UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Embedding the Signs

The creation of routines in clusters when implementing a new technological tool

Master Degree Project in Management

Author

Helén Gustafsson

Supervisor: Petra Adolfsson
Master's degree Project No.
Graduate School

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Helén Gustafsson
Master of Science in Management, Graduate School.
School of Business, Economics and Law at Gothenburg University

Abstract

This paper explores the process of routines creation when attempting to stabilise the use of new digital tools, fitting them into an organisation's existing routines. Digital technology is often complex, consisting of multiple objects requiring a cluster of interdependent routines. Implementation of new technology is considered a challenge for many organisations as, while considered crucial for a company's survival to adapt to technological changes, most leaders of organisations worry about their ability to adapt their existing processes. This study offers an opportunity to explore the micro-processes during implementation of a new digital tool that came into an organisation without an implementation plan. It confirms with previous studies that intentional routine creation is necessary when routines for new technology does not fit into an organisation existing processes, requiring a larger network of actors in an interdependent cluster. It contributes with the idea to classify routines into core- and subroutines, pursuant to their interdependency, while giving insights how this interdependency affects the creation of routines. This study also provides insights on how objects play a role in balancing routines stability and flexibility, both within and in between interrelated routines, by explaining their effect on actors affordance to the technology. Lastly it suggests a distinction between core- and complementary objects based on their ability to affect performance in routines.

Keywords
Sociomateriality, Performativity, Change, Routines, Spaces, Affordances, Objects

Introduction

Digitalisation is a mega trend with the characteristic of change that is fast, fierce and the future (Hans, 2018). It has reached all industries and sectors of society and companies are currently facing challenging transition processes (Andersson, et al., 2018). Studies have shown that most companies are united in the view that failure to effectively conduct digital transformation will harm their company´s ability to compete, but also that most companies have a digital immaturity and lack experience with digital technologies (Fitzgerald, et al., 2013). Responding quickly and effectively to new technologies affects the bottom line, and ultimately business survival (Fitzgerald, et al., 2013). According to *Insight Intelligent Technology Index; 2018,* seven out of ten business leaders are concerned about their firm's ability to adopt new technology (Ismail, 2018). With the acknowledgement that implementing new digital

technology has become a necessity while there are many concerns in abilities of implementation management, many guidelines, 'best practices', have been published. A few examples being; '*Industry 4.0: Managing The Digital Transformation'* (Ustundag & Cevekcan, 2018), *'Implementing new digital business processes'* (Boomer, 2017) and *'New materials, new processes: implementing digital imaging projects into existing workflow'* (Backlund, 2014).

The fact that organisations across the globe are exposed to an endless demand and progression of technological development have fuelled the interest to study its impact (Andersson, et al., 2013). Among scholars, there has been a concern that mainstream journals within business, management and organisations, lack attention of the intertwined relationship between the social and the material in organisations (Orlikowski & Scott, 2008; Leonardi & Barley, 2010). Regarding technological implementation while having a deterministic approach, assuming that a certain technology would provide a specific impact, would mean to fail in tracing the change in use, adaption of and accommodation to the technology itself (Mutch, 2013). Thus, one needs to recognise that the impacts of technology can much vary depending on the affordances and constraints that they offer to members of the organisations during points of implementation (Mutch, 2013). To increase understanding in the phenomena of technology implementation, a lens of sociomateriality will be used, but to explain the organisational processes that takes place, the study will turn its focus to routines.

Routines play a key role in the process of technology implementation as they enable repetitive and reliable performance of organisational activity (Yi, et al., 2015). They have a double role as they drive towards organisational stability as well as change, during constant variation in performance and adaption, giving them a central role how and organisation achieves efficiency and flexibility in their processes (Yi, et al., 2015). How routines can provide to both stability and change can be explained by the notion of routine dynamics, where Pentland et al. (2016) describes routines to entail multiple actions, multiple patterns and multiple social (human) as well as material (non-human) actors, constantly negotiating in, what is by D'Adderio and Pollock (2014) called, 'performative struggles' (p.1837). While routines can look stable from a far, they are in fact constantly changing (D'Adderio, 2008).

As routines are constantly changing by internal dynamics, how do then organisations manage to *create* change? To think that mutual adjustment and performativity is enough during larger and more radical routine change are only reasonable when involving a small group of people (Yanow & Tsoukas, 2009), yet less likely when routines are complex and consist of multiple interrelated subroutines involving many actors (Bucher & Langley, 2016). There is little known about more radical changes in routines (Cohendet & Simon, 2016), but Bucher and Langley (2016) made an interesting framework to explain how organisational members can strive to intentionally change routines by either altering how a routine is understood or how they are acted upon, by using reflective and experimental spaces. What increases the complexity to study routines regarding technological objects is that they often comprise of numerous technical objects which may themselves be decomposed (Markus & Silver, 2008), resulting in clusters of routines (Kremser & Schreyögg, 2016). The idea that routines occur in bundles

(Kilduff, 1992) has been recognized for years, but still most studies tend to focus on one or two routines at a time (Pentland, et al., 2016).

This study will, to provide insights within this gap, address the assignment in seeing how routines are emerging by effortful actions while considering a cluster of routines. Bucher and Langley's (2016) framework for intentional routine creation will be used, while adding the interrelated dimension of routines as a cluster. To understand how routines, get *created* while implementing digital technology, this study will put the technological tool forefront to identify the routine cluster with the common interest in reaching a certain goal (Kremser & Schreyögg, 2016). The notion of affordances (Leonardi, 2013a, Leonardi, 2013b; Mutch, 2013) from science and technology studies will be used to explain how the dynamic relationship between technology and actors changes the course of routines. To understand how routines gets balanced by affecting affordances and thus performances, the role of complementary artefacts (objects) (D'Addario, 2008; 2014) will have an important role.

This to answer the following research question; *'How are routines created when implementing a technological tool into existing practices?'*

To examine this question, a qualitative study is made using a single case. This, to be able to capture micro-processes between actors in one specific context. It is conducted at an over sixty years old Swedish company with diverse businesses including; exhibitions, conferences, congresses, hotels and restaurants, that for this paper with be called ExCo. The age and diversity of ExCo's businesses provides a setting where there already exist many established routines as well as diverse needs and interests. The digital technology observed is mobile digital signs purchased in 2015, representing the start of the period under study. As the fieldwork was conducted over a period of four months in 2019, existing practices of routines could be directly observed, but historical events were collected through stories from interviewees. The purchase of these digital tools did not go through any normal purchase procedure and were therefore never provided with an implementation plan.

> Well, they did not come in correct in our systems from the start and did not go through purchase and so on. So unfortunately, they got a bad start. – **Business Development Manager**

The lack of preparation and implementation plan offers a good opportunity to study how routines are (re)created by intentional as well as unintentional actions and performances. Offering a situation where initial actions are emerging without previous intentions.

Previous studies and important concepts

In this section a discussion of previous research will help explain the choice of theoretical concepts. Important concepts, used in the study, will be explained in more detail.

Origin of technology in organisational research, sociomateriality and affordances

There is a long history of studies trying to show the impact of technology on organisations (Andersson, et al., 2013). A study from the 1950s went beyond the role of individual and organisational goals in determining change, including the role of the technology itself and its

effect on organisational structures and individual behaviour (Mann & Williams, 1960). During early studies, the effects of technology had a deterministic approach, seeing technology as an external agent able to transform organisations directly (Robey & Bourdreau, 1999). There have been several ways where scholars have moved away from this, trying to explain the intertwining relationship of humans and technology in practice (Orlikowski, 2007). Actor-networks (Callon, 1986; Latour, 2005) gives both humans and material artefacts *agency*, the ability to act, affecting change. Pickering (1997) adds elements such as prior culture, individual interests, intentions and institutions. Orlikowski (2007), who has drawn her studies on authors such as Latour, argues that the social and material cannot be separated as they are inextricable intertwined. Technology should not be treated as a special thing or aspect of organisational life but instead as an integral part of it, *sociomaterial* (Orlikowski, 2007, Orlikowski & Scott 2008; Orlikowski 2010), meaning that there is no social that is also not material, and no material that is not also social (Orlikowski, 2007).

Viewing sociomateriality with an inextricable relationship between the social and the material can cause an issue when studied it in practice, as it makes it hard to define what is social and what is material (Mutch, 2013). In an empirical perspective it lacks explanatory power and thus overlook how practices are sustained and changed (Leonardi, 2013a). As this study is focusing on the *how*, by viewing practices, the need for a slightly different lens is considered necessary. Leonardi (2011) introduces the metaphor of imbrication to describe how social and material agencies are overlapping to create infrastructure in the form of routines and technologies. By themselves neither human or material agencies are empirically important but when they become imbricated, they together produce, sustain or change either routines or technologies (Leonardi, 2011). The social and the material have both capabilities for action but differ with respect to intention (Leonardi, 2013a). In this view, the materiality of technological artefacts affords certain users and actions, but outcome differs depending upon the context in which the materiality is used and the goal of the user (Leonardi, 2013a).

The notion of affordances comes from a psychologist, James Gibson (1986), who explained how animals perceive their environment, suggesting that surfaces and objects offers certain affordances for action. Affordance, within management theory, can be defined as the possibilities for goal-oriented action, afforded to specific users by technical objects (Markus & Silver, 2008). Leonardi (2013b) have developed the notion of affordance to explain when changes in networks between organisational members would occur by newly implemented technology. Reasoning that between interdependent organisational groups, collective or shared affordances will occur when a shared appropriation of a technology's features are jointly realised. Therefore, distinctions between the concepts for individual-, collective- and shared affordances can be made. *Individual affordance* is when someone enacts technological features not common in his or her workgroup or department, thus makes the actor able to use technology in a way that others cannot. *Collective affordance* on the other hand, describes when individual members work on their own, but their individual tasks aggregate a certain final output. A *shared affordance* is an affordance that is shared by all members of a group and distinct from collective affordance as it represents similar use of the technology. (Leonardi, 2013b) This study will borrow the idea to classify affordances, but instead use it to explain and distinguish

how technology afford or constrain users, and how this change, within or between routines, during implementation of technology.

Routines as constantly changing, interrelated processes

Now, when the lens is stated on how this study will view the relationship of social and material agents, routines deserves a closer examination. Routines have been defined as 'repetitive, recognizable patterns of independent actions, carried out by multiple actors' (Feldman & Pentland, 2003, p. 95). Routines were historically considered as temporal structures used to accomplish organizational work and provide stability, but Feldman (2000) proposed a performative model where the internal dynamics of routines promote continuous change. Feldman together with Pentland (2003), identified two aspects to explain why routines are a source of change as well as stability, based on Latour´s (1986) distinction of performative and ostensive aspects. According to Feldman and Pentland (2003), the ostensive aspect of a routine embodies what is typically thought of as the structure of the routine, while the performative aspect embodies the specific actions that brings the routine to life. The relationship between ostensive and performative aspects of routines creates an on-going opportunity for variation, build on Giddens' (1984) theory of structuration, explaining the recursive relationship between structure and action. The ostensive aspect enables people to guide, account for and refer to, specific performances of a routine, while the performative aspects creates, maintains and can modify the ostensive aspect (Feldman & Pentland, 2003).

This recursive relationship between ostensive and performative patterns are in this study an important motion, but as Pentland et al. (2016) describes, routines entail multiple actions, patterns, social (human) and material (non-human) actors constantly negotiating. As this study observe routines surrounding a technological object, to view routines as interrelated patterns of action is necessary. That technological objects often comprise of numerous technical objects which may themselves be decomposed (Markus & Silver, 2008), results in a cluster of routines (Kremser & Schreyögg, 2016). Very recent, some studies have started to regard the relationship between routines, trying to explain the effect and complexity that this interdependency creates. To help in the discussion on how routines gets *created,* Kremser and Schreyögg (2016) offer important insights to the complexity that this interrelation cause. Kremser and Schreyögg (2016) argues that incorporating routines based on a new technology into an existing cluster, the interdependency will narrow the scope for possible change, creating a leeway for cluster development but only along the already emerging path. Meaning that the fit of new technology already has into existing routines, will impact the outcome of implementation. Kremser and Schreyögg (2016) further explain that clusters develop its own dynamics consisting of 'multiple, complementary routines each contributing a partial result to accomplish a common task' (Kremser & Schreyögg, 2016, p. 1).

Reflective and experimental spaces

Acknowledging that to what extent technology will cause changes is based on its fit into existing routines, one must consider that technology implementation can cause more disruptive changes. As Yanow and Thoukas (2009) state, routine creation through mutual adjustment and performativity is possible when involving a small group of people, but less likely enough in

cases when routines are complex and consist of multiple interrelated subroutines, involving a network of actors (Bucher & Langley, 2016). Previous research has generally addressed intentional routine change either by emphasising dynamics internal to the routine, or interventions that takes place outside the practice of routines (Bucher & Langley, 2016). Studies considering routine creation through internal dynamics have found the importance of experimentation (D´Adderio, 2003, 2008) and adjustments made through trial and error processes (Bresman, 2013, Rerup & Feldman, 2011). Studies regarding changes rising from outside the routine itself have either focused on disruptive external changes, such as new industry standards (Jarzabkowski, et al., 2012) and market pressure (Cohendet & Simon, 2016), or from groups within the organisation. The latter addressing the importance to create settings apart from the day to day activity (Edmondson, et al., 2001) by for example creative projects (Obstfeld, 2012) and organisational communities (D´Adderio, 2014).

Bucher and Langley (2016) contributed with combining the idea that intentional routine change comes from either inside or outside the routine itself, using two types of *spaces*. This poses a very interesting concept for this study as it offers a way to identify ways how intentional routine change are performed during an implementation. Spaces have previously been used in management literature explaining how negotiations and narratives in different social settings create changes in institutional practices (Zilber, 2011; Hardy & Maguire, 2010; Santi, 2014), but have also appeared in the literature on organisational change (Howard-Grenville, et al., 2011). Zietzma and Lawrence (2010) explain spaces as a constitution of boundaries, (social settings), enabling new modes of interaction, separated from other activities. Discussed by Hendry and Seidl (2003), designing a space with physical and social separation from everyday work can also pose a challenge, as it needs to be generative, but at the same time not so separated that it will cause difficulty to transfer ideas back to practice. Bucher and Langley (2016) draw they framework on the importance they found for multiple social settings, sometimes pre-existing while others newly created, in the development of routine change.

Spaces can thus be seen as mechanisms through which actors engage in deliberate efforts to alter both performances (performative aspect) and abstract understanding (ostensive aspect) of a given routine. These spaces are either *reflective* or *experimental*, where the first takes space outside the routine in attempt to change the ostensive aspect, while the latter enables integrations of new action from within the routine. These two spaces reach change in complementary ways as they are enacted in relation to each other. *Reflective spaces* are taking place in a temporal setting outside the routine, involving actors not performing the routine itself. These spaces involve interactions that are geared toward developing novel conceptualisations of routine, meaning that actors outside of the routine through reflective work, constitute new ostensive aspects of the routine to guide changed performances. (Bucher & Langley, 2016)

Experimental spaces are located within the actual routine, leading to changes by integrating new actions into routine performances. The space is established by symbolic and temporal boundaries, signalling a provisional and localized nature of the experimental space. There is a finer separation between experimental spaces and the actual routine performance in

comparison to reflective spaces, but they are still identifiable by their temporal and symbolic nature. Collectively, reflective and experimental spaces can interrupt the recursive dynamics of original routines by disturbing their normal course, calling them into question, and further change both ostensive as well as performative aspects. (Bucher & Langley, 2016)

Complementary objects

In this study, special attention will be turned to, what here will be called, complementary objects. Meaning objects that assist the ostensive and performative understanding of routines, yet not consisting of the technology itself. D'Addario have in several studies highlighted the role of artefacts in routines theory, arguing that objects play a key role as they influence both stabilisation and emergence of routines, provide the glue that holds patterns together, or by acting as mediators and intermediaries (D'Addario, 2011). What in this study is referred to as complementary objects can be compared to D'Addario's (2008) description of artefactual representations of routines, where she more specifically refers to standard operating procedures and associated rules embedded in symbolic artefacts. She argues that when embedded in artefacts, skills, knowledge, rules and procedures tend to become more stable.

One can capture the key role that these objects play in the performance and evolution of routines through the notion of cognition (Hutchins, 1991; Hutchins, 1995). The reorganisation of work is normally attributed to the conscious reflection by members of the group (Hutchins, 1991), and special attention should be placed on these 'cognitive artefacts', developed to facilitate human cognition, thus constantly evolving practice (Hutchins, 1995). This idea suggests that actor's knowledge, skills and competence depend, and are at the same time configured, by these cognitive objects involved in routine performances (D'Addario, 2011). Scholars have included in this category a range of artefacts such as flowcharts and worksheets (Hutchins, 1995) but can also be non-material objects such as rule of thumb or memorized procedures (D'Addario, 2011).

D'Addario (2014) explains the importance of artefacts when shaping the dynamics in routines where she explores how artefactual representations of routines shapes actual performances as well as the other way around. Artefactual representations of routines affected emerging change as they are always interpreted when acted upon, but dominant agency from certain social groups gets also reflected in artefacts which can change the course of the routines towards their own interests (D'Adderio, 2008). This can be explained as negotiations between artefacts and communities, where the dynamic interrelations that communities of practice trade over different perceptions of the artefacts, resulting in changes in performance and routines (D´Adderio, 2014). She also concluded that when artefacts get embedded in software, it tends to become more stable in the routine as the artefact became harder to alter, refuse or provide technical constraints (D'Addario, 2011; D'Addario, 2008). In this study, complementary artefacts (here called objects) are important actors when *creating* change, as they contribute both to stability as well as changes ostensive understandings of routines.

To summarize, when analysing how routines are *created* during implementation of a technological tool into existing practices, this study will acknowledge routines as a cluster of

multiple interrelated and sociomaterial processes. A view from social and technology studies will provide a lens in how technology affords as well as constrain actors which affects, as well as get affected, during routine creation. As routines emerging through mutual adjustments alone, is regarded hard in a larger network of interdependent routines, intentional routine creation will be considered, using reflective and experimental spaces. Special attention will be given to the role of complementary objects in routine creation, how they stabilize routines and affect affordances within, and between, routines in a cluster.

Methodology

This section will explain the methodology of the study, how empirical data has been collected and analysed, to finish with reasoning around ethical risks and limitations.

Methodology of the study

This study offers a constructionist perspective, meaning that it focuses on *how* a phenomenon in the social world is put together by the participants, which requires a qualitative approach (Silverman, 2013). A qualitative method is field work oriented, attends to actor's intentionality, and is based on a non-comparative approach as it seeks to understand its objective rather than how it differs from others (Stake, 1995). As social science has not yet has succeeded in producing general, context-independent theory, but is based on concrete context-dependent knowledge, case studies are especially well suited for this type of research (Flyvbjerg, 2006). A case study gives a closeness to real-life situations and can enhance the learning for the researcher as they get a continuous view of reality (Flyvbjerg, 2006). There are different types of case studies where the researcher can have interest in the case itself, named *intrinsic*, regard multiple cases in a *collective* approach, or use an *instrumental* approach when the interest of the actual case is to understand something else (Stake, 1995). This specific study offers the latter approach to gain further insights into the phenomena of routine creation. This research is aimed to gain familiarity on a phenomenon and to provide new insights, thus can be regarded as a more exploratory study, why requires a lesser need for standardised research instruments (Silverman, 2013).

Data collection

Interviews, as a central part of contemporary social research (Silverman, 2013) constitute the largest part of the data collection. Thirty open ended interviews were conducted, as well as five follow up interviews. This, to capture and understand involved peoples experience, what they do, how they do it, as well as their perception of what they are doing. All participants have different roles in the processes of using of digital signs, which is the reason no standardised template was created in advance, but an open question; 'Explain your role as well as how you are using the digital signs?', became the start of every interview. The follow up interviews were naturally more structured as these were done at a later stage with a clear aim; filling in empirical gaps. All interviews were around one hour long except for the follow up interviews that lasted twenty to fifty minutes. The focus during the interviews was on the practice how the signs are used today, and changes that have occurred in these practices over the time-period studied. Some interviewees joined ExCo after 2015 when the initial investment was made, with the result that these interviews focused on the time-period employed. All the interviews were

conducted in Swedish, to provide the interviewees the opportunity to use their mother tongue. They were also recorded and transcribed into Swedish as a way of keeping the material intact during the whole study. To find participants close to the practice of digital signs, a list of ten persons, central in their use, were given by the head of digital marketing, who himself is an important figure in the strategy of digital signage. The rest of the interviewees have been targeted by snowball sampling, using the participant network (Silverman, 2013). This, to get a rich and broad understanding as many of the users cooperate during practice. The interviewees consist of different stakeholders surrounding the digital signs, including, among others, the sales team; the marketing team (both for inhouse branding and online marketing); project managers; the venue coordination team, responsible for operations (entrance, exhibition and conference facilitators); IT department, production, technicians, business development managers and responsible managers for the hotel, exhibitions and meetings.

All interviewees received information in advance of intent and purpose of the study which is documented in emails and on recordings. They were all assured anonymity and therefore no names of either the company or participants are ever presented in the study. Titles are provided to give the reader a better understanding of the participants role with regards to quotes, but all quotes used in this study are reviewed and approved by respective participant.

To gain deeper insight from the interviews, and to reach a better understanding of the culture and practice that interviewees may not be aware of themselves, interviews were complemented with observational studies. Observational studies have the goal to gather first-hand information about social processes in its natural occurring context, thus are a fundamental part of qualitative research (Silverman, 2013). There is an important craft to understand 'how things work', which requires presence at the sight where the study takes place (Van Maanen, 2011). Observations of practice were made during interviews, when the occasion allowed it. Two longer observations were made during the opening and conduction of an exhibition and one Congress. Continuous observations were also made in open spaces such as the lobby and conference centre during the whole period or research. To remember details from observations, notes were taken continuously, containing the categories; action of event, people involved and outcome of action. The intention was to keep the written material as objective as possible, not coloured by interpretations.

The last part of the empirical data consists of documents, containing 13 pages of instructions, templates and other related documents regarding the use of digital signs. This to see information and instructions given to users, affecting practices and understandings. It was thus only possible to get hold of the current version of this material as documents provided at earlier stages of implementation were never archived.

Methodology of analysis

The method chosen is close to grounded theory, which in an inductive methodology from Glacer & Strauss (1967) to discover theory from data. It allows the researcher to explore the empirical data with an open mind, and from insights, letting theoretical concepts emerge (Martin & Turner, 1986). This is considered useful in an exploratory study as it allows a

discovery of theory from data, rather than testing or verifying existing theories (Martin & Turner, 1986). This is well suited for dealing with qualitative data gathered from semi- or unstructured interviews, case study material and observations, as these tend to generate a large amount of no standardised and unpredictable data (Martin & Turner, 1986).

To delay the literature review has thus been seen as problematic and is criticized by several scientists, arguing it to be impossible for a researcher to neglect her/his expertise in ones own area, thus still be coloured by existing theories (Thornberg, 2011). The researcher also poses a risk to be ignorant, coming up with findings already invented, missing well known aspects as well as the chance to take advantage of knowledge in pre-existing literature (Thornberg, 2011). An earlier literature review can instead provide a rationale for the study, justify a research approach, help develop concepts and avoid methodological pitfalls (Dunne, 2011).

An alternative approach to grounded theory, that by Thornberg (2011) is called informed grounded theory, lets the researcher use pre-existing theories as heuristic tools to provide a lens (Kelle, 2005). Informed grounded theory has the pragmatistic idea of abduction, in contrast to induction (Thornberg, 2011), meaning that after uninformed guessing, absorbing a large amount of data which are interpreted and used to arrive to a meaningful conclusion (Reichertz, 2015). In this way the researcher moves between the empirical data and pre-existing theories in search for patterns and explanations (Bryant, 2009). Theories are used, but as a source of inspiration and interpretation to detect patterns (Alvesson & Sköldberg, 2017). This description fits well with the method used in this research. Starting with an interest towards practice theory and the relationship between the social and material yet entering the field with an open mind. Along the way it has been continuous movement between analysing the data collected and researching previous concepts, making the analysis a continuous process while discovering patterns and explanations.

Analysis of data

To analyse the data several levels of coding in the software Dedoose were made from the transcribed interviews in the search for patterns and themes. By coding, the researcher interacts with the data as well as asking analytical questions, defining what it is about (Thornberg & Charmaz, 2013). Coding have several phases; initial coding and focused coding, which cannot be considered a linear process, as the researcher often moves back and forth between different stages of coding (Thornberg & Charmaz, 2013). This study started out with empirically driven codes to keep the eyes close to the material. After coding seven interviews it was clear which codes were mostly used and thus had highest relevance, when the codes were merged and reduced from almost four hundred codes to twenty. According to Martin & Turner's (1986) approach, it is normal that the core concepts are discovered after three or four sets of data have been coded. These twenty codes were then exclusively used during the rest of the coding. Coding helps the researcher to see the familiar in a new light, gain distance from assumptions and to focus further data collection (Thornberg & Charmaz, 2013) The challenge is to create codes with the right level of abstraction, so it can contain a rich amount of material, yet also not to abstract so it will contain everything (Martin & Turner, 1986).

The twenty codes were then categorised, while thinking of the question; 'what is this an example of?', into five categories consisting of practices, preconditions, ownership, resistance and vision. Moving from data to concept is a movement over levels of abstraction and the goal is to find theoretical meanings in the empirical findings (Martin & Turner, 1986). It was at this stage the study turned its focus towards routines, where the category practices were containing the different routines discussed in this paper. This let to examining concepts in the literature related to routines and other concepts that was found interesting and relevant, such as affordances, objects and interrelated routines. As the empirical finding showed an example of a process where a technology without implementation plan are struggling to become embedded in routine practice, the interest came to view the material by observing how this process evolved. With the evolution of this process as the main theme, the coded material was sorted in a chronological order, by cross-checking the stories from the interviews. The empirical findings presented in the study, therefore resulted in a chronological story, not related to the categories. The categories were instead used as different dimensions in the findings, explaining the how and the why. It was during this process that complementary interviews were made to fill gaps of information and to gain further explanations of specific events.

The material from the observations, and the provided documents, were not included in the coding, but worked as supportive material to interpret the routines in practice as well as providing a better understanding of the context. They have also provided insights, enhancing the ability to keep the interviews relevant and on point, while helping to sympathize with the interviewee's interpretations on the respective technology as well as surrounding objects.

Ethical risks and limitations

The interviewer often has a higher instrumental knowledge in the area of research, and their interest will not only define the interview situation, but they are also provided monopoly over the interpretations of the interviewee´s statements (Kvale, 2006). These concerns cannot be completely avoided, but with a common interest and an honest dialogue about intentions of the study, the interviewees have gotten full awareness. The interviews can be described as a one-sided dialogue as this was considered useful and necessary for this type of study. Regarding interpretation, no one is free from culture or habits of thought, but the researcher can accept this and still try to grasp the others' point of view (Van Maanen, 2011). One of the main reasons of having open interviews was avoiding preconceptions and be open for the interviewees' stories. The spread of respondents' professions, as well using observations and collected documents, was also a way to look at practices from many angles to ensure a deeper understand of the meaning while trying to avoid subjectivity.

As all interviews were done in Swedish there is a risk of errors or loss of meaning during the translation into English. At occasion, quotes have also been adjusted to be more comprehensive for the reader, as while speaking, people tend to use uncomplete sentences. This limitation has been acknowledged with intentions to keep the quotes as close the original as possible. The quotes have also before publication been approved by respective interviewee, both to secure the meaning of content as well as ethical reasons. During interviews, all have been secured with anonymity, which is why the name of the organisation is never revealed in this study, but

to help the reader's comprehension, titles are used, providing the quotes with specific identity if read by members inside the company.

As much of the information is referring to past events, there is always a risk of forgotten details or misremembering, especially the chronological order of events. The documented material provided, did only contain present practices and therefore all retrospective processes had to be interpreted through interviews. To get as accurate empirical material as possible, the order of events was cross-checked between different interviews and double checked in follow up interviews. Another challenge, related to the amount of material collected, was the difficulty to be selective in the story line. This to be as informative as possible to the reader while at the same time make the right choices of exclusion. This meant discipline in choosing the right stories directly related to the theoretically plotted narrative, excluding parts that were not as related but, in some cases, simply funny or hard to exclude due to emotional attachments to its details.

As the process of analysis require interpretations, a pure form of objectivity is not only hard to achieve in practice, it is impossible to state that knowledge can be objective in such a way. Instead, the quality of a qualitative study should rather be handled in a way so that the reader is informed about past experiences and possible biases so that they can judge the degree of objectivity in the findings (Silverman, 2013). Before this study, there were no knowledge of routines regarding digital signage, nor about the organisation in terms of practices, that would pose an increased risk of subjective biases.

Embedding the signs

The empirical findings will start with a description of the setting where the research tool place. This will be followed by a story starting in the year 2015 when the new digital signs were purchased, continuing with a description of the growing network consisting of technology, users and objects, forming routines, to end with the present state of practice.

The setting

ExCo is an organisation with roots in early 1940s when their first exhibition was launched. During the years, ExCo have grown to a diverse organisation with multiple exhibitions yearly, added with congresses, conferences, hotels, restaurants, bars and an international show arena, attracting millions of visitors per year. New parts and buildings have been constructed to the premises while others have been rebuilt, resulting in a cluster of connected buildings containing many entrances, aisles and facilities. The organisational structure has changed several times and recently (a year before this observation started) they merged all units in the sphere into one single company. The restructure came in tandem with a vision called 'One Company', meaning a new legal structure while actively creating synergy effects and enhance collaboration between all parts of the organisation. Internal departments have merged, examples being the previous two marketing departments that are now one single unit. Profitability models have changed to encourage cross sales, replacing the previous system where different units 'bought' resources from each other.

> Culturally I did not think it would make such a big difference, but it has. It is very interesting. People have gotten a new focus and by talking more and more about it has made people to see everyone as more united. – **Business Development Manager**

Signage have always been an important function during events, why before the mobile digital signs were purchased in 2015, several routines regarding signage already existed. Fixed digital signs were located by some of the entrances to either welcome or sending a message to visitors on their way out. Booking of these digital signs could be done in EBMS, an administrative tool used by the project managers to book resources for events. Spaces on these signs could also be requested at the respective marketing department. Content was created by marketing, ordered at an external advertising agency, or sent in by clients if concerning an external event. Upload of content on regards of the hotel and restaurants was made by the Art Director (AD) at marketing, while exhibitions and other meetings and events sent theirs to 'The Sign group'. 'The Sign group' were a sub-unit consisting of members from a larger department responsible of operations during events, such as entrances and exhibitioners' service. 'The Sign group' consist mainly of one employee in the group that through his experience was used to this specific task. These fixed digital signs were much used in promotional purposes for current or future events or to promote the hotels and restaurants.

Most of the signage were still analogue and used as way finders to guide visitors, showing speakers' programs, or for promotional purposes, placed in strategic temporal places in the building. As the organisation often has multiple events simultaneously in a building consisting of many ails and halls, the way finders are crucial to help the flow of visitors to the right place. These signs were generally made from cardboard or hanging fabric, mostly for one-time use. They were ordered by a project manager or another interested party and created by an external partner to ExCo, a service company for printed material, located in their basement. The content of these signs was made either by the marketing departments, an external agency or by the external partner that also printed the material.

New digital tools

It started with an urge for development. The board wanted to keep up with the digital trend and invest in digital tools to keep their image as modern, competitive and attractive. The CDO, 'Chief Digital Officer', an experienced man with high technical knowledge belonging to the IT department at ExCo, got the mission from the board; 'You know what, you have to do something, we need to become more digital!'. The CDO created a business case, validating the new investment by the income that would come from selling slots (seconds of exposure) on the signs to customers during projects and exhibitions. Shortly thereafter, ten mobile digital signs were purchased and placed in the building.

> When the products came in it was quite easy. Then we place them where we find it appropriate. Or where I found appropriate. Of course, in collaboration with the conference department. It was them who had the biggest need for a digital and flexible way finding solution. But then we noticed that the need for the products were bigger, everyone had a need for that that type of product. – **Former CDO**

The mobile signs were located on places found suitable by the CDO, with advice from the conference department. The usage of the signs started in a modest pace as, despite that many had seen them, few knew where they came from or how to use them. At first, they were used primarily by the conferences and key projects to events arranged for clients, requiring many way finders. These mobile signs were supposed to be transportable, moved amongst the facilities shared by the organisations different departments. They were supposed to be flexible, with adjustable image to fit content for diverse needs, target groups and design. They were supposed to be sharable, with messages switching in loops to comply with the need of multiple users.

> These transportable signs were bought in as hardware by the IT department at some point. Something needed to happen, and it was a good thing. Some were critical and said that one should not makes such a purchase when not having the content supply. But if we did not buy those we might not have anything today. – **VP Sales and Marketing**

The hardware consisted of a screen that once purchased, was connected to a small computer by the IT department. They were put in a black metal box, about two meters high, so they could stand, with an opening for the displayed screen. The boxes were locked and secured to protect the hardware inside. The software used to upload content was called Smartsign, the same software previously used to the digital screens attached by the entrances. Smartsign was a cloud-based software, suited for this intended type of content, with a licence purchased for every sign on a three-year contract.

Start of use

> The new screens were connected to the administrative system, Smartsign, where content can be uploaded. It was just that they were transportable, where would they have their home? They must live somewhere so people can find them, otherwise they need to be provided with GPS. Questions like these arose. A trelloboard was created, but people needed to call him personally to book a sign. It was also him you called to say, 'This is not working', and he would say 'I´ll fix it'. He also got a cart, so it was possible to roll them around. – **Former Conference Manager**

In the beginning the CDO did most things himself. Those who wanted to book a sign called him directly. He purchased a cart, so they could be transported to a desired location, which he often did himself or someone else in the IT department. The content was emailed to him for completion and upload. After occasions where he accidently promised the same signs to different users on diverse locations on the same day, he created a trelloboard to easier keep track of when, where and by whom, the signs were supposed to be used. The trelloboard, which is a tool to organise and prioritise projects, could also be reached by the conference department to view availability of signs, but it was still him personally who members called, or emailed, to book them. Content came in the beginning mostly from customers, but as these signs were a more complicated product compared to the previous analogue material, it became harder for the sales team to sell spaces on signs as it required explaining format, resolution, size and other details.

> They became harder to sell as it requires a certain technical knowledge. Format, resolution and how to share it. It is the hard part with this type of digital products, something that used to be quite easy becomes more complex. **-Former CDO**

As the signs were at this point mostly used by key projects, meaning larger events arranged by one client, the CDO got involved in sales discussion directly with clients to explain and help to create content.

> Exhibitions started to use them quite early. Back then you had to email our CDO, how kept track of their location. There was no process for the actual move or the exact place to move them to. Everyone just did their best **-Business Development Manager**

The use of these signs started to increase, not only by key-projects but also co-workers within exhibitions and other events. They had been noticed when used during several events, and the CDO in a promotional effort arranged the mobile digital signs during a larger exhibition to increase their use with new members in the organisation. The CDO was still very involved in the operative routines regarding the signs, but sometimes production, the department building every event and moving all the props to sights, transported the signs. Occasionally a project manager or floor manager, the latter having operative responsibility for larger events, went to get the cart and moved it themselves. Once, after one of the signs had been missing for a while, it was found placed in a room in the basement, next to other props that production carries down after dissembling a finished event. The practice of uploading content also started to become spread. Some sent the content to the CDO, while others send it to 'The Sign group' or the Art Director (AD), who previously uploaded the content to the fixed digital signs. Some got their own login access to Smartsign, so they simply could upload content themselves.

> I had a lot to do with producing content, managing technics, transportation etc. when we just bought the product. This is ok for a period to get the product started while users discover the perks. But that period became very long. **-Former CDO**

Despite the increasing network of users, where operational tasks started to include others, the CDO remained a crucial actor for their use.

Identifying routines

> As I was manager over the one that bought the signs, I started to be involved in the discussion around who takes responsibility for the different processes and which questions we have around these. Since the CDO bought the signs he had to take a lot of responsibility around the processes. Many of the questions he could not solve on his own, but as he knew the technology he became an important part in this. The signs were not in our system where to order products. We have an EBMS system, but how do you order a sign, and who does it? How does it work in practice when it comes there, and were should they be when they are not ordered? A digital sign you order differently than a poster as you can use it all the time and constantly change the message. So, it was a lot of questions coming up when I became a part of trying to get us forward. – **Director Business Support**

As the usage of signs increased it was also found not durable that one man, with lots of other responsibilities, was taking care of most practical arrangements around them. A group was formed, consisting of people concerned with the signs, examples being managers within IT,

production and the CDO, to look at how to approach new processes to handle these new digital tools. It was found that these signs required a new structure of processes compared to previous routines of ordering analogue or booking the fixed signs by the entrances. From these meetings and discussions, routines started to grow. Questions were raised in who should take responsibility for these processes, where the responsibility for the products stayed at the IT department where the initial investment was made, but other departments became assigned with responsibility for different parts of the processes for use.

The overall routine, that will be called; 'To put aimed content on a digital sign at a desired location', was divided in the three processes of booking of sign, transport of sign and uploading content. The routine for booking the signs was assigned to be developed by Venue Coordination, a new department created with the aim to enhance and improve processes between departments within the organisation. The booking process itself was going to be built into EBMS, the tool used for booking the previous fixed digital signs as well as other props for events. The responsibility for transportation was delegated to production, the department moving all props to events, such as chairs and tables. The responsibility for uploading content was assigned to 'The Sign group', a unit already executing the upload of content to the fixed digital signs by the entrances.

Creating a booking process

Many questions were raised during the development of the booking process in EBMS. Even though it was a very similar process to book the existing fixed signs, the complication was the new signs mobility. One of the questions was how to share a sign instead of just booking it as an item. As it was considered confusing and not manageable in practice to order unlimited spaces on the sign, it was decided that it would be possible to book four different 'slots' to every sign that could change in a loop. Giving possibility to expose four different messages simultaneously on the screen with a seven seconds interval (an interval judged as most convenient for observers to view). These slots could either be booked to show promotion from the internal brands, be used as way finder for events or be sold to clients for their exposure.

> There needs to be a design for the location of these signs. The same way you need to know where a chair is going to be placed, you need to know where a sign is going to be placed. – **Venue Coordination Manager**

Other issues were clashes with the previous routines for the production department. They were used to produce every event as like it was new. They collected all props in the basement that they transported and constructed at the sight. After finishing an event, everything was dissembled and put back in the basement storage. But the signs were not a prop that was considered to belong in the basement, waiting to be used. To benefit the most of this type of expensive equipment they were also to be used in between events for promotional purposes. The mobile signs were therefore assigned with a suitable home in the building where they would always be put back after usage. They were provided with individual names associated with the position, so member in the organisation could identify which sign to book and where

it belonged. To make this visible, a map was created, showing the designated locations together with the names.

> This process requires a lot as the signs need to be used by different departments as well as work in operation. So, creating a booking process required a lot of discussions and testing. – **Co-worker**

When booking a sign, it was decided that an additional map needed to be attached into EBMS, marked with the new locations where they were to be transported. As these additional maps was for the sole use of production, a specific notation was also to be manually added in the booking so other potential users could see the intended location when the signs were not standing in its original place. When desiring to move a sign, the person making the order would need to make a second booking regarding electricity, so the sign could be plugged in at the new location. As most events have different set ups, it requires that the production department prepares the site and pull electricity in advance to the new location.

Regarding the designated content, this was to be placed in a folder in EBMS, marked with the event, name of sign and time for use. To assist with the design of the provided content, power point templates were developed in the right size and format to fit the mobile signs. This new booking routine, were accompanied by detailed instructions covering five pages, providing all information about the process for booking. Including how to book, use of 'slots', instructions for the maps, how to attach content, formats of content as well as instructions to templates.

Physical adjustments and uploading content

> These signs were not mobile, so we had to make them mobile. If we had seen all perspectives at once we might not have chosen this arrangement, but due to requirements, we had to do something as then solve the issues as they arose. For better or worse, something was done, and we got many insights along the way. – **Head of Logistics and Production**

The production department did not find the mobile signs as flexible and mobile as were intended. Even with a cart they were heavy and difficult to move. It was also found to be an extra element to locate the cart and collect it before moving a sign. Therefore, several physical adaptions of the hardware came in place. To lose the necessity for the cart, four large wheels were placed at the bottom of all the signs except for three that were appointed most fragile, instead assigning these with permanent positions. In a building with many aisles and rooms it was quickly noticed that the height of the construction had created an obstacle on its own. The signs became too high to pass through the doors and entrances. They instead needed to be tilted, which required two men as the construction was found broad, heavy and slippery to hold. To avoid the necessity of having two persons moving the signs, handles were built on both sides at a reachable height. This made it possible for one man to tilt a sign while moving it, now creating a more convenient routine for transport. A third adjustment was also shortly made, as it was noted that moving and tilting the signs occasionally caused parts to loosen between the hardware-construction inside the box. The boxes were then dissembled and strengthen so they could deal with the inconvenience of being moved around.

The routine for uploading content did not require any specific adjustment as it did not differ much from the previous process where 'The Sign group' was uploading content to the fixed digital signs. 'The Sign group' who in practice consisted of one person, was used to collecting the content in EBMS, attached to a project, to further uploading it in Smartsign. The difference after introducing the new mobile digital signs was that content originated from more diverse sources, with the effect of causing more manual adjustments to make the content fit the required format.

> We have two formats, one diagonal and one vertical, which is often mixed up. A lot of material that is coming are designed it to be horizontal, which does not work on the mobile digital screens. If I would upload it like this, it would look like crap. **-Co-worker, 'The Sign group'**

The blank templates, proving the format for the mobile signs, created while making the booking process, was made in power point. The problem that rose with these templates was, when cutting in information from other programs, the format easily changes, thus not providing the right outcome. Sometimes content was also sent after using the template, cut into an email, or in a totally different type of document. These signs could also, compared to the signs outside entrances, show moving content which often required extra elements in time adjustments and formatting. (The previous fixed signs had this limitation due to policies with respect to traffic outside the building, not constraints created by the signs per se).

Providing content to 'The Sign group' had previously (for the fixed signs) always had two weeks' time limit. This was partially due to the groups flexible work hours as they belonged to a very operative unit with project-based work hours. Meaning that they can work ten days in a row, but after that have eleven days free. These new mobile signs meant more work from the project managers to either create or receive content. When they were to be used on behalf of a client, content was often provided very close to the start of the event. This resulted in that the time limit of two weeks were hardly every kept. After discussions between several department managers, including the ones in charge of 'The Sign group', it was decided that the time limit would be decreased into one week, giving a longer time frame to provide content.

> We have a peculiar schedule. That is why I always, I know I shouldn't, but always bring my computer home. It is always someone that calls in the morning 'Can you upload this sign?', then I don't want to say 'No, I don't have my computer'. So, I bring the computer anyways. People might have become a bit spoiled with this it seems. **-Coworker, 'The Sign group'**

Despite a longer deadline, the routine to provide content were not often kept in practice. The project managers, also often receiving content at a too late stage, also had many other deadlines close to an event opening, making digital signage does not always an early priority. The staff member in 'The Sign group' therefore took the habit to always bring his computer home just in case this service was needed.

Changing the booking process

> Many questions arose, and I believe during this period, Venue Coordination got hundreds of emails with questions in only a couple of months. – **Business Manager**

Venue Coordination, a unit working project-based to improve processes, were only responsible for the creation of the booking routine and were never supposed to keep the ownership after creating the technical solution. But as there were no other assigned owner responsible for the routines of booking, the department drowned in emails and phone calls during the first months after launching the new booking process. The instructions, very detailed to provide all answers necessary, became by its length of five pages of text a problem on its own. Some found it to lengthy to read and created work arounds. Either by creating their own, shorter version, suited to their own knowledge, were not use at all, instead calling or sending emails to the department in question.

> It is a challenge to in a simple way explain to the customer what we need regarding content to the screens. It requires knowledge both from the sales team and customers. But everyone gets more used to it, also the clients, which makes it easier. – **Sales Manager**

For sales of slots to customers, the sales managers found it complex to explain and answer questions about technical details such as format or resolution. This often resulted in that content needed to be sent back to the client for adjustments or got adjusted directly by 'The Sign group'. These are mere examples of some of the questions and issues that were addressed to Venue Coordination, resulting in updated instructions with links to subdocuments, offering a shorter and more comprehensive overview. Complementary emails, to be sent to customers, were also created, explaining technicalities regarding content.

Technical problems

> Why the attached screens work so much better than the mobile we don't know, but it was often a problem to upload content as it did not appear on the screen. It also happened that it started up nicely, but during due date it just stopped working. I assigned a years' time to handle this, move them back and forth and uploading content, to see what happened – **Co-worker Technics**

With the increased usage of the mobile signs, technical problems were noticed, resulting in blank screens or signs showing old content. This problem happened seldom in their original spot, only after transport and upload. A technician, belonging to the subunit technics, a part of the production department, took notice of this issue and tested different ways to debug the problem. After many occasions with restarts and other tricks, he offered to handle the transport of signs until he had figured out the real issue. During this investigation, which lasted for about one year, this technician became assigned with transporting the digital signs instead of the production department, to do his research during use.

> For starters I was supposed to push them to the right place. Being the technician, I knew what to do if there was a problem. Then I got access to Smartsign as I needed to see what was uploaded. Someone discovered my access and asked 'So you know this? If I send content directly to you, can you upload it?'. Friendly as I am I say 'Yes". It just grew and eventually, some periods, I worked half-time on uploading material and contacting project managers about missing material. It did not become very efficient. Often, I cut the image as it went quicker than to send it back. Sometimes it needs to go back several steps to a graphist and then the risk of the issue getting misunderstood, ending up even worse. – **Co-worker Technics**

After a while, the technician asked for access to the software Smartsign, giving him opportunity to when problems were caused by content upload. This could, for example, be wrong format, missing content, content uploaded on the wrong day or problem with Smartsign's server, held by the service provider. During this investigation, his role escalated when his access and knowledge became widely known, resulting in a large part of his working hours becoming dedicated to handle the mobile signs. He noticed after a while that the main cause for malfunctions was lack of Wi-Fi connection, making the signs not able to receive the uploaded content. It mostly worked the day before an event when halls were empty, but after filling halls with thousands of visitors, carrying devices, the signs often lost connection. As the signs had their Wi-Fi antenna on the inside the black metal box, it got suspected that the confinement made them loose connection, resulting in complementing the signs with an extended antenna, placed outside the box.

The new adjustments made the signs work better but was still target for many mishaps by losing connection, leading to frustration amongst the project managers working under time pressure during their events. During more experimentation by the technician, he once took a network cable and connected it directly to the small computer within the box, giving immediate results. After this occasion, he always brought extra network cables with him while transporting the signs to their destination. As the boxes were hard to dissemble with many screws to detach in order to attach a cable, he built his own device out of a stick and a bent fork. With this tool, he could, when using something to stand on, attach the network cable through a hole from the top.

> From the start we had ten screens. Just before I was just about to say 'These are not working, they are crap' I heard; 'Good news, we just bought ten new ones since they are so good'. Well, then I was sitting with twenty screens. – **Co-worker Technics**

The mobile signs started to increase in popularity, both due to that project managers got used to working with them and the sales team got encouraged to sell more slots for promotion gaining more income for the projects. Suddenly there were many conflicting interests in who could book a sign and how many slots. Additionally, some projects with a planning period of years, had the ability to pre-book the total amount of signs at an early stage, creating a disadvantage for projects working on shorter time frames. An evaluation made by, amongst other, the CDO and Venue Coordination, resulted in a purchase of ten additional signs that were put available for booking. At this stage a network cable was, by advice from the technician, directly connected at the bottom of all the signs for easier plug in to the network. This to make it possible to reassign the transport of signs to production, making them more reliable, and less dependent on technical expertise. The new signs were also provided with a later version of the attached computer. Due to these adjustments, the then previous signs got an upgrade.

Getting rid of ownership

> Technics is a very small department. I could always get help from someone else but then we would do nothing else. During the fall I have been working to get rid of the transport. I did not have a big problem uploading content in Smartsign, but when this was delegated to "The Sign group", I was left with

> pushing boxes. Eventually I got rid of everything and I am a consultant now, helping if there is a problem. – **Co-worker Technics**

The technical team at ExCo is small and both the technician and his manager found it to be a problem having one person in the group working almost halftime with the mobile digital signs. This issue was expressed to other managers and 'The Sign group' was reassigned to handle the routine of uploading content. It also became acknowledged that having one of their most experienced technicians 'pushing boxes' was an unnecessary expensive way for transport. This resulted in that transport got reassigned back to production. On suggestion from the technician, a packaged booking order were created by Venue Coordination, including electric- and network cables by default together with the booking of a slot. As this before required several bookings, this was easily forgotten. When constructing an event site, cables and wires are the first thing to be constructed before floors, temporarily walls, stages or podiums. Meaning, if a project manager forgets to order electricity for a sign it could result in timely adjustments for the productions department.

The adjustment to a packaged booking resulted in another change, removing the system of 'slots' in EBMS, transforming it to a booking of an entire mobile sign. As a booking now by default packaged the sign with both an electric- and a network cable, the booking of several slots easy resulted in too many cables. This was never an issue while the technician handled the transport alone, as he would notice the mistake, but when giving the routine back to production together with other props that they transported, it became necessary for a more automated solution. Now when someone wanted to share a sign they would instead need to go into EBMS, observe who has booked the desired sign, and contact them for a joint arrangement.

What about content?

The responsibility for content creation has over the whole process been a bit overlooked and this routine can also be seen as the most diverse. The conferences, key projects and congresses get most content from customers, the marketing department do material for the entrance signs, and the way finders and promotions at the exhibitions are mostly done by either marketing, an external agency, or with help by their service partner in the basement. A lot of content were also made by the project team themselves with inspirations from previous years' content.

The increased use of digital signs was noticed at the marketing department while enhancing their workload. This led to questions to whom is responsible for the actual content and whom for the layout, and where to draw lines between these two. Employees at the marketing department found it very time-consuming that all material needed to be arranged by the project managers and then communicated to the marketing department, so they could create the content. More than often, close to events, changes need to be made, resulting in this material to be sent back and forth between project managers and the marketing department.

> A lot of extra time would be saved when the persons sitting on first-hand information created material and changes. It was also high and low how content was made, in this way it becomes more cohesive. – **Co-worker, Marketing**

This initiated a project where co-workers at the marketing department created power point templates, designed with a specific format similar for all brands to fit the signs, while keeping the brands individual layouts. These templates were made available for the respective project manager who could fill in the desired content to the desired template. Different workshops were scheduled to enrol the project managers and getting them used to these new templates.

> I wish that the marketing department would be more involved, so I knew that it looks good. I fill in the templates, but how will it look when it is on the sign? In what type of format should I save it. I don't have an eye for that. **– Project Manager, Exhibitions**

Despite workshops, the new templates caused many discussions between the groups regarding responsible for different parts of content. Several project managers found it difficult to cut in pictures and fit the right amount of text, uncertain if it would look good while on the screen. This new routine also came into question as it did not come from management, increasing the discussion on who should be responsible for what.

> Many says it disturbs the working environment and interrupting their sleep. Not knowing how to create the content and what to be responsible for makes people feel stressed. How to know what should be written, but how should it look? And the marketing departments' increasing workload, providing them will less time. Many testify that it is hell to get this to work. **– VP, Sales and Marketing**

After the first project managers trying these new templates, meetings were arranged between project managers, marketing and other involved actors such as change managers, Venue Coordination, Technics and IT. These meetings have led to further changes in the already existing instructions, as well as adjusted templates. Co-workers from the marketing department have also joined meetings with all project managers, where they have further discussed how to work with the new templates and how they will cooperate to make sure that content looks good on the screens.

The routine regarding providing content to 'The Sign group' also faced a change. As for now all content was provided directly in EMBS where it can be connected to the project in question and found for upload. But due to an update of EMBS, making it cloud-based instead of placed at ExCo's server, created problems when uploading content into Smartsign. Smartsign, already being a cloud-based system, created the necessity for the extra element of downloading the content to a desktop before upload, as it is not possible to drag content between two cloud-based systems. This adjustment alone doubled the time for every upload. After this problem were pointed out by 'The Sign group', a meeting was called, collecting different stakeholders regarding the signs to discuss this issue. This resulted in the creation of R:, a joint space on the server reachable for everyone, where content would instead be directly placed.

Late adjustments and lack of access to EBMS

Several routines can still be found under negotiation. One of the most critical issues is adjustment of content at a late stage. According to instructions, changes needs to be sent to 'The Sign group', at least twenty-four hours before execution, complemented with a phone call. Although, when events need speakers' programs, these programs often require change in

matter of hours due to sickness, making project managers to drop by 'The Sign group' in person for immediate help. This group belonging to operations, handling services during openings of events, this happens in their busiest hours, making it hard to prioritise changing of signs. This have resulted in different expression of dissatisfaction where customers require discounts or simply do not want to pay for signage. At one occasion when a speaker's program was not updated in over an hour, the speaker, missing from the program, anxious about the announcement of his appearance, created a hand-written note and taped it on the middle of the digital sign.

> It is often that content comes too late for us, which is understandable. A project manager might have to wait for an external customer. But it also means that we cannot plan or deliver as the project manager expects. The need does not rime with the preconditions that we have operationally. It is a big problem. And then as a group, we seem less service minded than we really are. We also don't know what has priority, advertising for restaurants or way finder for visitors. **– Group leader 'The Sign group'**

'The Sign group' finds this to be an issue, being very service minded, wanting to help, while restricted by other obligations. Another issue being that the co-worker in 'The Sign group', that today manages most of the uploads, is retiring, causing concern amongst others that will have to manage this task. After several workshops and meeting between managers and co-workers involved, different actions have been planned. Trainings are made to spread the practice of upload amongst other members in 'The Sign group', eliminating the vulnerability of depending on one person, while reducing the necessity for co-workers to bring the computer home. A division of responsibility for uploading content have also been made, where the conferences department will upload content related to events concerning their department.

> Most of the technical issues are solved now, but it has been a very long way to just find a way to handle them. And this is just to get the physical hardware in place. Then to get up content is still quite a large dilemma. – **Business Development Manager**

There is also an issue regarding access to book a sign. Staff doing promotions for internal brands such as the hotel and restaurant do not have access to EMBS as they are not working as project managers. Neither have employees booking signs solely for clients, in so called 'Large Client Bookings'. These clients often require signs as way finders and promotion for their guests. In these cases, different methods are used to get content to a sign, examples being asking the AD at the marketing department (with access to upload), sending the question to the closest supervisor, or emailing the content directly to 'The Sign group'.

> I just asked my manager and he booked a sign in some way, don't know if he does it himself or if he needs to ask someone to do it for him. **– Co-worker 'Large Clients Bookings'**

The lack of access to EBMS makes members unable to book a sign through a normal routine, while also hindering the possibility to see if a desired sign is booked and by whom. When 'The Sign group' receive content directly via email, it often needs to be sent back if the sign is already booked. 'The Sign group', knowing how to upload and adjust content, do not have authority to prioritize between events or the possibility to distinguish when a sign could be

shared or not. This has resulted that the AD at the marketing department, previously responsible for uploading content on the fixed digital signs for the hotels and restaurants, still handles a side track to this routine, still uploading content concerning these departments.

> Unfortunately, my name keeps popping up. It is very messy. I am AD for the whole house, all brands. But are also in charge of purchasing design and user design. Bit I have a history doing this. That is why I am stuck with the digital signs for some reason. Just because I know the system how to book and upload and similar. So, this is hanging on…. -**AD, Marketing**

Ending the narrative in 2019, when routines still currently goes through noticeable changes. Also, future change can be surmised, likely to affect practice of routines in this continuously growing network, surrounding the mobile digital signs. All starting four years earlier in an urge for digital development.

Discussion

The discussion will start with reasoning about the necessity to engage in intentional routine creation when embedding complex objects. An analysis will follow, explaining how routines are created when implementing a technological tool into existing practices. It will use the notion of reflective and experimental spaces, discuss changes in affordances and the role of complementary objects when stabilising within, as well as between, interdependent routines.

The necessity for intentional routine change

Observing the story of fitting digital tools into an organisation already existing processes, implementation cannot be viewed as a linear process. Like a disordered bowl of spaghetti, it must be viewed as a dynamic interdependent network (Pentland, et al., 2016) consisting of human actors, technology and complementary objects, struggling through interactive performance to stabilise routines. Looking closer into this network, patterns can be detected. Using a structure similar to Kremser and Schreyögg's (2016) definition of cluster, for this discussion, the overall goal will be identified as 'to show aimed content on a digital sign at a desired location', requiring several interdependent subroutines such as booking of sign, creation of content, physical transport and upload of content. The narrative shows the existence of other interrelated, more distant, routines such as the selling time slots, but to limit the discussion, main focus will stay the four main subroutines.

In the initiation of this digital investment, the signs' mobility caused a misfit into existing routine which was overlooked, causing a lack of implementation plan. Using Feldman and Pentland's (2003) definition of a routine as 'repetitive, recognizable patterns of independent actions, carried out by multiple actors' (p.95), an apparent lack of routines can be noticed during the first months. Causing low use of the signs, and wide spread of practice, as organisational members did not know how they were supposed to be used. This lack of routines resulted in that the CDO became a human-object, connecting the signs with the organisation, using his previous technical knowledge while enhancing his skills, his *individual affordance*, regarding the digital signs.

Individual affordance is by Leonardi (2013b) explained as affordance for someone not common with his or her workgroup/department with the consequence that they become central in the work by his/her ability to do things others cannot. What is interesting in this case is the implication that when an actor enhances his/her individual affordance, not able to spread the knowledge to others, (which can according to D'Addario (2008) be done with the help of artefacts), the actor himself/herself becomes an object. This discussion will now already make a distinction between two types of complementary objects, separated by their dependency for the overall goal. Different from D'Addario's (2008) distinction that representational artefacts (complementary objects) can be distinguished by stability, defining artefacts embedded into software more stable, this study will separate complementary objects that enhance understanding of a routine compared to objects becoming an obligatory part of routine practice. In this study the latter will be referred to as *core* objects. As the CDO did not only facilitate understanding, but became an unavoidable part of practice, he will therefore be compared to a core object. During the initial implementation of the digital tools, the development of one person's individual affordance increased the ability to use the signs, but as they stayed individual, practice became dependent on one person (a core object). When the network of actors grew, his ability to function as a core object reached its limit, resulting in a large spread of practice. As Pentland et al. (2016) stated, during a radical routine change, adjustments and performativity can be enough when involving as small group of people, but less likely when routines are complex and consist of multiple interrelated subroutines reaching beyond the realm of a few individuals. The temporal use, centring the CDO, did function during an initial phase. But as use started to grow, expanding the network of actors, mutual adjustments and performativity were no longer adequate.

In the performance of other actors, one can see several attempts to follow old routines of signs, examples being sending content to 'The Sign group' (like with other digital signs) and asking production for transport (like with a chair or a table). This shows an apparent connection that the ostensive view of managing the new signs comes from perceptions of previous routines regarding similar objects. But as they had a misfit into the existing routines, new routines became difficult to create and stabilize, why the spread in variation became very large. This confirms Kremser and Schreyögg's (2016) statement that the result of implementation of new technology depends on the 'fit' into existing routines. The first attempts to intentionally change the routine by using complementary objects, the trelloboard and a cart, solutions designed to solve parts of the subroutines booking and transport, were inadequate to create or stabilize routines in this growing network.

This shows the difficulty to grow routines only by emergent performativity, confirming the need for intentional routine creation (Pentland et al., 2016; Bucher & Langley, 2016) when requiring disruption in existing routines, involving a larger network of actors. Without stabilized routines, the deviation of use in practice will stay very large. It also illustrates that developing individual affordance are useful in the initial stage implementing the new technology, to increase knowledge, but when use becomes centred on a person ability, it leads to an objectification of the person in question, making him/her into an irreplaceable object. The

concept of core object has also been introduced, separating complementary object functioning as enhancers of cognitive knowledge to objects functioning as obligatory parts of practice.

Reflective spaces and core routines

During the process of embedding the use of the mobile signs into routines, several phases and disruptions can be observed. As previously argued, the lack of stability, causing an absence of routines, resulted in a large variation of practice. It was first when the difficulty use of this new investment was noticed by (or pointed out to) other managers that the first intentional disruptive attempt for routine creation came. A group was formed to identify necessary routines, an example of a *reflective space*, that by Bucher and Langley (2016) is a space located outside the routine itself, also involving actors not involved in the performance of the routine. The only actor involved in practice was the CDO, needed in this space by his knowledge (individual affordance) while driven by a desire to move away from the actual performance of practice. This reflective space resulted most of all in an acknowledgement of the overall goal, earlier described as, 'to show aimed content on a digital screen at a desired location', and identifying parts of the cluster of subroutines, booking of signs, transport of signs and upload of content. This reflective space initiated change in the ostensive as well as performative aspect of the routines, by identifying them and delegating responsibility of each routine to a department.

The delegation of bookings of signs, or rather the development for this, was given to Venue Coordination, transport to production and upload of content to 'The Sign group'. This confirming technology to be dependent on a routine cluster (Kremser & Schreyögg, 2016). Although in a closer look at these routines, distinctions can be seen. As the booking of signs was delegated for development, not for actual performance, this went to a new *reflective space*, where actors outside routine performance, developed the ostensive aspects of the routine in a space away from the actors that would perform it. Yet reflecting on this routine it should also be distinguished from the others, to, what in this paper be described as, a *core* routine, on which the other subroutines are dependent. Thus, by booking a sign to a specific location, generates production to move it, and the same person would also provide content to further be uploaded by 'The Sign group'. This implies that in this development, other routines needed to be considered, which is one explanation for the necessity of a new reflective space, keeping an ostensive view of the overall goal. Another reason being that this routine, with the new factor of mobility, did not have a good 'fit' (Kremser & Schreyögg, 2016) into the existing routine of booking digital signs, creating a necessity for a radical change in the previous routine (Bucher & Langley, 2016).

This complies with Kremser and Schreyögg (2016) notion that result in implementing new technology into existing routines depends on the fit into already existing routines. It also confirms Bucher and Langley (2016) idea that disrupting processes requires effort to develop ostensive aspects of routines from actors outside performance. What it contributes with is the classifications of routines in clusters, where a core routine is characterized by other routines dependence. Implicating that core routines require a more ostensive view of the overall goal during change, while acknowledging other subroutines, increasing the necessity for a reflective space located outside routine performance.

Complementary objects stabilizing routines by sharing affordances

The reflective space during development of the booking routine, required months of discussions, trial and error, from outside the routine itself. Many complementary objects were created such as the booking routine in EMBS, creation of a map, instructions as well as templates. These complementary objects can be separated by the earlier classification of complementary and core objects. The booking routine in EBMS, being designed as a core objects on which the booking routine were dependent, becoming an obligatory part of practice. The other complementary objects, such as instructions and templates, were enhancing the cognitive understanding of the routine by explaining and enhancing the abilities to performing actors.

Both these types of objects managed to distribute shared and collective affordance for performing actors. As a reminder of important concepts, shared affordances make it possible by all members of a group to use a technology in a similar way, while collective affordance opens the possibility to complete a joint task by pooling individual performances (Leonardi, 2013b). Before, the technology relied on one person's individual affordance so much that he became an irreplaceable object of the routine itself, a core object. Now introducing a new core object as well as several complementary objects, enhancing shared and collective affordances between the members in the organisation, creates a shared pattern of action despite different previous knowledge and skills (individual affordance) among members. To clarify, an object such as the instructions and the maps are replacing knowledge and experience, thus making it possible for everyone to use the technology in a similar way (shared affordance) despite their previous knowledge. It also bridges groups in various subroutines, creating an ostensive understanding of the overall goal as well as understanding how the routines are interconnected to provide the joint outcome. This enhance collective affordance, making it possible for actors between interrelated routines to common understanding of the overall goal while doing different tasks. An example is the instructions and maps that gives a project manager knowledge on how to book a sign in practice, but also an understanding on how a sign is transported and content uploaded.

This confirms earlier research in how complementary objects stabilize patterns in routines (D'Adderio, 2008; D'Adderio, 2014) but adds a dimension in how routines become stabilized by using the idea to classify affordances according to Leonardi's (2013b) framework. Here suggesting that artefacts can enhance shared and collective affordances, and thus stabilize routines. It further elaborates to previous discussion, confirming the difference between complementary and core objects.

Experimental spaces in core routine

After the initial reflective space in creating a booking process, it was not accounted for the necessity of an *experimental space* to test the new routine. An experimental space is where new concepts are tested, triggering improvisation as they are performed (Bucher & Langley, 2016). After introducing the new booking routine, this experimental space took the expression of hundreds of emails, phone calls and questions about the new routine and interconnected subroutines. The intent by Venue Coordination to create the booking routines and then to be

able to drop the question, failed to work in practice. This experimental space, a period of trial and error both within and between groups of actors, was triggering the necessity to bring the question to a new *reflective space*, recreating aspects of the routine and the complementary objects from outside the routine itself. This developed changes in the routine and instructions, while also creating new complementary objects related to other subroutines, such as email templates to clients.

This confirms Bucher and Langley's (2016) theory of the necessity to allow for an experimental space and how these two spaces reach change in complementary ways as they are enacted in relation to each other. One can argue that as the booking routine and the complementary objects were in fact developed from outside the routine, it should be close to impossible to take all factors of the actual performance of practice into account. Members, given tools to perform a new routine, will still have diverse knowledge and interpretations, affecting how to perform it. This research further argues that an experimental space does not necessarily take place in a temporal space provided by symbolic boundaries, but can arise through performance and interaction, yet be classified as an intentional attempt to change routines. This event also confirms previous statement in this discussion that concerning changes in *core* routines, the need to have an overall ostensive view of the overall goal is higher. This as the core routine affect and get affected by performance in other subroutines, now made it necessary to move to another reflective space.

Experimental spaces in subroutines

The delegation of the subroutine transportation to be performed by production, went immediately to an *experimental space*. This time caused by constraints from the physical object due to its lack of mobility, resulting in physical transformation to fit into their existing routines. These changes did not affect other interdependent routines in the cluster, and were neither moved to another reflective space, but were performed within the production group. As Leonardi (2011) argues, actors being constrained by a technology tend to make changes in the technology itself. In this case, the physical adjustments were made to fit into their process of transport, making them more mobile, thus not affecting any connected subroutines.

The delegation of uploading content, going to 'The Sign group', did at first not require much experimentation. Probably as this new task did not cause much disruption to their previous routine of content upload. Apart from the amount of material increasing, it already had a fit to the routine concerning the fixed digital signs. Interrelated subroutines, a bit overlooked, instead led to further adjustments. The routine for producing content were not really acknowledged in the original reflective space, and the enhanced use of the mobile signs resulted in a large spread in the material provided for upload both in terms of quality and time provided. Uploading content started to include a lot of adjustments in the provided material or sending the material back to its originator. Creating an *experimental space* between 'The Sign group' and the content providers, centred around developing content in the right format. These different negotiations continued during periods where the responsibility for uploading content went from 'The Sign group', to the technician, and back again. Resulted in many meetings and creative work outside the routines, *reflective spaces*. Leading to adjustments in old as well as creating

new complementary objects regarding content upload and adjusting the timing for providing content.

Resistance in the technological objects, affecting the overall goal, caused by an interrelated object (the Wi-Fi), resulted in an e*xperimental space* as the technician took over the transport of signs from production, placing the performance of this routine into a temporal test phase. A process that leading to new physical adjustments of replacing the antenna. These adjustments could be made without disrupting other routines. In contrast, the added cables, disrupting the routine for transport, required adjustment in the booking process through, requiring a new *reflective space* in forms of meetings and creative work.

This shows that experimental spaces, taking place within a specific routine not effecting other subroutines, can manage to be stabilized through experimentation alone. On the contrary, experimentation between interrelated routines, tend to require a more ostensive view of the overall goal, thus resulting to new reflective spaces. Another example in the narrative is the creation of the R:, the joint space on the server, where a technical change affecting content upload, required a reflective space to change the booking routine. This confirms Bucher and Langley's (2016) model of the continuous process between experimental and reflective spaces, while adding to the insights in previous discussion that changes affecting interrelated subroutines requires a more ostensive aspect of the overall goal, thus enhances the need for taken the question outside the routine, into a reflective space.

Affordances and artefacts affecting stability and flexibility

Uploading content was long dependent on one single person, continuously increasing his own knowledge of practice as well as adjusting content, his *individual affordance,* to the technology. The same happened with transport of signs when handled solely by the technician. The findings further imply that as long as routines remains dependent on one person with high individual affordance, a large variety of output in interrelated subroutine can be managed and adjusted to still create a good output for the overall goal. Examples here being through adjusting content or knowledge to providing the right amount of cables. But when needing to stabilize practice, relying on shared affordance, output in the interrelated routines needs to become more standardized. This suggests that balance between being flexibility and stability (individual vs. shared affordances), within a routine, are not only dependent on the spread of knowledge through objects, but also on interrelated routines ability to provide a stable output.

This refers back to previous discussion, showing that stable output can be achieved in two ways, either by standardizing, creating a spread shared affordance in the routine by using complementary objects, such as instructions, templates and trainings. Or centralizing performance of the routine to contain few people with high individual affordance. Adding the dimension of the consequences interrelated routines have for enhancing stability within a routine.

Access to core objects

Among the current struggles, there is one that will be highlighted to shed further light into the critical nature of core objects. This struggle, causing high variety of performance among actors,

is the lack of access to EBMS, a core object. Inability to book a sign, excludes members from the actual core routine, why performance in how to book a sign and upload content in these cases becomes very diverse. The core object, enhancing the possibility for shared affordance among large groups, here being a system solely devoted to project managers therefore excludes other groups from this routine. This can be compared to D'Addario's (2008; 2014) argument regarding the crucial role of artefacts in performance of routines. As she argues, when becoming embedded in software, the artefacts become more stable and harder t[i]o work around. In this case, there can be seen that the lack of access to core objects, an obligatory tool in the actual use, make it very hard to reach any stability and instead enhance a large deviation of practices. This suggests that without ability to use core objects, making the technology manageable, the spread in actual performativity will remain wide, not creating a shared or collective affordance amongst certain groups. It also creates high dependency on human-objects replacing the lack of workable routine. In this case the AD at the marketing department, that compensate for this lack of access, stabilizing this side track of the routine. This again confirms earlier research in how complementary objects stabilize patterns in routines (D'Adderio, 2008; D'Adderio, 2014), but also adds to previous discussion of the essential nature of core objects. Showing how inability to use these objects makes it hard to create stability, again highlighting the risk of objectifying human actors with high individual affordance when functional routines are lacking.

Conclusion and future research

Implementation of technology can never be regarded as a linear process, but as a constant process of dynamic negotiations between material and social actors in a sociomaterial network. A network consisting of the technology, interdependent routines, actors and complementary objects constantly affected by actions, affordances and constraints. Responding to new technologies is considered crucial for business survival while most business leaders worry about their ability to adopt new technology. To offers insights regarding implementation of digital technology this study have addressed the question; *'How are routines created when implementing a technological tool into existing practices?'*

This study confirms previous research stating that during implementation of a new technological tool into existing practices, the fit with previous routines will affect the outcome and must therefore be considered (Kremser & Schreyögg, 2016). When needing to disrupt routines, involving a larger network of people, intentional work in routine creation becomes necessary (Bucher and Langley, 2016; Pentland et al., 2016). This as it then is hard to reach an efficient fit into existing routines with adjustments through performativity and action alone. In addition, routines regarding technology should be viewed as clusters, where the overall goal requires a network of interrelated subroutines (Kremser & Schreyögg, 2016; Pentland et al., 2016).

What has been further discovered from this study, contributing to earlier research, is when dealing with a routine cluster, where an overall goal is dependent on several subroutines, the interdependency of routines plays a role on how intentional work progress. By using the classification of core- and subroutines, one can identify differences in the dependencies

between routines, where core routines affect interrelated subroutines to a larger extent. Changes in a core routine, therefore increases the necessity to keep an ostensive overview of the overall routine, moving routine work outside of the performativity of the routine into a reflective space. The necessity for reflective spaces also increases during changes in interrelated routines that spans across boundaries, where changes in one routine results in consequences in others. When creating changes in a routine, allowing for an *experimental space*, where actors can experiment and test routine practices from within the routine, cannot be underestimated. A need for local adaption and experimentation is a necessity for an efficient adaption which confirms previous studies where Bucher and Langley (2016) describe intentional routine work as an interactive process between reflective and experimental spaces.

To reach the overall goal, changes in routines is described as an interactive process between ostensive and performative patterns (Feldman & Pentland, 2003), where D'Addario (2008; 2014) and Pentland et al., further highlights the role of objects during routine change as a source of stability and change. This study confirms these previous notions but adds further insights by explaining how routines can become stable, using the classification of affordances by Leonardi (2013b). This to provide insights in how complementary objects such as instructions and trainings, make knowledge common within and between groups by creating shared and collective affordances. There exists balance between large flexibility, when a routine is performed by few actors with high individual affordance, or stability, where routines are performed by many actors through shared affordance. The latter with help of complementary objects such as instructions, templates and trainings. High individual affordance or wide shared affordance can both provide a stable outcome but differ in how they can manage diversity in output from interrelated routines. This makes balance routines in a cluster more complex as, in order to stabilize one routine by enhancing shared affordance, requires a more stable output from other interrelated routines.

This work also offers a classification between objects that helps facilitate routines in the use of technology, by separating core- from complementary objects. This classification is made, considering actors dependency on the object in question during routine performance. Complementary objects help facilitate routines and are important tools in enhancing shared and collective affordance amongst members but can be individual adjusted. Core objects become an inevitable part of the routine itself, and when actors lacking ability to use these objects, cause high deviation of routine performance. Persons can also become core objects when the dependency of the person's individual affordance becomes so high that they become an inevitable part of practice. This risk increases when lacking functional routines.

This study, using a single case, illustrates the complexity in creating routines during implementation of technology, requiring changes in a routine cluster. Yet, as the technology in question can be considered mundane, implemented in a national organisation, studying a cluster of routines in a larger, cross-cultural company, would be an interesting test of the validity of these classifications of routines as well as objects, and their effect on routine creation.

Studying change in retrospect through interviews is also a somewhat risky method with high dependency on the memory from people involved. A future study, preferably stretching over a longer time period, with ability to make an ethnographic study following an implementation of digital technology in real life, could provide further insights into creation of routines in clusters.

Reference list

Alvesson, K. & Sköldberg, K., 2017. *Tolkning och reflektion: ventskapsfilosofi och kvalitativ metod.* 3 ed. Lund: Studentlitteratur.

Andersson, C., Raymond, B. & Robey, D., 2013. Information Technology, Materiality, and Organizational Change: A Professional Odyssey. *Journal of the Association for Information Systems,* 14(7), pp. 379-398.

Andersson, P. et al., 2018. *Managing Digital Tranformation,* Stockholm: Stockholm School of Economics Institute for Research (SIR).

Backlund, L., 2014. *Technology Implementation Challenges and Best Practices,* Boca Ranton: Pipeline Articles.

Boomer, G. L., 2017. Implementing new digital business processes. *Accouting Today,* 03, 31(3), pp. 25-25.

Bresman, H., 2013. Changing Routines: a Process Model of Vicarious group learning in Pharmaceutical R&D. *The Academy of Management Journal,* 56(1), pp. 35-61.

Bryant, A., 2009. Grounded Theory and Pragmatism: The Curious Case of Anselm Strauss. *Forum: Qualitative Social Reserach,* 10(3), pp. xx-xx.

Bucher, S. & Langley, A., 2016. The Interplay of Reflexive and Experimental Spaces in Interrupting and Reorienting Routine Dynamics. *Organization Science,* 27(3), pp. 594-613.

Callon, M., 1986. Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In: *Power, action, and belief: a new sociology of knowledge.* London: Routledge & Kegan Paul, p. 196–223.

Cohendet, P. S. & Simon, L. O., 2016. Always Playable: Recombining Routines for Creative Efficiency at Ubisoft Montreal's Video Game Studio. *Organizational Science,* 27(3), pp. 614-632.

D´Adderio, L., 2003. Configuring software, reconfiguring memories: the influence of integrated systems on the reproduction of knowledge and routines. *Industrial and Corporate Change,* 12(2), pp. 321-350.

D´Adderio, L., 2014. The Replication Dilemma Unravelled: How Organizations Enact Multiple Goals in Routine Transfer. *Organization Science,* 25(5), pp. 1325-1350.

D'Addario, L., 2011. Artifacts at the center of routines: performing the material turn in routines theory. *Journal of Institutional Economics,* 7(2), pp. 197-230.

D'Adderio, L., 2008. The performativity of routines: Theorising the influence of artifacts and distributed agencies on routines dynamics. *Reserach policy,* 37(5), pp. 769-789.

D'Adderio, L. & Pollock, N., 2014. Performing Modularity: Competing Rules, Performative Struggles and the Effect on Organizational Theories on the Organization. *Organization Studies,* 35(12), pp. 1813-1843.

Dunne, C., 2011. The place of the literature review in grounded theory reserach. *International Journal of Science Research Methodology,* 14(2), pp. 111-124.

Edmondson, A. C., Bohmer, R. M. & Pisano, G. P., 2001. Disruptive Routines: Team Learning and New Technology Implementation in Hospitals. *Administrative Science Quarterly*, 46(4), pp. 685-716.

Feldman, M., 2000. Organizational Routines as a Source of Continous Change. *Organization Science*, 11(6), pp. 611-629.

Feldman, M. & Pentland, B., 2003. Reconceptualizing Organiztional Routines as a Source of Flexibility and Change. *Administrative Science Quarterly*, 48(1), pp. 94-118.

Fitzgerald, M., Kruschwitz, N., Bonnet, D. & Welch, M., 2013. *Embracing Digital Technology; A New Strategic Imperative*, Massachusetts: MIT Sloan Management Review.

Flyvbjerg, B., 2006. Five Misunderstandings About Case-Study Reserach. *Qualitative Inquiry*, 12(2), pp. 219-245.

Gibson, J. J., 1986. *The Ecological Approach to Visal Perception.* 1:a ed. Hillsdale, NJ: Lawrence Erlbaum Associates.

Giddens, A., 1984. *The Constitution of Society.* Cambridge: Polity Press.

Glaser, B. G. & Strauss, A. L., 1967. *The Discovery of Grounded Theory.* New Brunswick : AldineTransaction.

Hans, G., 2018. *Institute for Digital Transformation.* [Online]
Available at: www.institutefordigitaltransformation.org/digitalisation-an-unstoppable-mega-trend/
[Accessed 25 04 2019].

Hardy, C. & Maguire, S., 2010. Discourse, Field-Configuring Events, and change in Orgnizations and Institutional Fields: Narratives of DDT and the Stockholm Convention. *The Academy of Management Journal*, 53(6), pp. 1365-1392.

Hendry, J. & Seidl, D., 2003. The Structure and Significance of Strategic Episodes: Social Systems Theory and the Routine Practices of Strategic Change. *Journal of Management Studies*, 40(1), pp. 175-196.

Howard-Grenville, J., Golden-Biddle, K., Irwin, J. & Mao, J., 2011. Liminality as Cultural Process for Cultural Change. *Organizational Science*, 22(2), pp. 522-539.

Hutchins, E., 1991. Orgnizing Work by Adaption. *Organizational Leraning*, 2(1), pp. 14-39.

Hutchins, E., 1995. *Cognition in the wild.* 1 ed. Cambridge: MIT Press.

Ismail, N., 2018. The challenge of adopting new technology a concern for business leaders. *Information/Age*, 27 November.

Jarzabkowski, P. A., Lê, J. K. & Feldman, M. S., 2012. Toward A thory of Coordinating: Creating Coordinating Mechanisms in Practice. *Organization Science*, 23(4), pp. 907-927.

Kelle, U., 2005. "Emergence" vs. "Forcing" of Empirical Data? A Crucial Problem of "Grounded Theory" Reconsidered. *Forum Qualitative Social Reserach*, 6(2), pp. xx-xx.

Kilduff, M., 1992. Performance and Interaction Routines in Multinational Corporations. *Journal of International Business Studies*, 12(1), pp. 133-145.

Kremser, W. & Schreyögg, G., 2016. The Dynamics on Interrelated Routines: Introducing the Cluster Level. *Organization Science*, 27(3), pp. 698-721.

Kvale, S., 2006. Dominance Through Interviews and Dialogues. *Qualitative Inquiry*, 12(3), pp. 480-500.

Latour, B., 1986. The powers of association. In: *Power, action, and belief: a new sociology of knowledge.* London: Routledge & Kegan Paul, p. 264–280.

Latour, B., 2005. *Reassembling the Social; an Introduction to Actor-Network-Theory.* 1:a ed. Oxford: Oxford University Press.

Leonardi, P., 2011. When Flexible Routines Meet Flexible Technologies: Affordances, Constraint, and the Imbrication of Human and Material Agencies. *MIS Quarterly,* 35(1), pp. 147-167.

Leonardi, P., 2013a. Theoretical foundations for the study of sociomateriality. *Information and Organization,* 23(2), p. 59–76.

Leonardi, P., 2013b. When Does Technology Use Enable Network Change in Organisations? A Comparative Study of Feature Use and Shared Affordances. *MIS Quarterly,* 37(3), pp. 749-775.

Leonardi, P. M. & Barley, S. R., 2010. What´s Under Construction Here? Social Action, Materiality, and Power in Constructivist Studies of Technology and Organizing. *Academy of Management Annals,* 4(1), pp. 1-51.

Mann, F. & Williams, L., 1960. Observations on the Dynamics of a Change to Electronic Data-Processing Equipment. *Administrative Science Quarterly,* 5(2), pp. 217-256.

Markus, L. M. & Silver, M. S., 2008. A Foundation for the Study of IT Effects: A New Look at DeSanctis and Poole's Concepts of Structural Features and Spirit. *Journal of the Association for Information Systems,* 9(10/11), pp. 609-632.

Martin, P. & Turner, B., 1986. Grounded Theory and Organizational Research. *The Journal of Applied Behavioural Science,* 22(2), p. 141–157.

Mutch, A., 2013. Sociomateriality - Taking the wrong turning?. *Information and Organization,* Volume 23, pp. 28-40.

Obstfeld, D., 2012. Creative Projects: A Less Routine Approach Toward Getting New Things Done. *Organization Science,* 23(6), pp. 1571-1592.

Orlikowski, W., 2007. Sociomaterial Practices: Exploring Technology at Work. *Organization Studies,* 28(9), p. 1435–1448.

Orlikowski, W. J., 2010. The Sociomateriality of Organisational Life: Considering Technology in Management Research. *Cambridge Journal of Economics,* 34(1), pp. 125-141.

Orlikowski, W. J. & Scott, S. V., 2008. Sociomateriality: Challenging the seperation of Technology, Work and Organisation. *The Academy of Management Annals,* 2(1), pp. 433-474.

Pentland, B., Feldman, M., D´Adderio , L. & Lazaric, N., 2016. Beyond Routines as Things: Introduction to the Special Issue on Routine Dynamics. *Organization Science,* 27(3), pp. 505-513.

Pickering, A., 1997. The Mangle of Practice: Time, Agency, and Science. *Technology and Culture,* 38(3), pp. 815-817.

Reichertz, J., 2015. Induction, Deduction, Abduction. In: U. Flick, ed. *The SAGE Handbook of Qualitative Data Analysis.* London, Thousand Oaks, New Dehli, Singapore: SAGE Publications, pp. 123-135.

Rerup, C. & Feldman, M. S., 2011. Routines as a source of change in organizational schemata: The role of Trial-and-Error learning. *The Academy of Management Journal,* 54(3), pp. 577-610.

Robey, D. & Bourdreau, M.-C., 1999. Accounting for the Contradictory Organizational Consequence of Information Technology: Theoretical Directions and Methodological Implications. *Information Systems Reserach,* 10(2), pp. 167-185.

Santi, F., 2014. Interstitial Spaces: Microinteraction Settings and the Genesis Practices between Institutional fields. *Academy of Management Review,* 39(4), pp. 429-462.

Sele, K. & Grand, S., 2016. Ecologies of Routines: Mediators and Their Generative Effects in Routine Interactions. *Organizational Science,* 27(3), pp. 505-800.

Silverman, D., 2013. *Doing Qualitative Research.* 4 ed. London: SAGE.

Stake, R., 1995. *The Art of Case Study Reserach.* Thousand Oaks, Calif.: SAGE Publications.

Thornberg, R., 2011. Informed Grounded Theory. *Scandinavian Journal of Educational Reserach,* 56(3), pp. 243-259.

Thornberg, R. & Charmaz, K., 2013. Grounded Theory and Theoretical Coding. In: U. Flink, ed. *The SAGE Handbook of Qualitative Data Analysis.* London, Thousand Oaks, New Dehli, Singapore: SAGE Publications, pp. 153-169.

Ustundag, A. & Cevekcan, E., 2018. *Industry 4.0: Managing The Digital Transformation.* 1 ed. Cham: Springer International Publishing Switzerland.

Van Maanen, J., 2011. Ethography as Work: Some Rules of Engagement. *Journal of Management Studies,* 48(1), pp. 218-234.

Yanow, D. & Tsoukas, H., 2009. What is Reflection-In-Action? A Phenomenological Account. *Journal of Management Studies,* 46(8), pp. 1339-1364.

Yi, S., Knudsen, T. & Becker, M. C., 2015. *Inertia in Routines: A Hidden Source of Organizational Variation,* Odense: Strategic Organizationa Design Unit SOD & Danish Institute for Advanced Study.

Zietzma, C. & Lawrence, T. B., 2010. Institutional Work in the Transformation of an Organizational Field: The Interplay of Boundary Work and Practice Work. *Administrative Science Quarterly,* 55(2), pp. 189-221.

Zilber, T. B., 2011. Institutional Multiplicity in Practice: A Tale of Two High-Tech Conferences in Israel. *Organizational Science,* 22(6), pp. 1539-1559.