allow the formulation of conjectures on its implementation.

Keywords: Digital transformation, weakly structured system, Trifecta model of organizational regulation, ordinary employees, emergency response training.

1. Introduction

The concept of "digitalization" is commonly understood as the implementation of all sorts of digital technologies (IT) in an organization to support the capture and manipulation of data and to support or replace humans at work (Legner et al., 2017). In recent research, the term "digital transformation" (DT) has been used to refer to the multifaceted (Hallin et al., 2022) and lasting (Blanka et al., 2022) changes brought about by the digitalization process, including changes to conditions for learning (Tay & Low, 2017), work (Sewell & Taskin, 2015), and management practices (Thorén et al., 2018), among others.

Given the variety in the definitions of DT by different authors and in the sorts of digitization processes studied, there is still an ambiguity with regard to what exactly DT means (Chen & King, 2022, p. 401). DT's professional focus is often on technology-enabled, organization-wide changes in structures, processes, and work (IBM, 2023; KPMG, 2021), whereas DT is described as a "journey" (Giron, 2014) rather than an end state of the change. Against this background, recent research calls for theorizing the "relationships between the use of digital technologies, …and the response of organizations to digitalization" (Blanka et al., 2022, p. 2), which can be seen as a DT-focused context for the earlier call to theorize the individual and organizational levels of digitalization phenomena (Burton-Jones & Gallivan, 2007).

As DT requires organizational adaptation (Konopik et al., 2022, p. 2), as well as new knowledge from employees (Argote & Miron-Spektor, 2011; Blackler, 1993), prior research has focused on "ordinary employees" – people in an organization without innovation-specific functions in their job description (Bäckström & Lindberg, 2019; Kesting & Parm Ulhøi, 2010) who are (knowingly or not) key contributors to the DT process (Kesting & Parm Ulhøi, 2010; Opland et al., 2022, p. 255). To effectively contribute to the DT they must possess or acquire digital competence – i.e., a range of skills and knowledge required to elicit desired features from the IT system being implemented through the organizational digitalization process (Roberts, 1997; Blanka et al., 2022, p. 10).

Under the traditional view on IT implementation as a staged, top-down initiative aimed at putting in place *ex ante* defined system functions, the management's role is to ensure that users' behaviors and skills are aligned with those dictated by the IT system (Berente et al., 2016a, p. 1987; Lyytinen, 1987). Here, IT implementation is seen as the implementation of *highly structured systems* (HSS) – IT systems which structure and glue together organizations' activities by means of embedded rules and controls (Fomin et al., 2023). Some scholars attribute the origin of the concept of DT to the early studies of ERP systems (Chen & King, 2022; Venkatraman, 1994), which became the epitome of functional efficiency by means of structuring and controlling organizational tasks (Berente et al., 2019).

Today, increasingly, IT systems in organizations neither depend on nor are conditioned by *ex ante* defined

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organizational rules. This breed of IT, referred to as weakly structured (Fomin et al., 2023), differs significantly from the purposes and functions of HSS. *Weakly structured systems* (WSS) support weakly- or non-structured organizational tasks, encompassing spontaneous communications, knowledge sharing, learning, and so on (Alavi & Leidner, 2001; Neeley & Leonardi, 2018). e-Learning, including virtual reality (VR) learning, environments can be examples of such systems – at the start of the implementation process neither the functions nor how they can be meaningfully implemented in organizational practices are known/understood, by either the implementers or the users.

The analytic conjecture regarding the key role of "ordinary employees" assumes a different meaning when DT is considered as WSS implementation. WSS typically enable the transformation of organizational practices – not through the top-down mandates typical of HSS but through the discovery of new ways to complete the organizational tasks, new communication patterns, and improvised interactions (Leonardi, 2007). Consequently, DT for WSS becomes a bottom-up process, in which the competencies of "ordinary employees" push the boundaries of the IT implementation project.

While scholars have long acknowledged the juxtaposing and complementing each other of top-down/structured and bottom-up/unstructured organizational initiatives (Mintzberg & McHugh, 1985; Reynaud, 1988), it is only recently that theoretical models capable of capturing this interlocking behavior in the context of IT implementation projects have been suggested. The "Trifecta model of organizational regulation" (de Vaujany et al., 2018) succinctly captures the interaction of three key elements of the digitalization process: the IT artifact, the practices, and the organizational rules (de Vaujany et al., 2018). The model has recently been suggested as useful for studies of WSS implementation (Fomin et al., 2023). However, to date, the model has not been used in studies seeking to examine the digital and intrapreneurial competencies of "ordinary employees" in the process of digitalization (e.g., Blanka et al., 2022; Gekara & Thanh Nguyen, 2018).

In this paper, we use the lexicon of the Trifecta model to analyze the transformation of the key process within an organization providing training for emergency response professionals: the practice-based training of fire and rescue incident commander students, hereafter referred to as the training or the practice, enabled by virtual simulation technology, hereafter referred to as the IT or the IT artifact. We focus on the "ordinary employees" – the trainers – who plan, conduct, and assess the training process (Lamb et al., 2020). By drawing on data obtained from more than a decade-long case study, we examine the mutually shaping effects of the novel IT, the practices, and the organizational rules, as we seek to answer the main research question "what aided or curbed the DT process?" as the IT supported the gradual (but not effortless) gaining hold and legitimation in the case organization.

The contribution of this work is twofold. First, by applying the analytical lens and lexicon of the Trifecta model to analyze the DT process, we respond to the numerous calls for the investigation of new theoretical frameworks capable of capturing the interaction of individual- and organizational-level phenomena in the organizational change process (Blanka et al., 2022, pp. 1–2; Burton-Jones & Gallivan, 2007; Opland et al., 2022, p. 262). Second, we advance conjectures on the distinctive character of WSS (Fomin et al., 2023) against the backdrop of popular models of DT and develop recommendations for WSS implementation.

2. Digital transformation in the case of the implementation of weakly structured systems

When WSS are introduced, the IT does not carry *ex ante* scripted workflows or knowledge to be passed or enforced on its users, as it is in the case of HSS. Instead, employees must discover (new) ways of using IT in their daily work (Fomin et al., 2023). For the DT process to unfold, the patterns of individually discovered uses of the IT (referred to as affordances by Leonardi (2011)) must be shared and discussed among the users and the organizational management. This leads to suggestions for the legitimization of use patterns which are perceived as contributing to the desired improvements in organizational practice or rejecting or non-legitimizing other user-discovered or management-imposed IT uses (Orlikowski, 1996). Such dialectical interaction of bottom-up and top-down initiatives surrounding the implementation of digital technologies has been previously referred to as a joint-regulation process (de Vaujany et al., 2018; Reynaud, 2003), and its goal of establishing a new IT-supported *modus operandi* for the organization matches those of the DT process.

2.1. Digital transformation through the prism of the Trifecta model of organizational regulation

As the main theme of DT research is the organizational change process (IBM, 2023; Konopik et al., 2022), organizational routine (Becker et al., 2005) is a key construct used to explain enablers and inhibitors

of organizational change through a jointly constitutive relationship of formal and informal organizational *practices* and *rules* (Berente et al., 2016b). Employees, in turn, are seen as having a key role in enabling or driving the DT process, by conveying "both digital knowledge and the strategies for utilizing it" (Colbert et al., 2016).

Recent research called for new academic frameworks which can "take into account individual employee competency in the context of an organization's digital transformation" (Blanka et al., 2022, p. 2), overcoming the fallacious view that DT happens merely as a result of the introduction of novel technology. The fallacy of this view is especially pronounced in the case of WSS, which do not carry any *ex ante* defined scripts (either in the form of rules or guides for practice) on how organizational routines should or could be transformed.

We find the "Trifecta model of IT-based regulation" (de Vaujany et al., 2018) offers a simple yet robust lexicon for studies of DT in general and for linking the individual- (such as user interaction with IT) and organizational-level (such as issuing organizational rules and mandates) phenomena in particular.

According to the Trifecta model, to successfully introduce IT into an organization, three elements must jointly establish a (lasting) organizational system (originally: regulatory system): 1) the IT artifact(s), 2) the (sociomaterial) practices of organizational actors, and 3) the organizational rules which legitimize the use of the IT artifact and the practices (see Figure 1).

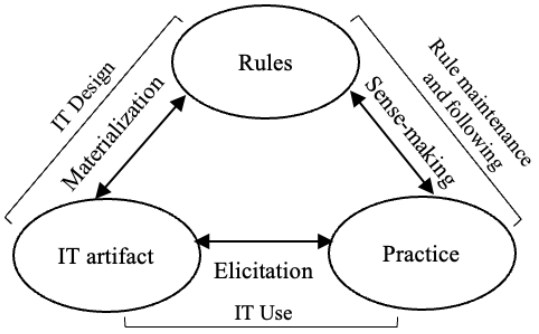

Figure 1. 'Trifecta' model of organizational regulation. Source: de Vaujany et al. (2018, p.5).

Using the Trifecta model lexicon, implementing an IT artifact in an organization requires mutually constitutive relationships to be built between the (newly introduced) IT artifact and two other elements of the organizational system – the practices and the organizational rules.

The traditional view on HSS posits that the implementation process locally enforces on the organizational practice the rules that were *ex ante* formulated and scripted into the system. Thus, a "Materialization" relationship is established through scripting into IT algorithms and parameters in support of existing or desired organizational rules and practices. As each Trifecta relationship is bi-directional, the model suggests that new organizational rules may be defined to support IT implementation (i.e., to support new IT-based practices). The 'Elicitation' relationship is established through bi-directional efforts between the IT and the users to elicit desired behaviors. Users learn to elicit system scripts in support of their organizational tasks, while the system can be more or less supportive of users' endeavors. Finally, users' training and experimentation to elicit the desired functionality from the novel IT contributes to the establishment of the "Sense-making" relationship, when employees learn about and make sense of the possibilities offered by the novel IT in the context of organizational goals and rules. Likewise, the binding of the Rules and Practice elements can be taking place as new rules are formulated to support the new patterns of practice enabled by the novel IT.

2.2. Weakly structured systems in relation to Trifecta

When implementing WSS, users must discover, invent, share, negotiate and legitimize scripts for system use (Fomin et al., 2023). Contrary to when HSS are implemented, none of the three constitutive relationships of Elicitation, Sense-making, and Materialization required for integration of the IT artifact into the organizational *modus operandi* exist, nor is there an attempt by the implementation team (consultants, technical experts) to enforce them; thus, they must be established anew. WSS carry generic functions to search, retrieve, store, manipulate, and display digital objects (DOs) and their combinations: fragments of text, audio, video, and other forms (Malhotra et al., 2021). For the DT process to unfold, the equivocality of the meanings of possible appropriations of DOs by different users must be reduced, and organizational rules for the IT artifact's uses must be established – this usually involves *formal recognition* (legitimation) of certain uses of the novel IT and rejection of others, for example legitimation of certain DOs as suitable for designing training scenarios and legitimation of certain scenarios to conduct and assess the training. This, in turn, requires (developing) the specific digital competencies and practices of "ordinary employees" at individual and group levels (Jung & Lyytinen, 2014; Majchrzak & Markus, 2012; Markus & Silver, 2008) and their legitimization by management (Orlikowski, 1996).

While the Trifecta model offers a suitable theoretical lens to capture the interaction of key

elements of the digitalization process – the IT, practices, and rules – to date, the model has only been applied in studies of HSS implementations (Butler et al., 2023; Davidson et al., 2023). Analysis of DT processes in the case of WSS implementation can reveal the process by which user initiatives and competencies gradually form meaningful collective use patterns (Orlikowski, 1996; Weick, 1979) and help establish the Trifecta regulatory system belt. Understanding how such a regulatory regime emerges can contribute to knowledge on DT in general and help better understand how the individual competencies and initiatives of "regular employees" contribute to the organization-wide *transformation* (Burton-Jones & Gallivan, 2007).

3. Research design

Seeking to answer the main research question – what aids or curbs the DT process – this study assumes that DT process can unfold through the implementation of weakly structured systems (WSS). We draw on a longer than 10-year case study of novel IT implementation, a virtual simulation tool, at the Swedish Civil Contingencies Agency (MSB), which is responsible for incident commander education. This work is based on data collected through interviews with key personnel, observations during impacting activities (e.g., training sessions and meetings) and secondary data (e.g., documents, schedules), during the period from 2011 till 2022.

This work uses methods appropriate for exploratory research, including Yin's principles of exploratory case study (2011, 2018) and suggestions from Eisenhardt for inductive theorizing (1989). Examining DT as an emergent process, subject to disagreements regarding meaning (Chen & King, 2022), forms one important motivation for this work. In keeping with the sentiments of Eisenhardt (1989) and Weick (1995), the theoretical contribution of this work lies in demonstrating the analytical power of the Trifecta model (de Vaujany et al., 2018) and its vocabulary for analyzing digitalization processes, and in formulating conjectures on WSS implementation in organizations.

4. Digital transformation of the training of emergency professionals

Organizations which provide training for emergency response professionals must utilize suitable learning scenarios. For incident commander students, such training is traditionally conducted using discussion-based scenarios, supported by pictures, table-top models, and videos in a classroom setting (CS) (Hammar Wijkmark et al., 2019; Reis & Neves, 2019). These may be supplemented by practice-based live simulations (LS) at training grounds, involving real buildings, vehicles, and people. The increased need to support qualitative, non-technical, command skills training (Lamb et al., 2020), and the drastic increase in complexity of new types of emergencies have contributed to growing interest in gaming and virtual simulation (VS) technologies for training. Different from CS and LS, VS allows students to act and interact in new, *dynamic scenarios* of an almost *unrestricted level of complexity*, matching real situations. These 3D virtual environments built by the trainers require commercial software and hardware solutions. The IT tools supporting VS training were recognized as carrying potential substantial improvements for the training practice (Bonnechère, 2018; Crookall, 2010; Jansen, 2014). These required improvements involve more training, repeat training situations, allowing training in various incidents, disasters, etc.

The nature of the changes in emergency response training was conditioned on the implementation of VS technologies as a new practice. We consider VS's introduction to satisfy the criteria of what is to be considered DT: the implementation of VS training can bring lasting and profound changes to the training process, including changes to conditions for learning (Tay & Low, 2017) for different roles, for *both* students *and* trainers, thus impacting on "key business functions and processes …, at different levels of business functions" (Blanka et al., 2022, p. 2). Trainers must acquire new competencies to develop VS scenarios and conduct training using the new IT. Students can attain a higher level of learning (Wijkmark et al., 2021), by applying knowledge (Bloom, 1956; Huitt, 2011) and experience to act in the commander role, in relevant, realistic incident situations, in a way similar to LS, while not being restricted by the physical constraints of the training ground. VS allows students to interact, while the situation can dynamically evolve based on their decisions (i.e., knowledge applied) in scenario-scripted training situations. VS scenarios can accommodate any required environment, objects, and incidents, as well as including realistic cues for situational awareness training (Lamb et al., 2020; Polikarpus et al., 2019) and enabling experience of like-real presence (Hammar Wijkmark et al., 2019).

While the digitalization of training was reported to bring multifaceted benefits, failures were also reported, with causes attributed to the use of immature technology (Williams-Bell et al., 2015), unexpected effects of the actual game design (Land, 2014), or trainers' lack of digital competence (Alklind Taylor, 2014). Summarizing earlier studies, the success of DT efforts does not hinge exclusively on the digital technology's capabilities but, rather, can be said to depend on the

interaction of technological and organizational factors and trainers' competence to deliver the training, given the specific techno-organizational setup.

5. Analysis of the case – through the lens of Trifecta

5.1. The IT artifact

The IT artifact analyzed in this study is a 3D virtual reality simulation tool acquired by MSB. This IT tool is a WSS by definition: it provides a range of DOs, e.g., vehicles, avatars, fire, and smoke, which trainers can use to build dynamic training scenarios, using multiple functions and by scripting actions, events, and triggers in a number of pre-defined (i.e., built-into the tool) environments, e.g., cities, train stations, industries, harbors, etc., but does not carry any ex ante defined and scripted workflows for how the training scenarios must be built. Based on the learning objectives (LOs) and assessment criteria, training scenarios are designed by trainers to allow students to encounter suitable situations and challenges. Students can act in the role of the incident commander, interact with other avatars at the scene, and perform expected tasks: e.g., assess risks, decide on actions, and give orders to firefighters.

An IT artifact may be used in multiple ways, but, in relation to the training at MSB, VS is used for two tasks: building scenarios and conducting training. For scenario building, competencies are required to script actions, events, and triggers in the virtual environment, e.g., the dynamic development of the fire with changes in density and color. For conducting training, competencies are required to control the actions of the firefighter avatars and the effects of decisions taken by the trainees, e.g., the firefighters enter the building; the fire decreases when water is applied; etc..

At MSB, training is conducted by a team of trainers involved in different roles: the operator (one), who executes the pre-scripted events or manually activates events and manipulates DOs during the training; the role-player(s), who control and role-play through specific avatars; and the assessor(s), who observe(s) and assess(es) the students. The roles require distinctive specific sets of technical competencies – i.e., in their different roles, trainers must be able to elicit different (types of) functionality from the IT artifact.

5.2. The rules

At the time the IT artifact was first introduced at MSB, all extant organizational rules supported training formats had been used for decades: LS and CS. With hindsight, we can state that managerial understanding of the IT artifact and its impact on practice was wrong – failing to see both the dissimilarities between the new IT and other digital tools in use and the opportunities and requirements of the new format of practice, VS. Therefore, the implementation was not supported by charting new or adjusting extant rules: there were no connections to learning goals (LOs), no assessment criteria defined to support or demand VS use, and no requirements for trainers (existing or newly hired) to learn and use VS. No mandates legitimizing the IT artifact on an organizational level were introduced or discussed: no implementation plan, no strategic goal or vision, no plan to build trainers' competence. The corresponding state of Trifecta is depicted in Figure 2.

Given the training curriculum, LOs emerge as proxies for rules regulating the training process, the size of classes, schedule, and included training sessions. At MSB, these are developed through a process involving experienced trainers, representatives from fire and rescue service organizations, and legitimized by management as rules which all trainers must adhere to. The LOs which existed at the time of VS implementation had existed before and remained neither changed nor harmonized with the new bottom-up driven VS training.

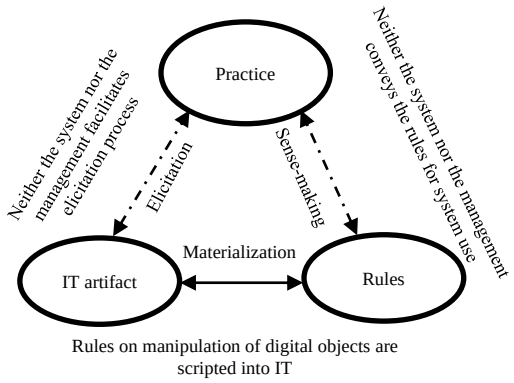

Figure 2. WSS implementation: users discover, invent, negotiate and legitimize uses of IT.

With hindsight, the Sense-making relationship between the Rules and Practice elements of Trifecta was not established (punctuated line in Figure 2) – a range of (new) rules to support the new practice was missing. There were missing mandates on institutionalizing VS training, adjustments of schedule and student groups, and how to combine LS, CS, and VS sessions, among others. At MSB, the void of VS-specific rules was left to be dealt with by trainers – the "ordinary employees". Only during the IT implementation process did they chart, discuss, and suggest new rules to management.

5.3. The practice: Building of Trifecta by the "ordinary employees"

As the VS technology in focus belongs to the WSS breed, trainers' learning was carried out through their own exploration of the new possibilities enabled by the IT and by determining a new format(s) of practice.

Ironically, MSB managers did not see either the transformative capability of the technology or the horizons of the possible or desired transformations. Interviews with management reveal no understanding of the IT artifact as a WSS or that uptake requires substantial top-down, as well as bottom-up, organizational efforts. According to them, the IT artifact should be used in ways similar to that of another digital technology, e.g., visualizations (pictures, films) in CS. VS was considered a supplement to CS and not as a (competing) supplement to LS, capable of yielding high(er) levels of learning. As a result, there were no management plan, decisions, or mandate for the VS implementation process at this organization.

The lack of managerial foresight resulted in confusion among the trainers, dividing the trainer group into three: 1) trainers with competence to develop VS, 2) trainers with interest but no competence to use VS, and 3) trainers with no competence or interest in VS – this last group argued against its use. With the void of rules on the newly introduced IT artifact, there was no guidance or support, but, at the same time, no prohibition of bottom-up initiatives to explore VS. It is through those initiatives taken by "ordinary employees" that Elicitation (between Practice and the IT artifact) and Sense-making (between Practice and Rules) relationships were gradually formed.

To transform the practice, and to establish the Elicitation relationship (see punctuated line in Figure 2), trainers had to obtain skills to elicit the required functionality from the new IT artifact. At the organizational level, MSB needed sufficient trainers with specific competences: 1) to design, build, and maintain a library of ready-to-use scenarios; 2) to use VS for training; 3) to use VS for assessment.

Trainers and management had to make sense of the new practice, based on earlier knowledge (from LS and CS), thus establishing the Sense-making relationship between Rules and Practice (see Figure 2). Specifically: 4) VS had to be understood as distinct from CS and VS; 5) the need to establish new rules for adequate VS training had to be acknowledged (e.g., the need to reach LOs, with VS-specific scheduling, etc.); 6) organizational rules were needed to establish dedicated responsibility and mandates for the implementation, management, and (continuous) development of VS.

With hindsight, the absence of the following organizational arrangements required for Sense-making relationships curbed the DT process: 6) management did not recognize the need for an organizational unit with dedicated trainer resources; 7) management neither gave a mandate for trainers to learn to use the system nor appointed responsibility for supervising the learning process; 8) managers at all levels lacked basic understanding of the competences necessary for VS.

Against this background of "missing items" for establishing a working Trifecta, a number of actions were taken by one, and later two, "ordinary employees" with sufficient competencies to facilitate learning and establish the Elicitation relationship. Specifically, they:

- designed and built a library of ready, and "easier-to-use" scenarios for other trainers;
- initiated demonstrations for other trainers and managers to observe;
- helped other trainers to make sense of how VS can be meaningful (and effective);
- developed and conducted courses adjusted to the specific trainer roles in VS.

At the same time, management made no attempt to build trainers' competencies (to elicit the required functionality). To establish a Sense-making relationship, the same "ordinary employees" argued for the necessary supporting rules and mandates. It took a long time for management to acknowledge the legitimacy of these requests. The demonstrations and studies aimed to help establish understanding (sense-making) and to find systematic evidence and help to inform management on the distinctiveness of VS.

Legitimation for VS-specific mandates was given only after seeing "evidence" in the form of appreciation of VS by external participants (highly respected incident commanders and fire chiefs) in the demonstrations and studies, and reports of commissioned research studies, etc.

5.4. Summary of the analysis

The case analysis allowed us to identify several bottom-up initiatives leading to the building of competence to elicit the required functionality from IT and the sense-making on the usefulness of the IT in daily practice, as well as to the materialization of certain knowledge and rules in the technology. The study thus confirms that "ordinary employees" can play an important, enabling, and intrapreneurial (Baroudi et al., 1986; Blanka et al., 2022; Legner et al., 2017) role in the DT process.

Through a bottom-up initiative, without direct support from management, by organizing training sessions and demonstrations, a few skilled trainers were binding the novel IT to practices requiring transformation, facilitating the identification of missing

rules, building competence and facilitating the sense-making of the rest of the organizational members.

The binding of IT and the organizational rule system was done by scripting into the system ready-to-use scenarios. This also facilitated the learning of less technically skilled trainers to act in the role of operator (thus contributing to Elicitation and Sense-making).

Observations of VS, convincing feedback from participants, and reports of the research studies initiated by the trainers all contributed to the Sense-making and establishment of VS-specific rules and mandates by management. Combined, observations, reports and feedback enabled legitimization of the scripted ready-to-use scenarios; legitimization of VS as a new format of practice; and the issuing of the mandate for a VS trainer team and the decision on necessary rule changes.

6. Discussion

One contribution of this research is in theorizing WSS as a different breed of IT system. Although not always identified as such, WSS can be seen with growing prominence in industry and in academic research, as constituted by such types of technology as e-learning, AI-based decision making systems, etc. (Barley, 2015; da Cunha & Orlikowski, 2008; Denyer et al., 2011; Gal et al., 2014; Malhotra et al., 2021). Analysis of this case study demonstrates that WSS implementation unfolds differently from a typical HSS implementation case (Kwon & Zmud, 1987).

When introducing WSS, necessary rules to support the transformation of practice may be difficult or impossible to foresee. Based on the theoretical and empirical findings in this study, we can formulate two conjectures as recommendations for management, as the following. First, identify, and give a dedicated mandate to, employees with sufficient competence to elicit the required functionality from the IT and intrapreneurial competence (Blanka et al., 2022, p. 4) to act as ambassadors for the system. Second, establish a mechanism for screening the emergent patterns of IT use, including decision points to legitimize or reject, and in this way bring the (bottom-up) individual-level and group-level efforts to the organization level, thus forming the organizational "structure" or a "regulatory belt" (Fomin et al., 2023) for WSS use.

The second contribution of this work can be seen in the novel insights into the DT process, as shown through popular incremental models. The digitization process at MSB started from the lack of management insights and understanding about the transforming potential of the technology (Verhoef et al., 2021). Instead of traditional "levels" of DT, our study revealed what can be referred to as "islands" of transformation. DT was concerned with what would correspond to only one of Venkatraman's (1994) levels – that of *transformation* of one specific business process (training) involving a number of organizational routines. We cannot easily establish that two lower levels of Venkatraman's model had already been attained when the IT implementation process started. Instead of seeing the case organization "moving up the ladder" (Blanka et al., 2022, p. 9) of DT, we observed a cyclic process iterating between two steps of Blanka et al.'s (2022) three-step flow: between "opportunity evaluation" and the duplet of "proactiveness" and "interpersonal mobilization". Interestingly, what is the first step in Blanka et al.'s (2022) model is a point-break step in MSB's case – once management understood the value of the technology and made a strategic plan for its implementation, the transformation process started to unfold faster.

The third contribution of this work is in demonstrating the utility of the Trifecta model for analysis of the DT process. The Trifecta model theorizes the IT implementation process as a (top-down) movement from rules to practices. WSS implementation, on the contrary, is a (bottom-up) movement from practices to rules (Fomin et al., 2023, p. 202), where the ordinary employees drive the innovation, and management must establish proper support for it (see Table 1).

Table 1. The roles of management and employees in the implementation of WSS

IT implementation to support current practice (sustain)	IT implementation to develop new practice (transform)
Management: Issue a mandate for the use of IT	Management: Establish mechanisms for screening and legitimation of user-discovered and user-developed workflows
Employees: Discover how IT can support the extant practice	Employees: Discover how IT can support the extant and new forms of practice

Our study shows that employees can play different roles in the implementation process. We identified three groups of trainers (see Section 5.3); the actions of one group supported the development of Trifecta relationships (Elicitation and Sense-making) for another group and Sense-making for managers. The third group did not participate in any activities, arguing against the use of the IT artifact and the new form of practice. The actions of this antagonist group of trainers, which may have had a negative effect on the establishment of Trifecta relationships, i.e., how their expressed rejection of the digitalization of practice slowed the process, requires further investigation. Also, changes in

management personnel during the studied time and their different attitudes may have influenced the process.

A main lesson is that a long-term perspective is necessary to examine the transformative changes brought by the IT implementation process, i.e., learning, work, and management practices. Initiating changes and having observable consequences can take time; the transformation process can be longer than expected, especially if not understood as such from the beginning. In this study, observable changes were often associated with implementation problems and resulted from the (non-) use of the IT artifact, necessary practice adjustments, or associated (or missing) rules. These problems do not necessarily occur at the same time, and handling them in isolation did not give the same insights into organizational problems associated with the DT process. Therefore, the Trifecta model can be considered helpful in enabling a holistic view of the transformation process, while also examining the main influencing factors and the relation between these.

Other cases, similar to that analyzed of MSB can be found today in other organizations conducting VS training. Following de Vaujany et al. (2018) and Fomin et al. (2023), we can conjecture that each implementation of VS tools at different locales will bring forth different Trifecta setups.

7. Conclusions

This study demonstrates that different breeds of IT require different roles and tasks from management and users in the implementation process. Based on theoretical inferences from an exploratory case study, we can conclude that MSB management's failure to properly identify novel IT as WSS curbed the digitalization process.

The management treated the IT implementation as if it were HSS or a tool with crystal-clear functionalities, which resulted in a lack of oversight regarding the role and source of competence for IT users and the importance of exploration and demonstration activities to enable sense-making among trainers, etc. Adopting the Trifecta model's analytic lens allowed analysis of WSS implementation as a movement from practice to rules, revealing that the transformation process is driven by "ordinary employees" – users of IT without a special mandate for innovation.

Future studies of WSS implementation should investigate whether the conjectures formulated here on WSS implementation will prove effective aids to the DT process, and whether other WSS implementations will follow similar patterns of transformation stages.

Given the exploratory nature of our study, we conclude by providing one more conjecture to be tested in future studies: with dedicated managerial support for user-led initiatives, including support for learning and innovation, the implementation and establishing of VS practice at MSB would have likely taken much less time.

8. References

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