Monitoring Enterprise Collaboration Platform Change and the Building of Digital Transformation Capabilities:

An Information Infrastructure Perspective

by

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Abstract

Enterprise collaboration platforms are increasingly gaining importance in organisations. Integrating groupware functionality and enterprise social software (ESS), they have substantially been transforming everyday work in organisations. While traditional collaboration systems have been studied in Computer Supported Cooperative Work (CSCW) for many years, the *large-scale, infrastructural and heterogeneous* nature of enterprise collaboration platforms remains uncharted. Enterprise collaboration platforms are embedded into organisations' *digital workplace* and come with a high degree of complexity, ambiguity, and generativity. When introduced, they are empty shells with no pre-determined purposes of use. They afford *interpretive flexibility*, and thus are shaping and being shaped by and in their social context. Outcomes and benefits emerge and evolve over time in an open-ended process and as the digital platform is *designed through use*. In order to make the most of the platform and associated continuous digital transformation, organisations have to develop the necessary competencies and capabilities.

Extant literature on enterprise collaboration platforms has proliferated and provide valuable insights on diverse topics, such as implementation strategies, adoption hurdles, or collaboration use cases, however, they tend to disregard their evolvability and related multiple time frames and settings. Thus, this research aims *to identify, investigate, and theorise the ways that enterprise collaboration platforms are changing over time and space and the ways that organisations build digital transformation capabilities*. To address this research aim two different case study types are conducted: i) *in-depth longitudinal qualitative case study*, where case narratives and visualisations capturing hard-to-summarise complexities in the enterprise collaboration platform evolution are developed and ii) *multiple-case studies* to capture, investigate, and compare cross-case elements that contribute to the shaping of enterprise collaboration platforms in different medium-sized and large organisations from a range of industries. Empirical data is captured and investigated through a *multi-method research design* (incl. focus groups, surveys, in-depth interviews, literature reviews, qualitative content analysis, descriptive statistics) with shifting units of analysis. The findings reveal unique change routes with unanticipated outcomes and transformations, context-specific change strategies to deal with multiple challenges (e.g. GDPR, works council, developments in the technological field, competing systems, integration of blue-collar workers), co-existing platform uses, and various interacting actors from the immediate setting and broader context. The interpretation draws on *information infrastructure (II)* as a theoretical lens and related *sociotechnical concepts* and perspectives (incl. *inscriptions*, *social worlds*, *biography of artefacts*). Iteratively, a *conceptual model of the building of digital transformation capabilities* is developed, integrating the insights gained from the study of enterprise collaboration platform change and developed monitoring change tools (e.g. MoBeC framework). It assists researchers and practitioners in understanding the building of digital transformation capabilities from a theoretical and practical viewpoint and organisations implement the depicted knowledge in their unique digital transformation processes.

Zusammenfassung

Kollaborationsplattformen gewinnen in Unternehmen immer mehr an Bedeutung. Ihre Groupwarefunktionen und Funktionalitäten sozialer Software verändern die tägliche Arbeit wesentlich. Während traditionelle Kollaborationssysteme seit vielen Jahren im Forschungsfeld der computergestützten Gruppenarbeit (CSCW) untersucht werden, ist der *großskalige, infrastrukturelle und heterogene* Charakter von Kollaborationsplattformen in Unternehmen noch weitestgehend unerforscht. Kollaborationsplattformen sind in den *digitalen Arbeitsplatz* eingebettet und weisen ein hohes Maß an Komplexität, Ambiguität und Generativität auf. Sie werden ohne vordefinierte Nutzungszwecke in Unternehmen eingeführt. Durch ihre *interpretative Flexibilität* nehmen sie im sozialen Kontext Form an. Ergebnisse und Nutzen entstehen und entwickeln sich über die Zeit im Zuge der Plattformgestaltung. Um die Plattform und die damit verbundene kontinuierliche digitale Transformation optimal zu gestalten, müssen Unternehmen die dafür notwendigen Kompetenzen und Fähigkeiten entwickeln.

Die Literatur zu Kollaborationsplattformen ist stark angewachsen; sie liefert wertvolle Erkenntnisse zu verschiedenen Themen, wie z.B. Implementierungsstrategien, Adoptionshürden oder Anwendungsfälle für die Zusammenarbeit. Allerdings wird die zeitliche und räumliche Plattformentfaltung vernachlässigt. Ziel dieser Dissertation ist daher die *Identifizierung, Untersuchung und Theoriebildung der Veränderungsprozesse von Kollaborationsplattformen über Zeit und Raum sowie der Art und Weise, in der Unternehmen Fähigkeiten zur digitalen Transformation erlangen*. Hierfür werden zwei Fallstudienarten durchgeführt: i) *qualitative Tiefen- und Längsschnittfallstudie*, in der Fallerzählungen und -visualisierungen Komplexitäten in der Evolution einer Kollaborationsplattform aufzeigen; ii) *Mehrfallstudien* zur Erfassung, Untersuchung und zum Vergleich fallübergreifender Elemente in der Kollaborationsplattformgestaltung in verschiedenen mittelgroßen und großen Unternehmen. Empirische Daten werden anhand eines multi-methodischen Forschungsdesigns erfasst und untersucht (einschl. Literaturstudie, Fokusgruppen, Umfragen, Tiefeninterviews, qualitative Inhaltsanalysen, deskriptive Statistik). Die Ergebnisse zeigen einzigartige Veränderungskurse mit unerwarteten Ergebnissen und Transformationen, kontextspezifischen Strategien zur Bewältigung vielfältiger Herausforderungen im Zuge des Wandels (z.B. DSGVO, Betriebsrat, technologische Entwicklungen, konkurrierende Systeme, Integration von „Blue-Collar Workers“), koexistente Plattformnutzungsweisen und verschiedenen interagierenden Akteuren. Die Interpretation stützt sich auf die Theorie der Informationsinfrastruktur (II) und verwandte soziotechnische Konzepte und Perspektiven (einschl. Inskriptionen, soziale Welten, Biografie von Artefakten). Iterativ wird ein konzeptionelles Modell zu den Entstehungsweisen von Fähigkeiten zur digitalen Transformation erarbeitet. Dieses integriert die Erkenntnisse aus den Fallstudien und entwickelten Methoden zur Überwachung von Veränderungen (z.B. MoBeC Rahmenwerk). Es soll Forscher und Anwender unterstützen, den Aufbau von Fähigkeiten zur digitalen Transformation zu verstehen, und Unternehmen in ihren einzigartigen digitalen Transformationsprozessen begleiten.

Chapter 1
Introduction

The present thesis addresses the ways that enterprise collaboration platforms and the related digital workplace are shaping and being shaped over time and space as an instance of the building of digital transformation capabilities. The first chapter presents the research background and motivation, as well as the research aim, objectives, and questions. Further, it provides an overview of the thesis structure.

1.1 Problem statement and motivation

Following the success of public, open-access social media platforms (e.g. Facebook or Twitter), social software has been introduced in the enterprise context (Herzog & Richter, 2016; Treem, Dailey, Pierce, & Leonardi, 2015). Enterprise social software (ESS) started out in the form of single social-software tools, such as wikis or blogs, changing communication from formal and top-down to more inclusive communication structures supporting collaboration and knowledge sharing (Grace, 2009; Jarrahi & Sawyer, 2013). Over the past years, highly integrated internally hosted and private enterprise collaboration platforms have emerged around enterprise collaboration systems (e.g. HCL Connections, Jive, Microsoft SharePoint (Kügler & Smolnik, 2014)), which combine traditional collaboration tools (e.g. email, shared calendar, document libraries, shared workspaces) with a variety of social software functionality (e.g. wikis, blogs, forums, collaborative tagging, activity streams, social profiles) (Leonardi, Huysman, & Steinfield, 2013; Osch, Steinfield, & Balogh, 2015; Wehner, Ritter, & Leist, 2016; S. P. Williams & Schubert, 2015). More recently, they have been integrated with transactional systems such as Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) systems (Gewehr, Gebel-Sauer, & Schubert, 2017). Integrating multiple modules and functions (Haefliger, Monteiro, Foray, & von Krogh, 2011; Leonardi et al., 2013) enterprise collaboration platforms support many different kinds of work (Leidner, Gonzalez, & Koch, 2018; Nitschke, Williams, & Schubert, 2019). They are large-scale, infrastructural and heterogenous in nature (de Reuver, Sørensen, & Basole, 2017; Monteiro, Pollock, Hanseth, & Williams, 2013; Star & Ruhleder, 1996) with potentially no restriction to the number and types of geographically distributed users (e.g. company customers or partners, employees from different departments, business areas, sites, subsidiaries and acquired firms) (S. P. Williams & Schubert, 2018). Enterprise collaboration platforms have been embedded into organisations' digital workplace and become an integral part of everyday work (Nitschke et al., 2019; S. P. Williams & Schubert, 2018). Traditional collaboration tools and systems in the form of groupware are not new and have been studied in the field of Computer Supported Cooperative Work (CSCW) for many decades (W. J. Orlikowski, 1992a). Nevertheless, the integration of various social software features and the accrued scale add new facets to the study and understanding of enterprise collaboration platforms (S. P. Williams & Schubert, 2017, p. 5401).

Enterprise collaboration platforms embrace sociality, not only functionality, making them different from traditional Information Technology (IT) (Bouman et al., 2007). Such platforms afford *interpretive flexibility* (Doherty, Coombs, & Loan-Clarke, 2006), i.e. they have no predefined purpose of use but are open to multiple interpretations with regard to how they can be used (Chin, Evans, & Choo, 2015; Richter & Riemer, 2009, 2013; Stocker, Richter, Hoefler, & Tochtermann, 2012). While this characteristic provides organisations with the opportunity to use the collaboration platform for many purposes (Henfridsson & Bygstad, 2013, p. 22), it also comes with uncertainty (Dourish, 2003) in terms of how to embed it into the digital workplace successfully (Dery, Sebastian, & van der Meulen, 2017; S. P. Williams & Schubert, 2018). Enterprise collaboration platforms offer high ambiguity and complexity and are open-ended (Ciborra et al., 2001; Richter & Riemer, 2009), bringing about unprecedented transformations of the ways organisations operate (Leonardi et al., 2013). Typically, enterprise collaboration platforms emerge bottom-up (Kumar, Loonam, Allen, & Sawyer, 2016; Richter, Stocker, Müller, & Avram, 2013) with various motivations and drivers for the platform introduction (e.g. make work easier, design the digital workplace of the future, usage of external social media applications, reduction of emails) (Nitschke et al., 2019) and visions in terms of the *outcomes*, i.e. "what organisations expect to gain from them" (Nitschke & Williams, 2020, p. 2609) (e.g. knowledge usage (Dittes & Smolnik, 2017), access to expertise (Wehner, Falk, & Leist, 2017), team-based collaboration (Holtzblatt, Drury, Weiss, Damianos, & Cuomo, 2013), people helping each other (Hughes & Chapel, 2014)), and *benefits*, i.e. "the contributions of the outcomes to the business" (Nitschke & Williams, 2020, p. 2609) (e.g. improved decision making (Drahošová & Balco, 2016), reduction of search costs (Wehner et al., 2017), enhanced innovation (Chin, Evans, & Choo, 2015), improved productivity (Raeth, Smolnik, Urbach, & Zimmer, 2009)). However, when introduced into an organisation, typically on a voluntary use basis (Greeven & Williams, 2017), enterprise collaboration platforms begin life in the form of "empty shells" (Nitschke & Williams, 2018, p. 581): they come with a set of integrated modules and components part of their underlying enterprise collaboration system but without content and little support for interpretation (Cabitza & Simone, 2012).

When employees start appropriating the platform, encompassing exploration, experimentation and sensemaking (Dourish, 2003; Richter & Riemer, 2009), not all of the initial expectations manifest (Bala, Massey, Rajanayakam, & Hsieh, 2015; Kügler, Smolnik, & Raeth, 2013; Stocker & Tochtermann, 2011). Also, some expectations may become more or less relevant and new potentially unanticipated outcomes and benefits may emerge (Herzog & Richter, 2016; Richter & Riemer, 2013), with possible multiple coexisting perspectives different organisational members and social groups (Mark & Poltrock, 2004) might have on the ways the collaboration platform can support their work in their local contexts (Dourish, 2003; Iacono & Kling, 1999; Pipek & Wulf, 2009). Enterprise collaboration platforms are malleable (Richter & Riemer, 2013) and "shaped and *designed through use"* (Brandes, Stich, & Wender, 2009; Nitschke & Williams, 2018; Tchounikine, 2017), i.e. they "are continuously evolving, and single workspaces within the platform and the platform itself are transforming" (Nitschke & Williams, 2020, p. 2609). For instance, an enterprise collaboration platform may transform from a mere information exchange tool to a network connecting groups and departments to a multi-function space for workflow support (Nitschke &

Williams, 2020, p. 2609; S. P. Williams & Schubert, 2018). In this vein, the organisation's expected outcomes (Nitschke & Williams, 2020, p. 2609) may change from problem-solving support to breaking up of silos to process flexibility (Wehner et al., 2017).

Platform designs and related outcomes and benefits are "emergent, social, unbounded, and disruptive" (Kumar et al., 2016, p. 99), and "dependent on the social contexts in which they are enacted (Orlikowski, 2000 as cited in Holmström & Robey, 2005, p. 29). This means that enterprise collaboration platforms are not stand-alone technological systems but large and dynamic sociotechnical systems, i.e. *information infrastructures* (Bygstad, 2010, p. 2; de Reuver et al., 2017). Although enterprise collaboration platforms come as empty shells with no content and prescribed routes to adoption, they are not being shaped from scratch. They extend an installed base of existing systems and practices (Monteiro et al., 2013, p. 576; Star & Ruhleder, 1996, p. 113), such as legacy software, company values, or established work procedures, and are gradually growing ("cultivation of the installed base" (Ciborra et al., 2001; Hanseth & Lyytinen, 2010; Hanseth, Monteiro, & Hatling, 1996)). As they are growing, they "connect[…] to and live[…] within" (Cordella, 2010, p. 38) emerging structures and organisational arrangements (Hanseth, 2000) shaped by people and their daily actions (Cordella, 2010; Star & Ruhleder, 1996). When organisations and their organisational members are engaging in the design process of enterprise collaboration platforms towards the achievement of positive outcomes and benefits, they may encounter a variety of challenges induced by (temporally emergent) heterogeneous actors (Law, 1992) – possibly with different, and partially conflicting goals and agendas – in the immediate settings and broader contexts (e.g. vendors, competitors, platform user groups, works council, laws/regulations, compliance requirements, project resources) (Karasti & Blomberg, 2018; R. Williams & Pollock, 2012). This also includes employees' attitudes and perceptions towards the platform, for example, relating to its usability, technological capabilities or links to multiple existing systems of the organisation's IT portfolio (Greeven & Williams, 2017; Nitschke et al., 2019), particularly emerging in practice as such employees with possibly different modes of engagement (Feldman & Orlikowski, 2011) interact with the platform (Dourish, 2004). Enterprise collaboration platforms are characterised by generativity "denot[ing] a technology's overall capacity to produce unprompted change driven by large, varied, and uncoordinated audiences" (Zittrain, 2006, p. 1980). As the platforms "tend to drift" (Ciborra et al., 2001, p. 4), platform trajectories can neither be known a priori nor be easily controlled (Bygstad, 2010; Tilson, Lyytinen, & Sørensen, 2010). Though, the inherent ambiguity can "be an asset, not an obstacle" (Ackerman, Dachtera, Pipek, & Wulf, 2013, p. 25) if organisations and their organisational members develop the necessary competencies and capabilities (Andreu & Ciborra, 1996) to make the most of the platform (Bødker, Dindler, & Iversen, 2017) and deal with diverse challenges occurring in multiple overlapping arenas (R. Williams & Pollock, 2012). Over time, organisations and their organisational members collect experiences and, in light of reflection and learning (Andreu & Ciborra, 1996; Gherardi, 2009), apply different planned and ad-hoc strategies and actions to address challenges, such as the deployment of platform usage guidelines, the collection and communication of platform use cases and best practices, community management, champions encouraging potential platform users to use and design the platform, the usage of platform community templates,

integration of regulatory requirements or the inclusion of certain actors in decision making in the enterprise collaboration platform project (Greeven & Williams, 2017; Nitschke & Williams, 2018; Nitschke et al., 2019).

To date, research on enterprise collaboration platforms and its ESS has proliferated, along with a growing body of literature on diverse topics. They include implementation strategies (Diehl, Kuettner, & Schubert, 2013; Richter, Stocker, & Koch, 2011), introduction and adoption challenges and measures (Alqahtani, Watson, & Partridge, 2014; Chin, Evans, & Choo, 2015; Forstner & Nedbal, 2017; Heinemann, Katzung, & Schröder, 2010; Stieglitz & Dang-Xuan, 2011), success factors (Lehner, Langbauer, & Amende, 2014; Zeiller & Schauer, 2011), benefits (Chin, Evans, Choo, & Tan, 2015; Drahošová & Balco, 2016; Hughes & Chapel, 2013; Kügler & Smolnik, 2013; Majumdar, Krishna, & Bjorn, 2013; Wehner et al., 2017), or different uses and use cases (Herzog & Richter, 2016; Mäntymäki & Riemer, 2016; Riemer & Richter, 2012; Schubert & Glitsch, 2016). While the research studies provide important insights into the multiple opportunities and risks of enterprise collaboration platforms, they exhibit two significant limitations: i) they tend to disregard the multiple locales (R. Williams & Pollock, 2012) and heterogeneous assemblages of technology, people and work (Cecez-Kecmanovic et al., 2014; W. J. Orlikowski, 2007) that make up an emerging enterprise collaboration platform, despite the increasing general research interest in digital platforms and infrastructures as large-scale sociotechnical phenomena (Constantinides, Henfridsson, & Parker, 2018; de Reuver et al., 2017; Eaton, Elaluf-Calderwood, Sorensen, & Yoo, 2015; Tilson et al., 2010), and ii) they largely constitute static pictures of enterprise collaboration platforms and related ESS in that the findings are typically based on snapshots taken at a single point in time, as acknowledged by different researchers (Holtzblatt et al., 2013; Mäntymäki & Riemer, 2016; Stocker & Müller, 2013, 2016). The evolving nature of enterprise collaboration platforms and related social software is identified in the literature (Alqahtani et al., 2014; Diehl et al., 2013, p. 245; Richter & Riemer, 2009, p. 729), along with the need for longitudinal study designs to investigate the changes in enterprise collaboration platforms and related ESS (Kügler, Dittes, Smolnik, & Richter, 2015, p. 192; Mäntymäki & Riemer, 2016, p. 1050; Stocker et al., 2012, p. 329).

Attempting to address these two major limitations and the research call for longitudinal studies (Aanestad & Jensen, 2016), this dissertation uses in-depth, longitudinal empirical data to contribute to the broader understanding of how enterprise collaboration platforms are transforming and being shaped and designed through use. Specifically, the overall research aim is *to identify, investigate, and theorise the ways that enterprise collaboration platforms are changing over time and space and the ways that organisations build digital transformation capabilities* that unfold "in an organisational context that is both determined by and a determinant of learning" (Andreu & Ciborra, 1996, p. 111), and are not only required for the successful embedding of the collaboration platform into the digital workplace but potentially in any future digital transformation endeavour.

1.2 Research aim, objectives and questions

The research is organised into five research objectives, each comprising a set of research questions, as shown in figure 1-1. The research objectives and related research questions are anchored in the knowledge laid out above in the problem statement and motivation and are further elaborated below.

Identification of outcomes and benefits

Organisations are provided with multiple opportunities to use the enterprise collaboration platform for many purposes (Henfridsson & Bygstad, 2013, p. 22; Nitschke, Vallo Hult, & Bigolin, 2020; Schubert & Glitsch, 2016). Correspondingly, organisations have different expectations and visions in terms of what they can achieve with their enterprise collaboration platform, placing them in different positions in the shaping of enterprise collaboration platforms. Despite this flexibility and creative freedom, there are only a few comprehensive research overviews of enterprise collaboration platform and ESS outcomes and benefits (Dittes & Smolnik, 2017; Wehner et al., 2017) with no detailed account of their multifaceted nature and richness. Thus, the first research objective (O1) of this work is to unveil the landscape of enterprise collaboration platform outcomes and benefits, as well as their complexity.

> Objective O1: To identify and investigate outcomes and benefits expected with the introduction of an enterprise collaboration platform.

The related research question (O1-Q1) focuses on what outcomes and benefits organisations expect to achieve with the enterprise collaboration platform introduction. In answering this question an inventory of outcomes and benefits is to be built while conducting an in-depth analysis of their characteristics and structure. This allows for the identification of the inherent flexibility of outcomes and benefits and a better understanding of their nature.

> Question O1-Q1: What outcomes and benefits do organisations expect to achieve with the enterprise collaboration platform introduction?

Changing nature

When employees explore, experiment with and make sense of the enterprise collaboration platform (Dourish, 2003; Richter & Riemer, 2009), they adapt and adopt the platform and discover purposes of use that have initially not been anticipated (Bala et al., 2015; Kügler et al., 2013; Stocker & Tochtermann, 2011). Over time, expected and realised enterprise collaboration platform outcomes and benefits emerge and evolve as experiences are collected through the interaction with the platform and in light of reflection and learning, where different challenges towards the achievement of expected outcomes and benefits may come about.

To date, enterprise collaboration platform and ESS studies largely examine time-independent outcomes and benefits of enterprise collaboration platforms and ESS (Drahošová & Balco, 2016; Leidner et al., 2018; Mäntymäki & Riemer, 2016; Wehner et al., 2017), general challenges organisations are confronted with in their enterprise collaboration platform and ESS projects, (Forstner & Nedbal, 2017; Greeven & Williams, 2017; Trier, Fung, Hansen, & Capili, 2017; S. P. Williams, Hausmann, Schubert, & Hardy, 2013), and general supporting factors to enterprise collaboration platform and ESS success, (Alqahtani et al., 2014; Kügler et al., 2013; Stei & Rossmann, 2017; Turban, Liang, & Wu, 2011; Zeiller & Schauer, 2011). Identified and examined general challenges include uncertainties about the purpose of the collaboration platform, reliance on other business systems, required cultural changes, or lack of top management support. Examples of identified and examined general success factors are training management support, social software use promoters, or comments and likes.

The second objective (O2) of this dissertation addresses this limitation in that it draws attention to how outcomes and benefits of enterprise collaboration platform change and the ways these changes and related challenges are managed.

> Objective O2: To identify and examine how enterprise collaboration platform outcomes and benefits are changing over time and the ways organisations manage these changes and related challenges.

The second research objective is addressed by three research questions. The first corresponding research question (O2-Q1) is targeted at the extent and ways outcomes and benefits change of enterprise collaboration platforms are addressed in the academic literature. In answering this question, a critical reflection of the extant literature and research motivation for studying outcomes and benefits change of enterprise collaboration platforms is provided.

> Question O2-Q1: To what extent and how are outcomes and benefits change being addressed in the enterprise collaboration platform literature?

The second associated research question (O2-Q2) directs attention to how outcomes and benefits of enterprise collaboration platform change over time in one selected enterprise collaboration

platform project, including the emergence of unanticipated outcomes and benefits. In answering this question, the evolving nature of enterprise collaboration platforms is identified, and a method and tool for generally monitoring outcomes and benefits change developed.

Question O2-Q2: How do outcomes and benefits of enterprise collaboration platforms change?

The third related research question (O2-Q3) addresses the challenges organisations have to deal with in the enterprise collaboration platform change and towards the realisation of expected outcomes and benefits. Answering this question supports capturing the variety of different but also common challenges in different enterprise collaboration platform projects and affiliated change. Similar to the research question O1-Q1, the deliverable of this question includes a deeper understanding of the characteristics and structure of the captured challenges.

Question O2-Q3: What challenges do organisations deal with in the enterprise collaboration platform change?

The fourth and last related research (O2-Q4) question examines the strategies and actions applied by organisations in managing enterprise collaboration platform change and towards the realisation of expected outcomes and benefits. Again, in answering this question a more nuanced understanding about their characteristics and structure is provided, where common challenges emerging in different enterprise collaboration platform projects may be addressed differently "dependent on the social contexts in which they are enacted (Orlikowski, 2000 as cited in Holmström & Robey, 2005, p. 29). Together with the previous research question O2-Q3, the deliverable of this question provides insights into the experiences of organisations and the development of digital transformation capabilities.

Question O2-Q4: What strategies and actions do organisations apply in managing enterprise collaboration platform change?

Platform designs

The trajectories of enterprise collaboration platforms cannot be known a priori (Ciborra et al., 2001), they are intertwined with the emerging social contexts (W. J. Orlikowski, 2000). While the previous research objectives (O1, O2) capture the outcomes and benefits of enterprise collaboration platforms and how they may change possibly in unanticipated ways, the third research objective (O3) focuses on the enacted platform designs. Platform designs go beyond outcomes and benefits of enterprise collaboration platforms, as well as related challenges and strategies and actions they are entangled with. Platform designs underscore how enterprise collaboration platforms are shaped across multiple frames and settings (Monteiro et al., 2013; R. Williams & Pollock, 2012) and their embedding into the broader digital workplace. The goal of this research objective is to capture the

different platform designs and the ways they are changing over space and time. For this, attention is paid on the evolving uses of one platform at different locales and human and nonhuman actors attached to the platform designs, both in the immediate settings and broader context. In this way, insights into the generative and complex nature of enterprise collaboration platforms and corresponding (boundary-spanning) learning mechanisms are gained. The research is based on one longitudinal and in-depth enterprise collaboration platform case.

Objective O3: To identify and examine how and why enterprise collaboration platform designs are changing over time and space.

This research objective embraces two research questions. The first related research question (O3-Q1) pays attention to how and why different, possibly coexisting, uses can be inscribed (Henningsson & Henriksen, 2011; Holmström & Robey, 2005) into one and the same collaboration platform across and within different working spheres (Mark & Poltrock, 2004) over time. In answering this question, reflective narratives and visualisations about how the collaboration platform is adopted, appropriated and shaped in different social worlds (working spheres) with distinct but also evolving shared practices are presented.

Question O3-Q1: How and why do the uses of an enterprise collaboration platform change across and within different working spheres over time?

The second associated research question (O3-Q2) explains enterprise collaboration platform change by capturing its different temporal and spatial actors and factors participating in platform designs. While the previous research question (O3-Q1) focuses on the emerging and enacted uses of enterprise collaboration platforms at different locales, this research question moves between different locales and levels of analysis to explain changes in platform design and its embedding into the digital workplace. Findings are discussed and visualised for a temporal and spatial mapping of the various actors and factors.

Question O3-Q2: What actors and factors are attached to the enterprise collaboration platform design and its embedding into the digital workplace over time and space?

Competencies and priority areas

Enterprise collaboration platforms have become the core of today's digital workplace (DWP) (S. P. Williams & Schubert, 2018). With the interpretive flexibility (Doherty et al., 2006) and malleable nature of enterprise collaboration platforms (Richter & Riemer, 2013), the DWP can be envisioned and designed in different ways. Correspondingly, organisations may prioritise different areas in the design of the DWP. Also, emerging in practice through the interaction with the collaboration platform, organisations are likely to gain different competencies in different areas of the DWP as focused on in the fourth research objective.

> Objective O4: To identify and assess the competencies and priority areas in the design of the digital workplace in enterprise collaboration platform projects.

This research objective, reflecting the shift from enterprise collaboration platforms to the broader notion of the DWP, is linked to two research questions.

The first associated research question (O4-Q1) focuses on priority areas and competencies in the design of the DWP. In answering this question, a method is provided for capturing, visualising, and comparing the different visions (priority areas) and competencies organisations and their individual organisational members with different backgrounds might have in the design of the digital workplace. Thereby, the flexibility in the design of the DWP is identified. Further, examining the competencies in the design of the digital workplace might potentially provide insights into the development of digital transformation capabilities (Andreu & Ciborra, 1996).

> Question O4-Q1: What are the organisations' competencies and priority areas in the design of the digital workplace?

Assuming the evolving nature of enterprise collaboration platforms at the heart of the digital workplace, the second linked research question (O4-Q2) looks at how organisations' competencies and priority areas in the design of the digital workplace may change. In answering this research question, it is expected to reveal within and across company-comparisons in terms of the evolving organisations' competencies and priority areas in the design of the digital workplace.

> Question O4-Q2: How may the organisations' competencies and priority areas in the design of the digital workplace change?

Capabilities model

The ambiguity inherent in enterprise collaboration platforms and the digital workplace can "be an asset, not an obstacle" (Ackerman et al., 2013, p. 25) if organisations and their organisational members develop the necessary competencies and capabilities (Andreu & Ciborra, 1996) to make the most of the platform (Bødker et al., 2017). For this, organisations need to "reflect on and learn

from the digital transformation process while identifying and developing the relevant competencies and resources, and […] to anticipate future changes shaping the digital workplace while building the knowledge, skills and resources for enabling digital change" (Nitschke et al., 2019, p. 1648). The fifth and last research objective (O5) builds on the findings and learnings of the objectives O1 to O4. Answering this question contributes to theory building of sociotechnical capabilities and supports organisations in developing the capabilities to reflect upon and anticipate digital transformations.

Objective O5: To develop a conceptual model visualising the building of digital transformation capabilities.

The fifth research objective entails two research questions.

In order to account for the relational quality of enterprise collaboration platforms and the digital workplace (Star & Ruhleder, 1996), the first research question (O5-Q1) does not look at what digital transformation capabilities are but when. This question will support identifying the elements and processes that, in their entanglement (Scott & Orlikowski, 2014), contribute to the building of digital transformation capabilities.

Question O5-Q1: When are digital transformation capabilities?[1]

The second research question (O5-Q2) of this objective is tightly bound to the previous research question (O4-Q1) and focuses on the visualisation of the building of digital transformation capabilities. Answering this question is expected to enable the coping with the complexity involved in the building of digital transformation capabilities and thereby support researchers and practitioners in the understanding of how the different elements and processes identified from the previous question come together.

Question O5-Q2: How can the ways digital transformation capabilities emerge be visualised?

[1] This is also a philosophical question where a verb (past participle) is excluded to emphasise the interest in being.

Aim			
To identify, investigate, and theorise the ways that enterprise collaboration platforms are changing over time and space and the ways organisations build digital transformation capabilities.			
Objective		**Question**	
O1	To identify and investigate outcomes and benefits expected with the introduction of an enterprise collaboration platform.	O1-Q1	What are the outcomes and benefits organisations expect to achieve with the enterprise collaboration platform introduction?
O2	To identify and examine how enterprise collaboration platform outcomes and benefits are changing over time and the ways organisations manage these changes and related challenges.	O2-Q1	To what extent and how are outcomes and benefits change being addressed in the enterprise collaboration platform literature?
		O2-Q2	How do outcomes and benefits of enterprise collaboration platforms change?
		O2-Q3	What challenges do organisations have to deal with in enterprise collaboration platforms change?
		O2-Q4	What strategies and actions do organisations apply in managing enterprise collaboration platforms change?
O3	To identify and examine how and why enterprise collaboration platform designs are changing over time and space.	O3-Q1	How and why do the uses of an enterprise collaboration platform change across and within different working spheres over time?
		O3-Q2	What actors and factors are attached to the enterprise collaboration platform design and its embedding into the digital workplace over time and space?
O4	To identify and assess the competencies and priority areas in the design of the digital workplace in enterprise collaboration platform projects.	O4-Q1	What are the organisations' competencies and priority areas in the design of the digital workplace?
		O4-Q2	How may the organisations' competencies and priority areas in the design of the digital workplace change?
O5	To develop a conceptual model visualising the building of digital transformation capabilities.	O5-Q1	When are digital transformation capabilities?
		O5-Q2	How can the ways digital transformation capabilities emerge be visualised?

Figure 1-1. Research objectives and questions

Figure 1-1 provides an overview of the research objectives and related questions.

1.3 Outline of this dissertation

Subsequent to the *introduction* in **chapter 1** (including a problem statement and motivation for this research (see chapter 1.1), as well as research aim, objectives, and questions (see chapter 1.2)), the remainder of this dissertation is structured as follows.

Chapter 2 presents the theoretical background of this research. It starts with *digital platforms* (see chapter 2.1); in particular, it discusses social media platforms (see chapter 2.1.1), as well as related enterprise collaboration platforms, including their history (see chapter 2.1) and distinctive characteristics (see chapters 2.1.3). Chapter 2 ends with a conceptual foundation of *Information System (IS) capabilities* (see chapter 2.2). This includes organisational IS capabilities (see chapter 2.2.1), technological IS capabilities (see chapter 2.2.2), and a reflection about how their aspects and dimensions contribute to the reasoning about the research data (see chapter 2.2.3).

Chapter 3 lays out the adopted *research design*, beginning with the *interpretive research philosophy* (see chapter 3.1) and *case study research methodology* (see chapter 3.2). Next, it provides information about how the IT artefact is conceptualised (see chapter 3.3). Following Orlikowski and Iacono (2001), this dissertation enacts *technology as an embedded system* focusing on enterprise collaboration platforms' sociotechnical relations. Chapter 3.4 presents the relevant sociotechnical lenses that are used, encompassing *Information Infrastructure (II)* theory and II compatible concepts and perspectives (interpretive flexibility, design through use, inscriptions, working spheres, biography of artefacts). Additionally, it discusses the notion of *digital transformation capabilities* and their role in studying the relational qualities of enterprise collaboration platforms. Then, it describes the applied *research methods* of data collection and analysis (see chapter 3.5). The applied research methods are linked to the research context providing the space and framework for the data collection (see chapter 3.6). Chapter 3 closes with a presentation of the research phases and steps (see chapter 3.7) and how research quality and ethics are ensured in this dissertation (see chapter 3.8).

Chapter 4 is the first findings chapter. Drawing from multiple case study research, it focuses on diverse routes to enterprise collaboration platform change. First, it examines the *range of enterprise collaboration platform outcomes and benefits* organisations expect to achieve, as well as their *enabling and constraining factors* (see chapter 4.1). Then, the role and influence of *two challenges* in the enterprise collaboration platform change are studied in-depth: *GDPR* and the *works council* (see chapter 4.2). This includes strategies and actions organisations apply to deal with them. Chapter 4 ends with an analysis of the findings from an II perspective (see chapter 4.3), and insights gained into the building of digital transformation capabilities captured in a preliminary conceptual model (see chapter 4.4).

Chapter 5 is the second findings chapter. It concerns the spaciotemporal shaping of one enterprise collaboration platform based on one in-depth longitudinal interpretive case study. Chapter 5 includes three different research strands: development and usage of the *Monitoring Benefits Change (MoBeC) framework* (see chapter 5.2), *inscribed platform uses in and across different working*

spheres over time (see chapter 5.3), and *actors and factors* from multiple time frames and settings *attached to and surrounding the enterprise collaboration platform design* (see chapter 5.4). Like chapter 4, chapter 5 provides an analysis of the findings from an II perspective (see chapter 5.5). Then, the conceptual model of when digital transformation capabilities are and emerge is extended based on the new insights gained (see chapter 5.6).

Chapter 6 is the third and last findings chapter. It draws attention to the broader notion of the digital workplace the enterprise collaboration platform is entangled with. Using multiple case study research, it identifies and assesses the co*mpetencies and priority areas* enterprise collaboration platform using organisations have *in the design of the digital workplace*. For this, a digital workplace assessment method is developed and applied. The digital workplace competencies and priority areas are compared within and across companies and over time (see chapters 6.1 and 6.2). Like the previous findings chapters, chapter 6 concludes with an analysis of the findings from an II perspective (see chapter 6.3). Insights gained into the building of digital transformation capabilities are incorporated into the subsequent theorisation chapter.

Chapter 7 theorises about the building of digital transformation capabilities. The insights gained in all three findings chapters (chapters 4, 5 and 6) are encapsulated to build a final *conceptual model of when digital transformation capabilities are and emerge*. In this way, chapter 7 constitutes one key contribution of this dissertation.

Chapter 8 provides a research conclusion. More specifically, it gives answers to all research questions (see chapter 8.1) and describes the practical and theoretical research contributions (see chapter 8.2) as well as research limitations (see chapter 8.3). Lastly, chapter 8 discusses future work (see chapter 8.4) and concludes the research with final remarks (see chapter 8.5)

Chapter 2
Theoretical Foundations

This chapter presents the theoretical background of enterprise collaboration platforms and related social media platforms. The two platform types are placed in a historical context and contrasted by their digital platform characteristics. Then, this chapter introduces Information System (IS) capabilities and explains how both organisational IS capabilities and technological IS capabilities inform this research about the shaping enterprise collaboration platforms.

2.1 Digital platforms

In recent years, a considerable amount of research on digital platforms has emerged in the Information Systems (IS) field with different types of, perspectives on and proposed conceptualisations of digital platforms and corresponding platform businesses (Constantinides et al., 2018; de Reuver et al., 2017; Ghazawneh & Henfridsson, 2013; Islind, Lindroth, Snis, & Sørensen, 2016; Tiwana, Konsynski, & Bush, 2010). Digital platforms, "created and cultivated on top of digital infrastructures" (Constantinides et al., 2018, p. 381), have come with changes in terms of how and with whom people interact commonly bringing together distinct interest groups within a platform mediated ecosystem (de Reuver et al., 2017; Hein et al., 2018). The typology of platforms by Evans and Gawer (2016) encompasses four different types of digital platforms: transaction, innovation, integrated, and investment platforms. Innovation platforms provide a large number of geographically dispersed people with the technological basis to innovate and produce complementary services or products forming an "innovation ecosystem", e.g. the iPhone. Typically, application programming interfaces (APIs) allow for continuous innovation and growth (P. C. Evans & Gawer, 2016). Transaction platforms, on the other hand, focus on "transactions between different types of individuals and organisations, e.g. different users, buyers or suppliers, who would otherwise have difficulty finding each other [,…such as] Uber [or…] Amazon Marketplace" (P. C. Evans & Gawer, 2016, p. 5). Integrated platforms combine both transaction and innovation features (P. C. Evans & Gawer, 2016). One prominent example is the social media platform Facebook (Tiwana, 2014), where millions of end-users benefit from social networking and different added third-party services, e.g. gaming apps (Alstyne, Parker, & Choudary, 2016), while feeding in their personal data (Gawer, 2014). Investment platforms are a special platform type consisting of companies that have a clear investment strategy in platform companies, "acting as a holding company or a portfolio or a combination of both", such as Softbank (P. C. Evans & Gawer, 2016, p. 15).

Digital platforms are said to be distinct through their "network effects" (McIntyre & Srinivasan, 2017; Parker & Van Alstyne, 2005) describing the phenomenon of increasing platform value with an increasing number of platform participants. Network effects have long been studied before

digital platforms, however, typically in the context of single side markets (Song, Xue, Rai, & Zhang, 2018), such as the telephone network (P. C. Evans & Gawer, 2016). Digital platforms embrace two-sidedness (Parker & Van Alstyne, 2005) and multi-sidedness (D. S. Evans, 2003), i.e. two or more distinct groups of stakeholders interact via a common platform and benefit from same-side and cross-side network effects (Tiwana, 2014). Network effects of the same side arise when an additional platform member on one side, for example a Skype end-user, increases the value to all other members on the same side. In contrast, cross-side network effects occur when value is created to all platform members of one side by one additional member on the other side, for example more developers see the potential to build apps for iPads if more people purchase iPads (Tiwana, 2014).

According to Tiwana (2010), digital platforms constitute an "extensible codebase of a software-based system that provides core functionality shared by the modules that interoperate with it and the interfaces through which they interoperate (e.g. Apple's iOS and Mozilla's Firefox browser)" (p. 675). Thus, digital platforms have built-in capabilities that allow for flexible user extension. They may comprise various modules as "add-on software subsystems" (Tiwana et al., 2010, p. 676) that extend the initial functionality. Over time, value of digital platforms unfolds as they are designed through use (Henfridsson, Nandhakumar, Scarbrough, & Panourgias, 2018; Nitschke & Williams, 2018), where "'use' is no longer a discrete act, but is about actively selecting resources of an offering and configuring them with other resources, or even rethinking their usage and purpose" (Henfridsson et al., 2018, p. 91). Digital platforms are evolving and show generativity in that continuous recombination allow for further developments and transformations (Tilson, Sørensen, & Lyytinen, 2013). Such recombination and activity of platform shaping is due to the exceptional openness of digital platforms that support multiple uses and unanticipated change (Zittrain, 2006). The "greater the heterogeneity [of the platform participants] the more generative the platform becomes" (Yoo, Henfridsson, & Lyytinen, 2010, p. 730). Along with this generative nature, the paradoxical relationships of change and control with digital platforms and digital infrastructures have been discussed (cf. Ciborra et al., 2001; Henfridsson & Bygstad, 2013; Tilson et al., 2010). The *paradox of change* describes the platform requirement to be "simultaneously stable and flexible" (Tilson et al., 2010, p. 753), where stability allows for a solid basis for the enrollment of platform actors and flexibility the open-ended growth (de Reuver et al., 2017; Tilson et al., 2010) reinforcing the value of digital platforms (Bygstad, 2010). The *paradox of control* denotes the platforms' "opposing logics around centralised and distributed control" (Tilson et al., 2010, p. 254). Some control is required to fuel platform generativity allowing for new, possibly unanticipated, innovations; however, extensive control may inhibit generativity (de Reuver et al., 2017) as there may be little incentives for the diverse actors (e.g. developers, content providers) to participate in the platform shaping and develop platform complements (Eaton et al., 2015; Tilson, Sørensen, & Lyytinen, 2011). Unveiling the dynamics of generative change requires unveiling the sociotechnical infrastructural assemblages (W. J. Orlikowski & Scott, 2008) comprising heterogeneous actors and artefacts (de Reuver et al., 2017; Rolland, Mathiassen, & Rai, 2018).

2.1.1 Social media platforms

Social media platforms (e.g. Facebook, LinkedIn, Instagram) are externally hosted and owned platforms that are openly accessible to the public via the Internet (Di Gangi, Johnston, Worrell, & Thompson, 2016; Schubert & Williams, 2013b). They have become an integral part of today's society (Alaimo & Kallinikos, 2017) and been widely adopted both in the private and organisational context (Di Gangi et al., 2016). Already in 2015, a survey of corporate social media use found that 100 per cent of the S&P (Standard & Poor's) 100 firms have one or more social media accounts (Investis, as cited in Demek, Raschke, Janvrin, & Dilla, 2018). Social media platforms feature new forms of social interaction and information exchange (de Reuver et al., 2017; Schwade & Schubert, 2017) and allow for large volumes of user-generated content (Dong & Wu, 2015; Kaplan & Haenlein, 2010). Initially, social media had been primarily viewed as single tools, such as social networking, microblogging, wikis, or content sharing sites used by the public (e.g. Ellison & Boyd, 2013; Kaplan & Haenlein, 2010; Vaast & Kaganer, 2013). However, with the evolvability (Baldwin & Woodard, 2009) and complexity (Tilson et al., 2013) of social media not only in terms of technology but also its embedding into the society, there has been a shift towards the understanding of social media as platforms (Alaimo & Kallinikos, 2017; Williams, Nitschke, & Hardy, 2021). According to Alaimo and Kallinikos (2017), social media platforms are "sociotechnical entities that variously shape user platform involvement and participation" (p. 175). Following the typology of platforms by Evans and Gawer (2016), social media platforms can be of different platform types depending on their specific design and purpose. For example, Twitter, a platform focused on microblogging, can be regarded as a transaction platform in its current form, facilitating exchange and transactions between different platform ecosystem members. It is typically being accessed via mobile devices where textual short message communication to an extensible base of subscribers (followers) is key. While Twitter initially was used largely for interactive communication it is now mainly used for unidirectional (mass) communications including information and news sharing. Now, Twitter can be reached via other platforms and technologies it is affiliated with, such as Google or Facebook (van Dijck, 2012). Facebook itself, as introduced above, is one of the most popular multi-sided social media platforms (Boudreau & Hagiu, 2009). In contrast to Twitter, Facebook can be labelled an integrated platform (P. C. Evans & Gawer, 2016) that extends the interaction function by the inclusion of the innovation function. However, Facebook initially began as a standalone product. Over time, it has evolved into a digital platform (Tiwana, 2014) and today illustrates that digital platforms are not confined to a single purpose of use and a specific group of platform participants. The platform ecosystem builds upon on a shared infrastructure provided by the platform owner Facebook. It comprises various users, including individual end-users utilising the platform to build social profiles and networks, interact with other individuals, act as content providers or consume information (Damianos, Cuomo, & Drozdetski, 2011; Gawer, 2014), firms and professionals using the platform for marketing purposes, recruiting donations, communicating with customers, clients and partners or collecting their data (e.g. to gather product opinions) (Aral, Dellarocas, & Godes, 2013; Guesalaga, 2016; Lackey Jr & Minta, 2012; Suby, 2013; Wakefield & Wakefield, 2016), governmental actors using the platform for campaigning (Andersen & Medaglia, 2009), developers offering third-party applications as platform complements (Tiwana et al., 2010,

p. 676) to end-users (Gawer, 2014), or data analytics companies benefitting from big data for target group analyses or opinion making (Friedman & Bromwich, 2018). Since the launch of Facebook, the uses of the platform have evolved significantly in terms of reach and scope (e.g. added Facebook messenger (Henfridsson et al., 2018) allowing for different platform access types and new uses, increased number and diversity of platform participants driven by network effects (P. C. Evans & Gawer, 2016, p. 6), newly integrated applications, and services or systems (Ghazawneh & Henfridsson, 2013)). In general, social media platforms are not only rapidly transforming but also blurring the boundaries between different social media platforms (Kane, Alavi, Labianca, & Borgatti, 2014).

2.1.2 The emergence of enterprise collaboration platforms from a historical perspective

Researchers in the field of *Computer Supported Cooperative Work (CSCW)* have for some decades been looking at how collaboration in work groups can be supported. CSCW is both concerned with theorising teamwork in the attempt to understand social interaction and with designing, developing, and evaluating the technologies and tools that support collaboration in work groups (M. Koch, 2008, p. 4). The dominant aim has been to improve technologies and tools, labelled as *groupware*, for collaborative purposes (W. J. Orlikowski, 1992a). Although collaboration by means of applications can be traced back to 1945, the term "groupware" was not used until 1978 (Allen, 2004). Peter and Trudy Johnson-Lenz coined the term, describing it as "intentional group processes plus software to support them" (Peter and Trudy Johnson-Lenz, as cited in Allen, 2004, sec. 1980s-Groupware (Part 1)). Based on the wide scope of groupware as means to "communicate, cooperate, coordinate, solve problems, compete, or negotiate" (Balthazard, 2006, p. 114), definitions of groupware evolved along with rapid changes of technologies and with time. The increasing use of personal computers in the mid-1980s led to groupware being increasingly available also to the general public. During this period definitions placed emphasis on computer-based systems that allow groups to collaborate (cf. the definition by Coleman or Ellis, as cited in Allen, 2004). Moreover, the spread of Internet technology in the early 1990s went along with ubiquitous access to groupware. Recently used stand-alone groupware components (e.g. email) were more and more frequently offered as part of suites integrating a number of different groupware functionality (Balthazard, 2006, pp. 115–116). One of the most known products sold under the category groupware was Lotus Notes that came with built-in features (e.g. email, phone book) (Allen, 2004; W. J. Orlikowski, 1992a). From its first release in 1989, it quickly developed into a database system that became more and more powerful. At the time of the third release in 1993, more than 2,000 companies and almost 500,000 people were using Lotus Notes. When IBM purchased Lotus in 1995, the Notes technology began to integrate with the web (IBM developerWorks, 2007). Along with the increasing competition in the market, Microsoft released the messaging server solution Microsoft Exchange Server in 1996 and the personal information manager (PIM) Microsoft Outlook in 1997 combining email, contacts and calendaring with tasks, which also were distributed under the label groupware (Allen, 2004). Marca and Bock (1992) see a conceptual shift from the traditional computing paradigm in which the

computer is used for manipulating and exchanging data to the *groupware paradigm* where the computer serves as a shared space for people to collaborate.

As the use of the term groupware was decreasing, with the invention of the World Wide Web system in 1989 and its open source release in 1993 (CERN, n.d.), *social software*, among others, emerged to describe functions that were based on user-selected filtering and evaluation (Cook, 2008, p. 29). While Drexler does not directly define the term social software, he considers the filtering of information to be linked to social software:

> *"A system that enables users to automatically display some links and hide others […] is filtered hypertext. This implies support for what may be termed social software, including voting and evaluation schemes that provide criteria for later filtering. […]*
>
> *Agents can also implement social software functions – for example -, applying voting-and-rating algorithms to sets of reader evaluations and publishing the results."* (Drexler, as cited in Allen, 2004, sec. kinds of hypertext; agent levels)

By means of voting-and-rating algorithms participants are able to express and share their opinions. In this respect, group communication and collaboration are supported that is similar to the basic idea of groupware. Though, the term social software was not commonly used at this time (Cook, 2008, p. 29). In 1995, the wiki technology was invented, although it had not been referred to social software (Allen, 2004). According to Allen (2004), the core idea of the today's most openly accessible wiki named Wikipedia, that was launched in 2001, was already captured by Bush's ideas regarding the "memex"[2] in 1945:

> *"Wholly new forms of encyclopedias will appear, ready-made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified."* (Back, Gronau, & Tochtermann, 2012, as cited in Allen, 2004, sec. 1940s-Memex)

The term social software increased in popularity when the first Social Software Summit conference was organised by Shirky and held in November 2002 (Cook, 2008, p. 29). The conference was supported by the chat tool "A Really Simple Chat" (ARSC), which was described by Shirky as a social whiteboard that could be used for remote team members to collaborate simultaneously in one virtual space via real-time text communication (Shirky, 2002). In short, Shirky defines social software as "software that supports group interaction" (Shirky, as cited in Allen, 2004, sec. 2000s — Changing Definitions of Social Software). Based on this definition, the task of social software is to support groups in their interaction, regardless of the goals they set. Since then, different understandings about what social software is emerged. For example, Hippner (2006) narrows down the scope by referring to social software as a set of web-based applications that enable people to

[2] See Houston and Harmon's (2007) review of Vannevar Bush and Memex.

exchange information, build relationships and communicate in a social context (p. 7). Here, the focus is on the manifestation of interaction, while taking into account the social context. The aspect of building relationships is also taken up by Coates, who defines social software as "augmentation of human's socializing and networking abilities by software" (Coates, as cited in Allen, 2004, sec. 2000s — Changing Definitions of Social Software). While this definition does not clarify the kinds of overloads and how they may be compensated, it links social software to the building of social networks. Similarly, Raeth, Smolnik, Urbach, and Zimmer (2009) highlight that social software differs from the groupware paradigm, as it is more people-oriented and allows for communities to "emerge instead of being imposed" (p. 2). There are a plethora of definitions that place emphasis on different aspects of social software. Some definitions focus on different social software tools, some on their attributes, and others on the added value by augmenting networks of people (Zeiller & Schauer, 2011). While research has been considered with describing and defining social software, the technology itself has been gaining wide organisational acceptance (M. Koch, 2008). Social Software applications like wikis, chat, weblogs, microblogging, forums, image and video sharing, RSS feeds, bookmarks, pinboards, or opinion polls have been very successful on the Web for more than ten years (M. Koch, 2008; Schubert & Williams, 2013b; Turban et al., 2011; Zeiller & Schauer, 2011). Along with social software a further topic gained increasing interest, namely that of *Web 2.0* demonstrating essential changes of the World Wide Web (Zeiller & Schauer, 2011), such as new possibilities for content syndication, sharing user-generated content, information sharing, or collective intelligence (S. P. Williams et al., 2013). This illustrates a shift from the web as business infrastructure (Web 1.0) to the web in which users add value (Web 2.0) (Fleisch, Weinberger, & Wortmann, 2015). The term Web 2.0 was first put about as part of the first O'Reilly Media Web 2.0 conference in 2004 (Alleen, 2009). It can be described as architecture of participation where users act as content producers (authors), there are mixable data sources, and classical desktop applications are substituted by lightweight services from the Web (O'Reilly, 2007). Large newspaper and magazines were extensively reporting about participation and collaboration of people in the Web and different Web 2.0 applications. Thereby, this term lays the focus not merely on collaboration but also and primarily on the participation of the individual (M. Koch, 2008, p. 7). However, the term was often criticised for being a meaningless marketing buzzword for tools from various vendors, such as Google Calendar, Wikipedia, del.icio.us, Dropbox, or Skype (M. Koch, 2008; O'Reilly, 2007; Zeiller & Schauer, 2011), and was sometimes used as a synonym for social software in the last years (Back, as cited in Jäger, 2014). A more established term for such tools has become *social media*. This term was initially used by several researchers to describe stand-alone social software tools such as wikis, microblogs, social networks or forums and link them to Web 2.0 (e.g. Aramo-Immonen, Jussila, Ilvonen, & Helander, 2016; Bertot, Jaeger, & Hansen, 2012; Meske & Stieglitz, 2013; Treem & Leonardi, 2012; J. Zhang, Qu, Cody, & Wu, 2010). Only recently, with the emergence of large-scale implementations, such as Facebook, MySpace and Twitter, which integrate a set of different social software features and increasingly show an evolving and growing scope in terms of users and purposes of use, researchers started to understand them as one form of digital platforms (*social media platforms*) (Alaimo & Kallinikos, 2017; P. C. Evans & Gawer, 2016). Such platforms have successfully been adopted by millions of users (Statista, 2019) and are said to have transformative impacts on different aspects of businesses,

including marketing, finance, human resource management (Aral et al., 2013) (see also chapter 2.1.1).

The growing use of social software for private purposes, significantly changing the way people communicate and exchange information, triggered the development of and demand for socially-enabled collaboration software in the workplace. In 2006, McAfee, a researcher at the MIT Center for Digital Business, first introduced the term *Enterprise 2.0* (*E2.0*), which he defines as "the use of emergent social software platforms within companies, or between companies and their partners or customers" (McAfee, 2006, as cited in Schubert & Williams, 2013b, p. 224). At the time it was introduced, it mainly referred to the embedding of social software tools known from the Web 2.0 movement (e.g. weblogs) in a corporate context (M. Koch, 2008). Researchers used to describe it as the use of Web 2.0 within the enterprise (cf. Turban et al., 2011). Thereby, E2.0 technologies are bought or built by companies for the use within and/or between organisations (Trimi & Galanxhi, 2014). McAfee (2006) summarises the characteristics of E2.0 technologies by means of the acronym SLATES meaning content that can be searched, linked, authored, tagged, extended, and signalled. However, this acronym can also be applied to social software not used in the business context. He further describes such tools as easy to use and not imposing on users any preconceived notions in terms of work processes. Studies during the late 2000s show that practitioners are unclear about the scope of E2.0 (Frappaolo & Keldsen, 2008). While research on E2.0 had been proliferating, the definition of this term was subject to change as businesses were experiencing a complex and changing technology landscape with a variety of different offers on the market (S. P. Williams et al., 2013, p. 42). In 2011, the exploitation of the collective potential of company staff by using integrated, large-scale implementations of social software in the enterprise context was labelled *Social Business* by IBM (Schubert & Williams, 2013b, p. 223). The introduction of this term helped to differentiate between a concept originally grounded on Web 2.0 (E 2.0) and a concept building on social media (Social Business)[3]. Further, the term was used by IBM for marketing purposes and to create brand value in relation to social software (Reti, 2015; Thielke, 2018). In recent years, the use of social software in the enterprise context has been researched under a variety of different terms (Wehner et al., 2016). They include *enterprise social media (ESM)* (Kane, 2015; Leonardi et al., 2013; Oostervink, Agterberg, & Huysman, 2016; Osch et al., 2015), *enterprise social software (ESS)* (Forstner & Nedbal, 2017; Herzog & Steinhüser, 2016; Kügler, Dittes, et al., 2015; Lehner et al., 2014), *enterprise social networks (ESN)* (Drahošová & Balco, 2016; Mäntymäki & Riemer, 2016; Stei, Sprenger, & Rossmann, 2016; Wehner et al., 2016), or *enterprise collaboration systems (ECS)* (Greeven & Williams, 2017; Schubert & Glitsch, 2015; Schwade & Schubert, 2017; S. P. Williams & Schubert, 2017). The latter is described as a more modern form

[3] The term „Social Business" has a second meaning not considered in this historical perspective of this work. It refers to a kind of business focusing on profit-maximising while pursuing specific social goals (Mesure, 2008).

of groupware (Schubert & Williams, 2013b, p. 224) in that it extends traditional groupware (e.g. email, shared calendar, workspaces) by the inclusion of ESS (e.g. wikis, blogs, social profiles, activity streams) (Greeven & Williams, 2017; Nitschke & Williams, 2020), such as IBM/HCL Connections, Yammer, Atlassian Confluence (Schwade & Schubert, 2017). However, entangled with emerging structures and organisational arrangements (Hanseth, 2000) and being shaped and designed through use (Nitschke & Williams, 2018), they have – similar to openly accessible social media platforms – evolved into large-scale, integrated *enterprise collaboration platforms* (S. P. Williams & Schubert, 2018). Built around an enterprise collaboration system, they have become the "central platform for the digital workplace" (p. 497). After its release in 2007, IBM Connections became the largest, most integrated technological basis for enterprise collaboration platforms (S. P. Williams & Schubert, 2018, p. 480). Its sale along with other IBM software products to HCL technologies for $1.8 billion dollars was announced in 2018 (IBM, 2018) and the transaction closed in 2019 (IBM, 2019). As the transaction was not closed at the time of this research work's data collection, IBM Connections is used in the presentation of the research findings to refer to the enterprise collaboration platform's core ECS and the enterprise collaboration platform created around it.

Figure 2-1 shows the historical path towards *enterprise collaboration platforms* as a research topic and to the *digital workplace* as a related topic impacting society and business.

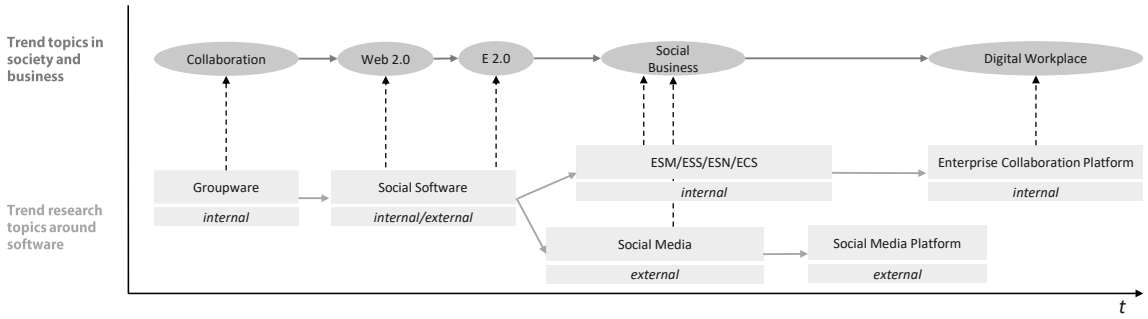


Figure 2-1. The historical path towards enterprise collaboration platforms (own illustration)

Note that figure 2-1 presents a simplified account of which research topics and related topics raised in society and business gained popularity over time. In reality, the topics emerged to some degree in parallel, and the relationships are more complex. For example, *social software* is relevant for *enterprise social software (ESS)*, as the term suggests. However, the term social software became popular after *groupware* and before *ESS* and *social media*. It was discussed as part of *Web 2.0*, which was used to demonstrate the essential changes of the World Wide Web (Zeiller & Schauer, 2011) and *Enterprise 2.0 (E 2.0)*. Another example is the topic of *collaboration*, which is still an issue of enterprise collaboration platforms but developed long before their emergence.

There are many other topics that could be mentioned as part of the historical path but are excluded as they did not gain wider acceptance (e.g. e-collaboration (Fichter, 2005), collaboration 2.0 (Turban et al., 2011), or corporate social software (Stocker & Müller, 2016)).

2.1.3 Distinctive characteristics of enterprise collaboration platforms

While social media platforms have explicitly been addressed in the academic literature on digital platforms (Alaimo & Kallinikos, 2017; Boudreau & Hagiu, 2009; Constantinides et al., 2018; de Reuver et al., 2017; P. C. Evans & Gawer, 2016; Gawer, 2014; Tiwana, 2014), limited attention has been directed towards enterprise collaboration platforms. This may be because digital platforms have been linked to a set of characteristics of which not all may fit enterprise collaboration platforms as described in the following.

While the ecosystem of enterprise collaboration platforms may also be portrayed as the relationship between platform owners, any kind of users and complementors such as third-party application developers, enterprise collaboration platforms cannot be easily classified according to the platform typology by Evans and Gawer (2016). While network effects also seem to pertain to enterprise collaboration platforms in that an increasing user base may increase platform value and support platform adoption within the organisation (Herzog & Richter, 2016; Herzog & Steinhüser, 2016), the study of cross-side network effects (Tiwana, 2014) makes limited sense. In contrast to social media platforms that are external platforms working as a baseline for external innovators, enterprise collaboration platforms are internal and company-specific platforms (Gawer & Cusumano, 2014). This means they have different characteristics in terms of "access" and "ownership": Social media platforms are openly accessible via the Internet for potentially any Internet user while enterprise collaboration platforms are used within the enterprise context and can only be accessed by authorised users (Schubert & Williams, 2013b; Schwade & Schubert, 2017). Access to the enterprise collaboration platform's underlying enterprise collaboration system (ECS) is enforced either by hosting the platform behind the company's firewall or by using/contracting dedicated hosted solutions (Leonardi et al., 2013; Schubert & Williams, 2013b). However, enterprise collaboration platforms are not to be seen as single instances of Information Technology (IT) but can be viewed as large-scale heterogeneous platforms (de Reuver et al., 2017). They are geographically distributed installations encompassing multiple contexts and time frames. Following Williams and Schubert (2018), they bring together three levels of structure. The *platform level* draws attention to the platform's broader role for the whole of the organisation. Authorised users, as controlled by the organisation, are typically different stakeholder inside (including users from subsidiaries and acquired firms) but also from outside the organisation (e.g. business and project partners, clients, contractors, marketing agencies) interacting with the organisation and its organisational members via the platform. The enterprise collaboration platform typically can be accessed location and device independent (e.g. via desktop or smart mobile devices) and be used to support various work areas and practices. Usually, different groups and members of the organisation can shape the enterprise collaboration platform, e.g. they can create ECS communities on the enterprise collaboration platform (as part of the platform, they can also be referred to platform communities). The *community level* focuses on the different types of platform communities to support various purposes of use (e.g. team organisation, inter-site collaboration, sales opportunity handling, human resources organisation (Nitschke et al., 2019; Schubert & Glitsch, 2016)) that emerge on the enterprise collaboration platform. Such platform communities may range from one member to many thousands of members. Finally, the *content level* accumulates the artefacts and

documents that are being created on and added to the enterprise collaboration platform with different software components and features from the core ECS (e.g. wikis, blogs, forums, tags) and additional complementary functionality. The content level provides further insights into the everyday work of collaboration within the organisation, including the building of coordination mechanisms (CM) (Nitschke & Williams, 2018; Y. Rogers, 1993; Schmidt & Simone, 1996) and awareness mechanisms (AM) (Cabitza, Simone, & Sarini, 2009; Dourish & Bellotti, 1992; Gutwin & Greenberg, 1996).

As *internal platforms* used within organisations (Tilson et al., 2013), the paradox of change and to some degree of control (Tilson et al., 2010) may also be observed with enterprise collaboration platforms. Unlike social media platforms, where organisations as end-users, employing the platform e.g. for marketing purposes or communicating with customers (Aral et al., 2013; Lehner & Fteimi, 2013), have little control over the platform, enterprise collaboration platforms are owned and used by their organisations that can exert control over the platform in terms of its "set of [software] subsystems and interfaces" (Meyer & Lehnerd, 1997, p. 39). Introduced as pure "ECS vanilla implementation" into the organisation, they quickly grow and connect to emerging structures and organisational arrangements (Hanseth, 2000), requiring a platform understanding to include not only the core ECS but also account for the complex sociotechnical relations. There is no standard enterprise collaboration platform that organisations can implement. Typically, the range of built-in groupware and social software modules and functions of the enterprise collaboration platform is extended over time by in-house or outsourced IT support through the inclusion of "federated services such as system-wide search and user management […and the integration of] other business systems […including] traditional process-based systems" (S. P. Williams & Schubert, 2018, p. 481), such as ERP systems (Gewehr et al., 2017). Third party integrations with the core ECS, such as HCL Connections with Microsoft Teams, are possible (HCL Software, 2020). In this way, the APIs support generativity (Tilson et al., 2010). In line with the understanding of digital platforms, enterprise collaboration platforms are malleable and evolving (Baldwin & Woodard, 2009; Richter & Riemer, 2013). However, at the current point in time, the single authorised end-users, whether from inside or outside the organisation, may have limited possibilities as to extend the core functionality by developing and adding complementary products or services (Baldwin & Woodard, 2009; Gawer, 2014); still they are flexibly participating in the platform's *design through use* (Brandes et al., 2009; Nitschke & Williams, 2018; Tchounikine, 2017) by largely configuring and building their own platform communities. While the extension of functionality may only happen within the framework of defined permissions, platform integration and flexibility will become more important in future (Gewehr et al., 2017) and may increasingly involve end-users. Already, available functionality may be employed by end-users in multiple and often unforeseen ways (Nitschke & Williams, 2018). In this way, the collaboration platform with its single workspaces (platform communities) and their contents may evolve where different purposes of use may be (temporally) inscribed (Akrich & Latour, 1992; Hanseth & Monteiro, 1997; Nitschke & Williams, 2018). Additionally, the platform may show multiple coexisting perspectives that users (Mark & Poltrock, 2004) might form in terms how the platform can support their work in their local contexts (Dourish, 2003; Iacono & Kling, 1999; Pipek & Wulf, 2009).

In this dissertation, the term enterprise collaboration platform is used not only to combine the ideas of groupware and ESS but also to point to its sociotechnical complexity and evolvability. To ground the research from a theoretical perspective, this research work draws on the theoretical work of *information infrastructures (II)* that resembles a variety of conceptual ideas of digital platforms and digital infrastructures while having "no strict limit between what is included […] and what is not" (Hanseth & Lundberg, 2001, p. 349). The notion of II and how it guides this research is elaborated on in the research design section (chapter 3).

2.2 Information System (IS) capabilities

Information Systems (IS) capabilities have widely been researched (M. H. Jensen & Bækgaard, 2016), with an often made distinction between *organisational capabilities* focusing on the capabilities of human beings and organisations to leverage and use information technology, and *technical capabilities* focusing on what information technology "offers to the social and technological environment in which it exists" (M. H. Jensen & Bækgaard, 2016, Chapter 4).

The notion of socio-technical IS capabilities, which takes account of organisational and technical capabilities, has not extensively been studied yet (M. H. Jensen & Bækgaard, 2016). Jensen and Bækgaard (2016) see a lack of socio-technical frameworks that incorporate organisational capabilities, technological capabilities, as well as their relations. As a first step towards such a framework, Jensen and Bækgaard (2016) conducted a literature review to explore different notions of organisational and technological IS capabilities under the socio-technical perspective. In the following, the findings by Jensen and Bækgaard (2016) are used to structure the different types of IS capabilities.

2.2.1 Organisational IS capabilities

The research stream of *organisational IS capabilities* addresses what "organizations and human beings can do" (M. H. Jensen & Bækgaard, 2016, Abstract). In this way, organisational IS capabilities deal with the capabilities of human beings to leverage the capabilities offered by digital technology (M. H. Jensen & Bækgaard, 2016). Researchers examining organisational IS capabilities often draw on the resource-based view and dynamic capabilities to explain firm performance and competitive advantage (e.g. Andreu & Ciborra, 1996; Eisenhardt & Martin, 2000; Salunke, Weerawardena, & McColl-Kennedy, 2011; Teece, 2012). Often, theories are combined with other theories or extended to provide a multi-sided view on IS capabilities. In the following, the *resource-based view of the firm* and *dynamic capabilities* are elaborated. This is followed by an alternative perspective of organisational IS capabilities, namely that of collective capabilities as presented by Aanestad and Jensen (2016).

Resource-based view of the firm

The *resource-based view (RBV)* is a commonly applied framework to explain how *competitive advantage* is achieved and sustained (Eisenhardt & Martin, 2000). The focus is on the firm's internal organisation and its resources and capabilities (Andreu & Ciborra, 1996; Eisenhardt & Martin, 2000). Paying attention to the *firm's resources and capabilities* allows understanding and formulating its business strategy (Andreu & Ciborra, 1996). RBV builds on the assumption that firms have a bundle of resources that are different from other firms but remain stable over time. When such resources are valuable, not imitable and substitutable, sustainable competitive advantage can be achieved through unique value-creating strategies (Eisenhardt & Martin, 2000). According to RBV, IT capabilities, defined by Sambarmuthy and Zmud (2000) as "combinations of IT-based assets and routines that support business conduct in value-adding ways" (p. 108), are

seen as the potential source of a firm's competitive advantage (e.g. Barney, 1991; Bhatt & Grover, 2005; Dierickx & Cool, 1989; Peppard & Ward, 2004; Wernerfelt, 1984). Based on the assumption of organisational capabilities as IT-enabled, Benitze-Amado and Walczuch (2012) introduce the organisational capability of the "proactive corporate environmental strategy". Such proactive corporate environmental strategy, they argue, may be enabled by IT capability and could significantly determine the business value of IT. The authors accept the existing research assumption that the implementation of environmental strategies may be supported in deploying other resources and capabilities. Other resource-based variables may be international experience, employee involvement or innovativeness.

Generally, RBV has been critiqued for being conceptually vague and not appropriately paying attention to how resources actually make for competitive advantage (Eisenhardt & Martin, 2000, p. 1106). In the following, three RBV based conceptual approaches are described in more depth to shed light on accounts of how resources can be used to achieve goals, value and competitive advantage.

Drawing on RBV, Peppard and Ward (2004) study how value can be generated and leveraged by organisations from information systems and technology (IS/IT). They propose the concept of IS capability and contend that value can be created based on the organisation's *competencies to develop, mobilise and use their resources*. Through focused IS/IT investments and deployment of their competencies, they can achieve capabilities. Their concept of IS capabilities assumes that an organisation can only constantly achieve "astute assessment of the impact of IS/IT and accurate alignment of IS/IT investments with business strategies" if they employ a track record of successful implementation allowing them to develop a complete set of IS competencies (2004, p. 188). Based on this assumption the IS capabilities concept requires a focus on the ways IS/IT is managed as well as learning from successes and failures.

Galavan (2015) builds on RBV, among others, to define the path from resources to corporate goals and objectives, respectively. According to the author, resources are "The stocks of tangible and intangible assets that are available to the organisation" and under its control (p. 3). Resources can be combined and used to deliver outcomes. The singular use of resources is different to the combination of resources relevant for the management of organisations. However, resources as a standalone component do not deliver anything. Thus, Galavan (2015) defines competencies[4] as "The *collective organisational routines used to deploy resources*" (p. 3) that need to be in place. This means that competencies are not based on individual action but on complex interactions between individuals and are the sum (collective interactions). Capabilities represent the next

[4] In IS research, both "competences" (see, e.g. Galavan) and "competencies" (see, e.g. Peppard and Ward) are used, however, the spelling "competencies" has been adopted more widely. Therefore, and for the purpose of consistency, this research uses the term "competencies".

element towards the realisation of goals; they are defined as "The capacity to deploy a combination of resources through collective organisational routines to a achieve a goal" (p. 3). Capabilities are shaped by collective routines and can be static (highly codified routines that use known resources) or dynamic (capabilities that allow organisations to react to changing requirements and learn from experiences, among others).

Building on RBV of the firm, Andreu and Ciborra (1996) focus on the *learning aspects* that are involved in the capability development and the related contribution of IT. According to the authors, IT plays an essential role in the transformation of resources into capabilities and eventually into core capabilities, which are distinctive capabilities differentiating a company strategically (p. 112). With this role, IT "can become – embedded in core capabilities – an active component of the firm's competitive advantages" (p. 111). In order to improve the IT effectiveness in organisations, Andreu and Ciborra (1996) propose an organisational learning model (see figure 2-2). This model visualises capability development with an emphasis on *situated learning and knowledge accumulation*. According to the authors, *capabilities* "*unfold […] 'naturally' embedded in an organisational context* that is both determined by and determinant of learning" (p. 111).

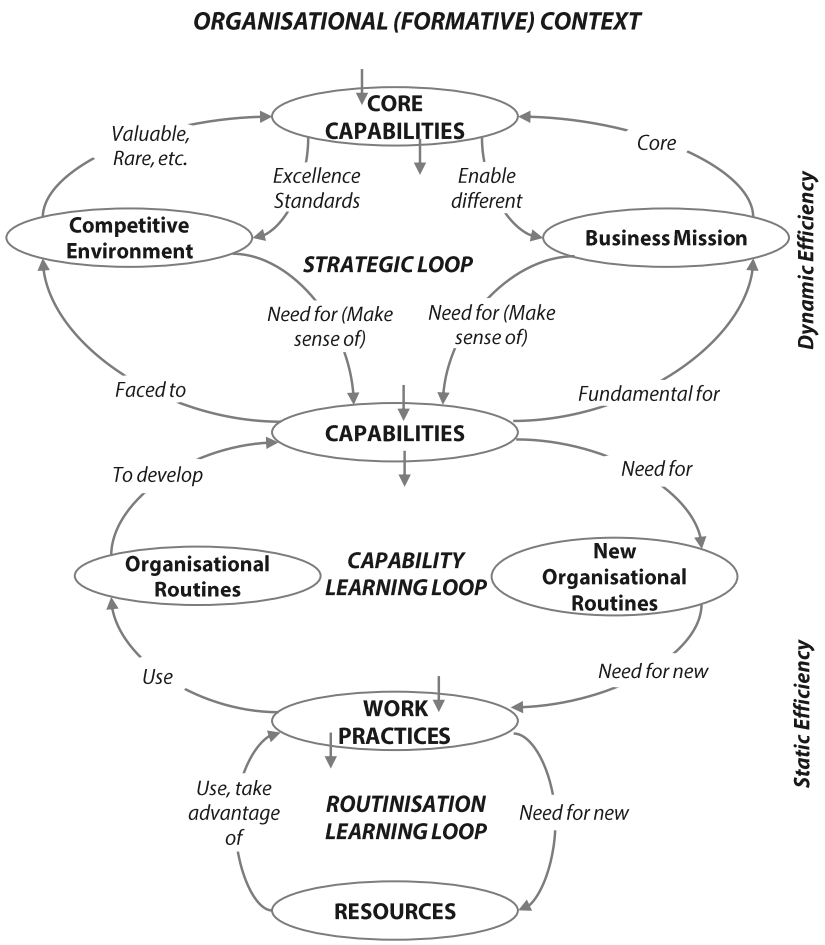


Figure 2-2. Learning in the capabilities and core capabilities development processes (Adapted from Andreu & Ciborra, 1996, p. 116)

Following RBV of the firm, core capabilities can emerge in organisations when *undifferentiated resources are used and combined within the organisational context* including *organisational routines*. The transformation process embraces a *path-dependent learning process*, i.e. the degree of path dependency increases over time with unique results to the firm. Organisations develop capabilities by combining and using existing resources, such as IT, with the support of organisational routines.

Andreu and Ciborra (1996) describe such organisational routines as a particular *way of doing* based on organisational knowledge that is acquired through organisational learning. According to the authors, learning is *embedded in the organisational routines* and guides the combination and usage of resources for the development of capabilities.

When standard resources are transformed into capabilities, two different types of learning are involved: The first type of learning deals with the use of standard resources to build efficient work practices. When new resources (assets), such as a new technology, appear, organisational members can benefit from them through new work practices. New work practices result from what they call the *routinization learning loop*. The organisational context influences and is influenced by the learning process. Andreu and Ciborra (1996) compare such work practices, being concrete, detailed,

specific and operative, with the concept of skills. An example of this type of learning may be the mastering of the use of a spreadsheet in a specific department.
The second type of learning addresses the development of capabilities from existing work practices. For this, work practices and organisational routines need to be combined. The capabilities that emerge incorporate generalizing work practices and placing them in a wider context. Again, a learning loop is required, which the authors name *capability learning loop*. In the development of capabilities, needs for new organisational routines that are required for the work practices may emerge.
Based on these two types of learning, Andreu and Ciborra (1996) link learning to a constantly improving set of capabilities. While the purposes the resources are used for are considered static, the way how they are achieved may change. The authors assign static efficiency as the motivation for continuous capability improvement.
As part of the *strategic learning loop*, where capabilities develop into core capabilities, both the business mission and the competitive environment are important. The business mission is fundamental for the identification of core capabilities. It helps assign meaning to the capabilities that, in turn, can enable new missions. When such new missions get accepted, they may trigger new capabilities. Considering the competitive environment, organisations can learn why some capabilities have strategic potential (rare, valuable etc.). The strategic learning loop is shaped by and shaping the organisational context. By understanding which capabilities are core and why, organisations can search for new organisational routines and resources.

Dynamic capabilities

Because the exclusive use of RBV provides largely a static picture, it is often combined with the notion of dynamic capabilities (M. H. Jensen & Bækgaard, 2016) that have widely ben defined as "the *firm's ability to integrate, build and reconfigure internal and external resources to changing environments*" (Teece, Pisano, & Shuen, 1997, p. 516). For example, Benitze-Amado and Walczuch (2012) use the concept of dynamic capabilities to include the notion of *changing environments*. Also, Eisenhardt and Martin (2000) combine RBV and dynamic capabilities which they conceptualise as

> *"a set of specific and identifiable processes by which managers integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organisational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die."* (Eisenhardt & Martin, 2000, p. 1107).

Focusing on the use of resources to generate new resource configurations this understanding of dynamic capabilities is similar to that by Teece, Pisano and Shuen (1997). Dynamic capabilities integrating resources are, for instance, product development routines or strategic decision making that integrate various skills and expertise. An example of a dynamic capability that reconfigures resources within firms is the capability to routinely create new products by copying, transferring and recombining knowledge-based resources from earlier product development projects. By

contrast, dynamic capabilities that are linked to gaining and releasing resources are, for example, knowledge-creating routines to establish new ideas and thinking within the firm, or alliance and acquisition routines to gain new resources from external sources (Eisenhardt & Martin, 2000, pp. 1107–1108). Eisenhardt and Martin (2000) highlight the role of *market change* that may be determined by and determinant of dynamic capabilities. They postulate that in moderately dynamic markets dynamic capabilities are "stable processes with predictable outcomes" (p. 1105), whereas in *high-velocity markets* they are "experiential and fragile processes with unpredictable outcomes" (p. 1105). In such high-velocity markets, dynamic capabilities evolve through *learning mechanisms* that cover, among others, *practice and mistakes*. *Knowledge is created in situation* and *organisations and people adjust their actions* based on real-time information (Eisenhardt & Martin, 2000, pp. 1111–1112). However, according to the authors, dynamic capabilities may also be common across firms with seemingly superior effectiveness. They agree with the notion that the specifics of any given capability may be unique in a firm (e.g. the way a cross-functional development team is exactly composed) and exhibit path dependence as they emerge. Though, they assume that 'best practice' for particular dynamic capabilities can be present across firms.
Butler and Murphy (2008) use dynamic capabilities as a framework to study the *conditions and factors that have formed business and IS capabilities* in a small and medium-sized software enterprise (SMSE). Following Eisenhardt and Martin (2000), among others, they define dynamic capabilities as

> *"those firm-specific processes or routines that integrate its activities, promote learning, and help firms build, reconfigure and transform its asset / resource positions (tangible and intangible), processes, and structures in order to deliver products and services that are of value to all stakeholders, both internal and external"* (Butler & Murphy, 2008, pp. 331–332).

This definition does not link dynamic capabilities with market changes but highlights the products and services that can be generated and be of value to all stakeholders of a firm. Still, referring to Teece and Pisano (1998), Butler and Murphy (2008) acknowledge the *role of the shifting economic environment*, e.g. decreasing time to market, environmental uncertainty caused by politics, or market entry barriers due to technological change, for dynamic capabilities. To study the creation, development, and application of business and IS capabilities in SMSEs and their relationship with firm performance, Butler and Murphy (2008) use Wheeler's net-enabled business innovation cycle, a variant of dynamic capabilities theory. According to this theoretical model, the capabilities of a firm are influenced by its history and are "knowledge in action" (p. 333). Valuable business and IS capabilities are not only dynamic but depend on a *firm's ability to learn*. From a case study, the authors identify 17 capabilities, for example, "facilitating a culture where innovation is encouraged and rewarded" or "the ability of IT professionals to […] apply IT skills in new programming languages, […]" (p. 341). Similarly, building on capability theory, Hogan, Soar, McColl-Kennedy, and Sweeney (2011) show that competitive advantage relies on the *ability to deploy resource assets*, e.g. physical, human or knowledge assets, effectively. Capabilities, as *path-dependent routines and information-based processes*, are achieved through *learning-by-doing*. This means that capabilities are not only assets (M. H. Jensen & Bækgaard, 2016), such as physical, human, or knowledge assets.

Collective capabilities

Aanestad and Jensen (2016) see the need to investigate how information systems (IS) evolve and are continuously adapted as challenges occur that IS users have to deal with, and the organisational capabilities that such IS require. By paying attention to the *evolutionary nature of IS and required capabilities* IS managers can be supported in the handling of the *continuous post-implementation adaption of IS*. As IS are in use, a variety of changes may come about after the initial implementation. Such changes may range from the exploitation of system functionalities as experiences with the system are collected, system upgrades extending the corpus of functionality, the integration into continuously evolving information infrastructures and changes in the broader context (in regulatory or market demands impacting IS design). With everyday changes not being organised as part of projects with set deadlines and milestones, organisations and their IS users are *confronted with uncertainty and ambiguity*. In order to deal with such changes and related challenges, certain capabilities are needed (2016, p. 13). In their empirical study on a change process around the implementation of a document scanning solution initiated two years after the initial implementation of an Electronic Health Record (EHR) system, Aanestad and Jensen (2016) focus on the

> *"capability of remaining 'aware of something that may be important' (Merriam Webster's definition of mindful) in an open and undefined situation, where the organisational setting deems that this awareness goes beyond the individual to encompass the collective setting — a capability we name "collective mindfulness.""* (Aanestad & Jensen, 2016, p. 14).

Following this, the authors assume that organisations may find themselves in an *open and undefined situation* in the IS post-implementation, where the capability, not of the individual but the *collective*, is required of being *aware of and sensitive to the organisation's situation and current operations*. They name such collective capability "collective mindfulness". In order to describe collective mindfulness, Aanestad and Jensen (2016) study the challenges IS users are confronted with and the *actions taken to address such challenges* in the IS post-implementation. According to the authors, a mindful organisation is able to *anticipate the unexpected*, which requires the *preoccupation with failure and attention to interpretations and explanations*. Further, it is able to contain or minimise the unexpected as it occurs. This implies that a mindful organisation is able to *deal with problems as they develop* not through careful planning and routine but *improvisation* and *adaption* including *learning from mistakes and surprises,* as well as the appropriate *use of extant expertise and experience* within the organisation.

The study by the Aanestad and Jensen (2016) reveals that the scanning project came along with profound redesign of work processes and routines, "the redesign process was largely delegated to the users" (p. 17). Still, *uncertainties were handled collectively*. By drawing on sensemaking theory, Aanestad and Jensen (2016) identify how collective mindfulness is achieved. Specifically, they refer to *sensemaking* theory by Weick and colleagues to "capture the users' interpretations and actions when *facing unexpected and confusing events*" (p. 17). Weick, Sutcliffe, and Obstfeld (2005) describe sensemaking as a process that incorporates "the *ongoing retrospective development*

of plausible images that rationalize what people are doing" (p. 409). In this way, *meaning is created as people interact with the stream of circumstances*. The process of sensemaking is social, where *past experiences and current practices have a reciprocal relationship* and are *intertwined with further action and interpretation*. Aanestad and Jensen (2016) claim that a variety of studies exist which examine the ways technologies are enacted in the specifics of the organisational contexts, including the continuous production of meaning and actions, but which focus on the early phase of IS implementation. They argue that sensemaking also encompasses the IS post-implementation. In the empirical study by Aanestad and Jensen (2016), the sensemaking process included, among others, *collectively finding solutions* for the scanning processes and requirements in the different departments and reframing related work processes (e.g. type of documents, responsibilities within the scanning process, different handling and distribution of different documents). As part of this, various *external constraints* (e.g. keeping paper documents for legal reasons) and *technical constraints* (e.g. no technical support of appending after-sent medical documents to previously scanned referral letters) needed to be detected and addressed.

2.2.2 Technological IS capabilities

The research stream of *technological IS capabilities* looks at "*what technology is capable of and what it offers to the environment in which it is embedded*" (M. H. Jensen & Bækgaard, 2016, Chapter 3). In this way, technological IS capabilities deal with the *capabilities of digital technology* that it offers to its social and technological environment. While studies belonging to the stream of organisational IS capabilities employ different theories and perspectives, they do not explicitly focus attention on artefacts of systems themselves. This is addressed by studies of the stream of technological IS capabilities that aim to define technical capabilities (M. H. Jensen & Bækgaard, 2016, Chapters 2.2, 4).

With a constantly shifting ecosystem in which digital artefacts are embedded, Kallinikos, Aaltonen, and Marton (2013) characterise *digital artefacts as increasingly editable, interactive, reprogrammable, and distributable*. This means that they feature *modularity and granularity* that *afford generativity* of digital technology. According to the authors, digital artefacts are in a "state of flux", i.e. they are *constantly changing and transfiguring*, which "renders the value and utility of these artifacts contingent on shifting webs of functional relations with other artifacts across specific contexts and organisations" (p. 357). Because of this, the shaping of digital artefacts is controlled by a range of dispersed stakeholders so that their management is technically and socially complex.

Nevo and Wade (2010) built on systems theory and RBV for a conceptual model that *links IT assets with firm-level benefits*, i.e. more specifically that addresses the path from IT assets to sustainable competitive advantage. The path assumes that IT assets "can play a strategic role when combined with organisational resources for the purpose of creating IT-enabled resources" (p. 117). The authors claim that synergy can be achieved when there is a compatibility between the IT asset (e.g. communication and decision-making enabled by a group support system) and the organisational resource (e.g. team's cultural norms, working routines, level of expertise). Similarly, Kohli and Grover (2008) pay attention to the *relationship between IT inputs and economic outputs* and found

that convergence between desired business capabilities and IT capabilities must be effective in order to achieve a wide repertoire of value.
In their study, Hanseth and Lyytinen (2010) propose a design theory that addresses dynamic complexity inherent in the design of information infrastructures. They define information infrastructures, e.g. the Internet or industry-wide Electronic Data Interchange (EDI) networks, as "shared, open, heterogenous and evolving socio-technical system of Information Technology (IT) capabilities" (p. 1) (see chapter 3.4.1). The authors assume the recursive nature of information infrastructure, i.e. they are recursively formed by other *infrastructures*, *platforms*, *applications,* and *IT capabilities*. Like Kallinikos et al. (2013), Hanseth and Lyytinen (2010) assume that control, in this case of information infrastructures, including their IT capabilities, is emergent and distributed. They define *IT capability* as "the possibility and/or right of the user or a user community to *perform a set of actions on a computational object or process*" (p. 2). An example they provide for such a capability is a text editor which can be viewed solely as an engineered artefact. Suites of IT capabilities are bundled in *applications* that are designed to serve certain user needs. This is determined by a priori decisions regarding design context, user groups and functional goals. While applications can become more complex, their design scope is confined. In contrast to single applications, *platforms*, such as office software platforms or operating system platforms, are heterogeneous with a growing user base. Their "design context is not fixed due to the constant generification of included IT capabilities" (Williams and Pollock, 2008, as cited in Hanseth & Lyytinen, 2010, p. 4).

2.2.3 Summary and reflective account of IS capabilities

IS capabilities have largely been subdivided into organisational IS capabilities and technological IS capabilities. This means the focus is typically either on the organisations and humans and what they can do with IT or on what IT is capable of and can offer to its environment. In this way, social and technical aspects are incorporated in both perspectives of IS capabilities, but the focus is on one of the two.

Three research fields of *organisational IS capabilities* have been presented in chapter 2.2.1: resource-based view (RBV) of the firm, dynamic capabilities, and collective capabilities.
RBV is interested in explaining how firm performance can be increased and competitive advantage achieved through deploying available/new valuable resources, competencies and value-creating strategies. It is often argued that IT capabilities, i.e. IT-based assets and routines, contribute to firm performance by enabling organisational capabilities (Eisenhardt & Martin, 2000), e.g. information management, service innovation or process management capabilities. In order to explain the process of how organisational IS capabilities emerge and competitive advantage can be achieved, a few researchers include competencies, learning mechanisms, routines, or the organisational context (e.g. Andreu & Ciborra, 1996; Galavan, 2015; Peppard & Ward, 2004). Such factors cannot be disregarded when trying to understand how organisations aim to leverage the IT capabilities of enterprise collaboration platforms and attain the best out of the platform to generate value. While firm performance or competitive advantage are important aspects to be addressed, the focus of this research is on how enterprise collaboration platforms are shaping and being shaped over time and

space to understand the processes and complexities involved in the building of capabilities. Specifically, this research regards how digital transformation capabilities emerge that support the management of enterprise collaboration platform enabled change and deal with the ambiguity that comes along with the enterprise collaboration platform implementation and use.

Dynamic capabilities are often combined with RBV and are used to explain how resources develop along with changing environments. Specifically, dynamic capabilities are concerned with the integration, building, and reconfiguring of internal and external resources. Researchers typically provide examples for such dynamic capabilities, e.g. a dynamic capability to integrate resources may be strategic decision making or a dynamic capability to reconfigure resources may be the capability to routinely create new products (Teece et al., 1997). Products and services are expected to be generated through dynamic capabilities and of value to all stakeholders of a firm (Butler & Murphy, 2008). Often, the role of market change is observed as being determined by and determining dynamic capabilities. Eisenhardt and Martin (2000) notice that in high-velocity markets, dynamic capabilities evolve through learning mechanisms covering practice and mistakes, and knowledge which is created in situation and as people adjust their actions based on real-time information. This is also supported by other researchers who highlight the role of knowledge and learning (e.g. Butler & Murphy, 2008; Hogan et al., 2011). As it is sometimes the case for the RBV research field (e.g. Andreu & Ciborra, 1996), dynamic capabilities consider the history of an organisation, i.e. a firm's capabilities and related learning are also considered a product of its history (path dependency) (e.g. Butler & Murphy, 2008; Teece et al., 1997). This research does not address market changes; however, it draws attention to external situations and events that shape the evolution of enterprise collaboration platforms, as well as the various actors participating in the platform designs over time and at different locales.

Collective capabilities, as introduced by Aanestad and Jensen (2016), help deal with changes and related challenges in the IS post-implementation. The authors coin the term "collective mindfulness" to denote the collective capability of being aware of and sensitive to the organisation's situation and current operations. A mindful organisation has the ability to anticipate and deal with unexpected changes and events, which, according to Aanestad and Jensen (2016), requires taking into account interpretations, dealing with failure and learning from mistakes and surprises. Collective mindfulness is particularly required when an IS post-implementation comes along with uncertainty and openness to the IS evolution. It involves expertise and experience and often requires improvisation. History is also considered by collective mindfulness in that past experiences and current practices have a reciprocal relationship and are intertwined with further action and interpretation. In order to capture the interactions and actions of IS users when being confronted with the unexpected, Aanestad and Jensen (2016) make use of sensemaking theory, which includes collectively and actively finding solutions and making decisions. In this research, it is also of interest to examine and understand the different challenges that emerge with the enterprise collaboration platform change and how organisations and users of the platform deal with them. As enterprise collaboration platforms offer interpretive flexibility and are designed through use, it is also of interest to capture the unexpected (e.g. new outcomes and benefits or constraints to platform design that emerge). However, in this research, it is assumed that it is not always about the active and collective engagement with challenges and development of plans. Instead, enterprise

collaboration platforms are shaped and shaping at different levels which may include the organisation, teams or even the individual who face unique challenges and participate in the platform design with or without collective platform decisions.

In contrast to organisational IS capabilities, *technological IS capabilities* (see chapter 2.2.2) regard system artefacts. This research stream aims at identifying and defining their technical capabilities. Digital artefacts that typically allow users to perform a set of actions are embedded in a constantly shifting ecosystem with more and more stakeholders having control over them. This means that digital artefacts are not static and are both technically and socially complex. IT capabilities can be linked and comprised in applications and platforms with a heterogeneous user base. Research interest has been, among others, on the compatibility and functional interaction between different digital artefacts (e.g. Kallinikos et al., 2013; Nevo & Wade, 2010) or on issues of design (e.g. Hanseth & Lyytinen, 2010); the latter of which also includes users' needs concerning digital artefacts and what it is capable of. In this research, the technological capabilities of the enterprise collaboration platform and related digital artefacts are considered. Nonetheless, they are not at the centre of interest and are not seen as the explanans (the thing doing the explaining) (Thomas, 2011) of the building of digital transformation capabilities. In order to understand how digital transformation capabilities emerge, it is considered essential to give attention to the intertwining of the social and the technical.

A description of how IS capabilities are used in this research to examine the building of digital transformation capabilities is provided in chapter 3.4.2.

Chapter 3
Research Design

This chapter describes the research design adopted for this research. It shows the specific study design choices that have been made based on the research aim *to identify, investigate, and theorise the ways that enterprise collaboration platforms are changing over time and the ways that organisations build digital transformation capabilities*, and the related research objectives and questions. Figure 3-1 provides an overview of the applied research design from research philosophy to methodology to theoretical and analytical lenses.

Research Philosophy	
Interpretivism (Chua, 1986; Orlikowski & Baroudi, 1991): Reality and our knowledge thereof are social products and cannot be understood independent of the social actors who construct and make sense of the reality.	
Ontology (nature of reality)	Social reality is constructed and reproduced through continually happening interactions. Interpretations of reality change over time and meanings are formed and negotiated. (Social constructionism: reality itself is a social construction) (Orlikowski & Baroudi, 1991; Alvesson & Sköldberg, 2009)
Epistemology (how we know what we know)	Meaning is not discovered but constructed, i.e. knowledge is constructed by actors through interaction with the world. (Social constructionism: knowledge is socially constructed) (Alvesson & Sköldberg, 2009)
Methodology	Qualitative case studies: The focus is on learning through the generation of context-dependent knowledge. One in-depth longitudinal case study will be conducted and complemented by multiple case studies with comparative elements (multiple snapshots at different times) to facilitate the learning process.
Data Collection Methods	Interviews, surveys, focus groups
Data Analysis Methods	Data iteratively analysed and collected guided by the research questions; use of qualitative content analyses (coding), drawing out patterns from case insights, narrating and interpreting the situations that are being investigated, descriptive statistics and data visualisation
Theoretical and Analytical Lenses	Theories and methods of and perspectives for studying sociotechnical change

Figure 3-1. Overview of the research design adopted in this research.

A holistic approach encompassing multi-method research enabling the study of shifting units of analysis is taken (de Reuver et al., 2017; Walsham, 2006) as per the elaboration below.

3.1 Research philosophy

The research purpose is neither to study uni-directional cause-effect relationships nor to increase predictive understanding. Instead, the key purpose of this work is to understand the deeper structure of enterprise collaboration platform change. This dissertation adopts the interpretive research philosophy according to Chua (1986). Thereby, social reality is ontologically constructed and reproduced through continually occurring interactions. Consequentially, interpretations of reality change over time along with ongoing interactions in which meanings are formed and negotiated (W. J. Orlikowski & Baroudi, 1991, pp. 13–14). This ontological assumption also reflects the way enterprise collaboration platforms are shaping and being shaped along their dynamically evolving complex sociotechnical relationships. Meaning of enterprise collaboration platforms has to be formed by the platform participants interacting with the platform and with each other at different frames and settings, where the interpretive flexibility afforded by the enterprise collaboration platforms offers a great space for negotiation (Bijker & Law, 1992; Doherty et al., 2006). The platform "both shapes and is shaped by the conventions of a community of practice " (Star & Ruhleder, 1996, p. 113). By adopting an interpretive research perspective, interpretations of reality may shift as context and settings change over time.

Epistemologically, understanding social processes warrants getting "inside the world of those generating it" (Rosen 1991, as cited in W. J. Orlikowski & Baroudi, 1991, p. 14). Although this study rejects the capability of completely getting inside other's worlds, it strives to make sense of what can be captured from these worlds. According to Putnam (1983, p. 41), interpretive researchers construct interpretations and explanations presenting meanings being created by subjects and achieving stability in particular settings. Getting to these interpretations and explanations is not a one-way approach but rather means processing through reciprocally interacting models of causality on the way to "understanding actors' views of their social world and role in it" (W. J. Orlikowski & Baroudi, 1991, p. 14). When applying it to this study, it is assumed that the interpretive act is complicated by complex sociotechnical relations which stretch over time and space. Thereby, the language used to express the interpretations regarding how enterprise collaboration platforms evolve and related digital transformation capabilities emerge over time and space in itself reflects the researcher's perspective.

3.2 Research methodology

Based on the interpretivist positions that underpins this research, a research methodology that is "sensitive to sense making and interpretation" (Hardy & Williams, 2008, p. 162) is needed. Therefore, this research employs interpretive case study methodology as suggested by Walsham (1997, p. 74). For this, two different case study types are conducted: i) *multiple case studies*, and ii) *in-depth longitudinal qualitative case study*. The focus is not on proving theory but on learning through the generation of context-dependent knowledge. As Flyvbjerg (2006, pp. 236–237) states, the learning process attached to the studied phenomena unfolding in practice often results in casting

off preconceived notions and theories. Therefore, the planned research approach for this study primarily serves as a gate into uncharted parts of reality.

The typology proposed by Thomas (2011) is used as a guideline for the intended case inquiry and to describe the specific manifestation of this case study research. The typology represents a response to the diverse existing perspectives in terms of the definition of case study and differing themes and priorities that have emerged around case study research. By presenting classificatory layers, the study can be characterised by its subject and object, its purpose, its analytical approach to be pursued, and the likely process to be followed for it.

In this research, the research *subject* is "The shaping and evolution of enterprise collaboration platforms and related digital workplace" and the research *object* is "The building of digital transformation capabilities"; thus, the shaping and evolution of enterprise collaboration platforms and related digital workplace is a case of the building of digital transformation capabilities. The object provides the analytical frame; however, it cannot be fully specified in advance. It is emergent and thickens as the research inquiry progresses. The study of the shaping and evolution of enterprise collaboration platforms (*subject*) is a key case with the capacity to exemplify the building of digital transformation capabilities which is the analytical object of the inquiry. The study is of intrinsic interest (*purpose*) in the phenomenon in itself, with exploratory elements regarding the shaping of an enterprise collaboration platform in terms of 'how' and 'why' allowing for an open-ended investigation. The study is both descriptive/illustrative (*approach*) and serves for theory-building (*approach*) in terms of Thomas (2011).

Multiple case studies

In this research, multiple case studies allow to capture, investigate, and compare cross-case elements that contribute to the shaping of enterprise collaboration platforms and related digital workplace. The selection of the cross-case elements is guided by the research aim and related research objectives and questions and are selected based on the context-dependent knowledge gained throughout the research. The analysis of cross-case elements is particularly valuable as organisations have different expectations in terms of what they want to achieve with their enterprise collaboration platform, and they demonstrate different ways to shape their platform and engage in its design through use processes. Multiple case studies allow capturing the variety of different visions and their instantiations including various approaches to emerging challenges in the shaping of the platform. Here, each single case in itself is not important; it is the aggregated information from several sites and "the comparison that each offers with the others" (Thomas, 2011, p. 517). Following the typology by Thomas (2011), the multiple case studies are primarily parallel studies, i.e. the cases are "happening and being studied concurrently" (p. 517) (*process*). Thus, several discrete snapshots are taken at multiple points in time. In contrast to extant platform research that is often limited to single-industry settings or narrative cases (McIntyre & Srinivasan, 2017, p. 142), the cases studied in this research cover a range of industries (see chapter 3.6 - research context).

In-depth longitudinal qualitative case study

One of the cases is followed in more depth and is, according to the case study typology by Thomas (2011), particularly diachronic (*process*) in nature (i.e. the focus is on change over time). To date, there is only preliminary knowledge on how enterprise collaboration platforms are shaping and being shaped spanning diverse frames of time and space. Case narratives capturing hard-to-summarise complexities in the evolution of the studied enterprise collaboration platform, as advocated by Flyvbjerg (2006, p. 237), are developed. However, simply describing the evolution of the platform and associated sociotechnical assemblages is considered not exhaustive. Instead, this study goes beyond mere description and considers implications and practical outcomes by interpreting and visually representing case insights. The in-depth case study enables the capturing and examination of "its multiple wealth of details […] for the development of a nuanced view of reality" (Flyvbjerg, 2006, p. 223).

With its plethora of details on the evolution of one specific enterprise collaboration platform, the in-depth longitudinal interpretive case study builds the main frame of the research inquiry. The insights gained from the multiple case studies complement and support the interpretation of the in-depth case study data. As the inquiry progresses the insights gained become more and more connected towards an increasingly integrated understanding of the evolution of enterprise collaboration platforms over time and space and the building of digital transformation capabilities captured in a conceptual model at the end of this study. Thereby, theory building is a type of generalisation as tendencies rather than predictions (Walsham, 1995, p. 80).

Figure 3-2 outlines the case study design choices that have been made following the case study typology by Thomas (2011).

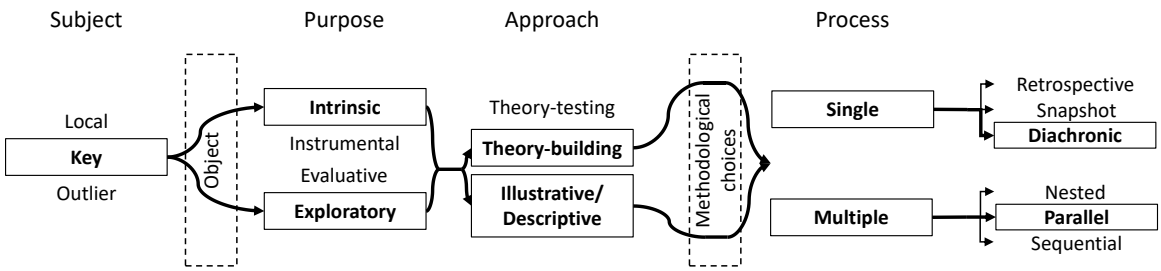


Figure 3-2. Case study design according to Thomas (2011)

3.3 Theorisation of the IT artefact: an ensemble view

This research follows Orlikowski and Iacono's (2001) research imperative to not take the Information Technology (IT) artefacts for granted, as often done in IS research, and seriously account for the IT artefacts' emergent and dynamic properties. By adopting the *ensemble view* (W. J. Orlikowski & Iacono, 2001), the focus is on the sociotechnical, infrastructural aspects of enterprise collaboration platforms, shedding light on the dynamic interactions between people and technology. This means that enterprise collaboration platforms are not conceived just as technology but as one element in a "package" (Illich, 1973, as cited in W. J. Orlikowski & Iacono, 2001). Studying enterprise collaboration platform change requires understanding it as the evolution of sociotechnical relations.

Orlikowski and Iacono (2001) distinguish between four variants of the ensemble view as described in the following.

Technology as development project

This variant of the ensemble view focuses on the building of an artefact by looking at "the social processes of designing, developing, and implementing technical artifacts, usually in specific organisational contexts" (W. J. Orlikowski & Iacono, 2001, p. 126). Research studies adopting this ensemble view variant often study IS development projects, where the development is viewed as a complex socio-political process, and place less emphasis on the ways the systems are used after their implementation.

Technology as production network

Research studies of this ensemble view variant also give weight to the ways that technologies are developed and less on how they are used. Thereby, technology development is examined at an industry and nation-state level and with interest in the formation of networks linking different actors, such as, innovators, engineers and development organisation, and governments.

Technology as embedded system

In this variant of the ensemble view, both social determinism and technological determinism are rejected. Instead, technology is studied as "an evolving system embedded in a complex and dynamic social context" (W. J. Orlikowski & Iacono, 2001, p. 126). In contrast to the first two variants of the ensemble view, less emphasis is on development and more on use, i.e. technology is "enmeshed with the conditions of its use" (W. J. Orlikowski & Iacono, 2001, p. 126). Research studies that can be assigned to this variant typically study a specific system when it becomes embedded in (a) specific social context(s).

Technology as structure

Similar to the "technology as embedded system" variant, this variant focuses on the use side of technology, or more specifically how it is intertwined with the conditions of its use. However, as the name of this variant indicates, research studies of this variant assume that technology embodies social structure as conceptualised as rules and resources in structuration theory (Giddens, 1984). In line with the proposition of structuration theory that structure is based on "the production and reproduction of social action [and is] at the same time the means of system reproduction" (Giddens, 1984, p. 19), this variant suggests that designers built structure into the technology as they develop it and users then appropriate it as they interact with it.

In this research, the assumption of *technology as embedded system* is adopted by understanding enterprise collaboration platforms and the wider digital workplace as an information infrastructure. Following DeLanda (2006), information infrastructures can be viewed as assemblages "consist[ing] of various types of [human and nonhuman] components, which in themselves may be assemblages. An assemblage allows for interactions between components that are emergent, i.e. mechanisms whose behaviour cannot be explained by the properties of the component" (DeLanda, 2006, as cited in Bygstad, 2010, p. 4). In this research, the in-depth study of one specific enterprise collaboration platform examines the embedding of the platform in one particular social context. This includes attention to how the enterprise collaboration platform is shaping and being shaped through use, where different social groups engage and interact with the platform.

In the following, the notion of *information infrastructure* is illuminated and viewed in relation to a set of associated research fields and related sociotechnical perspectives and concepts that contribute to the examination and understanding of enterprise collaboration platform change.

3.4 Underlying sociotechnical lenses and concepts

Over the past years there has been revived interest in the relationship between technology and the changing nature of work, with a corresponding body of literature concerned with contemporary sociotechnical approaches (e.g. Bødker et al., 2017; Cecez-Kecmanovic et al., 2014; Riemer, Overfeld, Scifleet, & Richter, 2012; Ulmer & Pallud, 2014).

The theoretical notion of information infrastructure (II) is used in this research work as a theoretical frame for enterprise collaboration platforms. While II itself is not the phenomenon of interest in this research, it provides a frame for interpreting the research.

3.4.1 Information Infrastructure (II)

The term "infrastructure" has its origin in the social studies of computing, where the interest had been on the sociology of technology (e.g. Kling et al., 1987; Kling and Scacchi, 1982; as cited in C. P. Lee & Schmidt, 2018). Using infrastructure as an analytical concept, computing could be understood as social action. Kling and colleagues introduced the notion of infrastructure to describe often taken-for-granted resources, be it skilled staff, good operations procedures, physical systems, that support computing development. In this way, the concept of infrastructure could be used to equally address organisational and practical aspects of computing. Over the last decades, the term infrastructure has been widely used to denote sets of collective equipment that is necessary for various human activities (e.g. buildings, roads, rail ways, communications networks). When supplemented with the term "information", infrastructure describes digital facilities and services that are typically related to the internet technology, speaking in broad terms (Bowker, Baker, Millerand, & Ribes, 2010, pp. 97–98). In accordance with Lee and Schmidt (2018), Star and Ruhleder (1996) recourse to the notion of "infrastructure", as used by Kling and colleagues, to understand experience in and failure of the building of a communication and publishing system (the Worm Community System). In their article, Star and Ruhleder (1996) argue for a reconceptualisation of information infrastructure. They (1996) refrain from defining what information infrastructure is but by answering "when – not what – is an infrastructure" (p. 113) focus on the relational qualities of Information Infrastructure (II): "infrastructure is a fundamentally relational concept. It becomes infrastructure in relation to organized practices" (p. 113). In this way, Information Infrastructure is not just there, transparent and visible. Instead, it "emerges with the following dimensions" (Star & Ruhleder, 1996, p. 113):

- *Embeddedness* (infrastructure is embedded into other structures, social arrangements and technologies)
- *Transparency* (infrastructure is transparent in use)
- *Reach or scope* (infrastructure is not limited to spatial or temporal reach/scope)
- *Learned as part of membership* (the taken-for-grantedness of artefacts and organisational arrangements is a sine qua non of membership in a community; new participants acquire familiarity and learn about the infrastructure as they become members)

- *Links with conventions of practice* (infrastructure both shapes and is shaped by the conventions of a community of practice)
- *Embodiment of standards* (modified by scope and often by conflicting conventions, infrastructure takes on transparency by plugging into other infrastructures and tools in a standardized fashion)
- *Built on an installed base* (infrastructure wrestles with the "inertia of the installed base" and inherits strengths and limitations from that base)
- *Becomes visible upon breakdown* (the normally invisible quality of working infrastructure becomes visible when it breaks)

The dimensions highlight the heterogeneity and sociotechnical nature of II (Hanseth & Monteiro, 1998, p. 48; Pipek & Wulf, 2009), i.e. II is not simply a technical artefact but needs to be examined and understood "in relation to organised practices, and […] as parts of the social and organisational structures where the infrastructure is embedded" (Star & Ruhleder, 1996; as cited in Halkola, Iivari, & Kuure, 2015, p. 4). II are "learned as part of membership", which implies users' activity of learning about the II, and are shaping and being shaped "by the conventions of a community of practice", where conventions are continuously negotiated (Pipek & Wulf, 2009, p. 454). II are open "to the number and types of users" (Monteiro et al., 2013, p. 576) but they are not shaping from scratch, instead, they are extending an installed base of existing systems and practices (Monteiro et al., 2013, p. 576; Star & Ruhleder, 1996, p. 113), show interconnections of "numerous modules/systems" (Monteiro et al., 2013, p. 576), and are dynamically evolving. II become stretched across space and time, i.e. they span many different locales and evolve over large periods of time (Hanseth & Monteiro, 1998; Monteiro et al., 2013). With this characteristic, II are likely to "drift" (Ciborra et al., 2001), meaning that they deviate from their initial planned purpose and unfold in unanticipated ways for various reasons that lie outside the organisation's influence (p. 4).

Enterprise collaboration platforms are in essence Information Infrastructures. They are not standalone actors in the digital workplace but are heterogeneous and link to a variety of modules and functions, other business systems, people from different departments and hierarchical levels, different work procedures, and other technical and non-technical elements (Aanestad & Jensen, 2011; S. P. Williams & Schubert, 2018). An enterprise collaboration platform project is highly ambiguous because organisations cannot know in advance about its outcome (Mikalsen, Farshchian, & Dahl, 2018) and how to make the best out of the technological capabilities provided. With their interpretive flexibility and malleable nature, enterprise collaboration platforms offer almost endless kinds of uses making them more generative than other kinds of platforms that offer fewer kinds of uses (Zittrain, 2006). Following Ciborra (2001), infrastructural drifts force managers to improvise. With enterprise collaboration platforms, not just managers but various actors engaging with the platform, whether single organisational members or networks of people coming together via platform communities, have to improvise when they face surprises that constantly may arise and learn to deal with unexpected outcomes (p. 29). In this way, drifts may happen at different levels and different scales, typically not visible to all platform members at once, and thus leading to multiple coexisting platform adaptions.

II capture and combine infrastructures as developing phenomena and embedded in multiple overlapping networks of actors and concrete activities (Pipek & Wulf, 2009, p. 454); "information infrastructure […] is simultaneously a micro-phenomenon (detailed design, formats, protocols, patterns of local use) and a macro-phenomenon (the actual infrastructure, the collection in total, cutting across local contexts)" (Monteiro, 2000, p. 80). An information infrastructure provides uncertainty in terms of what it includes and what not and as it is different things to different people at different locales (C. P. Lee & Schmidt, 2018; Star & Ruhleder, 1996). Along with the complexity and networked nature of II, there is an inherent (and challenging) flexibility in terms of the granularity and focus of II analysis. In order to support the analysis of different infrastructural elements enmeshed in the II space, this research links up with a set of specific sociotechnical lenses and concepts as outlined in the subsequent subchapters. While such lenses and concepts do not serve as means of a priori distinctions between micro and macro scales (C. B. Jensen, 2007; Parmiggiani, 2017) they are viewed as infrastructural anchor points to analyse and understand the shaping of enterprise collaboration platforms and traverse across the II space.

According to Henfridsson and Bygstad (2013), there are three different information infrastructure streams of research manifesting interpretivist assumptions. The authors label them complexity models, network models, and relational models. *Complexity models* place emphasis on the complexity inherent in the evolution of information infrastructures through the multitude of actors simultaneously enacting their goals. This means that the evolution of II refers to "the process by which heterogenous and autonomous human, or organisational, actors seek to use information technology in their adaption to each other and their external environments" (Henfridsson & Bygstad, 2013, p. 7). For example, Hanseth, Jacucci, Gristo, and Aanestad (2006) demonstrate the socio-technical complexity involved in electronic patient record (EPR) standardisation with an increased intertwining of technical standards with local, heterogeneous, and dispersed work practices. *Network models* have been informed by actor-network theory (ANT); i.e. it is assumed that both human and nonhuman actors drive the evolution of II. Networks of human and nonhuman are built as "multiple human actors translate and inscribe their interests into a technology" (Henfridsson & Bygstad, 2013, p. 7). For instance, Aanestad and Jensen (2011), examined two empirical case studies on realising a nation-wide II for healthcare with the challenge to mobilise and coordinate multiple stakeholders in the implementation strategy. The third group of models, namely *relational models*, assume that II should be comprehended by paying attention to the sensemaking of its users. Such models are based on theories of learning and work practices, where the evolution of II "is seen as a process by which socio-technical relations emerge from information technology-mediated activities meaningful in a given community-of-practice" (Henfridsson & Bygstad, 2013, p. 8). For example, Vaast and Walsham (2009) investigate and theorise trans-situated learning as occurring in the context of a "Network of Practice" (NoP) and supported by an information infrastructure.

3.4.1.1 II and interpretive flexibility

Interpretive flexibility has its origin in the conception of Social Construction of Technology (SCOT) (W. E. Bijker & Pinch, 1987). In SCOT, it is assumed that technology is socially constructed by humans (W. E. Bijker, 1997). The ways technology constrains or enables technology use are "matters of interpretative practices of people in the social context" (Sawyer & Jarrahi, 2013, p. 19). In SCOT, the concept of "relevant social group" is important and serves as a means to "follow the actors" (W. E. Bijker, 1997; Latour, 1987). Relevant social groups refer to institutions, organisations, and both unorganised and organised groups of individuals, sharing the same set of meanings and interpretations for a technology artefact (Pinch & Bijker, 1984, p. 414, 1987, p. 30). As a consequence thereof, different social groups may have different meanings they attribute to an artefact in its construction. This is where the notion of interpretive flexibility comes into the picture as a "first stage in a social analysis of technical design" (W. E. Bijker, 1997, p. 76). Flexibility becomes manifest in the way social groups interpret and design technology artefacts (W. E. Bijker & Pinch, 1987, p. 40). Put differently, interpretive flexibility is the artefact's ability to "represent[…] different things to different actors" (Law & Callon, 1992, p. 24). Over time, relevant social groups identify problems with the artefact, thus modify it until a state of closure is reached. Closure refers to the point where consensus about the meaning of an artefact emerges and no further modifications are made to the artefact. With closure, the interpretive flexibility decreases and the artefact stabilises within one or more relevant social groups (W. E. Bijker, 1997; Klein & Kleinman, 2017). According to Bijker, „the process of closure is almost irreversible" (W. E. Bijker, 1997, p. 87), as it is very difficult to come to former meanings.

Orlikowski (1992b) extends the notion of interpretive flexibility as coined by Pinch and Bijker (1984), by describing it in the following way:

> *"the degree to which users of a technology are engaged in its constitution (physically and / or socially) during development or use. Interpretive flexibility is an attribute of the relationship between humans and technology and hence it is influenced by characteristics of the material artifact (e.g., the specific hardware and software comprising the technology), characteristics of the human agents (e.g., experience, motivation), and characteristics of the context (e.g., social relations, task assignment, resource allocations)."* (W. J. Orlikowski, 1992b, p. 409).

According to this description, the concept of interpretive flexibility is not only helpful in understanding the design but also use phases of technology artefacts. In Orlikowski's understanding, interpretive flexibility reflects the relationship between technology and humans, where humans engage in the building of technology as they develop, use, and interpret it. Since development, use, and interpretation are intertwined with context, the interpretive flexibility as a relational attribute is not only influenced by the characteristics of the technology that is built and the characteristics of the human agents forming the technology, but also by the characteristics of the context. However, influenced by the material, human and contextual factors, the interpretive flexibility of a technology is not infinite.

Sahay and Robey (1996) demonstrate a shift in the understanding of interpretive flexibility denoting it as the "capacity of a specific technology (or other knowledge system) to sustain the divergent interpretations of multiple groups" (p. 260). Because there are multiple groups that may have divergent interpretations of the technology, interpretive flexibility does not terminate when closure is reached (Doherty et al., 2006, p. 572). In their article, Doherty, Coombs, and Loan-Clarke (2006) propose a re-conceptualisation of interpretive flexibility where they accept Sahay and Robey's (1996) understanding of interpretive flexibility and – as incorporated in the notion of interpretive flexibility by Orlikowski (1992b) – the influence of the material on the "degree to which [the artefact] can be interpreted flexibly" (Doherty et al., 2006, p. 580). Through evidence from case studies, Doherty et al. (2006) explore how technology can be shaping of and being shaped by its social context. They show how users proactively engage in the understanding of an artefact's interpretive flexibility. In this way, they "redress the balance between the social and the technical" (Doherty et al., 2006, p. 580) and react to SCOT's dominant conceptualisation of interpretive flexibility having been linked to social determinism (Sawyer & Jarrahi, 2013, p. 21).

The concept of interpret**at**ive flexibility has also been applied in studies of information infrastructures (e.g. Cadili & Whitley, 2005; Hanseth et al., 1996). In this research, interpretive flexibility is linked to the relational models of II. As outlined in chapter 3.4.1, *relational models* of information infrastructure assume that "infrastructure should be appreciated through the sensemaking of its users and stakeholders" (Henfridsson & Bygstad, 2013, p. 7). However, according to Henfridsson and Bygstad (2013), users of II do not determine and construct II, the evolution of II is "a process by which socio-technical relations emerge" (p. 8). In this way, interpretive flexibility cannot be understood as traditionally conceived in SCOT but should be viewed in Doherty's et al. (2006) fashion. With divergent interpretations of technology, or more broadly infrastructure, "one person's standard is in fact another's chaos" (Star & Ruhleder, 1996, p. 112). It has been claimed that large-scale integrated information systems offer less interpretive flexibility (Chae, 2001; W. J. Orlikowski, 1992b) and as II grow and become more interconnected, their malleability may be perceived to decrease (Cadili & Whitley, 2005, p. 184). While the perceived interpretive flexibility of enterprise collaboration platforms may also decrease over time as they increase in size and scope and become (temporarily) stable for different (groups of) people, enterprise collaboration platforms begin life in organisations with a very high degree of openness and interpretive flexibility (Riemer & Richter, 2012) linked to multiple different visions and expected outcomes and benefits (Nitschke & Williams, 2020). As interpretive flexibility is shaped by and shaped of its social context, enterprise collaboration platforms can evolve in multiple ways.

3.4.1.2 II and design through use

There is a large body of research that deals with the design of computer systems to support collaboration in work groups (M. Koch, 2008). The role of users in the design process has been of particular interest and led to research areas including Participatory Design (PD), contextual design (Beyer & Holtzblatt, 1998) and use-centred design (Norman & Draper, 1986) that emphasise the active involvement of users and their cooperation with software designers (Kyng, 1991). The aim of user participation in the software design process has been to include users' skills and work life experiences and in doing so to achieve a better fit between technology and work practices (Kensing & Blomberg, 1998). From the field of PD, Greenbaum and Kyng (1991) coined the term *Design at Work*. In their book about design at work, they consider computer systems as consisting of both the physical and mental environments of work. While the physical environment is composed of the work equipment that is utilised, such as desk, keyboard, mouse, or scanner, the mental environment covers the ways information is entered into the computer, it is processed and displayed by the computer. Both environments are incorporated in the "mutual learning" process between designers and users, in which designers gain insights into the application areas and users into new technological developments. To make technology and work practices fit, the authors propose the idea of *tailoring* that describes the practical work needed (e.g. adaption and reconfiguration) to enable the functioning of the computer system within a particular organisational setting and to make it useful for its users (Monteiro, Almklov, & Hepsø, 2012). According to Greenbaum and Kyng (1991), this process of tailoring illustrates that software design does not stop after the development and implementation phases but continues and encompasses the later phases of use. To capture this ongoing design process, Henderson and Kyng (1991) introduced the notion of *continuing design in use*, which places emphasis on the active role of users. Almost two decades later, Karasti et al. (2010) extended this notion by suggesting the term *continuing design* in order to address the tension between a short-term and long-term development orientation by blurring the boundaries between the different design phases that also include phases of maintenance and re-design.

The way systems are being designed after system implementation has also been considered in other research fields as part of, for example, *appropriation* (e.g. Balka & Wagner, 2006; Dix, 2007; Dourish, 2003; Henderson & Kyng, 1991; Tchounikine, 2017), *design by use* (e.g. Brandes et al., 2009), or *design in use* (e.g. Bødker, 1999; Lamb, Way, & Kling, 2003). These ideas are similar and interrelated; however, they focus on slightly different aspects of the design process. The concept of *appropriation* can be best compared with that of tailoring. It describes the process of making sense of software to incorporate it into users' daily working practices (Dourish, 2003, p. 467). There is a corpus of literature that looks at the early adoption and appropriation of Enterprise Social Software (ESS) (S. P. Williams & Schubert, 2017). For instance, Richter and Riemer (2009) identified that with ESS, it is "a process that takes time and is also open-ended in the sense that its outcome is open, i.e. the emergence of particular ways of usage can only to a certain extent be foreseen" (p. 729). This is consistent with Dix's (2007) conception about appropriation. Dix (ibid., p. 27) argues that with appropriation users adapt and adopt software and discover purposes of use that initially were not considered by software designers. These unforeseen ways of software design are specifically discussed by Brandes, Stich, and Wender (2009). With their notion of *design by*

use, they examine how the process of software design in and through use can go along with non-intentional design: "It describes all those actions, processes and ways of dealing with things where people change their living or working environment through minor or major interventions" (ibid., p.13). In contrast, *design in use* places emphasis on the creative embedding of the software into users' daily work practices (Bødker, 1999).

The extent to which software can be designed by actions of modification, adaption, tailoring etc. is, however, bound to the type of software to be embedded into the organisational setting (Greeven & Williams, 2017). Robinson (1993) and Dittrich et al. (2001) take the view that software can be designed by software developers to make it more open for ongoing design. According to Nitschke and Williams (2018), enterprise collaboration platforms are particularly flexible and open to being adapted and *designed through use*. The authors use the notion of design through use to study how users of enterprise collaboration platforms can flexibly build and extend coordination mechanisms (CM) to support the coordination of their evolving cooperative work activities and needs as they collect experiences with the platform. Nitschke and Williams (2018) exemplify that the way enterprise collaboration platforms are to be used cannot be prescribed a-priori, since the affordances of enterprise collaboration platforms are open to interpretive flexibility, i.e. the users appropriate and give meaning to the platform in their work contexts (Doherty et al., 2006).

This research draws on the notion of *design through use* as employed by Nitschke and Williams (2018) to place emphasis on the evolutionary nature of enterprise collaboration platforms. However, in this research, it is regarded more broadly, where design through use is not limited to the micro-level of individuals and small groups in their shaping and use of material artefacts but spreads across different design levels of enterprise collaboration platforms. In this research, enterprise collaboration platforms are understood as information infrastructures (II), where software designers can only assume control over the design space to some extent; control is distributed and characterised by negotiation and shared understanding between various platform participants engaging in the design of the collaboration platform (Hanseth & Lyytinen, 2010, p. 4). Pipek and Wulf (2009) examine challenges for designing within and for organisational information systems. They conceptualise IS as work infrastructure incorporating how technologies undergo design where users can "modify and appropriate different parts of the infrastructure in ways unforeseen by its designers" (p. 450) and where the infrastructure can "combine multiple purposes into one technology" (p. 449). Similarly, Hanseth and Lundberg (2001) assume that users reshape an infrastructure during use and infrastructure improvements can be discovered in work. In contrast to existing studies, where design activities are attributed to software designers and potential users, incorporating both intended and unintended design outcomes, this research assumes that both nonhuman actors (e.g. laws, guidelines, resources, built-in social software components) and human actors (e.g. certain stakeholder groups, people from different sites and departments, the platform project team, role models) interact with the enterprise collaboration platform in the immediate and broader setting. Such interaction characterises the actors as platform participants. They may have strong or weak ties with the platform. Platform participants with strong ties bear intentionality and consciousness regarding platform design, thus show any motivated, transformational activity in the design. Examples may be platform users who create and (constantly) shape platform communities

for various purposes (Nitschke & Williams, 2018), the works council having certain requirements regarding personally identifiable information being captured on the collaboration platform (Nitschke et al., 2019), or an ERP system being integrated with the platform and allowing for altered activity streams with new awareness mechanisms on the platform as intended by the platform architect (Gewehr et al., 2017). In contrast, platform participants with weak ties are not direct stakeholders of the platform and thus show little to no intentionality and consciousness with regard to platform design. An example may be another organisation's collaboration platform marketing slogan or platform managers with role model function impacting the benefits the organisation promotes and expects to achieve with its platform (Richter, Hetmank, Klier, Klier, & Müller, 2016). A further example may be records management or data confidentiality standards/laws that impact the records management tools and practices and what kind of data is being shared via the platform (S. P. Williams et al., 2013). The reduction of the budget for the platform project (Nitschke et al., 2019) may serve as another example where it limits extensions through "add-on software subsystems" (Tiwana et al., 2010, p. 676) or the number of email licenses, which are required for platform access. A limited number of email licenses means that not every organisational member or group (e.g. blue-collar workers) may have the opportunity to use the platform and inscribe their individual use purposes into the platform.

The building and evolution of information infrastructures have also been studied under the terms of *design of infrastructures* (e.g. Bygstad, 2010; Hanseth & Lyytinen, 2004, 2010) and *infrastructuring* (e.g. Halkola et al., 2015; Kow & Lustig, 2018; Mikalsen et al., 2018; Parmiggiani, 2017; Pipek & Wulf, 2009), the latter of which aims "to avoid confusion with classic notions of design" (Pipek & Wulf, 2009, p. 450). According to Björgvinsson, Ehn, and Hillgren (2010), "Infrastructuring entangles and intertwines potentially controversial 'a priori infrastructure activities' (like selection, design, development, deployment, and enactment), with 'everyday design activities in actual use' (like mediation, interpretation and articulation), as well as 'design in use' (like adaptation, appropriation, tailoring, re-design and maintenance)" (p. 43). This definition includes participants beyond the initial design and highlights the "processual" qualities of information infrastructures (Star & Bowker, 2002). While infrastructuring provides valuable insights into the open-ended and dynamic nature of information infrastructures (Karasti & Blomberg, 2018) and the generative dimension of design practices (Crabu & Magaudda, 2018), it also incorporates the aligning of social, organisational, physical, and technological elements (Pipek and Wulf, 2009, as cited in Hult & Wynn, 2019) and the ways "networks of collaboration across time and space" (Mikalsen et al., 2018, p. 197) are created, which is beyond the scope of this research.

3.4.1.3 II and inscriptions

The concept of *inscriptions* has its origin in actor-network theory (ANT). ANT is rooted in science and technology studies (STS) (W. E. Bijker & Law, 1992) and emerged in the 1980s primarily based on work by Bruno Latour, Michel Callon, and John Law (e.g. Callon, 1986; Latour, 1987, 2005b; Law, 1992). In ANT, it is assumed that "science is a process of heterogeneous engineering in which the social, technical, conceptual, and textual are puzzled together (or juxtaposed) and

transformed (or translated)" (Crawford, 2005, p. 1). With its attention to the sociotechnical world, it focuses on the shaping and reshaping of heterogeneous networks of both human and nonhuman actors. Using the term *actant*, ANT place emphasis on the sociotechnical relations and makes no distinction between any kind of elements (Hanseth, Aanestad, & Berg, 2004). Actants, whether individual or collective, have the power to change other actants through their interaction, "interaction is all there is" (Law, 1992). In this way, agency is not inherent in humans, but is relational and emergent through the association of actants (Latour, 1987, 1992, 2005a).

In ANT, the analytical concepts of *translation* and *inscription* are key. While there is no uniform notion of *translation* (e.g. Callon, 1986; Latour, 1999b; Law, 1992), it generally describes the ways actant-networks are transformed and interests are negotiated and aligned, "mobilizing broader support" (Monteiro, 2000, p. 77) to achieve temporary stability (Akrich, 1992b), where the translation becomes seemingly irreversible. The degree of irreversibility depends on the capacity to return to a previous network iteration, i.e. translation of the network (Callon, 1991; Crawford, 2005). Irreversibility in ANT is similar to the concept of closure known from the concept of interpretive flexibility. However, ANT additionally incorporates resistance against change and how it may accumulate (Akrich, 1992a, as cited in Hanseth et al., 1996, p. 418). The concept of *inscription* is closely related to the concept of translation. Inscription is described by Latour (1999b) as "the types of transformation through which any entity becomes materialized into a sign, an archive, a document, a piece of paper, a trace" (p. 306). This definition links translation and inscription in that transformation in terms of translation requires "the material into which it is inscribed" (Callon, 1991, p. 143). Monteiro (2000) describes the notion of *inscription* as "the way technical artifacts embody patterns of use" (p. 76). Akrich (1992b) places attention to the practice of *inscribing*, where designers and innovators, respectively, inscribe their "vision of (or prediction about) the world in the technical content of the new object" (p. 208). Although this definition might suggest that inscription indicates social determinism, it denotes how visions of future patterns of use are involved in the design of technology (Monteiro, 2000, p. 77). In fact, ANT tries to avoid determinism in that it bypasses the imposition of "a priori […] asymmetry among human intentional action and a material world of causal relations." (Latour, 2005b, p. 76).

Actor-network theory (ANT), that can be understood more as a method (Latour, 1999a), has been linked up with (Mol, 2010) in the context of information infrastructures (e.g. Cordella, 2010; Halkola et al., 2015; Hanseth & Lundberg, 2001; Monteiro, 2000). Conceptualising II as actor-network means that "technology cannot be separated from social and other non-technological elements […, i.e. II] are heterogeneous socio-technical networks" (Hanseth & Lundberg, 2001, p. 349). More specifically, Monteiro (2000) defines II as "an aligned actor network" (p. 79) and the building of information infrastructure, i.e. infrastructuring (Karasti & Blomberg, 2018, p. 254), as the "socio-technical process of negotiation" (Monteiro, 2000, p. 71). This corresponds to the network model of II as described by Henfridsson and Bygstad (2013) (see chapter 3.4.1), where both human and nonhuman actors drive the evolution of II (p. 7). According to Halkola, Iivari, and Kuure (2015), the installed base of II can be viewed as an actor in terms of ANT; it has the capacity to restrict the scope of design (Monteiro et al., 2013, p. 576). Generally, ANT is said to provide useful vocabulary and conceptual ideas to trace and describe information infrastructure and their

shaping. Through the flexible granularity of analysis, it allows researchers to zoom in and out of situations depending on the required scope, depth and level of analysis (Cresswell, Worth, & Sheikh, 2010; Monteiro, 2000). As a result, researchers can choose the "size" of an actor that is most convenient for the direction of the analysis (Monteiro, 2000), and traverse across the II space with shifting units of analysis (de Reuver et al., 2017).

The concept of inscription provided by ANT has been used in research inquiries on the evolution of II (e.g. Hanseth & Monteiro, 1997; Henningsson & Henriksen, 2011), and more specifically enterprise collaboration platforms (e.g. Nitschke & Williams, 2018; Schubert & Williams, 2016). As stated above, designers tend to produce scripts for action in that they inscribe their beliefs and visions in "the technical content of the new object" (Akrich, 1992b, p. 208). Monteiro (2000) discusses the role of designers who make assumptions about users and their competencies and work context as they inscribe a technology use scenario into a system; "When a program of action is inscribed into a piece of technology, the technology becomes an actor imposing its inscribed program of action on its users." (p. 77). However, users may not follow the programme of action inscribed into a technology, instead unanticipated paths of design through use and outcomes may occur, named as "anti-program" by Latour (1991). This may particularly be the case with enterprise collaboration platforms that offer more creative freedom than traditional business systems, such as ERP or CRM systems, in terms of how the collaboration platform is appropriated and involved in and embedded into the network of human and nonhuman actors. In other words, enterprise collaboration platforms inscribe weak/flexible programmes of action (Hanseth & Monteiro, 1997, p. 3) when they are introduced. Over time, as enterprise collaboration platforms are shaping and shaped, patterns and purposes of enterprise collaboration platform use emerge and can become inscribed into the technology. In this way, sequences of inscriptions can occur, and actor-networks become (temporarily) stable and irreversible (strong inscriptions) (Hanseth & Monteiro, 1997). For example, the inscribed purposes of use into an enterprise collaboration platform can be translated from a mere document storing tool to a place to coordinate work among employees to a multi-purpose digital platform streamlining work. Inscriptions added upon gain strength (Latour, 1999b, p. 158), thereby limit the flexibility of use of an information infrastructure, such as an enterprise collaboration platform, and accumulate resistance against change (Hanseth & Monteiro, 1998, p. 100).

For the single in-depth case study, this research draws on the concept of inscription to investigate different design through use paths in different working spheres over time. This serves as a means to understand the (possibly divergent) evolution of one enterprise collaboration platform involving the building of capabilities that both enable and are the result of platform transformations. Inscriptions and interpretive flexibility of enterprise collaboration platforms are assumed to be in a recursive relationship, i.e. interpretations generate inscriptions, and inscriptions modify the interpretations. In this research, no full ANT-analysis is carried out, i.e. the formation of actant-network receives no attention. Whilst the attention to the formation of actant-networks provides valuable insights into the complexities and the evolving and sociotechnical nature of information infrastructures, it is beyond the scope of this research (see also chapter 3.4.1.2). Moreover, the data required to capture the enrollment of different actants into evolving actant-networks is not available

for this research. Notwithstanding, this research illuminates the roles of different human and nonhuman actors, as far as possible. This may be, for example employees responsible for the enterprise collaboration platform project, different work groups, data protection regulations, or new modules integrated into the platform. The consideration of diverse actors is discussed in chapter 3.4.1.5.

3.4.1.4 II and social worlds / working spheres

The adoption of groupware and even more of enterprise collaboration platforms is "a messy process", where resistance may be attributed to different groups and organisational factors (Mark & Poltrock, 2004, p. 298). For example, resistance can emerge from the organisational culture that is noncooperative and resistant to changes or (groups of) people who show little collaboration readiness and accord more weight to possible disbenefits (e.g. extra work) than to possible benefits (e.g. improved decision-making) of enterprise collaboration platforms. However, research, typically focusing on the individual, group, or organisational level, have shown that adoption can be successful even if it is not well-planned and comes with unpredictable outcomes (Mark & Poltrock, 2004, p. 298). In times where organisations become increasingly complex and distributed, there are more and more distributed teams who bear new forms of work and can incorporate different work units or even different organisations. Mark and Poltrock (2004) introduce the notion of *social worlds* to blur the boundaries between adoption at the individual, work unit, and organisational level and understand how collaborative technology is adopted across distance. According to the authors, people are often members of a numerous social worlds that are not defined through geographical location but are based on work practices and learning about technologies across distance, typically with no management plan. More specifically, Mark and Poltrock (2004, p. 299) refer to work by Strauss (1978), defining social worlds as a unit of collective action, and Clarke (1991) defining it as ''groups with shared commitments to certain activities, sharing resources of many kinds to achieve their goals, and building shared ideologies about how to go about their business''(p. 131). Based on these definitions, Mark and Poltrock (2004) understand social worlds as any type of collective unit (e.g. a task force, a political action committee, academic department, organisational business area). In order to focus on social worlds in the organisational context, the authors use the term *working spheres* as a label for social worlds that exist within an organisation and deal with organisational work. More specifically, Mark and Poltrock (2004) introduce the notion of social worlds and working spheres as follows.

> *"We consider a social world as the unit for adoption of groupware [/collaboration platforms] in a distributed organisation. Social worlds is a rich concept as it can describe either collocated groups or distributed teams. People typically are members of multiple social worlds in the workplace, and they act as bridges between their social worlds. Technology diffuses as individuals introduce it into their other working spheres"* (Mark & Poltrock, 2004, p. 299)

Accordingly, the diffusion of enterprise collaboration platforms and related groupware and enterprise social software (ESS) functionality depends on the adoption that occurs in multiple social worlds and working spheres, respectively. Social worlds typically intersect in an organisation and corresponding working spheres have properties that relate to their individuals (e.g. experiences, attitudes, values, expertise, technology affinity of the individuals), collective group (e.g. collective shared knowledge, skills and history), work environment (e.g. policies, resources), and task (e.g. meetings, event management, or shared decisions) (Mark & Poltrock, 2004, p. 300). The research by Mark and Poltrock (2004) shows how "Users learned about the technology through one of their

social worlds and then introduced it into another of their worlds" (p. 322) and that malleable technology, such as enterprise collaboration platforms, are often adapted to fit different needs in different social worlds and working spheres, respectively.

Social worlds have also been linked to information infrastructure (e.g. Bossen & Markussen, 2010; Bowker & Star, 1998; Allesandro Mongili & Pellegrino, 2014). The convergence between infrastructure and human behaviour points to the learning of information infrastructure as part of membership (Star & Ruhleder, 1996) in different social worlds. Convergence conveys "the double process by which information artifacts and social worlds are fitted into each other" (Star, Bowker and Neumann, 2003, as cited in Allesandro Mongili & Pellegrino, 2014, p. xxiv). This means that enterprise collaboration platforms as information infrastructures cannot be understood without the social worlds and their members who learn about the platform in different working spheres. In this research, the notion of working spheres is used according to Mark and Poltrock (2004) in order to study and understand interpretive flexibility and inscriptions that emerge in different organisational contexts of the single in-depth case study. Enterprise collaboration platforms may have different meanings in different working spheres, i.e. different purposes of use can be inscribed into the collaboration platform (co-existing working spheres). As stated above, the same collaboration platform may be adopted, appropriated, and designed differently in different working spheres. In this research, it is assumed that platform communities portray different working spheres that incorporate individuals, the collective group, and the work environment. Tasks are often expressed in enterprise collaboration platform use intentions and expected outcomes and benefits and depend on the experiences that are collected by the members of the working spheres. Working spheres may include people from the same organisational department/area or from different departments, organisational units and business areas across a distributed organisation, for instance. Working spheres have fluid boundaries, i.e. they "are connected by communication and not by fixed organisational boundaries" (Mark & Poltrock, 2004, p. 303). As the contexts of different working spheres embody unique tasks, members, environments, and policies, they create different settings for the interpretive flexibility (Mark & Poltrock, 2004, p. 320) (see chapter 3.4.1.1).

3.4.1.5 II and biography of artefacts (BoA)

Approaches to studying the biographies of technology have emerged in response to micro-oriented CSCW studies with the dominant notion of design as a local activity with strong temporal and spatial boundaries (Monteiro et al., 2013, p. 596). Biography studies seek to "go beyond the study of technology at a single locale or moment and […] follow it through space and time" (R. Williams & Pollock, 2012, p. 1). To study the biography of technology, Williams and Pollock (2009; 2012) propose the *Biography of Artefacts (BoA)* approach for extended views of design. This approach is not "'hard-wired' to a specific theoretical perspective" (Pollock & Williams, 2009, p. 111), but it is closely related to an II viewpoint that considers design activity across time and space involving numerous and heterogeneous actors (Monteiro et al., 2013, p. 596). In BoA, temporal framing, spatial framing, actors as well as the technological field are important for the ability to create the biography of technology, especially of large-scale enterprise solutions (R. Williams & Pollock, 2012). BoA rests on rich longitudinal study designs, incorporating multiple historical and contemporary time frames around a technology in general and in context (with phases from technology design to implementation to adoption and use). Thus, this requires paying attention to multiple locales with interactions between different sites and places including actors from the immediate settings and broader contexts. According to Williams and Pollock (2012), actors from the broader institutional context include, for example, software vendors, suppliers or industry analysts who police the technological field. The way an enterprise solution evolves within the organisational setting cannot be isolated from the "developments within the wider terrain" (Swanson and Ramiller, 1997, as cited in Monteiro et al., 2013, p. 598). In contrast to ANT where the focus is on the actors and related actant-networks, BoA adopts a more "inclusive" perspective to account also for contextual influences that can reside within and outside the organisational boundaries. Through a more "contexted view", BoA supports "to address the complex social fabric and its history that patterns the activities of those involved locally" (R. Williams & Pollock, 2012, p. 10).

This research benefits from a BoA perspective in that multiple time frames and settings are addressed allowing to understand how enterprise collaboration platforms are shaping and being shaped (see chapter 3.4.1 and chapter 3.4.1.2). Instead of "following the actors" (Latour, 2005b) as proposed by ANT, this research aims to follow enterprise collaboration platforms through space and time across multiple sites with different actors and perspectives. As Williams and Pollock (2012) state "it is not simply the evolution of the system that is to be studied but also the wide range of actors and factors attached to and surrounding the technology" (p. 15). This research identifies and examines human and nonhuman actors in the shaping of a) one specific enterprise collaboration platform through a single in-depth longitudinal case study, and b) of multiple enterprise collaboration platforms through comparative studies of different projects (R. Williams & Pollock, 2012, p. 15). The latter allows for the comparison of different moments in the development and adoption of enterprise collaboration platforms and to capture various challenges organisations encounter as well as strategies and actions applied by them in managing platform change. Moreover, it is seen as a chance to gain a more complete picture about the technological field and developments in the broader institutional context (e.g. works councils as new dominant stakeholder

group, emergence of new data protection regulation, growing enterprise social software market, sale of IBM's collaboration software to HCL). Changes in platform designs at one organisation cannot be understood without paying attention to the ways several organisations introduce and modify their enterprise collaboration platforms (e.g. overall trend towards platform solutions with increasing scale and number of interfaces, commonly applied social software training approaches). Such developments from the wider terrain but also within the organisational boundaries (e.g. introduction of alternative file sharing solution, new platform use practices in other working spheres an employee belongs to, new platform community types as used by the parent or an affiliate company, resistance from middle management, upgrade of the organisation-wide Social Intranet) are regarded. However, it is not possible to study the "entire" socio-technical fabric of enterprise collaboration platforms. This research is sensitive to the local situated and contingent aspects of enterprise collaboration platform change, and, in line with the research aim and objectives, "foregrounds" some aspects for a close and detailed examination while others are placed in the "background".

3.4.2 Digital transformation capabilities

With the emergence of new digital technologies, such as mobile, big data, cloud, social networks, enterprise collaboration platforms etc., organisations from virtually all industries are running initiatives to examine their potentials and value (Matt, Hess, & Benlian, 2015; Reis, Amorim, Melao, & Matos, 2018). Digital transformation regards changes that are built on digital technologies (Nwankpa & Roumani, 2016), however it goes beyond merely digitizing resources and results in value and revenues being created from digital assets (McDonald and Rowsell-Jones, as cited in Reis et al., 2018, p. 417). Organisations are continuously transforming as they respond to the emergence of digital technologies and their technological IS capabilities and leverage them through the building of organisational IS capabilities. New digital technologies both enable new capabilities in business, public government, people's and society life and require new capabilities for a successful deployment and use (Martin, 2008; Nwankpa & Roumani, 2016).

In this research, the focus is on digital transformation capabilities that are required to manage digital transformation. In line with Nitschke, Williams, and Schubert (2019), digital transformation capabilities are understood as the *capabilities required to deal with the continuous digital transformation and successfully achieve and manage IT-enabled change*. It incorporates two types of capabilities: a) the capability to reflect on and learn from the digital transformation process and identify and develop the relevant resources and competencies, and b) the capability to look ahead and anticipate future changes shaping the digital workplace and to build the knowledge, skills and resources for enabling digital change (Nitschke et al., 2019). In line with Andreu and Ciborra (1996), it is assumed that digital transformation capabilities unfold "in an organisational context that is both determined by and a determinant of learning" (p. 111).

In the following, this research is not directed towards defining or identifying specific digital transformation capabilities but towards understanding how such capabilities emerge. For this, enterprise collaboration platforms are examined as one instance of change and transformation. The study of and establishment of an understanding of how enterprise collaboration platforms are transforming and being shaped and designed through use are in the foreground of this research and deemed necessary to both capture when digital transformation capability is (Star & Ruhleder, 1996) and visualise the ways digital transformation capabilities emerge. In this way, the relational qualities of enterprise collaboration platforms and related digital workplace are accounted for.

In line with the research background and definition of digital transformation capabilities, the examination of how digital transformation capabilities develop as part of the enterprise collaboration platform and related digital workplace change requires sensitivity towards the following interrelated aspects (table 3-1).

Table 3-1. Necessary aspects in the development of digital transformation capabilities (own table).

Aspect	Sensitivity to…	References
Learning	…the ways organisations and their organisational members learn to deal with various challenges in enterprise collaboration platform change and make the best out of the platform. … the ways organisations and their organisational members learn from experiences (failures and successes).	(e.g. Andreu & Ciborra, 1996; Eisenhardt & Martin, 2000; Galavan, 2015)
Reflection and Anticipation	… the ways organisations and their organisational members reflect on enterprise collaboration platform change (the reflection that happens and that is inherent in current and future practices). … the ways organisations and their organisational members look ahead and anticipate future enterprise collaboration platform change and more generally the digital transformation.	(Nitschke et al., 2019)
Dealing with the unexpected	… the ways organisations and their organisational members deal with the unexpected in enterprise collaboration platform change (e.g. events, actors, constraints, positive outcomes/benefits).	(Aanestad & Jensen, 2016)
Competencies	…the competencies organisations and their organisational members develop to successfully deploy resources in the enterprise collaboration platform and digital workplace change.	(Galavan, 2015)
Work practices	… evolving work practices as part of the enterprise collaboration platform change.	(e.g. Andreu & Ciborra, 1996; W. J. Orlikowski, 2002)
Context	…the change context as dynamically being designed through ongoing interactions between various (human/nonhuman) actors and the enterprise collaboration platform.	(Dourish, 2004)

3.5 Research methods of data collection and analysis

With interpretive research two primary roles of the researcher can be found, the outside observer and the involved researcher (Walsham, 1995). Both roles are subjective in the data collection and analysis, particularly with in-depth case studies that are carried out over time where researchers inevitably give direction to the interpretations of the setting and actors being studied. The outside observer studies the field organisations from more distance and tends to have no "direct personal stake" in the outcomes (Walsham, 1995, p. 77). Although the outside observer typically does not get a direct sense of the inside of the field organisations, employees are usually open in expressing their viewpoints. In contrast, the involved researcher may have a direct personal contribution to the various views and activities, but other employees might not share their interpretations freely (Walsham, 1995, p. 77). In this research, the role of an outside observer is adopted, and for this, a range of data collection methods considered appropriate and that can be found across different epistemologies is drawn on. Thereby, a pluralist approach is applied to enable the researcher to draw a rich picture about the paths of change of emergent phenomena (Davison & Martinsons, 2011).

This research work applies a variety of methods of data collection and analysis to capture the complexities of enterprise collaboration platform change from local to global and to be able to adapt to the shifting or emerging circumstances in the case studies (Davison & Martinsons, 2011, p. 290).

The following data collection methods are being applied:

- interviews
- documents/archives
- questionnaires
- focus groups

Patterns are drawn from the case insights to make sense of the retrieved data from the different sources, and the situations under study are narrated and interpreted. Existent literature on topics of research interest (e.g. outcomes and benefits) are analysed, critically reflected on, and used to guide the interpretation process. In some cases, qualitative content analysis is used as a data analysis method through the process of coding in which text get organised into a few content categories (Hsieh & Shannon, 2005). For the questionnaires, descriptive statistics with data visualisation methods (e.g. bar charts, spider web diagrams) are produced to show first differing elements in the enterprise collaboration platform and digital workplace design in the participating case companies.

The following data analysis methods are being used:

- literature review
- qualitative content analysis
- descriptive statistics and data visualisation
- interpretation

The different research methods of data collection and analysis are described in the following subchapters (chapter 3.5.1 to chapter 3.5.8).

Separate, but interlinked, research studies are conducted that apply different methods of data collection and analysis. Such studies are described in more detail in the chapter 4.1.1, chapter 4.2.1.1, chapter 4.2.2.1, chapter 5.2.1.1, chapter 5.3.1, chapter 5.4.1, and chapter 6.1.

3.5.1 Interviews

Interviews are one of the most dominant methods of data collection in qualitative research. They can be carried out in different ways. Interviews can be structured, semi-structured or unstructured. Interviews that are structured can be compared with a questionnaire type approach where gathered responses are generally superficial. Semi-structured interviews are characterised through areas of interest that are pre-determined and often captured in open questions that help guide the conversation. Unstructured interviews address a broad area of interest with the purpose to explore, where the researcher is mostly directed by the participant. Next to the degree of structure, interviews can be distinguished in terms of the "channel", i.e. they can be conducted face to face, by telephone or via the internet (Petty, Thomson, & Stew, 2012, p. 380).

Semi-structured face-to-face interviews constitute the primary data source for the in-depth longitudinal qualitative case study, with a balance between severe passivity and over-direction. In doing this, the objective is to gain insights into the various interpretations of the enterprise collaboration platform participants. Following the theoretical lenses described in chapter 3.4, multiple perspectives and interpretations from different enterprise collaboration platform stakeholders (from different departments and areas and with different kinds of interaction with the enterprise collaboration platform technology) are to be regarded. However, the main interviewee is a key informant with responsibility for the platform. In this research, three seven-hour interviews (I1, I2, I3) are conducted and one 30 minutes interview (I4) for eliminating final uncertainties in terms of content (e.g. "what was meant by…", "can you clarify…"). The interviews are digitally recorded and transcribed as an approach to qualitative data collection and analysis while acknowledging the drawbacks and merits of interview transcripts (Lapadat & Lindsay, 1999). In this research, it is viewed as a means of preserving data in a more permanent and retrievable way and serves as an input for the subsequent data analysis and incorporated interpretive thinking.

Table 3-2 shows the interviews conducted with the enterprise collaboration platform using company (Chemical Products Manufacturer 03, pseudonymised) of the in-depth longitudinal qualitative case study.

Table 3-2. Main interviews conducted in this research.

Inter-view ID	Month/ Year	Motivation / Topics	Interviewees (separately interviewed)	Purpose/ Other methods and concepts	Chapter
I1	06/2016	Establishing anchor measure: capturing base case information on the enterprise collaboration platform implementation project (incl. overview about the organisation; static views on the project (business, process, application, IT); project motivation, aim, and expected outcomes and benefits; project and change management)	Chemical Products Manufacturer 03, Project Manager, Communication & Marketing Chemical Products Manufacturer 03, Head of IT	eXperience case study method (Schubert & Wölfle, 2007; S. P. Williams & Schubert, 2017) Input for and usage of MoBeC Inscriptions /working spheres (see chapter 3.4.1.3, chapter 3.4.1.4) BoA (see chapter 3.4.1.5)	5.1 5.2.2 5.3 5.4
I2	09/2017	Clarification of open questions from I1 Follow up on what has changed since I1 (focus on motivations/aims, project influences/actors (incl. works council, GDPR), usage and adoption, current challenges)	Chemical Products Manufacturer 03, Project Manager, Communication & Marketing	Interview topics of the works council and GDPR emerged from I1, previous IndustryConnect's workshops and virtual workspace (see chapter 3.6) and survey Q1 (chapter 3.5.3) (actors have been emphasised as highly relevant). Inscriptions /working spheres (see chapter 3.4.1.3, chapter 3.4.1.4) BoA (see chapter 3.4.1.5)	5.3 5.4
		Role of the works council in the enterprise collaboration platform project Individual perception / opinion about the enterprise collaboration platform project (incl. challenges and expectations) Usage of the enterprise collaboration platform by the works council	Chemical Products Manufacturer 03, Chairman, Works Council		
		Gathering previous and current motivations/aims, project influences/actors (incl. works council, GDPR), usage and adoption, current challenges) Individual usage and uses of the enterprise collaboration platform	Chemical Products Manufacturer 03, Head of Communication and Marketing		
		Gathering previous and current motivations/aims, project influences/actors, usage and adoption, coordination mechanisms used in enterprise collaboration platform communities	Chemical Products Manufacturer 03, Head of Analytics Research and Development (R&D)		

I3	11/2018	Follow up on what has changed since I1 and I2, with focus on changes in motivations, outcomes and benefits usage and adoption, as well as pain points and challenges Capturing enterprise collaboration platform transformations (inscribed purposes of use, changes in the digital workplace (DWP))	Chemical Products Manufacturer 03, Project Manager, Communication & Marketing Chemical Products Manufacturer 03, Head of IT	Input for and usage of MoBeC (see chapter 5.2.2) Inscriptions /working spheres (see chapter 3.4.1.3, chapter 3.4.1.4) BoA (see chapter 3.4.1.5)	5.3 5.4
		Follow up on what has changed since I1 with focus on changes in motivations, usage, and adoption, as well as current pain points and challenges Capturing enterprise collaboration platform transformations (inscribed purposes of use, changes in the digital workplace (DWP))	Chemical Products Manufacturer 03, Head of IT	Inscriptions /working spheres (see chapter 3.4.1.3, chapter 3.4.1.4) BoA (see chapter 3.4.1.5)	
		Follow up on what has changed since I2 with focus on changes in motivations, usage, and adoption, as well as current pain points and challenges Capturing enterprise collaboration platform transformations (inscribed purposes of use, changes in the digital workplace (DWP))	Chemical Products Manufacturer 03, Head of Analytics Research and Development (R&D)	Inscriptions /working spheres (see chapter 3.4.1.3, chapter 3.4.1.4) BoA (see chapter 3.4.1.5)	
I4	10/2018	Eliminating uncertainties in terms of the base case Re-interview, where base case interpretations by the researcher are given back to the subject to receive feedback	Chemical Products Manufacturer 03, Project Manager, Communication & Marketing	-	5.2.2

A few days before the submission of this dissertation, a short asynchronous online interview with the case company's parent company (Chemical Products Manufacturer 02, pseudonymised) occurred spontaneously. Since the interview provides valuable insights into the longitudinal in-depth case, it was the wish of the author of this dissertation to bring them into the present thesis. Table 3-3 provides details about the interview. A short section about the findings is presented in chapter 5.4.2, and a related summary included in the concluding remarks (chapter 8.5) of this dissertation.

Table 3-3. Additional interview conducted in this research.

Inter-view ID	Month/ Year	Motivation / Topics	Interviewee	Purpose/ Other methods and concepts	Chapter
I5	01/2021	Follow-up on the impact of the acquisition of IBM software products (including the enterprise collaboration system IBM Connections) by HCL on the enterprise collaboration platform evolution (see chapter 2.1.2)	Chemical Products Manufacturer 02, Project Leader, IT	BoA (see chapter 3.4.1.5)	5.4.2 8.5

The analysis of all interview data is described in more detail in chapter 3.5.8.

3.5.2 Documents/archives

In this research, qualitative interviewing is a key method applied to obtain data for the longitudinal qualitative in-depth case study (see chapter 3.5.1). To cross-check the interview data and gain further details into the studied enterprise collaboration platform case, this research uses company-internal documents and their metadata as a further source of data (Petty et al., 2012; Walsham, 2006). This includes PowerPoint slides (e.g. company overview, platform promotion material covering expected platform benefits, and implementation strategies as to the Social Intranet), Excel files (e.g. results/evaluations of a questionnaire conducted on the level of satisfaction platform users experience with the enterprise collaboration platform), social business documents (Hausmann & Williams, 2015), such as platform wiki entries (e.g. platform usage guidelines and their date of publication, or blog posts (e.g. to nominate "Oscars": best new platform community, most supportive general manager, most engaging user, best newcomer, etc.) (see chapter 5.2.2.1 and chapter 5.3.1).

3.5.3 Questionnaire-based surveys

In this research, surveys in the form of questionnaires are considered particularly useful in examining cross-sectional case elements through both closed and open-ended questions that are developed based not on hypotheses to be tested but on interesting and relevant emerging issues of enterprise collaboration platform and digital workplace design (see table 3-4). The questionnaire-based survey method provides the opportunity to understand the degree to which certain issues exist in the given cases and how they vary across the cases (Flyvbjerg, 2006).

Over the course of this research, the works council and data protection regulations (GDPR) emerged as key actors in the enterprise collaboration platform projects. An online questionnaire (Q1, average duration of 12 minutes) is used to address the research interest on how enterprise collaboration platform using companies perceive these actors, integrate them into the project and deal with issues related to them. The survey findings are discussed and deepened with the survey participants in a mini-focus group (F2, see chapter 3.5.5). Also, using the interview method this research delves deeper into the role of these two actors in the enterprise collaboration platform project of the in-depth case study (I2, see chapter 3.5.1).

A second questionnaire (Q2.1, Q2.2) is also used to capture priority areas and competencies in the digital workplace (DWP). This questionnaire is used at two different points in time to increase the data basis (i.e. to increase the number of participating companies and individuals representing the companies allowing for within-company-comparisons) and to achieve over-time-comparisons (i.e. to identify how the DWP competencies and priority areas change over time).

Table 3-4 shows the questionnaires used in this research.

Table 3-4. Questionnaires used in this research.

Question-naire ID	**Mont/ Year**	**Motivation/Topics**	**#participants (represented user-companies)**	**Purpose/ Other methods**	**Chapter**
Q1	07-09/ 2017	Enterprise collaboration platform acceptance with focus on: *Implementation of legal requirements (GDPR)* – How do organisations deal with information in the enterprise collaboration platform? *Works council* - What is the role and influence of the works council?	20 (18)	Survey findings on the works council are discussed and deepened in a mini focus group (F2, see chapter 3.5.5)	4.2.1 Appendix D
Q2.1	10/ 2018	Identification of the current status of the digital workplace (DWP): Competencies and priority areas of the DWP Within and across company comparisons	13 (9)	Used as a follow-up method of a focus group (F3); application of a developed digital workplace assessment method	Chapter 6 Appendix D
Q2.2	02-03 / 2019	Identification of the current status of the digital workplace (DWP): Competencies and priority areas of the DWP Within and across company comparisons Identification of changes in DWP competencies and priority areas since Q2.1 Identification of explanations for priority areas	13 (10)	Used as a follow-up method of a focus group (F3) and survey (Q2.1); application of a developed digital workplace assessment method	Chapter 6 Appendix D

The analysis that is included in the survey method is described below (see esp. chapter 3.5.6, and chapter 3.5.7).

3.5.4 Literature review

According to Paré, Trudel, Jaana, and Kitsiou (2015), researchers are required to find a means for quickly synthesising the literature on various topics of interest along with the fast dissemination of information systems (IS) knowledge in the IS community. For this, various approaches for literature reviews have emerged. Paré et al. (2015) make the following statement regarding effective literature reviews.

> *"conducting effective literature reviews is essential to advance the knowledge and understand the breadth of the research on a topic of interest, synthesize the empirical evidence, develop theories or provide a conceptual background for subsequent research, and identify the topics or research domains that require more investigation"* (Paré et al., 2015, p. 183)

In this research, the collection and review of literature is an ongoing process; literature is discussed throughout this dissertation, where available and appropriate. Among others, the review, synthesis, and reflection of the available literature are integrated into the previous chapters (esp. chapter 1.1, chapter 2, chapter 3.4) and also in the subsequent chapters guiding the data analysis and interpretation. In line with the research objectives, one chapter is particularly devoted to conducting a critical literature review in order to provide a critical reflection on whether and how change of enterprise collaboration platform outcomes and benefits is being addressed in the enterprise collaboration platform and related enterprise social software (ESS) literature. The search and analysis process as part of the literature review is described in more detail in chapter 5.2.1.

3.5.5 Focus Group

Furthermore, focus groups as a qualitative data collection method (Morgan, 1997), where researchers work with experts on topics of interest through group interaction, is used. In this case, the researcher herself acts as a moderator to guide the identification and exploration of a broad set of enterprise collaboration platform outcomes/benefits, the diversity of strategies and actions applied in managing enterprise collaboration platform change (including emerging challenges, such as the works council), and competencies and priority areas in the design of the digital workplace.

Focus group as a method has reached wide acceptance in social science. According to Barbour (2017), the application of the focus group method has spread into new disciplinary contexts and new research topics, and yielded new creative approaches that have not yet attracted the wider audience. Next to more traditional usages of focus groups (e.g. to capture participants' views), approaches have emerged that focus more on the participatory aspect in that they allow for a collective production of discourse. Focus group research can "rang[e] from applied to more theoretically focused applications, macro- and micro-approaches, and importantly, the embedding of focus groups in mixed methods designs" (Barbour, 2017, p. 2). There can be stand-alone focus group studies or focus groups used together with other methods (qualitative or quantitative). According to Morgan (1996), focus groups can serve exploratory purposes or appear in the form of a follow-up method. Often, focus groups and surveys are combined, where one receives primary attention and the other serves as a preliminary or follow-up study. However, focus groups can also

be used as part of a series of focus groups with two or more focus groups following one another to extend and deepen the knowledge gained (Duchesne, 2017).

There is no "one-size fits-all" template for focus groups (Barbour, 2017); the needs of a specific research project have to be accounted for, i.e. researchers need to select a way of applying focus groups that is in line with the goals of the project (Morgan & Bottorff, 2010). While the kind of activity the participants are involved in varies in this research, all focus groups are started through the phase of *stimulation* and closed through the phase of *results* as proposed by Caillaud and Flick (2017): At the start of the focus group session, the context and motivation of the research project are presented to the participants and the methods and input for the activity and discussion are described. At the end of the focus group session, the main results of the activity and discussion are presented.

While two focus groups (F1, F3) are more structured (through the application of worksheets with specific tasks and that guide the discussion), one focus group (F2) is semi-structured (through open questions).

All focus groups involve a heterogeneous group of experts. All experts have a responsibility in enterprise collaboration platform projects; though, they have different experiences, diverse backgrounds and/or positions. The focus groups are audio-taped for subsequent transcription and qualitative content analysis (Petty et al., 2012) and for evidential utility. The focus groups conducted in this research involve activities and group discussions between 30 and 90 minutes[5].

Table 3-5 shows the focus groups used in this research. It shows their research motivation, number of participants (represented user-companies), purpose / other methods, and the reference to the corresponding chapter in this thesis. The details of the individual approaches and findings are discussed in the given chapters.

[5] The discrepancy in the duration is due to the research context (see chapter 3.6). The focus group activities are conducted as part of collaborative workshops on ECS and the wider digital workplace. The workshops include a series of research presentations, discussions between researchers and practitioners, focus groups, creativity techniques, questionnaires, etc. around different focus topics. Many topics go beyond but complement this research work (e.g. benefits metrics and measurement, social collaboration analytics, social process mining, information integration) (Schubert & Williams, 2020; S. P. Williams & Schubert, 2017).

Table 3-5. Focus groups used in this research.

Focus Group ID	Month/ Year	Motivation	#participants (represented user-companies)	Purpose/ Other methods	Chapter
F1	04/2017	Identification, discussion, and examination of enterprise collaboration platform outcomes/benefits and their enabling and constraining factors	10 (9)	Focus on exploration Force-field-analysis (Lewin, 1943) used to guide the identification, discussion, and examination	4.1.1
F2	09/2017	Discussion and examination of challenges and strategies and actions related to the works council (key actor in the enterprise collaboration platform project)	10 (9)	Used together with enterprise collaboration platform acceptance survey (Q1, see chapter 3.5.3) (follow-up data collection to gain deeper insights)	4.2.2
F3	04/2018	Identification of digital workplace characteristics and elements as well as resources and competencies required in the design of the digital workplace in order to develop a digital workplace assessment method	16 (12)	Focus group findings are used for the development of a digital workplace assessment method which is applied via the questionnaire-based survey method (Q2.1, Q2.2, see chapter 3.5.3)	6.1

The focus group discussions are shaped through interpretation (see chapter 3.5.8). The data collected through the focus group method is analysed using qualitative content analysis (see chapter 3.5.6).

3.5.6 Qualitative content analysis

Integrating texts and their specific contexts and allowing for the examination of meanings, themes, and patterns (Y. Zhang & Wildemuth, 2005), qualitative content analysis has been defined by Hsieh and Shannon (2005) as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (p. 1278) and by Patton (2002) as "any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings" (p. 453). Content analysis has been widely used in qualitative research to analyse text data, where text data can be represented verbally, in print or electronic form, and can be captured, among others, through open-ended survey questions, interviews, focus groups, or observations (Hsieh & Shannon, 2005, p. 1278). In this research, qualitative content analysis is applied on the transcripts and narrative responses of the focus groups' activities and discussions (F1, F2, F3; see chapter 3.5.5), as well as on the responses provided to open questions posed in the questionnaire-based surveys (Q1, Q2.2; see chapter 3.5.3). For this, the *conventional approach* according to Hsieh and Shannon (2005) is used. As reported by Hsieh and Shannon (2005) conventional content analysis is usually helpful when existing research and theory on a phenomenon is limited, so that researchers do not apply

preconceived categories when examining text data, the categories and their names emerge inductively from the data. Attention is paid on the unique themes that represent the range of the meanings of the phenomenon (Y. Zhang & Wildemuth, 2005). Categories and themes are identified through the process of coding (e.g. Miles, Huberman, & Saldaña, 2014; Saldaña, 2009). The conventional content analysis includes the following steps to analyse text data and derive codes (Hsieh & Shannon, 2005, p. 1279):

1. Reading all data repeatedly to get an idea and sense of the whole
2. Reading the data word by word to develop codes
    2.1. Marking the exact words that capture key ideas
    2.2. Making notes for the first impressions, thoughts, and initial analysis
    2.3. Iteratively identifying labels for codes that are reflective of more than one key thought (emergence of the initial coding scheme)
3. Sorting codes into categories on the basis of the relations and links between the codes

For the first focus group (F1), the interest is on the identification and categorisation of i) the variety of desired organisation-specific enterprise collaboration platform outcomes and benefits, i.e. new desired operational states and achievements, ii) their enabling factors, i.e. factors supporting and enabling the attainment of the desired enterprise collaboration platform outcomes and benefits, and iii) their constraining factors, i.e. factors making the achievement of enterprise collaboration platform outcomes and benefits more difficult. The works council was discussed as one key constraining factor and challenge in the enterprise collaboration platform projects. For the second focus group (F2), the interest is on the identification and categorisation of the different experiences and challenges with the works council for the enterprise collaboration platform project and applied solutions and measurements to address such challenges. The third focus group (F3) identifies and examines characteristics and elements of the digital workplace (DWP) as envisioned by enterprise collaboration platform using organisations. Concomitantly, it captures and assesses available and still required resources and competencies for a successful DWP.

This research combines the focus group method with other research methods, particularly with questionnaire-based surveys. The first questionnaire (Q1) includes open questions about the topics discussed with the works council and explanations for different experiences with the works council. The second questionnaire (Q 2.2) also concerns the identification and examination of explanations provided by the survey participants. Specifically, it includes an open question asking for reasons and motivations for selected priority areas in the design of the DWP.

The advantage of the applied conventional approach of qualitative content analysis is that there is access to direct information from the study participants without imposing preconceived categories or theoretical perspectives on them (Hsieh & Shannon, 2005, p. 1280). The details of the content analyses and related coding processes are discussed in chapter 4.1, chapter 4.2, and chapter 6.1.

For the interview transcripts, another approach to the examination and interpretation of text data is applied as described in chapter 3.5.8.

3.5.7 Descriptive statistics and data visualisation

In this research, the questionnaire-based survey data is analysed using descriptive statistics that are "the numerical and graphical techniques used to organise, present and analyse data" (Fisher & Marshall, 2009, p. 95). While the answers to the open-ended questions of the questionnaires are analysed through methods of content analysis and interpretation, the answers to the closed questions are used for the descriptive statistics. For this, the level of measurement is considered. In general, three broad measurement levels exist: nominal, ordinal and continuous (interval or ratio) (Fisher & Marshall, 2009, p. 94). In this research, the nominal scale and the ordinal scale are used. The nominal scale makes use of categories where the variables are labelled with no specific order (e.g. company name, yes/no (e.g. "Do your company's plans to meet the GDPR requirements also include the IBM Connections platform used by your company?"), project phases (e.g. "When was your works council involved in the IBM Connections project?"), name of the digital workplace priority area). The ordinal scale is used when variables cannot be directly measured. Categories are used, that are ordered hierarchically. For this, Likert scales, that are "numeric categories ordered from a low score to a high score" (Fisher & Marshall, 2009, p. 94), are employed. In this research, Likert scales are applied to measure the level of skills/abilities (competencies) in different DWP areas (e.g. "On a scale of 0 to 10 (where 0 = Very poor, 10 = Very good), please give an overall rating of your organisation's skills / abilities for the area Digital Workplace (DWP) Governance and Compliance."). In this research, descriptive statistics appear in the form of frequencies and percentages. For both, the nominal and ordinal measurement level, the cases are sorted into one of several categories so that a measure of dispersion is possible based on the count or frequency of cases in each category (frequency distribution). Thus, the use of descriptive statistics allows for capturing and displaying differing and common elements and issues in the enterprise collaboration platform change and related digital workplace design in the participating case companies (multiple case studies).

Next to the counting and calculation of frequencies and percentages, the data is visually represented using graphical displays. In this research, different kinds of graphs suitable for highlighting different aspects of enterprise collaboration platform change are used (e.g. bar graphs, pie charts, and spider web diagrams). The analysis of the questionnaire data and visual displays are elaborated on in more detail in chapter 4.2.1.1/4.2.1.2, and chapter 6.1/6.2.

3.5.8 Interpretation

Case narratives capturing hard-to-summarise complexities in the evolution of the studied enterprise collaboration platform, as advocated by Flyvbjerg (2006, p. 237), are developed. However, simply describing the evolution of the platform and associated sociotechnical assemblages is considered not enough. Instead, this study goes beyond mere description and considers implications and practical outcomes by interpreting and visually representing case insights. The in-depth case study enables the capturing and examination of "its multiple wealth of details […] for the development of a nuanced view of reality" (Flyvbjerg, 2006, p. 223). The act of interpretation as part of the data analysis is a constant companion of this research. As Brinkmann (2013) states,

> *"analysis is not reserved to a post hoc interpretation of transcripts, because the analytic task already begins during the interviews, e.g. when interviewers attempt to understand and interpret what the interviewees are trying to say. It is very common that interviewers summarize a narrative or description and ask the participant for verification or further reflections"* (Brinkmann, 2013, p. 61).

Similarly, Kvale (1996) reports that interpretation happens already during the interview, as the interviewer condenses and interprets the meaning of what is said by the interviewee, and " 'sends' the meaning back" (1996, p. 189) to receive feedback. After the interview, the transcribed interview can be interpreted by the interviewer. For this, clarification of the material is achieved through the elimination of superfluous material (e.g. repetitions, digressions) and a distinction into essential or non-essential information depending on the purpose of the study and phenomena of interest (incl. theoretical presuppositions) (Kvale, 1996, p. 190). Once this is done, the focus is on developing meanings of the interviews, where the subjects' own understanding as well as the researchers perspectives on the phenomena are considered (Kvale, 1996, p. 190).

In this research, interpretation is not confined to the in-depth case study and interpreting interview data, it also occurs with the other research methods applied, e.g. focus groups where in-situ interpretation is incorporated in the moderated discussion and subsequent coding process, and when findings from different data sources and analyses are related and linked.

Often, the interpretation is guided by analytical tools and theoretical concepts, for example the eXperience method (Schubert & Wölfle, 2007) (see chapter 3.6), the concept of inscriptions (see chapter 3.4.1.3), the notion of working spheres (see chapter 3.4.1.4), or outcomes of the literature review (e.g. on existing benefits realisation management frameworks) (see chapter 3.5.4). And particularly, interpretation occurs where efforts are made to work out and visualise when digital transformation capabilities are and emerge (see chapter 4.4, chapter 5.6, chapter 5.6, and chapter 7).

3.6 Research context

This research is part of i) the peer-reviewed research project "A Sociotechnical Framework for ECS Benefits Realisation"[6] funded by the DFG (Deutsche Forschungsgemeinschaft), and ii) the long-term practice-based research programme *IndustryConnect* (Schubert & Williams, 2020; S. P. Williams & Schubert, 2017).

The *DFG research project* has been running since 2016. It started with a focus on benefits of enterprise collaboration platform systems and methods for the identification, measurement, and realisation of enterprise collaboration system (ECS) benefits (Benefits of Enterprise Collaboration Systems (*BECS-1*[7]; period: 01/10/2016 to 30/09/2018)). The findings revealed that ECS benefits and linked outcomes are part of an organisation-wide endeavour to shape a digital workplace. Based on the findings, the research imperative to study digital transformation processes more deeply and the ways that organisations create their digital workplace was identified. Thus, since the start of the extended project phase (*BECS-2*[8], period: 01/10/2018 to 30/06/2021) the focus has been on the processes of digital transformation, and the study of digital transformation capabilities and resources. BECS-1 and BECS-2 are embedded in the research programme IndustryConnect described below.

IndustryConnect examines a variety of topics around digital transformation and digital workplace technologies (e.g. social documents, collaboration use cases and scenarios, benefits metrics and measurement, social collaboration analytics, social process mining, information integration). It builds on the collaboration between two research groups at a German University and a range of medium- and large-sized German/Swiss organisations[9] from different industries (e.g. automotive, chemicals, finance, leisure & travel). These organisations are early adopters of the currently largest, most integrated ECS *HCL Connections* (IBM Connections at the time of this research work's data collection) around which organisations build their enterprise collaboration platforms. The participating organisations are represented by different key practitioners who are members of this practice-based research community and have responsibility for the introduction and use HCL Connections. The participating organisations with their key practitioners, who are all collaboration

[6] https://gepris.dfg.de/gepris/projekt/285717372?language=en

[7] https://www.uni-koblenz-landau.de/en/campus-koblenz/fb4/iwvi/ageim/projects/a-sociotechnical-framework-for-ecs-benefits-realisation

[8] https://www.uni-koblenz-landau.de/en/campus-koblenz/fb4/iwvi/ageim/projects/BECS-2

[9] At the time of this research work's data collection 31 organisations participated in the IndustryConnect initiative. Today, the initiative includes 38 organisations.

experts but have different educational and professional backgrounds (e.g. information technology, information and knowledge management, organisational processes, internal communications), serve as study subjects for this research. IndustryConnect provides the participating practitioners with the opportunity to exchange information and experiences with other collaboration experts and researchers. The latter provide reflective accounts of current project challenges and various interactive research activities and their findings.

IndustryConnect is structured through three work strands: *a virtual workspace* (an online community of a collaboration platform hosted by the said German University), *bilateral research work with individual practitioners / organisations*, and *collaborative workshops* (twice-yearly physical meetings that bring participants together and are used to conduct research activities and present current research findings). For this dissertation, all three research strands are of importance. The virtual workspace is used, for example, for online surveys, bilateral research work in the form of interviews is conducted with the practitioners / organisation (Chemical Products Manufacturer 03) of the in-depth case study, and the collaborative workshops are used for different research activities as input for the multiple case studies (different kinds of focus groups, offline survey, presentation and discussion of research findings to gather feedback and seek for clarification). Data collected from the organisations are systematically recorded, documented, and evaluated.

The participating organisations agreed to have their experiences documented in eXperience base cases that provide a uniform structure. The eXperience method (Schubert & Wölfle, 2007; S. P. Williams & Schubert, 2017) is a method for writing case studies of IT implementations. It includes different content sections (e.g. motivation for the IT implementation, expected benefits with the IT implementation, the four eXperience views on the IT implementation (business, process, application, technical), project and change management, lessons learned) that guide the questions for writing the base case. To date, IndustryConnect yielded 13 base cases that allow for a comparison between the different enterprise collaboration platform implementation projects. Out of the 13 base cases there is also one written for the organisation (Chemical Products Manufacturer 03, abbreviated CPM03) which is addressed in the in-depth case study of this research. The eXperience base case for this organisation and its enterprise collaboration platform project is a snapshot of the implementation and use of IBM Connections (now HCL Connections) and represents an important anchor measure for this dissertation (see chapter 5.2.2). Through a longitudinal in-depth case study enterprise collaboration platform change is monitored.

3.7 Research phases and steps

Figure 3-3 presents the research steps mapped onto the broader research phases: *study preparation*, *outcomes and benefits analysis*, *challenges & strategies/actions analysis*, *enterprise collaboration platform designs examination*, *DWP competencies and priority areas examination*, and *digital transformation capabilities theorisation*. The phases are organised according to the research objectives and questions (see chapter 1.2). The phases are partially conducted in parallel but are separated for clarity and to show their potential order from top to bottom. This parallel sequence also applies to the steps ordered from left to right for each research phase.

Phase 1: Study preparation

Phase 1 is the initial phase where the research is prepared in that the research need is identified and the research scope and frame are defined. Phase 1 is used to develop the argument and establish the research motivation to investigate the shaping of enterprise collaboration platforms as an instance of the building of digital transformation capabilities. To base the argument and research design on theoretical work, a literature review on enterprise collaboration platforms, sociotechnical change theories, information infrastructure, as well as outcomes, benefits, and capabilities is conducted. However, the collection and review of literature is an ongoing endeavour in this research and particularly guides some of the research steps in the remaining research phases.

Phase 2: Outcomes and benefits analysis

Phase 2 is devoted to the analysis of enterprise collaboration platform outcomes and benefits. This research phase contributes both to the multiple case studies and single in-depth longitudinal case study. In the first step of phase 2, expected enterprise collaboration platform outcomes and benefits from a variety of participating organisations are collected and examined thoroughly. A landscape of outcomes and benefits is established, unveiling their diversity. The next three steps of phase 2 focus on the changing nature of enterprise collaboration platform outcomes and benefits. In step two, the extent to which enterprise collaboration platform outcomes and benefits change is addressed in the enterprise collaboration platform and enterprise social software (ESS) literature is identified; it serves as an essential foundation for step three and step four of phase 2. In step three, a framework as a means for capturing and monitoring enterprise collaboration platform outcomes and benefits change is developed. The development is based on three existing eXperience base cases (see chapter 3.6) next to existing benefits realisation frameworks. In step four, the developed framework is applied to capture the outcomes and benefits of the in-depth longitudinal case study organisation at two different points in time to monitor how enterprise collaboration platform outcomes and benefits change over time.

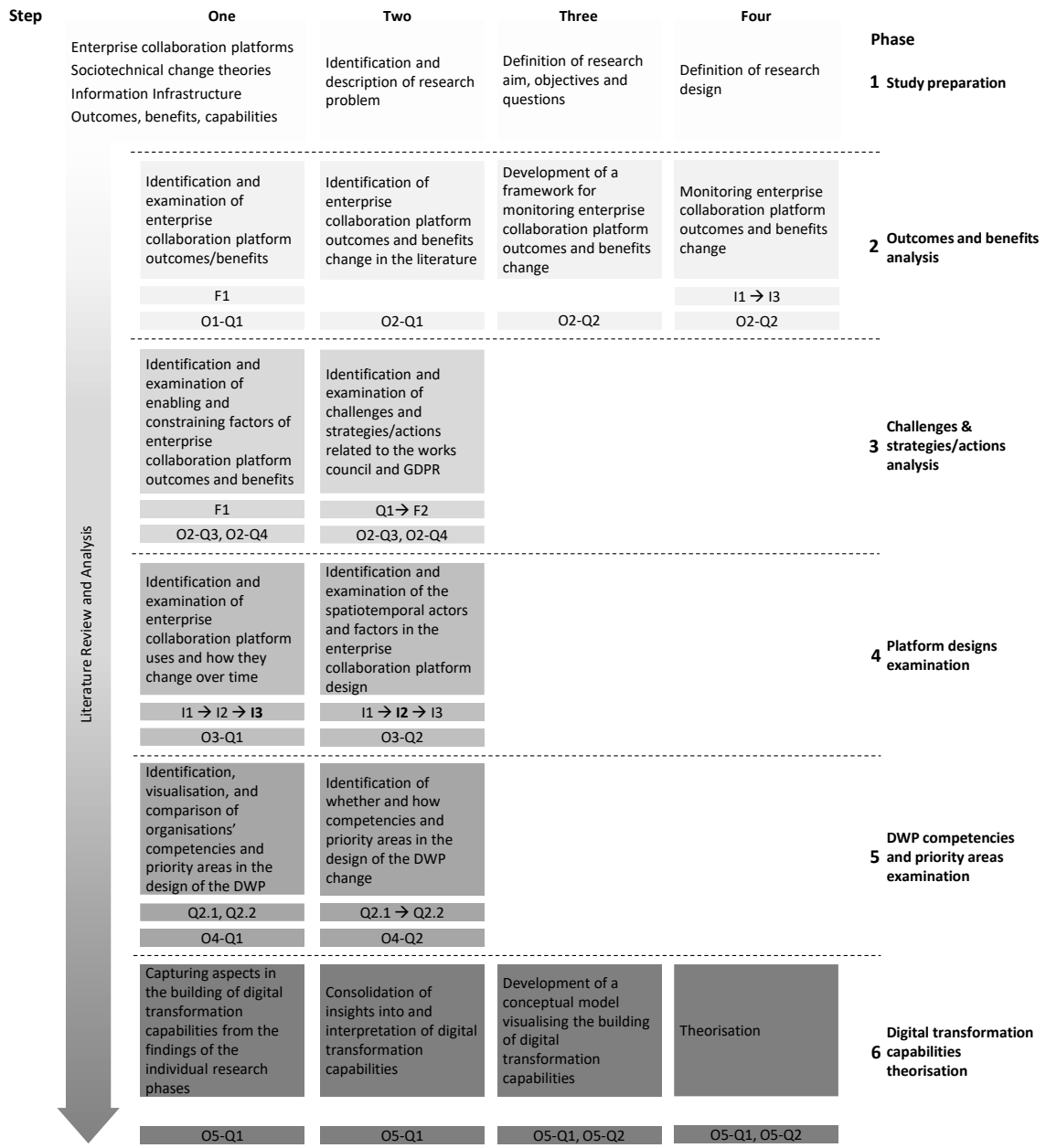


Figure 3-3. Research phases and steps.

Phase 3: Challenges & strategies/actions analysis

Phase 3 focuses on the challenges that organisations deal with in enterprise collaboration platform change and the strategies and actions applied in managing enterprise collaboration platform change. The first step of phase 3 is interrelated with the preceding research phase. It examines how the achievement of desired outcomes and benefits is made more difficult or facilitated. Specifically, this step is used to identify and examine the enabling and constraining factors of enterprise collaboration platform outcomes and benefits in the multiple case study organisations. Attention is placed on the different characteristics and structures of the enabling and constraining factors that may be subject to change. In step two of phase 3, two challenges identified are examined in more detail: the general data protection regulation (GDPR) and the works council. Both are identified as

key actors in the enterprise collaboration platform change and are dealt with differently in different enterprise collaboration platform projects.

Phase 4: Platform designs examination

The findings of Phase 1 to Phase 3 exemplify the interpretive flexibility and malleability of enterprise collaboration platforms. Organisations have different visions of what they can achieve with their enterprise collaboration platform and are faced with different challenges towards their achievement and in the enterprise collaboration platform change. Phase 4 builds on the insights gained and looks more deeply into how enterprise collaboration platforms are shaped across multiple frames and settings and their embedding into the broader digital workplace. This phase is designed for the in-depth longitudinal case study to identify and examine how enterprise collaboration platform use inscriptions change across and within different working spheres (social worlds) of the case study organisation (step one of phase 4). In order to explain changes in platform design, step two of phase 4 identifies and examines the roles and influences of its emerging spatiotemporal actors and factors.

Phase 5: DWP competencies and priority areas examination

Phase 5 deals with the competencies and priority areas in the design of the enterprise collaboration platform enabled digital workplace in the multiple case study organisations. Step one and step two of this phase are highly interrelated. Step one is concerned with capturing, visualising, and comparing organisations' competencies and priority areas in the design of the digital workplace (DWP). Both within and across company comparisons are conducted, i.e. the different perceptions of individual practitioners / collaboration experts towards their organisations' DWP priority areas and competencies are identified and compared within and across organisations. To increase the data basis, data is collected at two different points in time. In step two, the data collection at two different time points also allows for comparing how DWP priority areas and competencies change over time.

This research phase represents the shift from enterprise collaboration platforms to the broader notion of the DWP and calls attention to its design flexibility that is not only an organisational matter but also a matter of perspective shaped by the individual interaction with the enterprise collaboration platform enabled DWP.

Phase 6: Digital transformation capabilities theorisation

This last phase is interwoven with the phases 2 to 5, where the study of and establishment of an understanding of how enterprise collaboration platforms (and related DWP) are transforming and being shaped and designed through use is paramount. Phase 6 is broken up into four research steps. The first step is an ongoing step and concerns the screening of the research findings from the previous research phases in order to identify various aspects and qualities that may be relevant for the building of digital transformation capabilities. As outlined in chapter 3.4.2, digital transformation capabilities are required to deal with the continuous digital transformation and successfully achieve and manage IT-enabled change. Step two consolidates and integrates the

insights gained. Based on this, step three concerns the visualisation of the building of digital transformation capabilities and proposition of a related conceptual model that supports organisations in developing the capabilities to reflect upon and anticipate digital transformations. Step four is conducted in tandem with step three and amends the practical outcomes of this research through a theorisation of the findings. Knowledge about the emergence and building of digital transformation capabilities in volatile sociotechnical environments is developed.

As seen in figure 3-3, both the methods of data collection and the research questions are mapped onto the single research steps using their identifiers (ID). In this research, data collection methods and research questions are assigned to one or more research steps. Likewise, single research steps can embrace several data collection methods and research questions. In some cases, single research steps show no data collection method. This is the case when data in the research step is merely collected as part of the literature review and analysis, which is an ongoing task throughout all research phases (see arrow downwards symbol on the left of figure 3-3), or when the research step focuses on the interpretation and analysis of data collected and generated in other research steps. Figure 3-3 does not include the data analysis methods for each research step because the methods of data analysis typically spread across a variety of different research steps and phases. The following chapters (chapter 4 to chapter 6) provide detailed descriptions of the data analysis methods along with detailed descriptions of the research phases, steps, and related studies performed.

3.8 Research quality and ethics

Qualitative research has often been criticised for a lack of trustworthiness by positivist researchers, which may, according to Shenton (2004) be because qualitative research cannot address the concepts of validity and reliability in the same way as in quantitative research (p. 63). In response to this claim, qualitative researchers have presented ways to deal with the issues of validity and reliability. However, the majority of qualitative researchers have used different terminology to address research rigor in qualitative research (Shenton, 2004). In this research, Guba's four quality criteria for trustworthiness according to Shenton (2004) are used: *Credibility*, *transferability*, *dependability*, and *confirmability*. Table 3-6 explains each quality criterion and shows how each quality criterion, and related provision, is addressed in this research.

Table 3-6. Guba's four quality criteria for trustworthiness according to Shenton (2004).

Credibility Replaces internal validity as traditionally used in positivism. Credibility aims to achieve trustworthiness through adequately and truly representing the phenomenon under study (Shenton, 2004).	
Provision	**Approach in this research**
The adoption of research methods that are well established	In this research, the proven case study methodology (Thomas, 2011) is used to value concrete, context-dependent knowledge (Flyvbjerg, 2006). For data collection and analysis, a range of different well-established research methods is applied as outlined in the previous chapters (chapter 3.5.1 to chapter 3.5.8). Thick descriptions of the application of the research methods and how they fit the stated research aim are described in the subsequent chapters (chapter 4 to chapter 6).
The development of an early familiarity with the culture of participating organisations	This research benefits from the IndustryConnect initiative (see chapter 3.6) that brings together researchers and practitioners to examine digital transformation and digital workplace technologies. For this research, member organisations are met on a regular basis (e.g. in collaborative workshops or bilateral meetings / visits to the case study organisation) in order to establish a relationship of trust and gain an adequate understanding of the organisations and their culture.
Triangulation	Triangulation is used to avoid subjective bias in research through the use of multiple researchers, data sources, methods, and theoretical lenses (Tracy, 2010). Accordingly, Denzin (1970) describes four different types of triangulation: investigator triangulation, data triangulation, methodological triangulation, and theory triangulation. In this research, they are used as described below. Data triangulation: different data sources are used that do not refer to the different research methods of generating data but to the collection of data from multiple organisations and organisational members at multiple time points. In this way, different data about the same event can be collected, where "different viewpoints and experiences can be verified against others and […] a rich picture of the attitudes, needs or behaviour […] constructed" (Shenton, 2004, p. 66). Theory triangulation: Same sets of collected data are analysed through different theoretical lenses (e.g. inscriptions, BoA, social worlds), particularly as part of the single in-depth case study. This allows for different perspectives and multiple levels of analysis. Methodological triangulation: different research methods (e.g. interviews, focus groups, surveys) with different characteristics, strengths, and weaknesses are selected based on their theoretical relevance for this study. The different methods yielding different results are applied in concert to shed light on different details of

	the enterprise collaboration platform change and related building of digital transformation capabilities. Investigator triangulation: In order to strengthen the integrity of the research findings, a large proportion of the data analysis (e.g. eXperience case studies, coding outcomes) are reviewed by multiple researchers who are part of the IndustryConnect initiative. Further, the data analysis is carried out by different researchers in some cases (see, for example, the development of the digital workplace assessment method in chapter 6.1). Different researchers can bring in different perspectives, as well as cross-examine and discuss the findings (see also Anney, 2014).
Frequent debriefing sessions	In this research, there are regular meetings between the researcher and her supervisor to discuss the research goals, research findings and unanticipated research directions. The supervisor contributes to the discussions through her experiences and perceptions. Alternative approaches and methods of data collection and analysis are reviewed and discussed based on emerging topics and issues (e.g. the role of the works council, the digital workplace competencies).
Member checks	Member checking (Bygstad & Munkvold, 2007; Iivari, 2018) as a key foundation for the credibility of this research happens "on the spot" (Shenton, 2004, p. 68), e.g. during interviews and focus groups through queries / comprehension questions to the subjects, or at the end when findings of interviews, surveys, or focus groups are presented, verified, and discussed in follow-up workshops. For the eXperience (Schubert & Wölfle, 2007) base case of the single in-depth case study, written text is reviewed and verified by the informants, and edited by the researcher until the articulations by the informants are accurately captured.
Thick descriptions of the phenomenon under scrutiny	This research provides detailed descriptions of the in-depth case company and the phenomenon of interest to promote credibility. Specifically, the situations studied, and their incorporated contexts are described thoroughly. To allow for such rich descriptions, data collection is rigorously documented (e.g. interview and focus groups are audio-taped and transcribed verbatim).
Transferability Constitutes an alternative to "external validity" / "generalisability" as traditionally used in positivism. Transferability refers to the provision of sufficient detail of the research context; it can be identified whether the findings of a research study can be applied to other situations (Shenton, 2004).	
	Approach in this research
	This research provides detailed background information (incl. e.g. research motivation, research setting, information about the participants, characteristics of the organisations, data collection approach) to establish the context of this research and rich description of the phenomenon of interest. This enables readers to gain an adequate understanding of this research, so that the instances of the phenomenon can be compared with those that emerge in their investigations (Shenton, 2004, p. 70). While the results in this qualitative research are specific to the specific environment and its individuals, this research work is considered essential in gaining important insights into the shaping of enterprise collaboration platforms and the building of digital transformation capabilities. Inconsistencies between this research and future studies with interest in the same phenomenon in different settings are not viewed as errors and proof for poor transferability but as a reflection of multiple realities and as an opportunity to gain a more inclusive and overall picture of the phenomenon of interest.

Dependability Constitutes an alternative to "reliability" as traditionally used in positivism. Dependability refers to the repeatability of the research study in the same context, with the same methods and participants yielding the same results (Shenton, 2004).	
	Approach in this research
	Dependability cannot be easily achieved in qualitative research. This is because of the changing nature of the phenomena under study (Marshall and Rossman, as cited in Shenton, 2004, p. 71). Though, as Shenton (2004) proposes, the research design of this work is considered a "prototype model", which is based on a description of the plans for the research design and its actual implementation, the provision of data gathering details, and a reflective account of the research inquiry.
Confirmability Constitutes an alternative to "objectivity" as traditionally used in positivism. Confirmability is concerned with demonstrating that research results are derived from the data and not from the preferences and predispositions of the researcher (Shenton, 2004).	
	Approach in this research
	Following Shenton (2004), a detailed description of the research methodology is provided so that the reader can "determine how far the data and constructs emerging from it may be accepted" (p. 72). As a means for establishing confirmability, audits of the research processes and results are provided.

Along with research quality, this research considers ethical issues in conducting research and research writing. Ethics concerns doing good and avoiding harm (Orb, Eisenhauer, & Wynaden, 2001, p. 93), i.e. it embraces the principles of what is right and what is wrong conduct in a profession. Such a profession is information systems research that is a social science (Recker, 2013, pp. 141, 143).

According to Recker (2013, pp. 143, 144), there are key ethical principles that need to be addressed. One is the task of having the responsibility to protect human subjects / participants of research. This includes obtaining the necessary permission and safeguarding the interests of all stakeholders. This research is part of the IndustryConnect initiative where research activities are based on informed consent of the member organisations. Gathered information must not be misused, i.e. the privacy of all research participants is kept secure. During the data collection through focus groups and interviews the principle of anonymity cannot be fulfilled in this research (informants and the researcher interact face-to-face); however, the confidentiality of the obtained data is maintained in all cases. This means that pseudonyms for participating organisations, organisational members, company internal names/labels for processes, products, information systems, and applications, etc. are used in this dissertation so that they cannot be identified (see table 9-1, Appendix A). This research recognises that the research participants are autonomous people. They can participate and share information voluntarily in this research and related studies and can withdraw from the research at any time without consequences. In this research, one organisation had decided to withdraw from in-depth case investigations after two years.

Another ethical consideration to research conduct refers to the storage and analysis of the collected data. In this research, all research data (e.g. data from survey questionnaires, recordings, research results) are securely stored in durable storage facilities. Multiple data backups are created so that

data can be recovered in case of data loss or deletion. Access to all materials and raw data is reserved to the researcher. Following Recker (2013), the ethical principle of providing an “honest and complete reporting of how data is analysed” (p. 144) is addressed (see chapter 4.1.1, chapter 4.2.1.1, chapter 4.2.2.1, chapter 4.4, chapter, 5.2.1.1, chapter 5.2.2.1, chapter 5.3.1, chapter 5.4.1, chapter 5.6, chapter 6.1, chapter 6.4, and chapter 7). This allows for transparency and reliable evidence.

Chapter 4
Diverse Routes to Enterprise Collaboration Platform Change

Enterprise collaboration platform change is unique, i.e. the ways enterprise collaboration platforms are shaping and being shaped do not follow a-priori defined routes, they are emergent and unbounded. Enterprise collaboration platform change can incorporate various use motivations, intentions, manifestations as well as a unique constellation of material artefacts, human agents and their contexts in which they are embedded through their ongoing interactions (Nitschke et al., 2020).

Using multiple case study research (see chapter 3.2), this chapter places emphasis on the variations in enterprise collaboration platform change. It provides the findings of an in-depth examination of the diverse *outcomes and benefits* organisations expect to achieve with their enterprise collaboration platforms and underlying ECS (see research objective O1; chapter 1.2), i.e. what organisations expect to gain from enterprise collaboration platforms and the related contributions to the business (Nitschke & Williams, 2020, p. 2609), as well as related challenges and management strategies and actions in the enterprise collaboration platform change (see research questions O2-Q3, O2-Q4; chapter 1.2). Specifically, this part of the work examines *enterprise collaboration platform constraints*, i.e. factors making the achievement of enterprise collaboration platform outcomes and benefits more difficult, and *enterprise collaboration platform enablers*, i.e. factors supporting and enabling the attainment of enterprise collaboration platform outcomes and benefits. The in-depth examination yields an inventory of enterprise collaboration platform outcomes/benefits, enablers and constraints and reveals their relation to each other and their characteristics and structure. In addition, it provides insights into how enterprise collaboration platform enablers and constraints can evolve over time (see research question O2-Q2; chapter 1.2) and as organisations and their organisational members are engaging in the design process of enterprise collaboration platforms. This chapter further provides an analysis of two challenges, namely the *General Data Protection Regulation (GDPR)* and the *works council*, which emerged as key actors in the enterprise collaboration platform change and members in the platform design, respectively (see research question O2-Q4; chapter 1.2). The focus is on how enterprise collaboration platform using companies perceive these actors, integrate them into the enterprise collaboration platform project and deal with them.

For this purpose, two focus groups (F1, F2; see chapter 3.5.5) and a questionnaire-based survey (Q1; see chapter 3.5.3) were conducted as described in the subsequent subchapters.

4.1 Enterprise collaboration platform outcomes/benefits and their enabling and constraining factors: A focus group activity and analysis

This part of the research work focuses on the desired enterprise collaboration platform outcomes/benefits and their enablers and constraints encountered in the course of enterprise collaboration platform change. By looking at enterprise collaboration platform outcome specific enablers and constraints, it extends previous research work by Greeven and Williams (2017, 2016). Using the focus group method, an in-depth qualitative and exploratory research design was adopted to investigate their variety and multifacetedness as detailed below.

At this point, no distinction between enterprise collaboration platform outcomes and enterprise collaboration platform benefits is made. With the focus of this part of the work, this has no negative influence on the research findings. However, both concepts emerged with different qualities in the course of this research and are later considered as distinct concepts in chapter 5.

4.1.1 Focus group outline

The aim of this research work part is to *investigate the variety and multifacetedness of enterprise collaboration platform outcomes/benefits and their enabling and constraining factors*.

To achieve this aim, the objectives are to

i) identify desired enterprise collaboration platform outcomes/benefits and their enablers and constraints,

ii) investigate the characteristics of enterprise collaboration platform outcomes/benefits and their enablers and constraints, and

iii) understand how different enterprise collaboration platform outcome/benefit-specific enablers and constraints co-evolve over time.

This part of the research work is organised into four research phases and includes 11 different research steps as shown in figure 4-1 and described below.

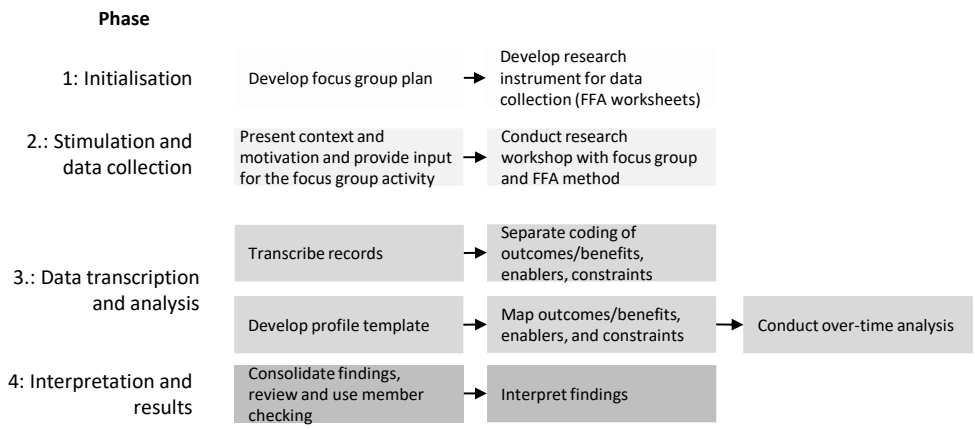


Figure 4-1. Phases and steps of focus group (F1) activity and analysis informed by Caillaud and Flick (2017).

Phase 1: Initialisation

First, a focus group plan is developed in preparation of an IndustryConnect research workshop in April 2017 and to initialise the research on enterprise collaboration platform outcomes and benefits and their enablers and constraints. In order to gain detailed insights into their complexities, an exploratory research approach with interaction between the enterprise collaboration platform using organisations is selected (Morgan, 1996). In the second step of this phase, worksheets are developed as a research instrument building on the force-field-analysis (FFA) method (Lewin, 1943) for the subsequent data collection and analysis phases.

Phase 2: Stimulation and data collection

In the first step of this phase, the focus group participants are stimulated first, i.e. the context and motivation of the research project are presented to the participants. Furthermore, the methods and input for the activity and discussion are described. In the second step, the data is collected from nine enterprise collaboration platform using organisations employing the FFA and focus group method (F1; see chapter 3.5.5). The workshop participants are all collaboration experts representing a range of different business areas (e.g. information technology, information and knowledge management, internal communications, human resources) (see table 9-1, Appendix A). Figure 4-2 presents the goal of the research workshop, which is to collect detailed data about: i) desired organisation-specific enterprise collaboration platform outcomes/benefits, i.e. what organisations expect to gain from enterprise collaboration platforms and the related contributions to the business (Nitschke & Williams, 2020, p. 2609); ii) enterprise collaboration platform enablers, i.e. factors supporting and enabling the attainment of enterprise collaboration platform outcomes/benefits; and iii) enterprise collaboration platform constraints, i.e. factors making the achievement of enterprise collaboration platform outcomes/benefits more difficult.

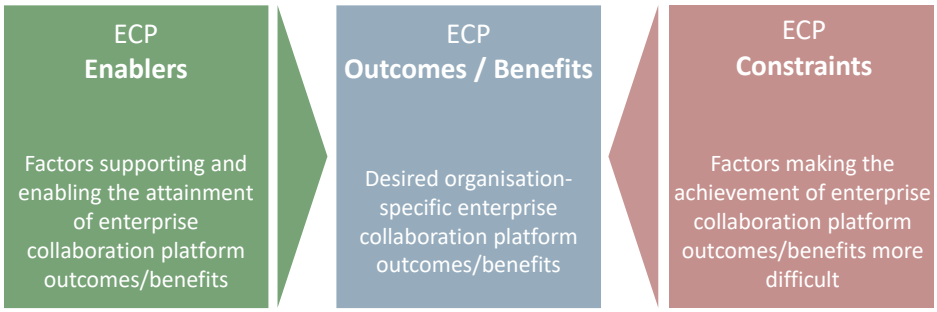


Figure 4-2. FFA method with enterprise collaboration platform outcomes, enablers, and constraints.

For the data collection, individual FFA worksheets with the following guiding questions are used (see figure 4-3):

1. What are the three key enterprise collaboration platform outcomes/benefits your organisation wanted or still wants to achieve?
2. Select one of these three key enterprise collaboration platform outcomes/benefits from question 1. For this outcome/benefit, what are a) the main enterprise collaboration platform enablers that supported or still support achieving it, and b) the main enterprise collaboration platform constraints that made or still make achieving it difficult?

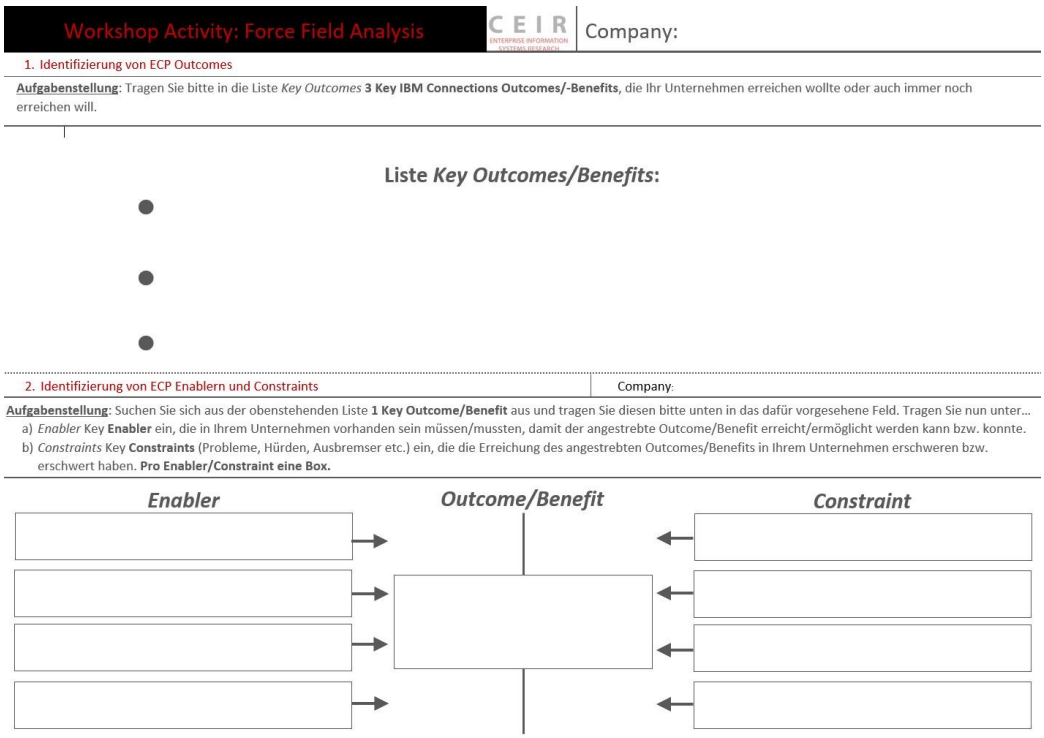


Figure 4-3. Screenshot of the FFA worksheet.

The individual FFA worksheets are filled in by each workshop participant and a focus group discussion on the collected enterprise collaboration platform outcomes/benefits, and their enablers and constraints is conducted afterwards. The discussion is digitally recorded for data transcription and analysis purposes.

Phase 3: Data transcription and analysis

This phase is separated into two parallel strands of research steps.

In the first step of the first strand, the recorded data is transcribed verbatim and the data from the completed FFA worksheets are brought together in a spreadsheet by the researcher. In the second step of the first strand, qualitative content analysis methods following Saldaña (2009) are used to inductively and iteratively code the gathered data through first and second coding cycles to identify, explore and investigate the complexity of enterprise collaboration platform outcomes/benefits and associated enablers and constraints in terms of their characteristics and structure. Enterprise collaboration platform outcomes/benefits, enablers, and constraints are coded separately.

Through descriptive, in vivo, evaluation and magnitude coding as first coding cycle methods and pattern and axial coding as second coding methods a profile template for enterprise collaboration platform outcomes/benefits and their enablers and constraints is developed in the first step of the second strand. This profile template is then applied in the second step of the second strand to map the coded enterprise collaboration platform enablers and constraints to specific coded enterprise collaboration platform outcomes/benefits in order to structure and understand them. Three example enterprise collaboration platform outcomes/benefits, each with an example of the identified enablers and constraints, are presented to illustrate their multifacetedness. For one of the exemplary outcome/benefit examples, the temporal co-evolution of enterprise collaboration platform outcome/benefit specific enablers and constraints is studied in the third step of the second strand. Time data is extracted from the focus group transcript by conducting further coding cycles with attribute and magnitude coding. The findings are visualised over time, i.e. alongside the enterprise collaboration platform project of one participating enterprise collaboration platform using organisation.

Phase 4: Interpretation and results. This study concludes with a consolidation and interpretation of the overall research findings. First, the findings are consolidated and reviewed. As a form of member checking (Bygstad & Munkvold, 2007; Iivari, 2018) the findings are presented and discussed with the study participants in a follow-up IndustryConnect research workshop. Second, the findings are interpreted.

4.1.2 Focus group analysis and findings

The following two subchapters present the focus group analysis and findings. The focus is on the variety of enterprise collaboration platform outcomes/benefits, enablers, and constraints, as well as a corresponding profile template developed for their analysis. The findings include an over-time visualisation of how enablers and constraints to a specific enterprise collaboration platform outcome/benefit evolve (chapter 4.1.2.2).

4.1.2.1 Profiles of enterprise collaboration platform outcomes/benefits, enablers, and constraints

This subchapter addresses the development and application of a profile template for enterprise collaboration platform outcomes/benefits and their enabling and constraining factors.

Enterprise collaboration platform outcomes/benefits

Both the data from the focus groups transcripts and the completed FFA worksheets were coded by applying descriptive coding. The coding process yielded a total number of 30 initial individual enterprise collaboration platform outcome/benefit codes. Examples of outcomes/benefits identified in this process are presented in table 4-1.

Table 4-1. Examples of enterprise collaboration platform outcomes/benefits

Highly networked company	Simplified exchange of group-wide information	Breaking down silos
Faster integration of new companies and employees	Consolidation of group-wide information	Nucleus for the digital workplace
Facilitate international and cross-divisional communication	Need for the replacement of the intranet	Overcome a fragmented IT infrastructure

Through further first coding cycle iterations, the identified enterprise collaboration platform outcomes/benefits were consolidated and relabelled into 17 descriptive codes. Similarly coded enterprise collaboration platform outcomes/benefits were organised and grouped into categories as part of the second coding cycle iterations through pattern coding. The final descriptive code categories range from communication/collaboration to knowledge and information management to economic and represent different types of desired enterprise collaboration platform outcomes/benefits without further evaluative information (see table 9-2, Appendix C).

The evaluative information was extracted from the initial code set in subsequent coding rounds through in vivo coding, covering evaluation and magnitude codes, and pattern coding. This complementary information shows different objectives of enterprise collaboration platform outcomes/benefits (e.g. optimisation, creation, or achievement) (see table 9-3, Appendix C). By further breaking down the data from the initial code set into discrete parts, it was identified that enterprise collaboration platform outcomes/benefits can be of different motivation (problem-driven,

opportunity-driven), include various resources (e.g. information, processes, structures, human resources), and be of different nature (e.g. cultural/organisational, strategic, operational).

Enterprise collaboration platform enablers and constraints

Both the enterprise collaboration platform enablers and enterprise collaboration platform constraints were coded simultaneously with the enterprise collaboration platform outcomes/benefits from the focus group transcript and FFA worksheet data, resulting in 39 descriptive enabler codes and 38 descriptive constraint codes from first coding cycle iterations. Table 4-2 and table 4-3 present examples of collected enterprise collaboration platform enablers and constraints.

Table 4-2. Examples of enterprise collaboration platform enablers

Ambassadors	Own budget	Mobile access options
Inclusion of externals	Generation change	Need for information exchange
Legal requirements	IBM improves the API	Identification of all killer applications

The examples presented in the two tables (table 4-2, table 4-3) show enterprise collaboration platform enablers and constraints of different types and nature. Pattern and axial coding as second coding cycle methods were applied to attribute a more evocative meaning to the data. Further analyses reveal that the corresponding enterprise collaboration platform enablers and constraints may also be many-layered.

Table 4-3. Examples of enterprise collaboration platform constraints

Tool constraints	Language barrier	Difficulty to include the production level
Time for documentation	Competing systems	Budget constraints
Missing management support	Tool is developing too slowly	Project expires

Both can be of different *structure* (condition, event, strategies/actions) (see table 9-4, Appendix C) and be distinguished in terms of their *change design* (see table 9-5, Appendix C): They can represent a motivation or reason for change (driver, e.g. need for information exchange, project expires), actually enable or constraint change (enabler/constraint, e.g. the displaying of positive enterprise collaboration platform use cases, enterprise collaboration platform project resource savings) and make change that has happened or is happening visible (embodiment, e.g. users are increasingly accepting enterprise social software, enterprise collaboration platform users are becoming more passive).

Furthermore, enablers and constraints can be distinguished in terms of their source (internal, external), project relation (project-related, project-unrelated), and controllability (controllable, uncontrollable).

Profile template for enterprise collaboration platform outcomes/benefits, enablers, and constraints

From the final codes and categories, a profile template for enterprise collaboration platform outcomes/benefits and their enablers and constraints was developed. The template supports structuring and understanding their multifacetedness. As part of the qualitative content analysis, a range of characteristics of enterprise collaboration platform outcomes/benefits, enablers, and constraints were identified as profile information. This includes profile characteristics such as type, objective, or nature of enterprise collaboration platform outcomes/benefits, and structure, project-relation, or controllability of enablers and constraints. Since enterprise collaboration platform enablers and constraints are viewed as counterparts of enterprise collaboration platform outcomes/benefits following the FFA method, it was reasonable to use the same profile characteristics. This decision was strengthened through the fact that some enablers in one enterprise collaboration platform change initiative might be constraints in another enterprise collaboration platform change initiative and vice versa. Also, constraints might become enablers alongside one enterprise collaboration platform change initiative, as illustrated in more depth in the following section. The identified profile characteristics and possible manifestations were clustered to build a profile template for enterprise collaboration platform outcomes/benefits and their enabling and constraining factors. The profile template supports structuring and understanding the nature and complexity of enterprise collaboration platform outcomes/benefits, enablers, and constraints, and therefore, serves as a tool for learning from and reflecting enterprise collaboration platform change necessary for the development of required digital transformation capabilities.

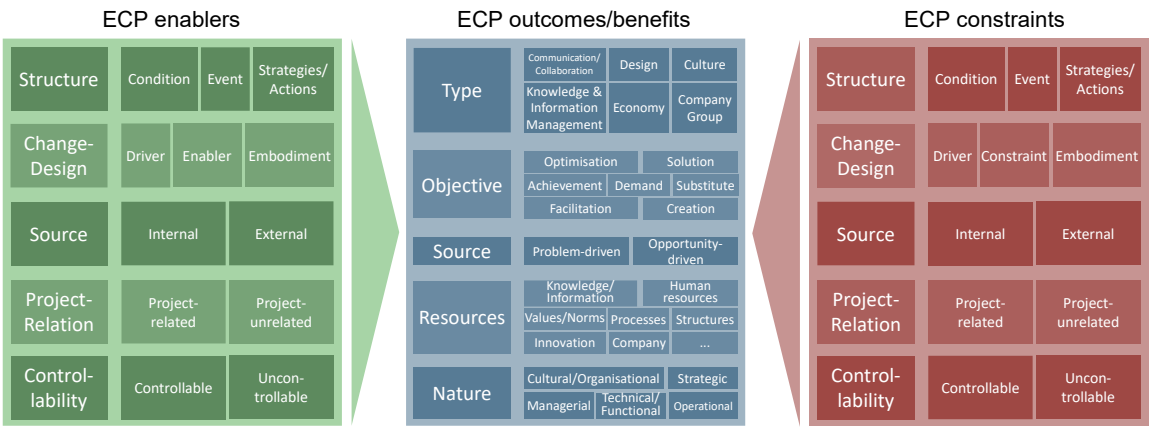


Figure 4-4. Profile template for enterprise collaboration platform (ECP) outcomes/benefits and their enabling and constraining factors.

Mapping enterprise collaboration platform outcomes/benefits, enablers and constraints

As stated above, enterprise collaboration platform outcomes/benefits were examined in relation to their enablers and constraints. For each study participant, the established codes of enterprise collaboration platform outcomes/benefits, enablers, and constraints were used and linked in line with the focus group question two ([…] For this outcome/benefit, what are a) the main enterprise collaboration platform enablers […], and b) the main enterprise collaboration platform constraints). Table 4-4 to table 4-6 present three example enterprise collaboration platform outcomes/benefits, each with an example of the identified enablers and constraints, using the developed profile template. The example outcomes/benefits, enablers, and constraints were selected in such a way as to illustrate their multifacetedness and complexity with varying manifestations of the different profile characteristics.

Table 4-4. Example one: Specific enterprise collaboration platform (ECP) outcome/benefit with one identified enabler and one identified constraint (Finance Industry Association 01).

ECP enabler		**ECP outcome/benefit**		**ECP constraint**	
Make cross-divisional use cases visible		Breaking down silos		'Knowledge is power' attitude	
Structure	Strategies/ Actions	Type	Culture	Structure	Condition
Change Design	Enabler	Objective	Solution	Change Design	Constraint
Source	Internal	Motivation	Problem-driven	Source	Internal
Project Relation	Project-related	Resources	-	Project Relation	Project-unrelated
Controllability	Controllable	Nature	Cultural/ Organisational	Controllability	Uncontrollable

In example one (table 4-4), the objective is to solve an existing cultural problem, which is the existence of communication silos making collaborative work more difficult. One of the enablers to the desired enterprise collaboration platform outcome/benefit of breaking down silos is the chosen act of making cross-divisional use cases visible, for example through a wiki entry reporting on success stories where different departments communicate and collaborate successfully with each other on common tasks via enterprise collaboration platform communities. However, a problem perceived is the attitude of 'knowledge is power' prevalent in the company, where sharing knowledge is viewed as latent loss of influence, which cannot easily be controlled and makes the breaking down of silos more difficult.

Table 4-5. Example two: Specific enterprise collaboration platform (ECP) outcome/benefit with one identified enabler and one identified constraint (Steel Manufacturer 01).

ECP enabler		**ECP outcome/benefit**		**ECP constraint**	
Users are more and more accepting of enterprise social software (ESS)		Improve knowledge documentation		ECP use restrictions through usage guidelines	
Structure	Condition	Type	Knowledge & Information management	Structure	Strategies/ Actions
Change Design	Embodiment	Objective	Optimisation	Change Design	Constraint
Source	Internal	Motivation	Opportunity-driven	Source	Internal
Project Relation	Project-related	Resources	Knowledge/ Information	Project Relation	Project-related
Controllability	Uncontrollable	Nature	Managerial	Controllability	Controllable

In example two (table 4-5), there is the perceived opportunity to improve the documentation of knowledge, i.e. the objective is to optimise current procedures for documenting knowledge through the introduction of enterprise collaboration platform. The organisation has observed that more and more users are accepting the platform as a working tool, which creates favourable conditions for the adoption of new and improved enterprise collaboration platform supported knowledge documentation practices. On the other hand, it was identified that the enterprise collaboration platform usage guidelines developed and currently in use are too restrictive in nature preventing users from using the system to document their knowledge as they fear the disclosure of confidential information without permission.

Table 4-6. Example three: Specific enterprise collaboration platform (ECP) outcome/benefit with one identified enabler and one identified constraint (Chemical Products Manufacturer 02).

ECP enabler		**ECP outcome/benefit**		**ECP constraint**	
Innovation-driven company		Faster On-Boarding of employees		Takeover attempt by another company	
Structure	Condition	Type	Company Group	Structure	Event
Change Design	Driver	Objective	Optimisation	Change Design	Constraint
Source	Internal	Motivation	Opportunity-driven	Source	External
Project Relation	Project-unrelated	Resources	Project-related	Project Relation	Project unrelated
Controllability	Uncontrollable	Nature	Cultural / Organisational	Controllability	Uncontrollable

In example three (table 4-6), with mergers and acquisitions being part of the organisation's growth strategy, the organisation sees the opportunity to achieve faster on-boarding and integration of employees by introducing each new employee via enterprise collaboration platform communities to include them in collaborative work. This objective is not achieved but driven by innovation as a strategic pillar of the organisation, desirable but uncontrollable from the enterprise collaboration platform project management perspective. The takeover attempt of the organisation by one of the largest competitors has led to uncertainty and reduction in enterprise collaboration platform project resources (human and financial) constraining the achievement of faster on-boarding of employees, though.

Although other or additional characteristics (e.g. duration, involvement (active/passive), intentionality, predictability (anticipated/unanticipated)) could have been considered in the analysis of enterprise collaboration platform outcomes/benefits and their constraints and enablers, the examples presented prove the usability of the developed profile template for structuring and understanding them. The findings were reviewed and as a form of member checking, the findings were also presented and discussed with the study participants in a follow-up workshop. As part of this, further layers of complexity could be identified showing that enterprise collaboration platform outcomes/benefits and their enablers and constraints, i.e. their **profiles**, are **evolving and interacting** with each other, which is typical of the sociotechnical nature of enterprise collaboration platforms. This can be illustrated by the following examples.

- *Linked structures*. Both enablers and constraints of different structures may be mutually supportive and shaping, e.g. the introduction of a mobile app developed by IBM (event) together with the possibility to now make use of the mobile access options provided by the company (strategies/actions) might support that users are more and more accepting ESS (condition).
- *Changes in change design*. Enablers and constraints may shift in change design, e.g. increasing enterprise collaboration platform use as change embodiment might in turn act as a change enabler, or the idea of 'knowledge is power' as change constraint might in turn work as change driver.
- *From constraints to enablers and vice versa*. Constraints may become enablers and vice versa based on experiences and learning. For example, the works council objecting to the use of a certain enterprise collaboration platform feature might become an enabler if it is actively involved in the enterprise collaboration platform project and acts as a role model. The works council may act as a role model through its enterprise collaboration platform usage showing best practices that incorporate alternative features.
- *From uncontrollable to controllable and vice versa*. Uncontrollable enablers and constraints may become controllable and vice versa. An example is that users being more and more accepting of enterprise social software (ESS) might be rooted in the increasing use of social software in private lives (uncontrollable) but might also be further supported in the enterprise context through appropriate incentive mechanisms intentionally applied

(controllable). External enablers and constraints (e.g. laws and regulations) largely stay uncontrollable.

- *From project-unrelated to project-related and vice versa*. Project-unrelated enablers and constraints may become project-related and vice versa and manifest depending on the use context. For example, the principle of 'Working out loud' enabling the achievement of a specific enterprise collaboration platform outcome/benefit might have existed before the introduction of the enterprise collaboration platform (project-unrelated) or be a result of enterprise collaboration platform use (project-related).
- *Changes in enterprise collaboration platform outcome/benefit characteristics*. Enterprise collaboration platform outcomes/benefits themselves may change in terms of their characteristics. For instance, instead of the desired outcome/benefit to improve knowledge documentation (initial objective), organisations might strive first to ease knowledge documentation (new objective) based on the constraints encountered alongside the enterprise collaboration platform change.

4.1.2.2 Evolution of enterprise collaboration platform outcome specific enablers and constraints

As stated above, enterprise collaboration platform outcomes/benefits, enablers and constraints evolve alongside the enterprise collaboration platform change (i.e. over time). Some enterprise collaboration platform outcomes/benefits could become less important to the enterprise collaboration platform change, and others become more outstanding. That is the case when, for example, the corresponding enterprise collaboration platform constraints diminish, enterprise collaboration platform outcomes/benefits are achieved through enterprise collaboration platform enablers, or when new contextual developments, such as the involvement of new stakeholders, come about.

In line with objective III) (see chapter 4.1.1), this research work part sought to extend the understanding of enterprise collaboration platform outcomes/benefits by identifying and visualising how different identified enablers and constraints of one exemplary enterprise collaboration platform outcome/benefit co-evolve over time in terms of importance. In this dissertation, the desired enterprise collaboration platform outcome/benefit of 'breaking down silos' from example one (Finance Industry Association 01, Spokesperson / Internal Communication) and its enablers and constraints is examined more closely. For this purpose, the focus group transcript was used as an input for magnitude and attribute coding. Thereby, the magnitude codes indicate the importance of the coded enablers and constraints of the enterprise collaboration platform outcome/benefit, and the attribute codes add time frames to them. The transcript excerpts provided in the appendix (see table 9-6, Appendix C) illustrate how the text of one workshop participant, reporting on the enterprise collaboration platform outcome/benefit from example one (breaking down silos) and its enablers and constraints, was coded.

The captured information on the importance and time frames of the enterprise collaboration platform outcome/benefit specific enablers and constraints was then used to visualise how they co-evolve over time in the participating enterprise collaboration platform using organisation. Figure 4-5 extends example one from chapter 4.1.2.1 with 'breaking down silos' as the desired enterprise collaboration platform outcome/benefit. While this outcome/benefit is only one of multiple existing outcomes/benefits within one enterprise collaboration platform change initiative, it exemplifies how different enablers and constraints to the selected enterprise collaboration platform outcome/benefit co-evolve and are changing in importance in the enterprise collaboration platform change (no exact quantitative measures by absolute numbers).

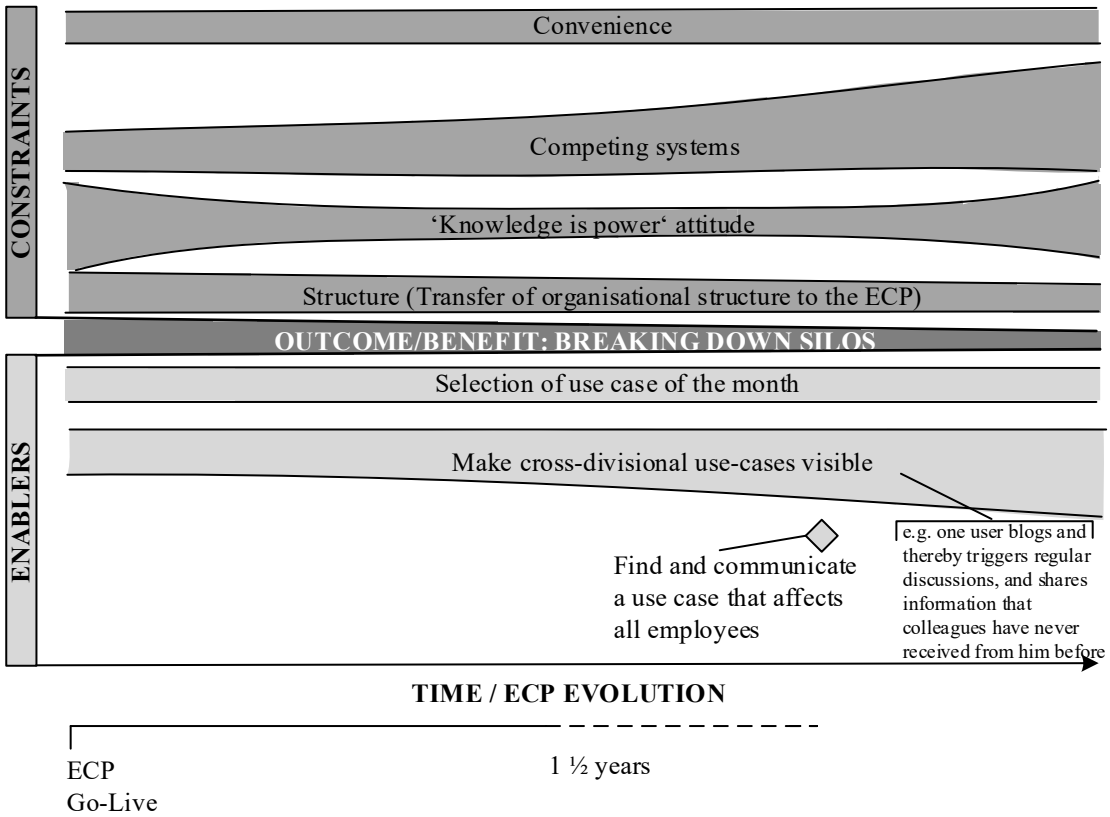


Figure 4-5. Evolution of enterprise collaboration platform (ECP) outcome/benefit specific enablers and constraints (Finance Industry Association 01).

Figure 4-5 shows the enterprise collaboration platform outcome/benefit 'breaking down silos' (middle) and its identified enterprise collaboration platform constraints (upper half) and enterprise collaboration platform enablers (lower half). The rhombus represents events of enterprise collaboration platform enablers and constraints, and the horizontal bars represent conditions or strategies/actions of enterprise collaboration platform enablers and constraints that evolve over time. The depth of the bars shows their increasing/decreasing importance. Figure 4-5 shows that some enterprise collaboration platform enablers and constraints are of constant importance (e.g. 'Selection of use case of the month' or 'Convenience') whereas others are changing in importance (e.g. 'Make cross-divisional use cases visible' or 'Competing systems' increasingly enabling/constraining the desired enterprise collaboration platform outcome/benefit). In order to

gain a more in-depth understanding of enterprise collaboration platform outcomes/benefits and their enabling and constraining factors, the over-time visualisation can be examined together with the developed profile template. For example, the constraints from figure 4-5 appear to be largely uncontrollable and project-unrelated from the enterprise collaboration platform project team point of view. In contrast, the enablers are to higher degree controllable, where strategies/actions are applied to actively direct the enterprise collaboration platform evolution towards the achievement of the desired enterprise collaboration platform outcome/benefit. When being aware of the type and nature of current enterprise collaboration platform enablers and constraints, organisations have the possibility to target enterprise collaboration platform outcomes/benefits more purposefully. For instance, the attitude of 'Knowledge is power' might constrain achieving the desired enterprise collaboration platform outcome/benefit of breaking down silos but might be prevalent independently of the enterprise collaboration platform change. Thus, dealing with this constraint might require going beyond enterprise collaboration platform change boundaries and finding ways for establishing a knowledge-sharing culture. Considering the importance of different enterprise collaboration platform constraints over time might show, in the case of decreasing importance, where organisations have found ways to deal with them. In the case of increasing importance, it might help organisations in identifying priority areas for action.

4.2 Two key actors in the enterprise collaboration platform change: General Data Protection Regulation (GDPR) and the works council

Both the works council and general data protection regulations (GDPR) were discussed as key actors constraining the achievement of positive enterprise collaboration platform outcomes and benefits and as major challenges in the enterprise collaboration platforms acceptance and change. Both actors were made a subject of discussion by the IndustryConnect member organisations in the IndustryConnect's virtual workspace, bilateral research work and collaborative workshops. Figure 4-6 provides snapshots of exemplary forum entries created by collaboration experts of the IndustryConnect member organisations to drive discussions around the works council and GDPR and how they are addressed in the enterprise collaboration platform change.

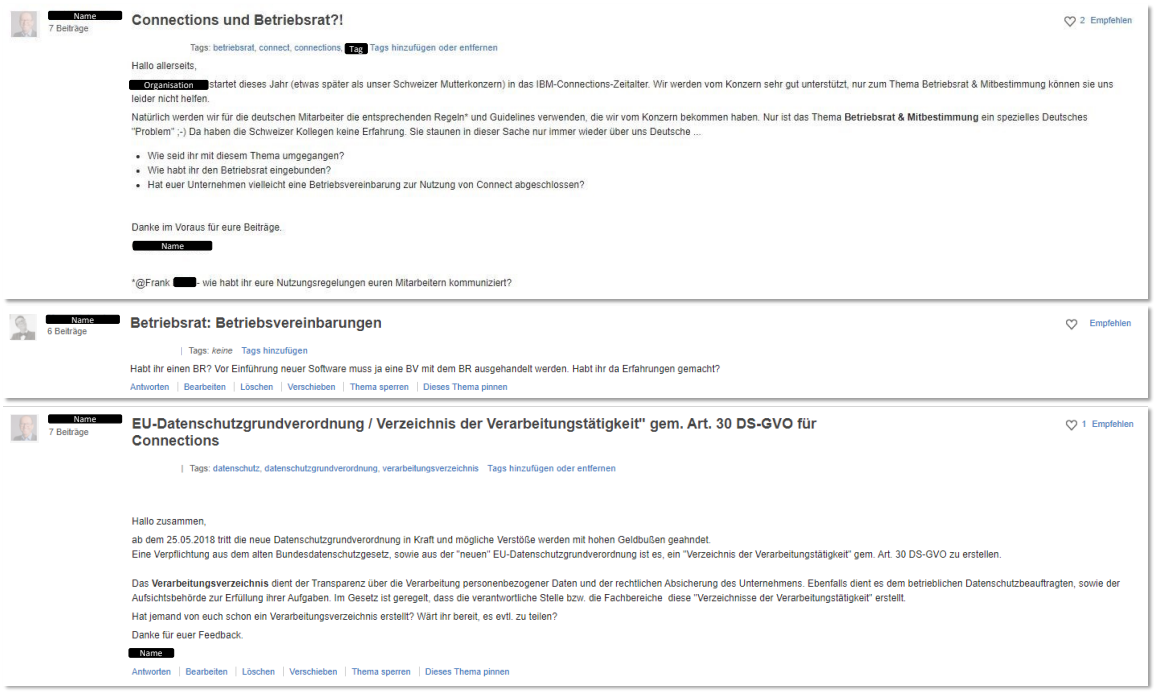


Figure 4-6. Exemplary forum entries in the IndustryConnect's virtual workspace on the works council and GDPR as actors in the enterprise collaboration platform change.

Because both the works council and GDPR emerged as key actors, a questionnaire-based online survey (Q1; see chapter 3.5.3) is used in this research to gather information about how enterprise collaboration platform using organisations perceive these actors, integrate them into the enterprise collaboration platform project and deal with different issues related to them. The survey findings are presented to the survey participants in one of the IndustryConnect's collaborative workshops, working as an input for a subsequent mini focus group (F2; see chapter 3.5.5). The mini focus group deepens the insights gained in Q1 specifically on the role and management of the works council.

The following subchapters present the aim, approach, analysis, and findings of the questionnaire-based online survey (Q1) and mini focus group (F2).

4.2.1 The role and influence of GDPR and the works council in the enterprise collaboration platform change: A questionnaire-based online survey

Based on the identified key role of the General Data Protection Regulation (GDPR) and the works council in the enterprise collaboration platform change, a questionnaire-based online survey on GDPR and the works council was conducted in 2017 (Q1). This was at a time when GDPR of the European Union had not yet come into force but when organisations had started their preparations. GDPR came into force in May 2018 and mandated with new requirements regarding the management and handling of personal information and addresses. It confers EU citizens (e.g. organisations' customers and partners) different rights such as the personal "right to be forgotten" or the right of access to personal data (Basin, Debois, & Hildebrandt, 2018; Voigt & von dem Bussche, 2018). With the coming into force of GDPR, the regulation became directly binding without further implementing legislation needed. Meeting the GDPR's requirements is of great concern to organisations as they can be punished with up to 20,000,000.00 Euros or four per cent of the company's annual turnover in the case of breaching (art. 83 GDPR) (J. Kirchner & Morgenroth, 2018, p. 14).

The works council (in German: "Betriebsrat"), which is a common actor in organisations based in Germany, represents employees in an organisation to increase workplace democracy (Mueller, 2019, p. 881). Based on the Works Constitution Act (BetrVG) the works council has participation and co-determination rights in managerial decisions that regard personnel, social, and operational matters. The works council is elected, where the number of work council members depends on the size of the business operation (J. Kirchner & Morgenroth, 2018, p. 18). Representing the employees of the organisation, they address issues such as environmental protection, health and safety or gender equality (Mueller, 2019, p. 881). The works council is a closely related actor to GDPR[10], as it is also interested in employee data protection (J. Kirchner & Morgenroth, 2018, p. 18).

The following subchapters address the aim and objectives of the survey, steps in developing, conducting, and analysing the questionnaire (chapter 4.2.1.1), and the survey findings (chapter 4.2.1.2).

[10] This research is less interested in the details of the two actors (GDPR, works council) than in their role and influence in the enterprise collaboration platform change. For more information on GDPR and the works council, the following publications can be recommended: Voigt and von dem Bussche (2018); Kirchner, Kremp, and Magotsch (2018).

4.2.1.1 Survey outline

The aim of the questionnaire-based online survey is *to investigate and learn about the implementation of the General Data Protection Regulation (GDPR) as well as the involvement and influence of the works council in the enterprise collaboration platform change*.

Specifically, the objectives are to…

i. identify the relevance of GDPR for the enterprise collaboration platform change,
ii. identify and learn about the planned and implemented ways personally identifiable information (PII) is monitored in the enterprise collaboration platform change to comply with GDPR,
iii. identify the timing and type of involvement of the works council in the enterprise collaboration platform change, and
iv. identify and learn about the kind of influence of the works council in the enterprise collaboration platform change.

The process of developing, conducting, and analysing the questionnaire is divided into four research phases and includes 14 different research steps as shown in figure 4-7 and described below.

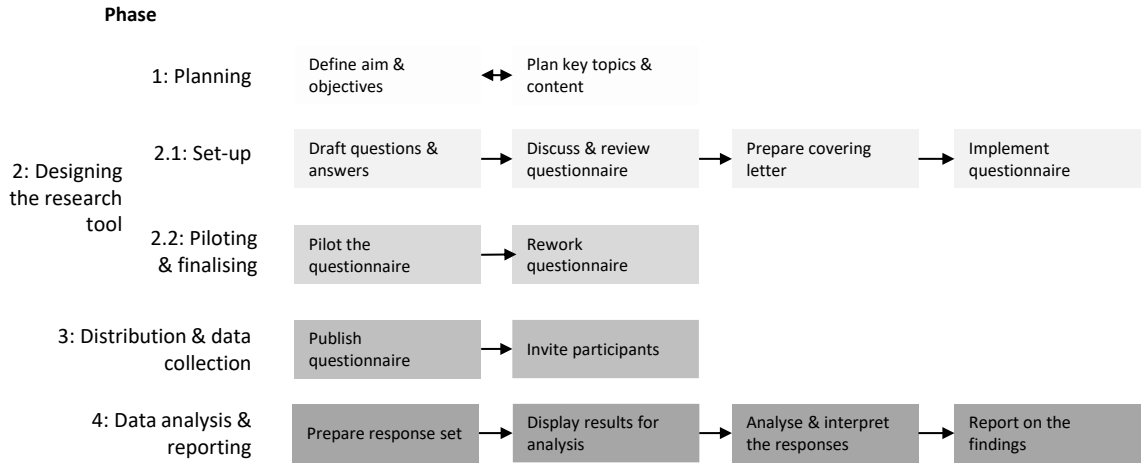


Figure 4-7. Phases and steps of the questionnaire (Q1) informed by Gillham (2000): Role and influence of GDPR and the works council in the enterprise collaboration platform change.

Phase 1: Planning

In the first step of this phase, the aim and objectives of the survey are defined. A single clear research aim and related explicit research objectives are required in order to develop the questionnaire. The second step is entangled with the first step. In the second step, the main topic areas are defined for the questionnaire: *GDPR* and the *works council*. This step also includes deciding the order of these topic areas in the questionnaire. Questions about GDPR are presented prior to questions about the works council. This decision was made because the works council may

issue GDPR matters. Starting with GDPR allows for the examination of its role in the enterprise collaboration platform change independent of the works council.

Phase 2: Designing the research tool

This phase is split into two subphases, 2.1: Set-up and 2.2: Piloting & findings.

Phase 2.1: Set-up

Based on phase 1, questions and answers are drafted for the questionnaire. A range of questions is listed below the two headings in an individual brainstorming session. Thereafter, questions are eliminated, rewritten, and combined to include those questions that fit the purpose of the survey and keep the questionnaire focused. When writing and selecting the questions, it needs to be considered that the questions lead logically one into another and do not come as "stand alone" questions (Gillham, 2000, p. 25). There are different types of questions, questions about facts (e.g. demographics, the existence of a works council in an organisation) and questions about opinions, beliefs and judgements (e.g. plans or measurements/actions for monitoring personally identifiable information (PII), experiences with the works council). In order to avoid misunderstanding, complex questions are avoided. In some cases, examples are provided to guide the respondent and make the point of the question clear. The questionnaire is semi-structured, i.e. open and closed questions are used (i.e. sometimes answers are predetermined and sometimes the respondent needs to write the answers herself/himself).

In the next step of this phase, the questions and answers are discussed and reviewed with the researcher's supervisor. As part of this, questions are formulated more precisely and only the most important questions are selected. Afterwards, a cover letter with explanations of the survey is prepared for the next phase. The cover letter is used to convey to the respondents the topic of the questionnaire and briefly expand on this. It does not include the exact aim and objectives to avoid research bias.

In the last step of this phase, the questionnaire is implemented as an online survey using LimeSurvey[11], an open source software.

[11] limesurvey.org

Phase 2.2: Piloting & finalising

In the first step, the questionnaire is piloted. Specifically, this includes piloting the questions, questionnaire design, and logical sequence of the questions as well as functioning of the online survey. This is done with expert researchers who are not members of the target group. Based on their feedback (suggestions for improvement, things that are unclear), the questionnaire is improved: the wording of questions and answers is adjusted, errors with the logical sequence of the questionnaire are fixed, and issues of questionnaire design are addressed to achieve a clean and uncluttered look.

The final number of questions per question group is displayed in table 4-7.

Table 4-7. Questionnaire structure: number of questions / question group

Question group	No. of questions min/max
Demographics	3/3
General Data Protection Regulation (GDPR)	2/4
Works council	1/6
Concluding questions (end)	2/2

Appendix D provides an overview of the questions translated into English, including the respective objective and response type (see table 9-9). Also, it shows the logical sequence of the questions (see figure 9-2) and provides screenshots of the final implemented online questionnaire (see figure 9-4).

Phase 3: Distribution & data collection

In the first step, the questionnaire is published to make it available for the potential survey participants. In the second step, the IndustryConnect's virtual workspace is used to invite participants. Following Kelley, Clark, Brown, and Sitzia (2003) this technique can be labelled purposive sampling (i.e. only enterprise collaboration platform using organisations being members of the initiative IndustryConnect are invited to the survey). The survey is distributed under the topic of enterprise collaboration platform (/system[12]) ECS acceptance. Appendix D (see figure 9-3) shows the letter of invitation and the cover letter that is shown when participants begin with the questionnaire.

[12] At the time of the survey, the term "enterprise collaboration system" was used. Later, the term "enterprise collaboration platform" was considered more suitable acknowledging the large-scale, integrated, and heterogeneous nature (see chapter 2.1.2 and chapter 2.1.3).

Often, surveys have the aim to build a representative picture of a particular population. This is not the case for this questionnaire-based survey. The questionnaire is used as a tool to achieve an exploratory and comparative picture with enterprise collaboration platform (specifically IBM Connections) using organisations. To increase the data basis, the questionnaire was available for two months (08/07/2017-13/09/2017).

Phase 4: Data analysis and reporting

In the first step, the .xls data sheet extracted from LimeSurvey is checked for missing answers. Incomplete data sets are removed for the analysis. Multiple responses from the same company were welcome allowing for the capturing of different perceptions within the same organisation. In the second step, the results are visually displayed using tables and graphs (see chapter 3.5.7). This is a descriptive step, i.e. one "can see the overall response to individual questions at a glance" (Gillham, 2000, p. 49) (see chapter 3.5.7). Furthermore, open questions are subject to qualitative analysis, i.e. qualitative content analyses (see chapter 3.5.6) and interpretation (see chapter 3.5.8). All data is anonymised in the analysis. Next, the visualised data is analysed and interpreted, and, finally, in the last step, the findings are reported back to the study participants as part of one of the IndustryConnect's collaborative workshops to trigger thought processes and use them as an input for the subsequent mini focus group (F2; see chapter 3.5.5).

4.2.1.2 Questionnaire data analysis and findings

In the following, the data analysis and findings are structured according to the main questionnaire groups: demographics, General Data Protection Regulation (GDPR), and works council.

Participants and demographics

In total, 20 individual participants (n_p) from 18 organisations (n_o) fully completed the questionnaire (n_p=20, n_o=18). Of the 18 organisations, 16 are German and two Swiss organisations (see table 9-1, Appendix A). For one German organisation and one Swiss organisation, there are two participants each. The remaining organisations are represented by one participant each.

In terms of the operating model for the enterprise collaboration platform, seven organisations make use of the "on-premises / in-house" model, seven organisations make use of "on-premises / maintained by external service provider" model, three organisations make use of the IBM Connections cloud (S1/S2), and one has selected "other". No link between the operating model and responses to the questions in the question groups GDPR and works council could be revealed.

General Data Protection Regulation (GDPR)

The question group "General Data Protection Regulation (GDPR)" encompasses a maximum of four questions. The first question is used to establish whether the companies' plans to comply with the GDPR requirements include the embedded enterprise collaboration platform. The responses help understand whether GDPR is an issue for the collaboration platform according to the survey participants. The majority of the respondents (65 per cent) indicated that the collaboration platform is incorporated in the company's plans to meet the GDPR requirements, only a tenth of the respondents (10 per cent) indicated that it is not incorporated, and a quarter (25 per cent) of the respondents (with various job positions) are not sure (figure 4-8). Those who have selected "don't know" may not know about any plans to meet the GDPR requirements as they may not have had any contact points. The responses provided by the respondents from the same company are consistent.

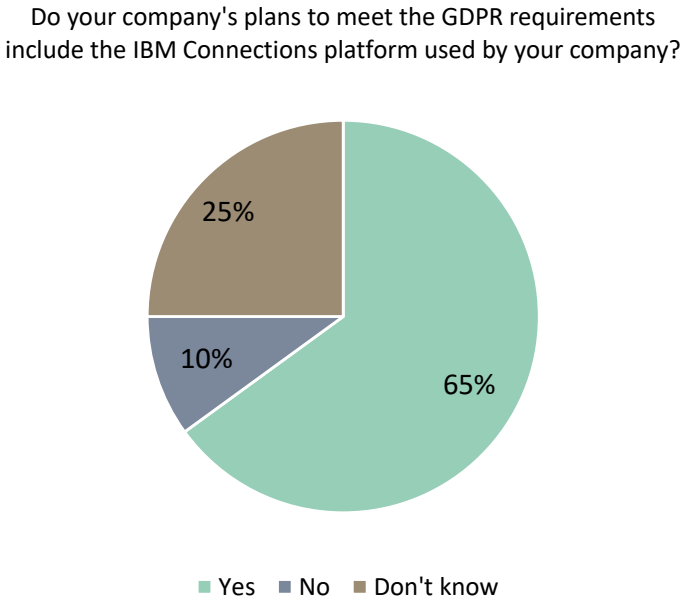


Figure 4-8. Responses to the question "Do your company's plans to meet the GDPR requirements include the IBM Connections platform used by your company?" (n_p=20).

The second question in this question group aims to identify whether there is personally identifiable information (PII) in the enterprise collaboration platform communities of the surveyed organisations. PII is a key issue in GDPR, as "The EU's GDPR only applies to personal data, which is any piece of information that relates to an identifiable person." (R. Koch, 2019, p. 1). Consequentially, if PII is stored in enterprise collaboration platform communities, then the respective company must comply with the GDPR's requirements. Examples of PII provided to the respondents, among others, are photos of an event where people can be identified, lists of employee or customer data. Interestingly, 80 per cent of the respondents indicated that there is PII in their collaboration platform communities, although only 65 per cent know about any plans to comply with the GDPR requirements. Ten per cent each of the respondents indicated that there is no PII stored in the collaboration platform communities or do not know about it (figure 4-9, left). The

responses provided by the respondents of the same company are consistent. Based on all responses to the second question, it is assumed that GDPR is an issue and important actor in the enterprise collaboration platform change in at least 78 per cent of the surveyed companies (excluding those who selected "don't know" as the answer) (figure 4-9, right).

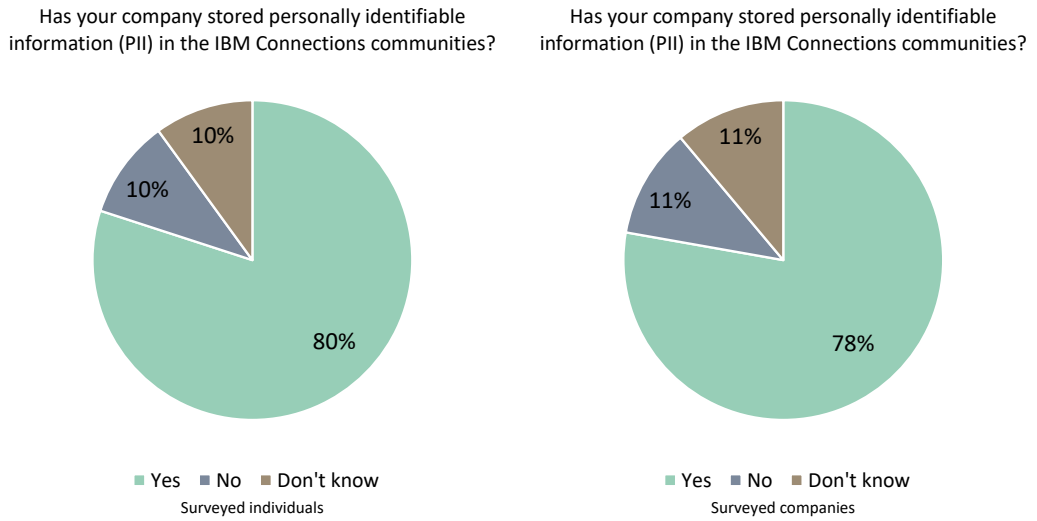


Figure 4-9. Responses to the question "Has your company stored personally identifiable information (PII) in the IBM Connections communities?" (n_p=20 (left), n_o=18 (right)).

The third question of this question group is only visible to the respondents who have indicated that there is PII stored in the enterprise collaboration platform communities. The third question asks for the existence of any plans or measurements/actions (implemented or proposed) for monitoring PII in the enterprise collaboration platform. While previous data protection regulations, such as the Federal Data Protection Act (BDSG) or the European Data Protection Directive 95/46/EC, focus on compliance with data protection principles, GDPR is also targeted at monitoring and verifying compliance (Grentzenberg & Kirchner, 2018; J. Kirchner & Morgenroth, 2018). Although 80 per cent of the respondents have reported on PII in the enterprise collaboration platform communities in their companies, only 25 per cent know about plans or measurements/actions for monitoring PII in the collaboration platform. Some of the respondents (19 per cent) are not sure whether plans or measurements/actions exist; however, the majority of the respondents (56 per cent) indicate that there are no plans or measurements/actions implemented or proposed (figure 4-10). For one of the two companies with two survey participants each, there are two different responses to this question (one time answered with "yes", one time answered with "no"). The reason for the divergent answers cannot be identified. Though, it can be assumed that this is a matter of perspective depending on the role of the survey participant and the links to other actors (human and nonhuman (in this case existing plans or measurements/actions)) in the enterprise collaboration platform change.

Overall, the responses to this question reveal that most companies seem to be unprepared for dealing with PII in their enterprise collaboration platforms.

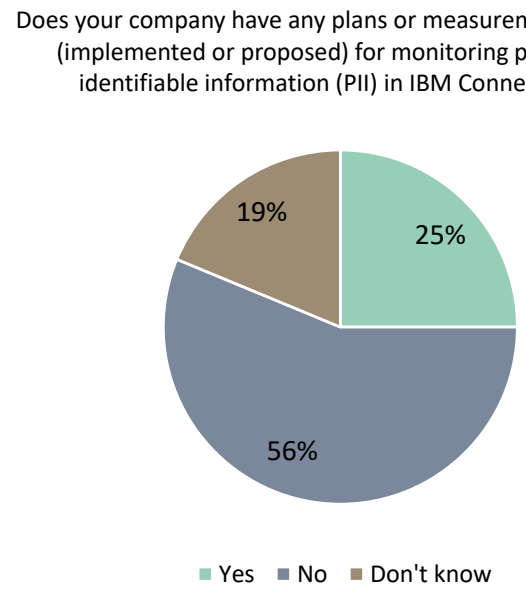


Figure 4-10. Responses to the question "Does your company have any plans or measurements/actions (implemented or proposed) for monitoring personally identifiable information (PII) in IBM Connections?" (n_p=16).

The fourth and last question of this question group can only be seen and answered by those who have indicated that there are plans or measurements/actions for monitoring PII in the company's enterprise collaboration platform. This question asks the respondents to briefly explain these measurements/actions to gain in-depth information on what is exactly done to monitor PII. The responses (table 4-8) include plans and measurements/actions that are proposed or implemented for generally meeting GDPR requirements. Such plans and measurements/actions range from written documents and related practices (e.g. guidelines, checklists, confidentiality agreement) guiding and controlling platform participants (presumably largely platform users) to changes to the software functionality (hiding the PII attached to downloaded files).

Table 4-8. Translated responses (German to English) to the question "Please briefly explain these plans or measurements/actions" (n_p=4).

Organisation (Respondent)	**Responses**
Consumer Electronics Manufacturer 02 (Head of Communications/Knowledge)	Guidelines
Chemical Products Manufacturer 02 (Head Digital Learning & New Technologies)	Hiding those who have downloaded something (will be implemented in 2 weeks)
Textile Design/Manufacturer 01 (Head of IT)	In planning currently → should include checklists and necessary actions
Public Administration Services 01 (Head of IT)	Process description according to the Federal Data Protection Action (BDSG) Regulations for the access and use of personal data Confidentiality agreement of authorised community users

Works council

The question group "Works Council" encompasses a maximum of six questions. The first question of this section aims to identify whether there is a works council in the participating companies which potentially might have an influence on the enterprise collaboration platform change.

Figure 4-11 shows that 80 per cent of the respondents indicate that their company has a works council. The responses provided by the respondents of the same company are consistent. In total, 83 per cent of the participating companies have a works council. The companies who have no works council are from Switzerland and one German registered association.

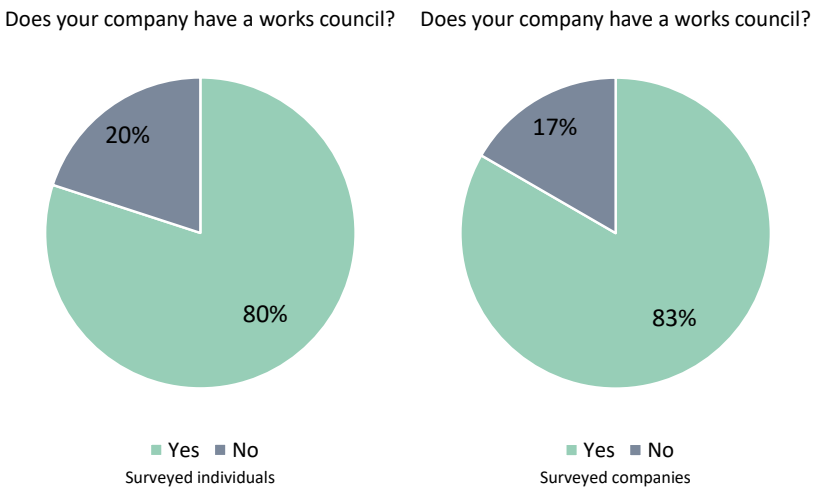


Figure 4-11. Responses to the question "Does your company have a works council?" (n_p=20 (left), n_o=18 (right)).

The second question of this question group can be answered by those who have indicated that there is a works council in their company. The second question is used to identify whether the works council is an actor in the enterprise collaboration platform project and thus in the enterprise collaboration platform change. The majority of the respondents (84 per cent) indicated that the works council had been involved in the enterprise collaboration platform project, only 16 per cent of the respondents were not sure. No respondent indicated that the works council had not been involved (figure 4-12).

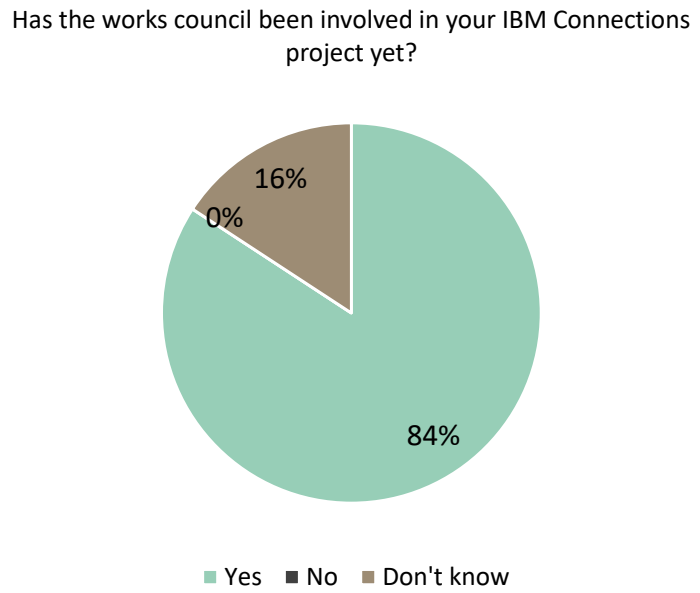


Figure 4-12. Responses to the question "Has the works council been involved in your IBM Connections project yet?" (n_p=16).

The subsequent questions of this section are visible to the respondents who indicated that the works council had been involved in their enterprise collaboration platform project.

The third question of this section is a multiple-choice question asking for the time of involvement in the enterprise collaboration platform project. The answer options represent common enterprise collaboration platform implementation phases as identified from the eXperience base cases (see chapter 3.6). The phase with the highest percentage of works council involvement is the planning phase of the implementation project: 75 per cent of the respondents indicated that the works council was involved in this phase. Also, more than half of the respondents indicated that the works council was involved in the roll-out phase (62,5 per cent) and the adoption phase (56,25 per cent). In the other phases, the works council was not involved for the majority of the respondents. The responses allow first conclusions; the works council is typically not continuously involved and may be an important actor in the enterprise collaboration platform change at specific points in time. It can be assumed that different topics are discussed depending on the phase of involvement, e.g. onboarding techniques or voluntariness of usage.

When evaluating the responses of this question, it must be considered that the participating organisations may be in different phases of the enterprise collaboration platform implementation or beyond the adoption phase at the time of the survey rollout.

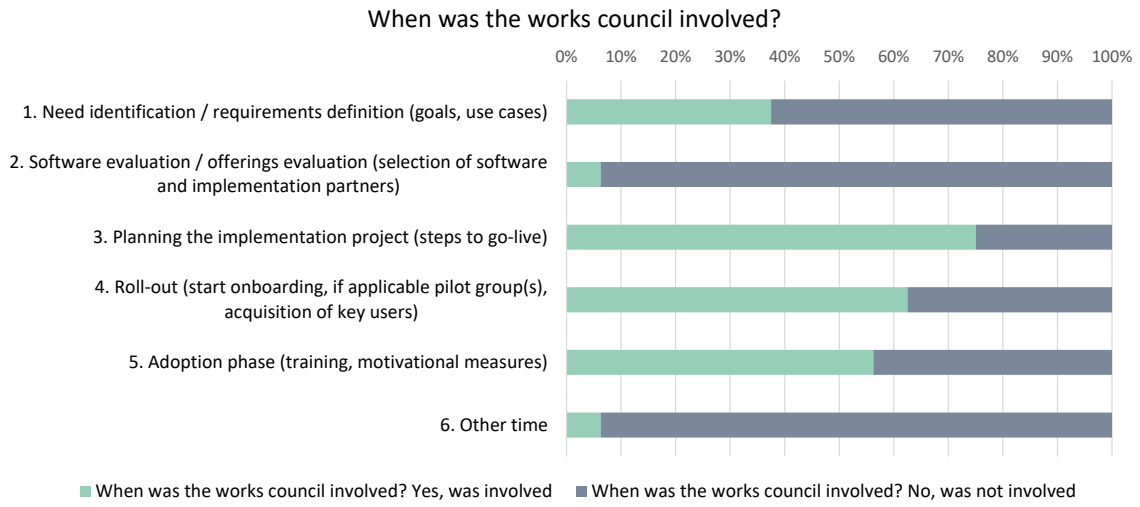


Figure 4-13. Responses to the question "When was the works council involved?" (n_p=16).

The fourth question of this question group addresses the topics that have been discussed with the works council. With the exception of one respondent (Consumer Electronics Manufacturer 01, Project Manager, Collaboration/Knowledge), all respondents named specific topics or topic areas that were discussed with the works council (table 4-9). There is considerable diversity in the answers; however, some topics were mentioned a few times.

Table 4-9. Translated responses (German to English) to the question "What topics have been discussed with the works council?" (n_p=16).

Organisation (Respondent)	**Responses (topics)**
Travel Operator 01 (Consultant, Hotel Management Systems)	Rather only functionality and performance data, which we do not capture.
Clothing Manufacturer/Retail 02 (Project Manager, IT)	Clarifying monitoring options, ensuring that collected data may not be used for termination of the employment relationship
Consumer Electronics Manufacturer 02 (Head of Communications/Knowledge)	Data protection, privacy, workload, training, guidelines
Automotive Parts Manufacturer 02 (Senior Manager, IT)	All topics mentioned in the question as well as the topic "Voluntary use" and "training offers for employees"
Logistics Services 01 (IS Service Manager Information Management)	Data protection, workload, usage
Chemical Products Manufacturer 03 (Project Manager, Communication & Marketing)	Data privacy in general, Kudos Analytics, anonymisation of downloaded data, "two-class information society" (with [IBM] Connections we can only reach employees with their own email address. At least one-quarter of the employees does not have its own email address, e.g. from the production area)
Public Administration Services 01 (Head of IT)	Privacy, user agreement, works agreement

Automotive Parts Manufacturer 02 (Project Manager)	Platform usage, rules of the game, data protection especially with regard to personally identifiable information and safeguarding employees with regard to success and performance monitoring (e.g. analyses), training, enabling measures, access for external employees, etc.
Finance Industry Association 01 (Head of Team Association Committees)	Usage and contents of IBM Connections
Air Transportation 01 (Head of IT/Collaboration Platforms)	Data protection, behaviour and performance control, processing of personal data
Automotive Parts Manufacturer 01 (Project Manager, IT)	IBM Connections is a system of many. Therefore, no special needs are discussed. The acceptance of Kudos Boards was important, which was seen as part of the overall package and not as an addition in the context of the IBM Connections introduction. Works councils exist at three German company locations of the group, each of which weights ad evaluates the handling of PII individually. According to GDPR, the platform constitutes order data processing by the group's holding company, or strictly speaking appropriate agreements between all companies of the group are necessary since there seems to be no group privilege in the context of GDPR.
Steel Manufacturer 01 (Specialist, Collaboration)	Group Works Agreement - I did not participate in this discussion panel. But all [example] points that are included in the question have been addressed through the Group Works Agreement.
Construction Engineering Services 01 (Head of IT)	Our works council was positive about the [IBM Connections] implementation project and was the first to create the works council community [on IBM Connections]
Automotive Parts Manufacturer 05 (Service Owner, IT)	All topics that are subject to co-determination and of course general project information and detailed tool information
Technical Inspections 01 (IT Manager, Collaboration/Knowledge)	Privacy, data protection and general [IBM] Connections usage
Consumer Electronics Manufacturer 01 (Project Manager, Collaboration/Knowledge)	Unfortunately, I cannot answer this question

Due to the high number of responses (n_p=16) the topics presented in table 4-9 were iteratively coded using descriptive and pattern codes (Saldaña, 2009). For this, a code book was created in a spreadsheet. In total, seven topic categories were identified and described (*scope*, *functionality*, *platform access*, *agreements*, *employee support*, *employee protection*, and *employee health*). Code frequencies (#) were calculated in Excel. Table 4-10 shows the coded topic categories (TC), related topics (T), sub-topics (ST) and their frequencies. The topic category's frequency (TC#) represents the sum of counts of its related topics plus the number of mentions of the topic category itself (TC# = $\sum T\#$ + TC mentions). The most common topics discussed with the works council are the GDPR related topics of monitoring and controlling employees using the collaboration platform (five counts), data protection (five counts) and privacy (four counts) of the topic category employee protection (16 counts), general platform usage (4 counts) of the topic category scope (seven counts),

and training measures (three counts) to support employees in their collaboration platform use of the topic category employee support (five counts). Accordingly, employee protection is most frequently discussed among the participating companies.

Table 4-10. Coded topics discussed with the works council and related frequencies (n_p=15; excluding Consumer Electronics Manufacturer 01 (Project Manager, Collaboration/Knowledge)).

Topic category (TC)	**TC#**	**Topic (T)**	**T#**	**Sub-topic (ST)**	**ST#**
Scope *With the general right of information and co-determination rights concerning social, personnel, and economic issues (J. Kirchner & Morgenroth, 2018, p. 19), the works council seeks for information about the platform (e.g. purpose, contents) and related implementation project.*	7 (7+0)	Tool information	1		
		Project information	1		
		Platform contents	1		
		Platform usage	4		
Functionality *The functionality of the enterprise collaboration platform is discussed, as computer software which allows companies to evaluate employee performance has to be approved by the works council (Kremp & Kirchner, 2018, p. 279).*	4 (3+1)	Anonymisation of downloaded data	1		
		Kudos Analytics	1		
		Kudos Boards	1		
Platform access *The works council discusses access rights to the enterprise collaboration platform. This comes with a range of issues that can refer to equal treatment of the employees, for instance (J. Kirchner, Kremp, & Magotsch, 2018).*	2 (2+0)	Access equality for employees	1		
		Access for externals	1		
Agreements *Contents of written agreements, such as the user agreement or works agreement, are discussed with the works council to specify different social matters, e.g. working conditions, platform use conditions, or data protection (J. Kirchner et al., 2018; Weitbrecht, Mehrwald, & Motzkau, 2002).*	3 (3+0)	User Agreement	1		
		Works Agreement	2		

Employee support *Representing the interests of employees, the works council is interested in continued education and establishing the support required by employees to develop the skills to effectively use the collaboration platform (Kremp & Kirchner, 2018, p. 277).*	5 (5+0)	Training	3		
		Guidelines	1		
		Enabling measures	1		
Employee protection *The works council is committed to protecting employees. In particular, this includes protecting employee's privacy and data when they use the collaboration platform. Related topics are the use and processing of personal employee data and activities of monitoring and control of employee's performance and behaviour (J. Kirchner & Morgenroth, 2018, p. 12 et seqq.). This topic category is closely related to the topic categories of scope, functionality, and agreements.*	16 (16+0)	PII	2		
		Monitoring/control	5 (4+1)	Performance monitoring/control	3
				Behaviour monitoring/control	1
		Data protection	5		
		Privacy	4		
Employee health *Enforcing employee's health is one of the works council's key commitments (Mueller, 2019), i.e. he has the right to co-determine health protection measures. These can relate to conditions at the workplace (Morgenroth & Hesse, 2018, pp. 112–113) potentially being shaped by the enterprise collaboration platform.*	3 (3+0)	Voluntary use	1		
		Workload	2		

However, the compilation of topics discussed with the works council varies from company to company. Related to the different topics, the works council is likely to have specific requirements and ideas on how these should be implemented. The individual topics constitute "points of contact" with the enterprise collaboration platform change. Points of contact can emerge at different time points in the enterprise collaboration platform change. For example, the works council may request *scope*-related information in early enterprise collaboration platform implementation phases to get a clearer picture about the enterprise collaboration platform (involving operational changes in the form of new working methods and processes (J. Kirchner & Morgenroth, 2018, p. 19)). Based on that the works council may define requirements and frames with regard to how the enterprise collaboration platform is designed and used to safeguard employees' interests. This also concerns topics that relate to *functionality* or *employee protection*, which may become more dominant at a later point in time when the works council has identified IT capabilities and related business

practices that may potentially be disadvantageous for the employees. It is assumed that the kind of influence in the enterprise collaboration platform change depends on the degree of involvement of the works council, how much it is familiar with the collaboration platform and the benefits the works council sees in the platform for itself, the employees, and the company.

The fifth question of this question group aims to identify whether and how the works council has influenced the enterprise collaboration platform project in the participating companies and thus their enterprise collaboration platform change initiatives (figure 4-14). Although the works council discusses a variety of different topics as identified with the previous survey question, 43,75 per cent of the respondents indicated that the works council had not influenced the enterprise collaboration platform project so far. Interestingly, 37.5 per cent indicated that the works council had even positively influenced the platform project through constructive criticism. Only 6.25 per cent indicated that the works council had led to success of the platform project through positive criticism, and 12.5 per cent indicated that the works council had negatively influenced the platform project. The responses provided by the respondents of the same company are consistent.

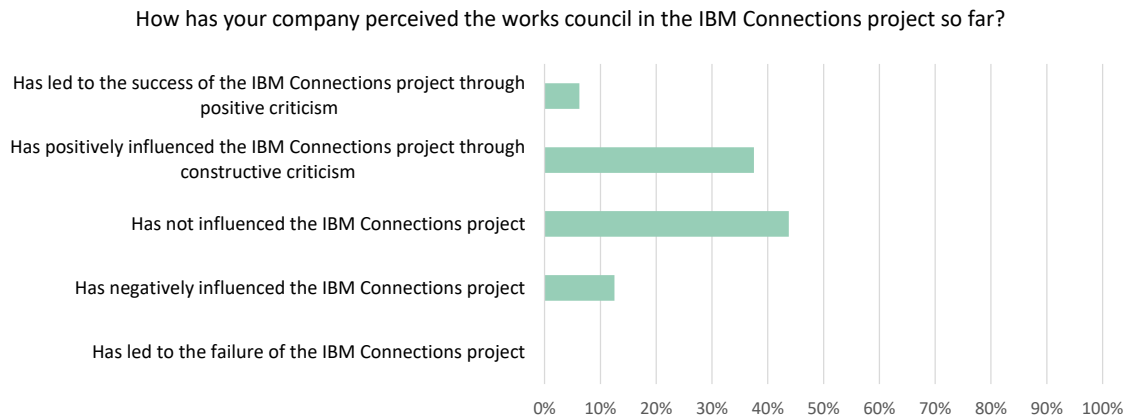


Figure 4-14. Responses to the question “How has your company perceived the works council in the IBM Connections project so far?” (n_p=16).

In order to identify the reasons for the positive or negative experiences with the works council, the sixth and last question of this question group requires one or two examples to explain the experiences with the works council in the enterprise collaboration platform project and thus the enterprise collaboration platform change. Table 4-11 lists the different explanations by experience.

Table 4-11. Translated responses (German to English) to the question "Please give one or two examples to explain your experiences with your works council in the IBM Connections project" (n_p=9).

Organisation (Respondent)	**Responses**
[The works council] has led to the success of the IBM Connections project through positive criticism.	
Finance Industry Association 01 (Head of Team Association Committees)	The works council, in our case the staff council, has actively supported the introduction of IBM Connections and is itself using it [(the collaboration platform)] for internal corporate communications.
[The works council] has positively influenced the IBM Connections project through constructive criticism.	
Consumer Electronics Manufacturer 02 (Head of Communications/Knowledge)	Regular votes on guidelines & qualification concept, Awareness-raising about multiple stresses and user concerns
Automotive Parts Manufacturer 02 (Senior manager, IT)	Usage of the tool by the works council itself was helpful, Significant differences of opinion about usage analyses/reporting
Public Administration Services 01 (Head of IT)	The staff [/works] council of Public Administration Services 01 has defined the benefits for the employees [when using IBM Connections] after jointly identifying the use cases and has weighed the [various] interests. With this approach, the staff [/works] council was able to contribute to the design of [IBM] Connections and has actively supported the introduction of [IBM] Connections
Automotive Parts Manufacturer 02 (Project Manager)	Without the works council, we would certainly not have been able to illuminate and implement topics such as the rules of the game and related to this the protection of the employees (including the escalation committee) in-depth, even if this meant more time than planned, including a delayed start of the pilot run.
Steel Manufacturer 01 (Specialist, Collaboration)	Group Works Agreement - I did not participate in this discussion panel. But all [example] points that are included in the question have been addressed through the Group Works Agreement. If the Group Works Agreement had been against it, then the introduction would not have taken place in this way.
Automotive Parts Manufacturer 05 (Service owner, IT)	The works council, as it is its role, is committed to protecting employees, especially pay-scale employees. Among other things, this involves understanding exactly all topics of performance and behavioural control and regulating them in the interests of the employees. The works council was basically open to the tool [IBM Connections] but wanted to understand each function exactly.
[The works council] has negatively influenced the IBM Connections project.	
Chemical Products Manufacturer 03 (Project Manager, Communication & Marketing)	Ban of Kudos Analytics, Shutting down of [IBM] Connections if data protection is not ensured
Air Transportation 01 (Head of IT/Collaboration Platforms)	Despite an existing works agreement on a social collaboration tool (Jive), all functions [in IBM Connections] were renegotiated. The delay in the project was three months.

Using descriptive coding as a first coding cycle method (Saldaña, 2009, p. 70 et seqq.), the different explanations for the experiences with the works council were coded iteratively. For each type of

experience, explanations were provided by the respondents ("Has led to success of the IBM Connections project through positive criticism", "Has positively influenced the IBM Connections project through constructive criticism", "Has negatively influenced the IBM Connections project"). Table 4-12 shows the developed codes. Again, frequencies were calculated in an Excel spreadsheet. First, it was calculated how often the coded explanations occur with the respective experience type (E#), and then it was calculated how often the coded explanations occur with all experience types in total (E total#). Table 4-12 reveals that some coded explanations appear with different types of experience. This is the case for the coded explanation "role model", for instance. This code describes the situation where the works council sets a good example and is a role model for the company's employees. He sees the advantages and benefits of the enterprise collaboration platform and uses the platform itself, e.g. for internal corporate communications. For one respondent, the works council, as the role model, positively influenced the collaboration platform project, for another respondent, it even contributed to the success of the collaboration platform project. Another coded explanation that occurs with two different types of experiences is "project delay". This code describes the situation where it took more time than planned to start the enterprise collaboration platform project. This delay was explained with the time needed to discuss, address, or negotiate different topics raised by the works council. One respondent sees the project delay as a negative influence of the works council on the collaboration platform project. Despite an existing works agreement for another collaboration tool (Jive) of the organisation's IT portfolio, all functions of the enterprise collaboration platform were renegotiated. Another respondent mentions the project delay as part of his explanation for a positive influence of the works council on the collaboration platform project. This respondent sees the additional time required as valuable, since important topics on employee protection could be illuminated and implemented (e.g. rules of the game, escalation committee).

Table 4-12. Coded explanations for experiences, related frequencies and semantic relationships (n_p=9).

Type of experience	**Explanation (E)**	**E#**	**E total#**	**Semantic relationship**
Has led to success of the IBM Connections project through positive criticism	Active support	1	2	
	Role model	1	2	

Has positively influenced the IBM Connections project through constructive criticism	Co-determining employee support	1	1	
	Co-determining employee protection	4	4	*Automotive Parts Manufacturer 02 (Project Manager):* Project delay IS A RESULT OF Co-determining employee protection IS A REASON FOR Providing new insights
	Project delay	1	2	
	Providing new insights	1	1	
	Role model	1	2	*Automotive Parts Manufacturer 02 (Senior Manager, IT):* Role model DESPITE Differences in opinion on employee protection
	Differences in opinion on employee protection	1	1	
	Awareness-raising on user concerns that need to be addressed	1	1	
	Collaboration with works council to identify use cases	1	1	*Public Administration Services 01 (Head of IT):* Collaboration with works council to identify use cases IS A REASON FOR Communication of usage benefits by the works council IS A REASON FOR Active support
	Communication of usage benefits by the works council	1	1	
	Active support	1	2	
	Openness to the platform	1	1	*Automotive Parts Manufacturer 05 (Service Owner, IT):* Claiming for explanation of platform functions IS A REASON FOR Co-determining employee protection MAY BE A REASON FOR Openness to the platform
	Claiming for explanation of platform functions	1	1	
Has **negatively influenced** the IBM Connections project	Prohibition of functionality	1	1	
	Shutting down of the platform	1	1	
	Negotiation of platform functions	1	1	*Air Transportation 01 (Head of IT/Collaboration Platforms):* Project delay IS A RESULT OF Negotiation of platform functions
	Project delay	1	2	

The responses show that the respondents from different companies collect similar experiences with the works council, although they seem to deal differently with the experiences. Similar experiences may lead to a positive influence of the works council in the enterprise collaboration platform change and in other cases, to a negative influence. In order to understand the respondents' reasoning in the explanations for the different types of experiences, semantic relationships were identified in the bodies of text according to Saldaña (2009, p. 134), as shown in the last column of table 4-12.

4.2.2 Dealing with the works council in the enterprise collaboration platform change: A mini focus group activity and analysis

This part of the research work exclusively focuses on the works council identified as one of two key actors and challenges in the enterprise collaboration platform change. Using the focus group method, a qualitative research design was adopted to investigate concerns related to the works council and associated management strategies and actions in the enterprise collaboration platform change.

4.2.2.1 Mini focus group outline

This mini focus group (F2) deepens the knowledge gained from the online survey on the role and influence of GDPR and the works council. Specifically, it aims to *enlarge upon the experiences with the works council in the enterprise collaboration platform change*.

To achieve this aim, the research objectives are to

i. identify the experiences with the works council as an actor in the enterprise collaboration platform change,
ii. identify concerns expressed by the works council about the enterprise collaboration platform in the organisation, and
iii. identify strategies and actions to address possible works council concerns about the enterprise collaboration platform.

This research work is organised into four research phases shown in figure 4-15.

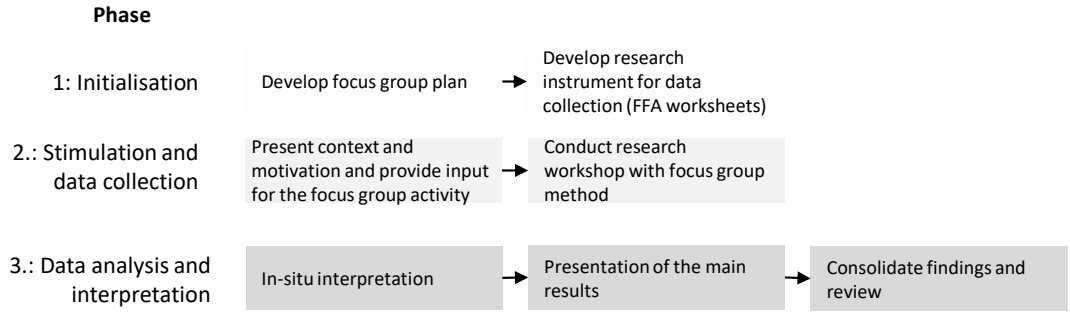


Figure 4-15. Phases of the mini focus group (F2) activity & analysis informed by Caillaud and Flick (2017).

Phase 1: Initialisation

In order to be able to conduct a focus group, the needs of this research work have to be accounted for. The focus group serves as a follow-up method, i.e. it is used to follow up on the enterprise collaboration platform acceptance survey (Q1). Such being the case, a focus group plan is developed to enable the deepening on the experiences with the works council in the enterprise collaboration platform change and in preparation of an IndustryConnect research workshop in September 2017.

Phase 2: Stimulation and data collection

To stimulate the focus group participants, the context and motivation of the research project are presented to the participants at first. The method and input for the activity and discussion are introduced. The survey findings (Q1) are presented, followed by three focus group questions to guide the focus group participants:

1. What experiences have you gained with the works council in the enterprise collaboration platform change?
2. What have been concerns/topics expressed by the works council about the enterprise collaboration platform?
3. How have you addressed possible concerns about the enterprise collaboration platform (solutions, measurements, etc.)?

In the second step of this phase, the data is collected from nine enterprise collaboration platform using organisations (see table 9-1, Appendix A) employing the focus group method. Again, the workshop participants are all collaboration experts representing a range of different business areas (e.g. information technology, information and knowledge management, internal communications, human resources). The majority of the organisations (eight) and persons (six) participating in this focus group also participated in the preceding enterprise collaboration platform acceptance survey (Q1). The discussion around the three focus group questions is digitally recorded to ensure a transparent record of the focus group.

Phase 3: Data analysis and interpretation

The data collection is accompanied by the data analysis and interpretation phase. Firstly, the collected data is interpreted in-situ. In other words, in-situ interpretation is incorporated in the moderated discussion and when writing down the responses and discussion points of the focus group participants. The responses and discussion points are written down on a flip chart. In this way, a coding iteration yielding descriptive codes is conducted with the help of the participants. The answers by the focus group participants are interpreted and the interpreted meaning is “sent back” to the participants to receive feedback (“So you mean…”, “So it can be summarised as…?”, etc.). The codes written down work as labels to structure the data and summarise short fragments of speech. As the coding process is also influenced by the results of the online survey (Q1), some of the codes are deductively developed based on the experiences collected through the online

survey. Secondly, the main results captured with the flip chart are presented at the end of the focus group session. Lastly, the findings are reviewed and consolidated (see below).

4.2.2.2 Mini focus group analysis and findings

The focus group participants have reported on *concerns* expressed by and topics discussed with the works council (performance monitoring/control, areas of responsibility) and *negative experiences* with the works council in the enterprise collaboration platform change (for example, project delay, the prohibition of certain enterprise collaboration platform functionality and/or of information displayed in the enterprise collaboration platform (e.g. social profile information, download information), conflict of interests between works councils of a group's different affiliated companies, the influence of the works council on other affiliated companies). The latter is also the case in one globally active Swiss organisation (Chemical Products Manufacturer 02) that has no works council, but the works council of its German subsidiary (Chemical Products Manufacturer 03) makes demands on the design and usage of the globally rolled out enterprise collaboration platform. One key topic discussed with the works council is the display of download information (who has downloaded which documents) which is visible to all platform users by default. Following pressure from the German works council, the functionality to display download information was disabled. Shortly after the removal of the download information other affiliated companies located in other countries and not being involved in this decision complained to the group company about the missing information. Often, they value the display of download information allowing authors of documents to draw conclusions about the usefulness of their documents for their colleagues and other platform users. Though, the decision to hide download information was not withdrawn so that the platform did not have to be shut down under pressure from the German works council.

The platform's project manager of Chemical Products Manufacturer 03 believes that there will be other functions issued by the works council in future due to the upcoming General Data Protection Regulation (GDPR). Because of the planned migration to a cloud computing environment, he is not sure whether the organisational members with responsibility for the collaboration platform will always be able to address the works council's demands in terms of platform functionality.

In another participating company (Air Transportation 01), the experiences with the works council were negative because the works council is itself neither a user of the collaboration platform nor has any intention to use the collaboration platform. The works council's attitude towards the collaboration platform is influenced by negative examples from other applications and tools used in some affiliated companies for performance monitoring of executives. Such an attitude is incorporated in negotiations about the usage of the enterprise collaboration platform and has caused a project delay (more time needed to start the enterprise collaboration platform project).

In order to deal with the different challenges associated with works council concerns, the enterprise collaboration platform using organisations have developed different strategies and actions (e.g. new/edited works agreement, hiding certain enterprise collaboration platform functionality) causing positive reactions by the works council (learning/experiences, exchange between persons

responsible for GDPR compliance and the works council to deal with GDPR requirements, and the works council starts adopting and using the enterprise collaboration platform and acts as a role model). While some organisations have decided to actively involve the works council in the enterprise collaboration platform project in order to prevent a negative attitude of the works council towards to the platform, other companies rely on the exclusion of the works council and a "diversionary tactic" (drawing attention to platform functionality that the company is willing to give up). However, certain strategies to deal with the works council can have different effects in different companies. This was the case for the active involvement of the works council and its training in enterprise collaboration platform benefits and usage. On the one hand, the works council may be overwhelmed with what the collaboration platform offers going along with an increased number of concerns regarding employee protection. On the other hand, the works council may see the benefits of the collaboration platform for the employees and refrain from initiating negotiations about the platform arbitrarily.

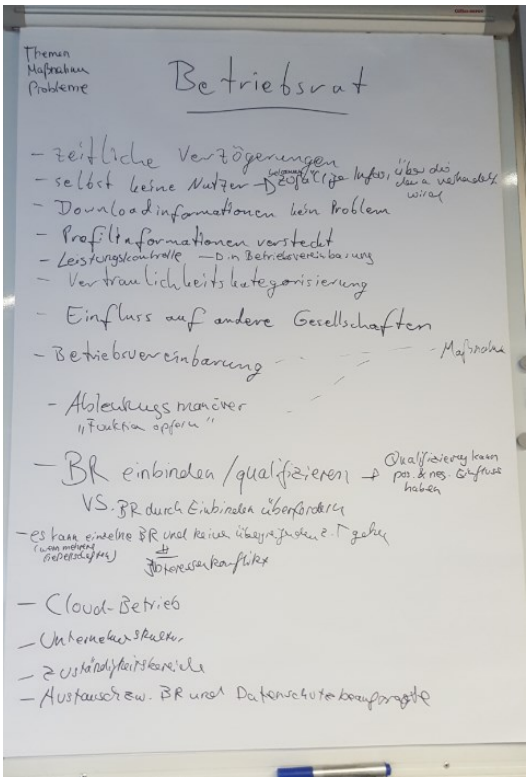


Figure 4-16. Photograph of the flip chart used for the focus group activity and analysis.

Figure 4-16 shows a photograph of the flip chart used to collect the experiences with the works council in the enterprise collaboration platform change, concerns/topics expressed by the works council about the enterprise collaboration platform as well as strategies and actions to address works council concerns about the enterprise collaboration platform.

4.3 An II perspective on diverse routes to enterprise collaboration platform change

Enterprise collaboration platforms arise in relation to organised practices, i.e. enterprise collaboration platforms need to be considered with their social and organisational structures, which are emerging, and can incorporate a variety of actors.

From an information infrastructure (II) perspective (see chapter 3.4.1), enterprise collaboration platforms extend an installed base. When an enterprise collaboration platform is introduced, the installed base of existing systems and practices shapes and is shaped by the desired enterprise collaboration platform outcomes and benefits. At this point in time but also at any later point in time in the enterprise collaboration platform change, organisations and their organisational members cannot know in advance whether and how they will achieve them. Also, they cannot know in advance how to make the best out of the technological capabilities provided. While the path to expected outcomes and benefits may become less vague along with experiences collected and learning, the management of enterprise collaboration platforms requires sensitivity to local situations and developments. Evolving enterprise collaboration platforms inherit both strengths and limitations from the installed base (Hanseth & Lyytinen, 2010, p. 4; Star & Ruhleder, 1996, p. 113). This also covers existing expectations and requirements by various platform participants, such as of the works council discussed in this chapter. The current works council's demands on the enterprise collaboration platform are influenced by what is already in place (e.g. attitude towards platform supported collaboration, negative experiences with tools for employee monitoring, established and accepted work practices, GDPR discussions and plans, existing works agreement). In principle, the installed base of enterprise collaboration platforms is constantly changing, it "is changed through use in different contexts" (Rolland, 2000, p. 586) where the next changes are very much path-dependent. Path dependency (cf. Hanseth & Lyytinen, 2004; Monteiro et al., 2013) includes a multitude of human and nonhuman actors, linked events, actions and learning processes. At the same time, enterprise collaboration platforms are highly generative, meaning that they bear "the overall capacity to produce unprompted change driven by large, varied, and uncoordinated audiences" (Zittrain, 2006, p. 1980).

In this chapter, attention is drawn to both challenges and strategies and actions in the enterprise collaboration platform change. To investigate them, two focus groups and one questionnaire-based online survey are used. The first focus group (F1) specifically focuses on enterprise collaboration platform constraints that make the achievement of enterprise collaboration platform outcomes/benefits more difficult, and, on the other hand, enterprise collaboration platform enablers that support and enable the attainment of enterprise collaboration platform outcomes/benefits. Over time, constraints and enablers can emerge as well as diminish. Enablers may be tried out and turn out to be more or less successful. When constraints diminish or become less visible, organisations and their organisational members often find ways to deal with such constraints and challenges, respectively. Correspondingly, when enablers emerge, they may have discovered means to address certain challenges and contribute to desired outcomes/benefits. The analysis of outcomes/benefits

and their enablers and constraints has shown that they can have different characteristics and structures (e.g. objective, controllability, source, project-relation, change design). An enterprise collaboration platform as II is not simply a web of different modules and functions, other business systems, people from different departments and hierarchical levels, different work procedures etc., their platform participants (whether human or nonhuman) are multifaceted and evolving – as shown with the layers of complexity of enterprise collaboration platform outcomes, enablers and constraint. Their relation, influence, structures, and characteristics are dynamically evolving, in interaction, and in constant flux. The outcomes/benefits and their enabling and constraining factors captured and discussed in this chapter are presented from the perspective of collaboration experts who have responsibility for the collaboration platform. Other platform users may see other or further enterprise collaboration platform outcomes, enablers, and constraints, which makes the study of the II space more challenging. Enterprise collaboration platform developments and drifts are typically not visible to all platform participants at once and interpreted differently. An enterprise collaboration platform is a developing phenomenon, and it is difficult, if not impossible, to capture all infrastructural elements that are part of the interactions within the II space. Therefore, the intention of this chapter is not to portray an enterprise collaboration platform change route in its entirety. This chapter builds on the capturing, investigation, and comparison of cross-case elements of multiple case studies. Thus, aggregated information can be presented that reveals the richness involved in enterprise collaboration platforms change. Enterprise collaboration platform change is no means-end analysis, i.e. with given enterprise collaboration platform constellations end manifestations cannot be foreseen and calculated. This chapter shows various snapshots of enterprise collaboration platform change taken from different cases. They represent different visions and their instantiations including multiple approaches in the enterprise collaboration platform change involving various actors.

Some actors and their interactions with the collaboration platform constitute surprises (e.g. the production level that has no access to the platform and may feel discriminated, upcoming budget restrictions), others are more predictable or permanent (e.g. company that is innovation-driven, language barriers to enterprise-wide collaboration). In this chapter, two key actors and challenges in the enterprise collaboration platform change are investigated using the online survey (Q1) and second focus group (F2): the works council and the General Data Protection Regulation (GDPR). The role and influence of both actors in the enterprise collaboration platform change are perceived differently by the different participating organisations and also their individual participants. Interpretations of the role and influence of the works council and GDPR depend on the observed interactions between these actors and the platform and also between the observing actor (survey / focus group participant). The pure existence of the works council is typically not surprising for the enterprise collaboration platform using companies. However, the works council's actions in the enterprise collaboration platform change (imposition of requirements regarding personally identifiable information (PII), co-determination of employee protection) can often not be anticipated. This also regards the reach and integration of the works council in the enterprise collaboration platform change. A mentioned earlier, the globally active Swiss organisation (Chemical Products Manufacturer 02) with no works council was facing unanticipated demands by

the works council of its German subsidiary (Chemical Products Manufacturer 03). Such demands were made on the prohibition of certain platform functionality (display of download information - who has downloaded which documents). In such a situation, organisations and platform responsibilities need to improvise and learn to deal with such actors also in the future which may include expecting the unexpected.

The way enterprise collaboration platforms are designed is not characterised through control over the design space by software designers. Control is distributed both in time and space, involving a large number of actors of various kinds. Human actors (e.g. certain stakeholder groups such as the works council, role models, platform project team communicating certain platform benefits) and nonhuman actors (e.g. laws and regulations such as GDPR, guidelines and resources enabling positive outcomes/benefits, built-in social software components (e.g. download function impacting use practices)) interact with the enterprise collaboration platform in the immediate and broader setting. Some of the actors may have strong ties, others more weak ties with the enterprise collaboration platform. This depends on the actor itself but also on its embedding into the wider social context and II space. For example, the works council exists independent of the collaboration platform but may be involved in the enterprise collaboration platform change to different degrees. In most cases, the works council shows intentionality and consciousness with regard to the platform design, i.e. it shows a motivated, transformational activity in design (strong ties with the platform). Topics raised by the works council about the enterprise collaboration platform represent points of contact with the enterprise collaboration platform change and can occur at different times. The findings presented in this chapter showed that the works council may not even use the collaboration platform itself. Also, such non-usage of the enterprise collaboration platform may shape its influence, specifically its requirements related to the platform (e.g. those that regard the use of personally identifiable information in the collaboration platform). If the works council uses the platform and sees the platform's benefits, then its attitude may be generally less negative, and the platform managers and responsibilities may be more willing to actively involve the works council in shaping the platform. This may be, for example, through the joint creation of usage regulations or a works agreement that satisfy sceptical potential platform users so that they are more open to the collaboration platform. As is the case for the works council, GDPR exists independent of the collaboration platform. It belongs to the "developments within [the enterprise collaboration platform's] wider terrain" (Swanson and Ramiller, 1997, as cited in Monteiro et al., 2013, p. 598). Despite its weak ties with the collaboration platform, the findings presented in this chapter reveal that GDPR is a key actor in the enterprise collaboration platform change, and this at a time when the regulation had not yet come into force. GDPR urges enterprise collaboration platform using organisations to understand the enterprise collaboration platform contents and related requirements but also constitutes an opportunity to improve the structure of the content and positively shape enterprise collaboration platform change. GDPR is something that organisations need to address, but it can also help organisations improve the long-term management of information. Whether a person knows about plans or measurements/actions to deal with GDPR related to the enterprise collaboration platform is expected to depend on the role of the person and his/her experienced

interaction with such plans or measurements/actions in the enterprise collaboration platform change.

4.4 Insights from enterprise collaboration platform change routes into the building of digital transformation capabilities

Enterprise collaboration platform change routes are multifaceted and cannot be planned and designed in advance. This is because enterprise collaboration platforms come with high ambiguity and complexity, and are open-ended (Ciborra et al., 2001; Richter & Riemer, 2009). They are information infrastructures, i.e. large and dynamic sociotechnical systems with a variety of actors involved (Bygstad, 2010, p. 2; de Reuver et al., 2017). Although enterprise collaboration platform change routes are unpredictable, organisations and their organisational members can develop digital transformation capabilities that support them in making the best out of the collaboration platform and manage the corresponding digital transformation.

Based on the research aim (see chapter 1.2), the findings from the two focus groups (F1, F2) and questionnaire-based survey (Q1) were reviewed and examined closely with regard to *when digital transformation capabilities emerge* as part of the enterprise collaboration platform change. For the examination, the theoretical notion of information infrastructure (II) and related sociotechnical perspectives and concepts (esp. design through use and BoA) are used (see chapter 3.4.1) together with the theoretical background of digital transformation capabilities (see chapter 3.4.2). The examination incorporates several iterations of interpretation (see chapter 3.5.8) to work out and visualise when digital transformation capabilities are and emerge. Interpretation happens as ideas and notes are written down, compared, labelled, related, and restructured. Figure 4-17 shows the resulting conceptual model. Developed exclusively from the insights gained from enterprise collaboration platform change routes illuminated in chapter 4, the conceptual model is preliminary and to be extended based on the further research parts presented in the subsequent chapters.

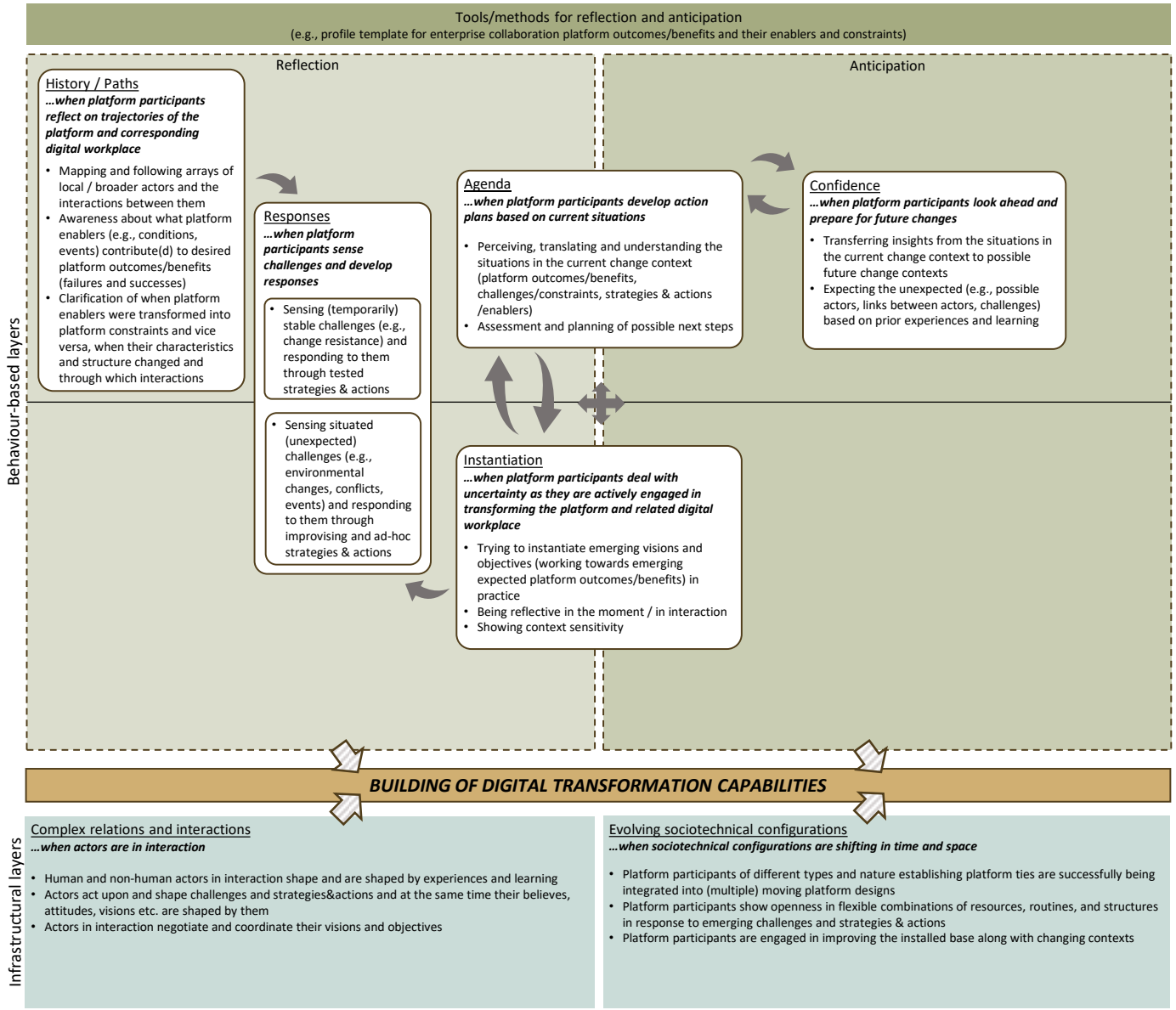


Figure 4-17. Conceptual model of when digital transformation capabilities are and emerge – version 1

At the centre of figure 4-17 is the *building of digital transformation capabilities*, which is framed by two types of layers of explanation for the building of digital transformation capabilities: behaviour-based layers (upper part of figure 4-17) and infrastructural layers (bottom part of figure 4-17).

Behaviour-based layers

These layers concern human platform participants and their relations with the continuous digital transformation. Specifically, they show their actions and related behaviour in a set of interwoven arenas where "multiple actors are present and active" (R. Williams & Pollock, 2012, p. 12). Such arenas represent spaces where digital transformation capabilities can be and emerge. The arenas are organised according to the two different types of capabilities: *reflection* (the capability to reflect on and learn from the digital transformation process and identify and develop the relevant competencies and resources), and *anticipation* (the capability to look ahead and anticipate future changes shaping the digital workplace and to build the knowledge, skills and resources for enabling digital change) (Nitschke et al., 2019). Reflection (left section of the upper part of figure 4-17) and anticipation (right section of the upper part of figure 4-17) can be mutually dependent, i.e. careful considerations of digital transformation efforts, experiences and learnings (reflection) can configure predictions and reasoning about the future (anticipation) and vice versa. In other words, the ways that a person reflects on the digital transformation are typically shaped by this person's anticipated changes as part of the digital transformation. Equally, the ways that a person anticipates changes as part of the digital transformation are typically shaped by the person's reflections on the digital transformation processes. Whether an arena is categorised as reflection or anticipation depends on the focus of the involved actions and related behaviour. Some arenas involve actions and related behaviour that (possibly concurrently) span both, reflection and anticipation.

Further, the arenas are organised according to two different modes of action: planned and situated (Magalhães, 2011). Arenas categorised as *planned* (top section of the upper part of figure 4-17) incorporate actions and related behaviour of people that elicit or are based on plans and linked organisational structures and procedures (Magalhães, 2011, p. 39). Plans depend on the recognition of intent to successfully manage and understand digital transformation and are used to reflect on and prescribe action and behaviour (Suchman, 1985). In contrast, arenas categorised as *situated* (bottom section of the upper part of figure 4-17) incorporate actions and related behaviour of people interacting in "emergent ways […where] learning [is] taking place in a situated fashion" (Magalhães, 2011, p. 39). Situated action is shaping and shaped by the particularities of situations (Suchman, 1985) of the digital transformation. As with reflection and anticipation, planned and situated can be mutually dependent, i.e. plans can be regarded as derivative from situated action (Suchman, 1985) just like situations, in Ng (2002, p. 618) terms, may become less problematic with the collection of experiences resulting in a possible decrease in deviations from plans. Ng (2002, p. 618) refers to Schutz' (1962) phenomenological approach in which context and plan, and "indexicality and habitualised recipes of actions", respectively, must be viewed as interwoven.

The behaviour-based layers incorporate the following identified arenas.

History/Paths. This arena focuses on planned reflection, i.e. digital transformation capabilities can be and emerge when platform participants follow a plan and established practice, respectively, to reflect on trajectories of the platform and digital workplace. This allows them to understand the current change context, acknowledging path-dependency (cf. Hanseth & Lyytinen, 2004; Monteiro et al., 2013). The findings from chapter 4 suggest that enterprise collaboration platform change routes show unique interactions between different human and nonhuman actors. The existence of actors alone does not explain challenges or strategies and actions in the enterprise collaboration platform change; it is their interactions with other actors that provide explanations. Thus, mapping and following arrays of local and broader actors and their interactions allow platform participants to understand and learn from the biography of the enterprise collaboration platform in order to develop the capabilities to manage the related digital transformation. With regard to enterprise collaboration platform enablers and constraints, platform participants should be aware of the platform enablers (e.g. conditions, events) that currently contribute and, in the past, contributed to desired enterprise collaboration platform outcomes/benefits. Identifying and documenting them may offer them the opportunity to learn from failures and successes. Since enterprise collaboration platform enablers and constraints are highly complex, relational, and evolving, platform participants can benefit from paying attention to when platform enablers were transformed into platform constraints and vice versa, and when their characteristics and structure changed and through which interactions.
It must be noted that reflection on the history/paths of enterprise collaboration platforms can also be part of situated practice, i.e. it can be mediated by the context in which the person doing the reflection is situated (Ovens & Tinning, 2009, p. 1125). However, this arena places emphasis on planned reflection through the application of tools and methods, such as the profile template for enterprise collaboration platform outcomes/benefits and their enabling and constraining factors, which guide reflective activities.

Responses. This arena focuses on planned and situated reflection, i.e. digital transformation capabilities can be and emerge when platform participants sense challenges in the enterprise collaboration platform change and related digital workplace and develop responses. Related activities and behaviour can be regarded as planned when platform participants sense (temporarily) stable challenges (e.g. change resistance) and respond to them through tested strategies and actions. Responses to such challenges may be identified from documented reflections as part of the *History/Paths* arena (e.g. strategies and actions identified as successful for such or similar challenges the platform participant is familiar with). When platform participants sense situated, probably unexpected, challenges (e.g. environmental changes, conflicts between platform participants, organisational events) and respond to them through improvising and the application of ad-hoc strategies and actions, then their activities and behaviour can be regarded as situated. According to Suchman (1985), situated action "comprises necessarily ad hoc responses to the actions of others and to the contingencies of particular situations" (sec. abstract). The findings in chapter 4 shows that platform participants often sense certain challenges as they are engaged in the situations of the digital transformation (*Instantiation* arena). For example, the ways the works council interacts with the enterprise collaboration platform change are often unexpected and emerge

in context (the raising of certain topics, e.g. platform contents or monitoring/control, and linked requirements regarding platform functionality). Platform participants with responsibility for the collaboration platform may have to improvise to deal with the unexpected.

Instantiation. This arena focuses on situated reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants deal with uncertainty as they are actively engaged in transforming the platform and related digital workplace. Chapter 4 examines diverse enterprise collaboration platform change routes. They cannot be planned and designed in advance, as they are open-ended, i.e. the change routes unfold as platform participants try to instantiate emerging visions and objectives in practice. Chapter 4 provides a snapshot of such visions and objectives by identifying and examining the diverse anticipated desired enterprise collaboration platform outcomes/benefits. Such platform outcomes/benefits may be inscribed in digital transformation agendas (*Agenda* arena). However, working towards the achievement of desired outcomes/benefits requires dealing with situated platform constraints and making sense of situated platform enablers. The analysis of enterprise collaboration platform outcomes/benefits and their constraining and enabling factors has revealed that they are highly relational and evolving in interaction, with changing characteristics and structure. For instance, project-unrelated enablers and constraints may become project-related and vice versa and manifest depending on the use context. The findings of chapter 4 also show that different enterprise collaboration platform using companies may collect similar experiences with the same actor (works council) and related challenges but deal differently with such experiences. Platform participants need to be reflective in the moment and be sensitive to the contextual developments in order to develop successful ad-hoc responses (*Responses* arena). Learning happens in practice, where reflection and anticipation are mutually shaping.

Agenda. This arena focuses on planned reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants develop action plans based on the current change context. This involves reflection through perceiving, translating, and understanding the situations in the current change context (platform outcomes/benefits, challenges/constraints, strategies and actions / enablers (chapter 4)) and anticipation through the assessment and planning of possible next steps. Plans for action can be seen as derivative from the situated engagement of platform participants (*Instantiation* arena). Resulting agendas become typically inscribed into different material or medium (e.g. formal discussions, roadmaps, platform advertising strategies and texts). For the development of digital transformation capabilities, it is important that such agendas are not static but flexible and dynamic to account for changes as part of the digital transformation.

Confidence. This arena focuses on planned anticipation, i.e. digital transformation capabilities can be and emerge when platform participants look ahead and prepare for future changes. While the *Agenda* arena deals with planned actions based on the current change context, this arena addresses anticipated change contexts and how platform participants can handle them in future. For this, experiences with and learning from documented situations in the current change context (*Agenda* arena) is key. Platform participants can transfer insights gained from the situations in the current

change context to possible future change contexts. For example, one enterprise collaboration platform using organisation knows about the platform's planned migration to a cloud environment (see chapter 4.2.2.2). Such migration will be part of an anticipated change context in future. From the current change context, the organisation and its platform participants may have learned about the works council's expectations and GDPR requirements regarding the collaboration platform design (e.g. display and usage of PII) and can envision how such actors may interact with the migrated platform (e.g. topics and demands raised, discussions with platform participants with responsibility for the platform). This arena also includes expecting the unexpected based on prior experiences and learning. Organisations may have faced unexpected challenges (e.g. unexpected constraining factors to enterprise collaboration platform outcomes/benefits, unexpected interactions between different actors (see chapter 4.1.2)) in the past allowing them to expect surprises in the future and be prepared for them. The forward-looking actions and behaviour involved in this arena may shape how the situations in the current change context are assessed and the next steps planned as part of the digital transformation (*Agenda* arena).

It is emphasised that the relations between the identified arenas are more complex (e.g. relation between platform trajectories and the understanding of situations in the current change context (see, for example, Garrety & Badham, 1999, p. 279; Hanseth & Lyytinen, 2004). For reasons of simplification and practicality, only the most important links between the different arenas are modelled. In this way, organisations and their organisational members are provided with clear guidance in the building of digital transformation capabilities.

Arenas categorised as reflection and anticipation can be supported by a set of *tools/methods* (bar at the top of figure 4-17) that may be part of planned or situated modes of action. In chapter 4, the profile template for enterprise collaboration platform outcomes/benefits and their enabling and constraining factors was developed and discussed. Such profile template can primarily be used for planned reflection and anticipation.

Infrastructural layers

These layers concern different, but related information infrastructure properties explaining when digital transformation capabilities are and emerge. Specifically, they represent the underlying logics of behaviour-based layers. In this way, they help organisations and their organisational members understand the different arenas of the behaviour-based layers. In contrast to the behaviour-based layers, infrastructural layers do not distinguish between reflection and anticipation, and planned and situated, respectively.

Two different infrastructural layers come into focus when reviewing and examining the findings presented in chapter 4. The two layers can be described as follows.

Complex relations and interactions. Acknowledging the relational quality of information infrastructure (Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when actors are in interaction. Their interactions are complex and "embedded in open ranges of relationships" (Cordella, 2010, p. 45). Human and nonhuman actors discussed in chapter 4 range from enterprise collaboration platform enablers and strategies/actions to enterprise collaboration platform constraints and challenges to organisational members (with responsibility for the enterprise collaboration platform) aiming to achieve certain enterprise collaboration platform outcomes/benefits. Actors can be involved in multiple interactions. For example, GDPR as one key actor in the enterprise collaboration platform change may be in interaction with the works council, different platform workspaces, platform usage guidelines, etc. Actors of the evolving information infrastructure shape and are shaped by experiences and learning as they are in interaction. Based on the findings from chapter 4, such interactions incorporate human actors who act upon and shape challenges, as well as strategies and actions. At the same time, their believes, attitudes, visions, etc. are shaped by such challenges and strategies and actions. Interactions between actors with conflicting interests (e.g. the works council and platform managers) are particularly challenging. In this case, it is necessary that the interacting actors negotiate and coordinate their visions and objectives (e.g. through a works agreement). The findings from chapter 4 show that the majority of the participating enterprise collaboration platform organisations and their organisational members interact with the same actors (works council, GDPR). However, their interactions with such actors and resulting experiences in the enterprise collaboration platform change are very different. Both positive and negative experiences are part of the ongoing learning process.

Evolving sociotechnical configurations. Acknowledging the heterogeneous and evolving nature of information infrastructure as well as the reach and scope of information infrastructure (Hanseth & Monteiro, 1998; Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when sociotechnical configurations are shifting in time and space. Thus, understanding when digital transformation capabilities can be and emerge requires an extended view on design not restricted by particular locales and immediate action (R. Williams & Pollock, 2012). The emergence of digital transformation capabilities spans "multilocal spaces and multiple time frames" (R. Williams & Pollock, 2012, p. 16) and "is an outcome of multiple paths of interconnected contextual conditions and mechanisms" (El Sawy et al. 2010; Meyer et al. 1993; Pawson and Tilley 1997, as cited in

Henfridsson & Bygstad, 2013, p. 5). Chapter 4 provides insights into multiple time frames (e.g. through the evolution of enterprise collaboration platform constraints and enablers over time or the timing of involvement of the works council in the enterprise collaboration platform change), however, it particularly directs attention to heterogeneous actors, and platform participants, respectively, and their interactions at different spaces (e.g. enterprise collaboration platform outcomes/benefits, constraints, and enablers with different dimensions establishing links across various locales, the works council's topics and discussions influencing the enterprise collaboration platform change at local and global levels). The findings of chapter 4 reveal that the sociotechnical configurations are unique to the different organisations' enterprise collaboration platform change contexts and go along with different enterprise collaboration platform designs. The building of digital transformation capabilities covers the successful integration of (emerging) platform participants of different types and nature into (multiple) moving platform designs. As enterprise collaboration platforms and their corresponding digital workplace often evolve in unanticipated ways and tend to drift (Ciborra et al., 2001), platform participants are required to show openness in flexible combinations of resources, routines and structures in response to emerging challenges and strategies and actions. Changing contexts require adaption. As such contexts are evolving, platform participants are engaged in improving the installed base (Star & Ruhleder, 1996) and making the best out of the collaboration platform. Chapter 4 provides snapshots of the platform participants' engagement.

Chapter 5
Enterprise Collaboration Platform Change Across Multiple Spaces and Time Frames: A Longitudinal In-depth Case Study

As enterprise collaboration platforms are large, complex and heterogeneous and evolve over long time periods (Hanseth & Lyytinen, 2004, p. 207), it is necessary to investigate and understand enterprise collaboration platform change as multi-level change (Lyytinen & Newman, 2008, p. 592). However, the study of such multi-level change over long periods of time has been viewed as challenging and, based on particular school of scientific thoughts, scholars have largely "restricted [their studies] to selective arrays of actors and settings, time frames, and issues" (R. Williams & Pollock, 2012, p. 14).

This chapter concerns the evolution of one specific enterprise collaboration platform based on one in-depth longitudinal interpretive case study building the main frame of this research inquiry. It provides rich insights into the ways enterprise collaboration platforms are shaping and being shaped spanning diverse frames of time and space. This part of the work includes the following research strands: examination of enterprise collaboration platform outcomes and benefits change (see research objective O2; chapter 1.2), and of how and why enterprise collaboration platform designs are changing over time and space (see research objective O3; chapter 1.2).

Specifically, it concerns the extent and manner of addressing outcomes and benefits change in the enterprise collaboration platform literature (see research question O2-Q1; chapter 1.2). In response to a limited consideration of outcomes and benefits change in existing research, this part of the work deals with the development and application of a framework and method for capturing and monitoring how outcomes and benefits of enterprise collaboration platforms, and generally generative digital platforms, are changing over time (see research question O2-Q2; chapter 1.2). The development is based on a theoretical and practical integration of insights gained from the extant research literature on benefits realisation management (BRM) and eXperience case studies on the implementation and use of enterprise collaboration platforms (see chapter 3.6). The

application of the resulting Monitoring Benefits Change (MoBeC) framework is part of the empirical study on the evolution of one enterprise collaboration platform constituting the focus of this chapter. The application of MoBeC serves as a starting point for examining more closely the ways the collaboration platform is shaping and being shaped differently in and across different social worlds (working spheres) (Mark & Poltrock, 2004) over time (see research question O3-Q1; chapter 1.2). The consideration of different working spheres allows for the study of multiple coexisting perspectives and uses that can be inscribed (Henningsson & Henriksen, 2011; Holmström & Robey, 2005) into one and the same collaboration platform over time. Further, in order to explain changes in platform design and the overall embedding of the platform into the digital workplace, this chapter identifies and assesses the roles and influences of its various spatiotemporal actors and factors (see research question O3-Q2; chapter 1.2).

For this multi-layered purpose, a critical literature review (see chapter 3.5.4), interviews[13] (I1-I3; see chapter 3.5.1) and document analysis (see chapter 3.5.2) are used as described in the subsequent subchapters (esp. chapter 5.2.1.1, chapter 5.2.2.1, chapter 5.3.1, chapter 5.4.1). First, however, background information about the case is provided.

[13] The interviews were conducted in German. Direct quotes presented in this dissertation were translated into English.

5.1 Case background

The following presents a summary of how the case was selected and an overview of the case organisation and its enterprise collaboration platform implementation project.

Case selection

For the longitudinal in-depth case study, a case company was selected to examine the ways that enterprise collaboration platforms are shaping and being shaped across multiple spaces and time frames. Three selection criteria are used: i) the enterprise collaboration platform project is just beginning enabling the study of it right from the start, ii) aiming to develop a key case of the shaping and evolution of enterprise collaboration platforms (see chapter 3.2), the platform is introduced bottom-up, which is typical for enterprise collaboration platforms (Richter & Riemer, 2013; Richter, Stocker, et al., 2011), and iii) the organisation is willing to share and discuss their experiences (see chapter 3.8).

The case description, as provided below, is based on the company's eXperience case study (see chapter 3.6), company documents (see chapter 3.5.2) and corporate websites.

Case description

Overview of the organisation. The selected case company, pseudonymised as Chemical Products Manufacturer 03 (CPM03), is a speciality chemical company. As a subsidiary company of its globally active Swiss parent company, CPM03 is one of the world's leading manufacturers and suppliers of construction chemical product systems and sealants and adhesives for industrial production. The case company is based in Germany and has around 1,400 employees. With numerous company mergers and acquisitions, the case company is one of the top-selling companies within the group. In 2018, CPM03 achieved a production volume of around 350,000 tons and an annual turnover of around 718 million Euros. Like the parent company, the case company is organised into different target markets: concrete, waterproofing, roofing, flooring, sealing and bonding, refurbishment, interior finishing, industrial coatings, and industry. These target markets are complemented by the business areas of Human Resources, Communication and Marketing as well as Operations and Administration.
With a business to business (B2B) sales model, customers are only commercial users and are primarily construction companies. The market partners of CPM03 are primarily engineering offices and architects involved in the planning of buildings and advised by the German subsidiary. CPM03 focuses on strong branding and brand management for skilled tradesmen, suppliers, and company customers, and aims to provide professional project support, including advice from the planning phase to the creation of individual solution concepts. The service, quality, customer, and innovation orientation determine the company's strategic direction. Further, the company places high priority to sustainability aspects (e.g. procurement of sustainable raw materials, production with as few solvents as possible, support of local environmental protection projects).

Initial organisational, social, and cultural situation. CPM03 has a flat organisational structure where employees often communicate face-to-face on first name terms. Flat hierarchies are considered a strength of the individual business areas geared to the different target markets, as they benefit from easier decision-making processes and improved direct communication. However, a silo mentality has established in the case company, where little cooperation and communication between the different business areas exists. This is also supported by the company group's focus on growing sales. The individual business areas [/units] of CPM03 are responsible for sales of their respective target markets and compete partially. In 2016, when data collection for the longitudinal case study started, the company was under sales pressure. Because shares of the company group had been sold to a competitor by the group's founding family, the group was faced with a company takeover. In order to achieve a high shareholder value and to have both small and major shareholders backing the company against the takeover, an increase in sales was required. Also, the employees of the German subsidiary were backing the board of directors and the management of the company group fighting against the takeover. It was the concern of the entire company to remain independent and not to become a brand in a large corporation, which illustrates the employees' strong identification with the company. Despite this situation, CPM03 is focused on the well-being of its employees having an average age of around 50 years and mostly holding on to old traditions and known work practices (e.g. using the German language). The management's philosophy of CPM03 incorporates the protection of employees in terms of workload and to minimise fears and concerns.

Introduction of an enterprise collaboration platform. The introduction of the enterprise collaboration platform's ECS IBM Connections (now HCL Connections) was decided bottom-up in CPM03's parent company. In line with the group's goal to fully incorporate all subsidiary companies, the collaboration platform needed to be accessible company wide. The collaboration platform itself was initially hosted internally in the parent company serving as a pilot project for 200 employees (on-premises). After a successful pilot phase characterised by an exponential growth in the number of users, the global-roll out began in 2014. Operated as a cloud solution (IBM SmartCloud), the collaboration platform was successively introduced in the parent company's subsidiaries and became part of the group's new global Social Intranet. Despite the German subsidiary's leading role in the company group, it was the last subsidiary company to officially introduce the enterprise collaboration platform. The reason for this was temporary personnel shortage in CPM03's Communication and Marketing area[14] entrusted with the introduction of the platform in the German subsidiary. In June 2016, a project team from the Communication and Marketing area and members of the Information Technology (IT) area and the Human Resources area started to actively promote the enterprise collaboration platform offered on a voluntary use

[14] Hereinafter, functional areas, such as Communication and Marketing, Human Resources, or Research and Development, are referred to as "business areas" or in short as "areas".

basis. Whilst the decision to introduce the collaboration platform was decided bottom-up in the parent company, CPM03, like all other subsidiaries, is free in terms of related project and change management measures. Also, it can freely decide on the goals it wants to achieve with the platform and how the platform workspaces (communities) are used, and thereby designed for individual purposes.

5.2 Enterprise collaboration platform outcomes and benefits change[15]

This subchapter concerns the evolution of enterprise collaboration platform outcomes and benefits over time. Prior to the examination and description of how enterprise collaboration platform outcomes and benefits of the case company change, extant enterprise collaboration platform and ESS literature is examined to illuminate and reflect on the addressing of outcomes and benefits change. A suitable method for capturing and monitoring outcomes and benefits change is developed and then applied in the empirical setting.

5.2.1 A critical literature review on the addressing of outcomes and benefits change

This part of the research work focuses on a review of enterprise collaboration platform and related ESS literature and its addressing of enterprise collaboration platform outcomes and benefits change. In the following, the approach and the findings of the review conducted in May 2019 are described.

5.2.1.1 Literature review outline

The aim of this research work part is to *provide a critical reflection on whether and how outcomes and benefits change of enterprise collaboration platforms and their related enterprise social software (ESS) is being addressed in extant literature*.

To achieve this aim, the objectives are to

i. identify enterprise collaboration platform and related ESS literature dealing with outcomes and benefits,
ii. identify and critically reflect on how outcomes and benefits are conceptualised/theorised in the enterprise collaboration platform and related ESS literature, and
iii. identify and critically reflect on whether and how the evolutionary nature of outcomes and benefits is being addressed in the enterprise collaboration platform and related ESS literature.

For this, a critical literature review approach (Paré et al., 2015; Torraco, 2016) is adopted where it is seen as an "essential first step and foundation when undertaking a research project" (Baker, 2000, p. 219). Instead of integrating existing research work, this review is used to hold different research streams of enterprise collaboration platform and ESS outcomes and benefits against a set of criteria.

[15] Parts of this chapter 5.2 have been published in: Nitschke, C. S., & Williams, S. P. (2020). Monitoring and Understanding Enterprise Collaboration Platform Outcomes and Benefits Change. 53rd Hawaii International Conference on System Sciences, 2609–2618. Maui, Hawaii.

By pointing to problems and limitations, the critical literature review can support knowledge development and provide future research directions (Paré et al., 2015, p. 7).

This part of the research work is organised into four research steps as shown in figure 5-1 and described below.

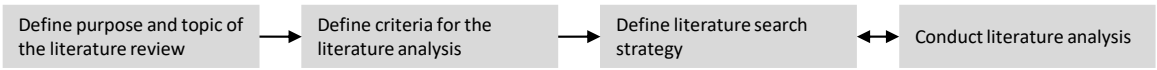


Figure 5-1. Steps of the critical literature review

In the first step, the purpose and topic of the literature review are defined as outlined above. The literature review focuses on outcomes and benefits and whether and how their evolutionary nature is accounted for in the enterprise collaboration platform and ESS literature. This includes a critical reflection on the existence and usefulness of current outcomes and benefits conceptualisations and theorisation.

In the second step, criteria for the review and analysis of the extant enterprise collaboration platform and ESS literature are defined based on the purpose and topic of the literature review and related research objectives. For this, an excel spreadsheet is prepared for the collection and analysis of the literature. The spreadsheet includes the following criteria for the analysis: *bibliographic information* (title, year, author, literature type, data source, database / search engine), *use of outcomes and benefits terminology* (Outcomes OR Benefits in the Title, Outcomes OR Benefits in the Abstract, Outcomes OR Benefits as Keywords, Outcomes OR Benefits in the Text, alternative terminology used for Outcomes OR Benefits), *research study* (focus topic, unit of analysis, research aim and method, addressing of outcomes/benefits change, timing of data collection, conceptualisation/theorisation of outcomes/benefits, research findings), *reflection* (interesting insights from the study, strengths and limitations).

In the third step, a literature search strategy is defined, i.e. the search approach and related search parameters. The strategy is iteratively adjusted involving the actual literature analysis as part of the fourth step. Table 5-1 shows the resulting search approach and related search parameters.

Table 5-1. Overview of literature search strategy

Search approach	**Keyword search, extended by backward and forward snowballing**
Search terms	('enterprise 2.0' OR 'enterprise social software' OR 'ESS' OR 'enterprise social network' OR 'ESN' OR 'enterprise social media' OR 'social business' OR 'collaboration system' OR 'enterprise collaboration platform' OR 'social collaboration platform') AND ('benefits' OR 'benefits change' OR 'outcomes' OR 'outcomes change')
Databases / search engine	Google Scholar, ScienceDirect, ACM Digital Library, SpringerLink, IEEE Explore, JSTOR, Wiley Online Library
Journals	JSIS, JKM, IJIM, TEL, Comput. Netw., Behav. Inform. Technol., MISQ, MISQ Executives, BISE, Bus. Inf. Rev.
Conferences	HICSS, AMCIS, ECIS, PACIS, ICIS, Bled, CENTERIS, MKWI, PRET, IC3K, i-Know, CSCW, ESCW, HCII,
Time period	2008 - 2019

As seen in table 5-1, keyword search is used applying a variety of different search terms in combination: enterprise collaboration platform or related terminology (terms used as synonyms / in the context of enterprise collaboration platforms and ESS) is combined with benefits, benefits change, outcomes or outcomes change. Databases and search engines, respectively, are used that have acquired popularity in various research fields, such as (management) information systems (IS), computer science, computer supported cooperative work (CSCW), or human-computer interaction (HCI). The search procedure is extended by backward and forward snowball sampling referring to "using the reference list of a paper or the citations to the paper to identify additional papers" (Wohlin, 2014, p. 1).

While the search process includes books and working papers, it focuses on journals and conferences (most of which are ranked highly by the IS research community). The journals and conferences shown in table 5-1 primarily resulted from and guided the search process. The time period shown in table 5-1 is a result of the search-analysis iterations, i.e. no publications before 2008 were identified.

In the fourth step, the literature is reviewed and analysed. As described as part of the third step, the literature search and analysis are iteratively conducted. For example, when saturation in results is achieved for a certain keyword combination or database, then it is not included in the search process anymore. For each literature item, its search term match and related reference from backward and forward snowballing, respectively, is documented. Based on the literature spreadsheet, different streams of enterprise collaboration platform and ESS literature are identified with attention to their consideration and conceptualisation/theorisation of outcomes and benefits.

5.2.1.2 Literature review findings

The search process resulted in 65 papers published between 2008 and 2019 and address outcomes and benefits of either single social software features (e.g. forums, microblogs, wikis) or integrated platforms comprising a set of different social software features.

An excerpt from the literature spreadsheet with some of its criteria for the literature analysis is provided in the appendix (see figure 9-1, Appendix B). As stated above, the literature spreadsheet was used as an input to identify and examine different streams of research and their strengths and limitations as outlined in the following.

Associations of outcomes and benefits

This research stream is dominated by empirical studies proposing and testing structural models with outcomes and benefits measures and their associations (antecedents and impacts). Accordingly, outcomes and benefits are typically conceptualised and used as dependent or independent variables. For example, Kügler, Smolnik, and Raeth (2013) use job-related benefits as one of many independent variables determining ESS usage. In contrast, the paper by Koroleva, Krasnova, Veltri, and Günther (2011) conducted one study where social capital benefits (comprising networking value or emotional support, among others) are examined as a dependent variable determined by different types of user actions within the ESS (e.g. posting, following) and where the relation is mediated by the variables network structure and social connectedness. For testing the relationships between outcomes/benefits and other variables, a correlational research design is adopted in this research stream. Often, the models are not built from scratch but draw on and extend existing and well-known IS benefits models and theories. A high proportion of the collected papers of this stream uses the updated DeLone and McLean information success model (DeLone & McLean, 2003), e.g. (Lehner et al., 2014; Raeth et al., 2009), the Technology Acceptance Model (TAM) (F. D. Davis, 1989) or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Vankatesh, Morris, Davis, & Davis, 2003), e.g. (Günther, Krasnova, Riehle, & Schöndienst, 2009; Harden, 2012; Trimi & Galanxhi, 2014; Wang, Jung, Kang, & Chung, 2013).
The analysis of the literature items in this research stream reveals that outcomes and benefits may concern one type (e.g. decision making performance (Kügler & Smolnik, 2013), employee innovation (Kügler, Smolnik, & Kane, 2015)) or be combined to build one consolidated construct (e.g. relative advantage (Kügler et al., 2013), net benefits (Lehner et al., 2014), value (Chin, Evans, & Choo, 2015; Mäntymäki & Riemer, 2014)), thus disregarding the multifacetedness of outcomes and benefits. Aiming at generalisability, studies of this research stream typically focus on large representative samples. Though, in the context of enterprise collaboration platform change, the attention to generalisability may be questionable. While studies of this research stream provide valuable insights into possible success factors and use intentions of enterprise collaboration platforms and related ESS, they do not appropriately account for the unique enterprise collaboration platform trajectories with their evolving outcomes and benefits (Richter & Riemer, 2013; Riemer et al., 2012). Structural models are prescriptive and typically built before the survey-based data collection.

Identification and classification of outcomes and benefits

This stream of research dealing with the identification and classification of outcomes and benefits has gained increasing attention (e.g. Archer-Brown & Kietzmann, 2018; Holtzblatt et al., 2013; Majumdar et al., 2013; Stocker & Tochtermann, 2011; van Zyl, 2009; Wehner et al., 2017). Researchers of this stream may focus on outcomes and benefits from specific stakeholder perspectives. For example, Majumdar, Krishna, and Björn (2013) look at benefits from the perspective of enterprise collaboration platform and ESS managers, or Holtzblatt, Drury, and Weiss (2013) compare identified benefits by different types of platform groups. Other researchers examine the plethora of generally achievable outcomes and benefits (e.g. Wehner et al., 2017). Often, case studies are used as either primary or secondary data. For instance, Wehner, Falk, and Leist (2017) review and analyse 37 case study publications that examine different types of benefits. The benefits described in the different case studies are linked to the studies' individual research objects. From the 37 case study publications, Wehner et al. (2017) identify 99 distinct benefits. In order to classify them, the authors use the traditional IT capabilities as proposed by Davenport and Short (1990). Using this classification schema, all identified benefits could be assigned to six of the nine traditional IT capabilities: Transactional, geographical, informational, knowledge management, tracking, and disintermediation.

Similarly, Archer-Brown and Kietzmann (2018) inspect 39 case studies, including cases published by software vendors and market reports, to identify different outcomes and benefits, which they group on the basis of intellectual capital dimensions (human, social and structural capital).

Other studies conduct cross-case snapshot analyses to identify and compare perceived or realised outcomes and benefits of a small set of enterprise collaboration platform and ESS projects (e.g. Stocker & Tochtermann, 2011; Zeiller & Schauer, 2011).

Only a few studies consider the classification of outcomes and benefits to different times. For example, Dittes and Smolnik (2017) examine outcomes of enterprise collaboration platform and ESS use based on a comprehensive literature review. The outcomes extracted from 70 publications are coded and assigned to three different impact levels (process, employee, organisational) generally being achieved over time. For instance, new collaboration capabilities (process level outcome, directly influenced by ESS use) and changes in knowledge capturing, creating and dissemination (process level outcome, indirectly influenced by ESS use) can impact employee's perceptions, behaviour and task completion. Resulting from the changing business processes, a new knowledge sharing behaviour (employee level outcome) may be adopted. If such behaviour is leveraged by a growing number of employees, then it may have productivity impacts on the whole organisation (organisational level outcome). Herzog and Steinhüser (2016) take a different approach to the classification of outcomes and benefits to different times by mapping them onto different successive stages of the ESS-enabled innovation process: knowledge, persuasion, decision, implementation, and confirmation. Benefits, such as rapid exchanges of ideas (knowledge stage) or faster decision-making (decision stage), are identified from a long-term exploratory case study.

Overall, this research stream illuminates the variety and range of different outcomes and benefits, and, in part, provides clues as to the realisation of outcomes and benefits at different times of the

project. Nevertheless, this stream does not yet address the ways enterprise collaboration platform outcomes and benefits themselves are evolving including changes in their importance and the emergence of unanticipated and unintended outcomes and benefits (Schubert & Williams, 2016).

Measurement of outcomes and benefits

Driven by the diffusion of social software in personal contexts, organisations have started to adopt enterprise collaboration platforms and leverage their IT capabilities (Greeven & Williams, 2017). By now, such platforms have become a significant business investment that needs to be justified by organisations (Osch et al., 2015; Raeth et al., 2009). The justification of enterprise collaboration platform investments is not a simple undertaking because such platforms offer many different opportunities to organisations and come with uncertainty concerning the achievement of expected outcomes and benefits. This research stream deals with the development and use of outcomes and benefits metrics to provide evidence for the successful adoption and use of enterprise collaboration platforms and related ESS. For this, different measurement approaches are proposed and applied ranging from database queries / logfile analysis to process analysis to social network analysis to content analysis to sentiment analysis to user interviews and surveys (K. Kirchner & Razmerita, 2019; Richter, Heidemann, Klier, & Behrendt, 2013). Related measures include different uses of the platform (e.g. consumptive use, hedonic use, social use, contributive use) (Kügler & Smolnik, 2014), usage frequencies of different activities (e.g. visiting, contributing, creating, uploading, commenting, following) (e.g. De Michele, Fabbri, & Canali, 2018; Herzog et al., 2013; Stocker & Müller, 2013, 2016) and associated user types (e.g. creator, contributor, lurker) (Schwade & Schubert, 2019). With this set of different approaches and related measures, researchers of this research stream aim to support organisations in the setting of objectives and monitoring of their achievements (cf. Richter, Heidemann, et al., 2013).

One of the most cited publications of this research stream was written by Muller, Freyne, Dugan, Millen, and Thom-Santelli (2009) who propose the return on contribution (ROC) construct. ROC represents the ratio of benefit divided by cost, and consumption divided by production, respectively. The focus is on human actors who produce and consume knowledge / collaborative resources in ESS. Muller et al. (2009) show the evolution of the ROC value over time for two ESS applications. However, with just a ratio of two values, their measurement approach is rather simplistic, not accounting for the richness of benefits.

Other measures are more result-oriented and focus on revealing the value of platform usage, e.g. reduced time worked with documents (Richter, Heidemann, et al., 2013), reduction of emails (Herzog et al., 2013; K. Kirchner & Razmerita, 2019), number of ideas (K. Kirchner & Razmerita, 2019; Richter, Heidemann, et al., 2013), or new customer acquisition (Herzog et al., 2013).

Use cases as outcomes

This stream of research focuses on the interpretive flexibility of enterprise collaboration platforms and related ESS, i.e. it considers outcomes of enterprise collaboration platform and ESS use as a result of user experiences and skills embedded in actual use processes (Schubert & Glitsch, 2016, p. 44). Enterprise collaboration platform and ESS outcomes are examined in the form of use cases

described by Glitsch and Schubert (2017) as "descriptions of business activities on a high level that support collaborative tasks" (p. 867). In order to examine and illustrate the possibilities of value creation from enterprise collaboration platforms and ESS, researchers of this stream identify, catalogue, and describe a variety of different use cases, such as information sharing, work coordination, event management, internal marketing, discussion, seeking support, team organisation, problem-solving, or enterprise communication (Glitsch & Schubert, 2017; Richter, Mörl, Trier, & Koch, 2011; Riemer & Richter, 2012; Schubert & Glitsch, 2016). Aiming to support the implementation of use cases in an "unstructured field of collaboration", Schubert and Glitsch (2016) propose the concept of collaboration scenarios, defined as "modular components that support business processes and use cases" (p. 51), e.g. sharing files, finding an expert, alerting to news, or rating information. Similarly, Richter, Mörl, Trier, and Koch (2011) describe sub-classes of use cases that can be compared with the collaboration scenarios by Schubert and Glitsch (2017; 2016), examples include invitations, sharing of links to articles, searching for discussion partners, or identification of a contact person. This research stream does not account for how uses cases change but sheds light on the many degrees of freedom in the enterprise collaboration platform and ESS appropriation and use.
Often, a qualitative research design is adopted, where use cases are identified from enterprise collaboration platform and ESS cases employing content analyses and related coding.

Technology affordances and resulting outcomes

A small proportion of the analysed literature concerns outcomes of affordances of enterprise collaboration platforms and related ESS (e.g. Kane, 2015; Leidner et al., 2018; Treem & Leonardi, 2012). In line with a technology affordance perspective, technology is regarded as affording different options for action and ways of using it (Leonardi, 2011; Volkoff & Strong, 2013). Often, research in this stream adopts a case study research approach or draws from existing, already published case studies. Findings show that outcomes of enterprise collaboration platforms and ESS are not just there and may not be identical for all organisational members and groups, "simply possessing technology is not enough […] People must […] use information systems […] effectively to achieve desired outcomes" (Kane, 2015, p. 3). For instance, Leidner, Gonzalez, and Koch (2018) study one case in depth to examine the influences of ESS on the socialisation process. For this, they apply technology affordance theory to identify first-order affordances, e.g. interacting with peers, and second-order affordances such as building relationships with peers, and their outcomes, e.g. productivity enhancement. In their study, they use the concept of generative mechanisms for causal structures being formed by interacting affordances and helping to explain empirical outcomes. Drawing on a data collection phase of eight years, the findings demonstrate the intertwining of affordances, outcomes, and different groups of actors. Similarly, assuming a relational character of affordances, Treem and Leonardi (2012) propose that affordances "are constituted in relationships between people and the materiality of the things with which they come in contact" (p. 146). Accordingly, they can be linked to different outcomes in different contexts. However, based on a literature review, Treem and Leonardi (2012) consider four affordances offered by ESS to their users which they describe as relatively constant across various organisations: visibility, persistence,

editability, and association. Moreover, they explore the different outcomes such affordances may have on socialisation, information sharing and power processes in organisations.
While this research stream's studies well illustrate that outcomes require actualisation of affordances, they do not yet cover the ways that outcomes and benefits change over time.

As set out above, the literature analysis yielded different streams of research with an increasing interest in outcomes and benefits of enterprise collaboration platforms and ESS. Along with the technological developments, the unit of analysis changed from single social software tools (particularly microblogs, wikis, and social networks) (e.g. Muller et al., 2009; Riemer & Richter, 2012; Stocker et al., 2012; Stocker & Tochtermann, 2011; J. Zhang et al., 2010) to more integrated collaboration platforms comprising a range of different social software components and groupware capabilities (e.g. De Michele et al., 2018; Holtzblatt et al., 2013; K. Kirchner & Razmerita, 2019; Kügler, Smolnik, et al., 2015; Osch et al., 2015). While the studied software is described in most of the studies, the terminology for outcomes and benefits seems to be largely unclear. Often, both terms are not precisely defined, used inconsistently as well as interchangeably with other terms, such as impacts, success, opportunities, advantages, or value, to explain what organisations can gain from enterprise collaboration platforms and ESS. This is not only the case for different publications that use different terminology, but also occurs within a study and publication, respectively (e.g. Holtzblatt et al. (2013) using benefits and value, Osch, Steinfield, and Balogh (2015) using opportunities, advantages, and benefits, or Kügler and Smolnik (2013) using outcomes, benefits, and impacts). However, in order to monitor and understand how enterprise collaboration platform outcomes and benefits change, a common understanding of what outcomes and benefits mean needs to be developed. Therefore, the terms **outcomes and benefits** are **no longer considered without distinction** as in the previous research part (see chapter 4) but **examined separately to account for their relationship**.
While the extant literature stresses the importance of investigating the evolution of enterprise collaboration platforms and ESS (e.g. Bala et al., 2015; Kügler et al., 2013; Stocker et al., 2012; Stocker & Tochtermann, 2011), it has not yet covered the evolutionary perspective in any depth. The research part presented in this chapter addresses this limitation, and the expressed imperative for conducting longitudinal studies in order to account for enterprise collaboration platform change (Dittes & Smolnik, 2017; Mäntymäki & Riemer, 2016; Stocker et al., 2012).

5.2.2 The Monitoring Benefits Change (MoBeC) framework

In the previous subchapter (chapter 5.2.1), the need to monitor outcomes and benefits change is outlined. Currently, extant literature does not provide the means to address this need. Therefore, this research work part deals with the development of a suitable theoretical framework and method that allows for capturing and monitoring the ways that outcomes and benefits of enterprise collaboration platforms change: The **Mo**nitoring **Be**nefits **C**hange (MoBeC) framework. This framework is then applied to examine changes in the expected and realised outcomes and benefits in the studied enterprise collaboration platform case, contributing to a well-grounded understanding of the dynamic and evolving nature of such malleable digital platforms.

5.2.2.1 Framework development and application outline

The aim of this research work part is *to provide researchers and practitioners with a method for capturing and monitoring how outcomes and benefits of malleable digital platforms, such as enterprise collaboration platforms, change over time*.

Specifically, the objectives are to…

i. develop a framework and method for capturing and monitoring how expected and realised outcomes and benefits change over time,
ii. apply the derived framework in an empirical setting to capture and monitor the ways that expected and realised outcomes and benefits change over time, and thereby
iii. reflect on the applicability of MoBeC for studying the dynamic and evolving nature of enterprise collaboration platforms and malleable digital platforms in general.

Following a qualitative approach (Walsham, 2006), this research work part is organised into two research phases (*framework development* and *framework application*) including five subphases and nine different research steps as shown in figure 5-2 and detailed below.

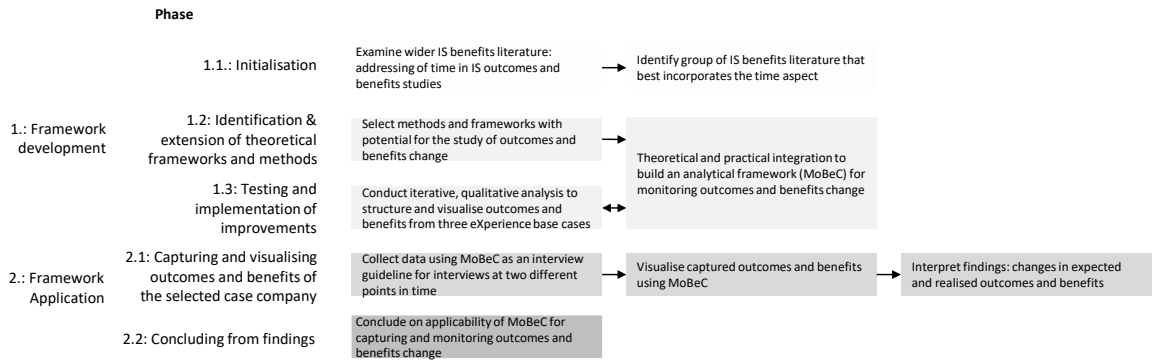


Figure 5-2. Phases and steps of the framework development and application.

Phase 1: Framework development

The goal of this phase is to assess existing IS benefits frameworks and methods with regards to their support for capturing and monitoring outcomes and benefits change, and if required, extend and improve them to handle the generative and evolutionary nature of digital platforms. This phase is divided into three subphases, 1.1: Initialisation, and the two parallel and interlinked subphases 1.2: Identification and extension of theoretical frameworks and methods and 1.3: Testing and implementation of improvements.

Phase 1.1: Initialisation

This subphase deals with the necessary preparatory work for the identification of existing IS benefits frameworks and methods providing a basis for capturing and monitoring outcomes and benefits change of generative digital platforms. The study of information systems benefits has been a key topic of research in the Information Systems (IS) field for over 40 years. In the first step of this phase, the wider IS benefits literature is examined. Specifically, four different IS benefits literature streams and categories (Jacob, 2004), respectively, are analysed with regard to whether and how the aspect of time is incorporated in the study of outcomes and benefits: *IS/IT investment studies* (e.g. Brynjolfsson & Hitt, 1993; J. L. King & Schrems, 1978; Remenyi, Bannister, & Money, 2007), *IS success measurement* (e.g. DeLone & McLean, 1992; Petter, Delone, & Mclean, 2008; Seddon, 1997), *IS benefits classification and measurement* (e.g. Nah, Lau, & Jinghua, 2001; O'Leary, 2004; Shang & Seddon, 2002), and *benefits realisation management (BRM)* (e.g. Peppard, Ward, & Daniel, 2007; Remenyi, White, & Sherwood-Smith, 1997)). In the second step of this phase, the IS benefits literature category with the greatest consideration of time is identified, deserving further theoretical attention.

Phase 1.2: Identification & extension of theoretical frameworks and methods

The second subphase of phase 1 constitutes the theoretical part of the framework development. Based on the findings from the first subphase (phase 1.1), the second subphase (phase 1.2) is devoted to the IS benefits literature stream/category with the greatest consideration of time. In the first step of this phase, the degree to which IS benefits stream related methods and frameworks incorporate outcomes and benefits change is examined. Appropriate frameworks and methods for the studying of outcomes and benefits change are selected. Insights into their strengths and limitations are considered for the final framework development in the subsequent step. Potential extensions and improvements to the selected frameworks and methods are iteratively implemented based on subphase 1.3 (described below).

Phase 1.3: Testing and implementation of improvements

The third subphase of phase 1 constitutes the practical part of the framework development. The selected frameworks and methods from subphase 1.2 are used for the analysis of three existing case studies of enterprise collaboration platform implementation projects. The studies are conducted in three different organisations as part of the IndustryConnect initiative (see chapter 3.6). Developed

with the eXperience method (Schubert & Williams, 2011; Schubert & Wölfle, 2007), the cases are uniformly structured. Documenting reasons for the project and project expectations, including expected outcomes and benefits, the second section of the case studies provides the main data basis for the analysis. Through a qualitative analysis (Glaser, 1965), the selected frameworks and methods from phase 1.2 are used to structure and visualise (see chapter 3.5.7) the outcomes and benefits documented in the case studies. Insights gained from the practical data are used to iteratively extend and improve the frameworks and methods and, at the same time, guide the further analysis of the outcomes and benefits. In this way, the second step of phase 1.2 and 1.3, respectively, is both a theoretical and practical integration to build an analytical framework (Monitoring Benefits Change (MoBeC) framework) for capturing and monitoring outcomes and benefits change.

Phase 2: Framework application

The application of the framework is part of the in-depth longitudinal interpretive case study of enterprise collaboration platform change and the building of digital transformation capabilities. This phase is split into two subphases: 2.1: Capturing and visualising outcomes and benefits of the selected case company, and 2.2. Concluding from findings.

Phase 2.1: Capturing and visualising outcomes and benefits

The first step of this subphase deals with the data collection. The selected case organisation (see chapter 5.1) provides the empirical setting for the application of MoBeC and corresponding analysis of outcomes and benefits expected and realised in one enterprise collaboration platform project over time. Two seven-hour semi-structured face to face interviews (I1, I3; see chapter 3.5.1) are conducted with key informants with responsibility for the case company's enterprise collaboration platform (Project Manager, Communication & Marketing; Head of IT). The first interview (I1) is conducted in June 2016, where base case information on the enterprise collaboration platform project is collected in order to establish an anchor measure and provide a point of departure for the longitudinal case investigation. The eXperience case study method (see chapter 3.6) is used as a main frame for the interview and to gather information on the reasons for the project and project expectations, among others. To guide particularly the capturing of enterprise collaboration platform outcomes and benefits, the developed MoBeC framework is used for targeted questions. The second interview (I3) is conducted in November 2018. While I3 serves different research purposes (see chapter 3.5.1), one purpose is to provide an over-time comparison of expected and realised outcomes and benefits. Again, the MoBeC framework is used as an interview guideline. In the second step of this phase, the collected enterprise collaboration platform outcomes and benefits are cross-checked with company-internal platform promotion material (see chapter 3.5.2), and then visualised employing MoBeC's instantiation template for 2016 and 2018. In the third and last step of this phase, the findings are interpreted focusing on the changes in enterprise collaboration platform outcomes and benefits.

Phase 2.2: Concluding from findings

This subphase provides a reflection on the MoBeC application findings; for example, it is based on the results from phase 2.1. Specifically, this subphase concludes on the suitability of the MoBeC framework for capturing and monitoring outcomes and benefits change of enterprise collaboration platforms and malleable digital platforms in general.

5.2.2.2 Framework development and application findings

The findings of the framework development phase and framework application phase are provided in the following. They are structured as per the related subphases as outlined above.

Framework development findings

The results of the single framework development subphases, as well as the derived Monitoring Benefits Change (MoBeC) framework, are described below.

IS benefits literature streams and their consideration of outcomes and benefits change

IS/IT investment evaluation research studies propose and discuss tools and measurement methods for IS investment decisions, the business value of IS, and the relation between IS/IT expenditure and improvements in return on investment (e.g. Brynjolfsson & Hitt, 1993; J. L. King & Schrems, 1978; Lentz, Gogan, & Henderson, 2002; Remenyi et al., 2007). This stream focuses on what value is generated by IS/IT investments, not on why, where and how value is provided (Chan, 2000). In this way, this research stream is very much ends-focused, i.e. the research interest is in what is delivered by IT/IS and not on how outcomes and benefits change. While IS/IT investments were seen as necessary to achieve value, they are nowadays rather seen as enabling change (Peppard & Ward, 2004; Peppard et al., 2007).

IS success measurement research addresses means-end investigations and pays particular attention to the outcomes of IS projects and independent variables of IS success (e.g. DeLone & McLean, 1992, 2003; Petter et al., 2008; Reich & Benbasat, 1990; Seddon, 1997). DeLone and McLean developed one of the most cited models of information systems success (1992), including independent variables to IS success such as information or systems quality, and updated it more than ten years later to include the variable "Net Benefits" (2003) that combines impacts of different types and dimensions, e.g. cost or time savings. Further, a distinction between benefits (positive) and dis-benefits (negative) is made. This stream provides a comprehensive view of IS success and has often been cited in the context of IS/IT benefits. However, it is limited to the inputs (investments) and outcomes (success) of IS-enabled change and incorporates little consideration of context and how outcomes and benefits evolve over time.

IS benefits classification and measurement research concerns the identification of IS benefits by employing diverse classification dimensions (e.g. tangible/intangible, organisational, external/internal) and measurement of enterprise systems success (e.g. Nah et al., 2001; O'Leary, 2004; Shang & Seddon, 2002). Shang and Seddon (2002) provide a list of grouped ERP system

benefits and point out that benefit dimensions might interact with each other (p. 286). For example, operational benefits go along with increased managerial effectiveness or strategic benefits are based on operational efficiency. This is an interesting finding which shows that benefits should not be studied in isolation but by considering their dependencies. While the time dimension of benefits is not directly considered, the benefits interactions indicate sequences or parallelisation of benefits. Other researchers such as Nah, Lau and Jinghua (2001) or Sammon and Adam (2008) focus on critical success factors (CSF) for the successful implementation of enterprise systems. This is typical for enterprise systems being introduced with more clearly defined purposes of use and little variations in outcomes and benefits over time.

Benefits realisation management (BRM) is a research stream that has its origin in the study of IS-enabled change and deals with the management of the realisation of benefits across time (process for management) and contexts (e.g. Peppard & Ward, 2004; Peppard et al., 2007; Remenyi et al., 1997; Ward & Elvin, 1999; Ward, Taylor, & Bond, 1996). This stream shows that IS/IT on its own does not deliver benefits, but business change and processes for benefits management are also required. Another key finding is that further benefits might be achieved after the realisation of benefits implying a time dimension (Peppard et al., 2007; Ward et al., 1996). Aside from scholarly frameworks, industry approaches and frameworks in the area of project and programme management research that cover BRM have also emerged, with two of the most well-known being the Managing Successful Programmes (MSP) approach (OGC, 2011) and The Standard for Program Management 3rd Edition (Project Management Institute, 2013). The focus is on managing benefits realisation with activities that must be performed and phases with certain deliverables completed so that benefits can be delivered. Thus, contrary to the other three research streams, the emphasis is on the paths towards the achievement of benefits including the development of required capabilities so that value can be generated (Ashurst, Doherty, & Peppard, 2008).

Of the four different IS benefits research streams, BRM addresses the time aspect to the largest extent, having its origin in IS-enabled change and focusing on the management of the realisation of benefits over time. With this finding, this research work specifically focuses on BRM methods and frameworks and their support for studying outcomes and benefits change.

BRM frameworks

Two BRM frameworks have been identified as appropriate starting points for the study of outcomes and benefits change of generative digital platforms, such as enterprise collaboration platforms, as they incorporate a temporal flow of outcomes and benefits as well as their relation to organisational changes and required capabilities for the delivery of change: the *Office of Government Commerce (OGC)'s benefits realisation framework* (OGC, 2011), and the *benefits dependency network (BDN)* (Peppard et al., 2007; Ward & Daniel, 2006).

OGC's benefits realisation framework. The benefits realisation framework was developed as part of the Managing Successful Programmes (MSP) approach by the Office of Government Commerce (OGC) (OGC, 2006, 2007, 2011). MSP is based on the analysis of various projects from practice and constitutes a foundation of PRINCE2 (OGC, 2007; Schubert & Williams, 2013a). In contrast to input-output approaches where benefits are considered as a consequence of IT (Soh & Markus, 1995), the OGC benefits realisation framework (OGC, 2011, p. 79) fits into programme management and focuses on the paths towards the realisation of benefits. For this, it includes the concepts of output, capability, and outcome that succeed one another before benefits are realised. While the entire MSP approach also covers negative benefits, i.e. disbenefits, the benefits realisation framework focuses on positive benefits.

Benefits dependency network. The benefits dependency network (BDN) is a key tool of the Benefits Management Process model developed from research work conducted by Ward and his colleagues at the Cranfield Institute of Technology (Ward & Elvin, 1999; Ward et al., 1996). Visualising benefits in relation to each other, to project's objectives, to organisational change and to the provided information system functionality (Ward & Daniel, 2006, p. 108), BDN has gained great empirical attention in the literature (e.g. N. King, 2011; B. Rogers, Stone, & Foss, 2008; H. Wilson, Clark, & Smith, 2007). IT itself does not come with benefits to organisations, IT enables organisations to derive benefits. Accordingly, Ward and Peppard (2002) define benefits management as "the process of organizing and managing so that the potential benefits from using IT are actually realized" (p. 439).

The following section describes how the two frameworks and the insights gained through the analysis of the three case studies of enterprise collaboration platform implementation projects are used for the development of a consolidated and extended framework, the *Monitoring Benefits Change (MoBeC) framework*. MoBeC allows for capturing and monitoring how outcomes and benefits of enterprise collaboration platforms are changing over time.

Monitoring Benefits Change (MoBeC) framework and instantiation

Encompassing a temporal flow of expected outcomes and benefits and their relation to organisational changes and required capabilities to deliver change, both the OGC's benefits realisation framework and BDN are used to structure and visualise (see chapter 3.5.7) the outcomes and benefits captured in the three eXperience base cases (Schubert & Williams, 2011; Schubert & Wölfle, 2007; see chapter 3.6). The theoretical and practical insights are integrated to build the

Monitoring Benefits Change (MoBeC) framework that provides a means for understanding the evolutionary nature of enterprise collaboration platforms and digital platforms in general.

The OGC's benefits realisation framework (OGC, 2011, p. 79) serves as the key foundation for MoBeC (figure 5-3). It considers the IS/IT implementation itself and organisational competencies for the delivery of outcomes and benefits, and provides a common set of terminology for organisations to "understand the impact of changes on different parts of the organization" (p. 79). According to the framework (OGC, 2011, p. 79), *outcomes* are "new desired operational state[s]", for example "transformed client service organization" which realise planned benefits. *Benefits* that can manifest at any time are defined as "the measurable improvement resulting from an outcome perceived as an advantage by one or more stakeholders and which contributes towards one or more organisational objective(s)", such as "increased sales revenues of x%". In this way, benefits explain what a programme may deliver and what organisations may gain from realising outcomes. Focusing on the realisation of outcomes and benefits, the OGC's benefits realisation framework considers necessary preceding changes captured by the concepts of outputs and capabilities. *Outputs* are defined as "the deliverable […] developed […] from a planned activity", and often these are of technical or functional nature (e.g. a specific social software component or application). *Capabilities* enable outcomes, i.e. "the new operational state[s]", by utilising and transforming outputs into outcomes. Examples of capabilities may be testing a technology solution or training staff. MoBeC adopts the temporal flow from outputs to benefits, as suggested by the OGC's benefits realisation framework. Though, in contrast to the OGC's benefits realisation framework, MoBeC makes a distinction between the *benefit description* and *benefit measure*, since previous research (e.g. Murphy & Simon, 2002) and the analyses of the eXperience cases reveal that not all resulting benefits may be measurable and tangible. The benefit description is used to explain an observable change. If a specific metric or evidence for that change is available, then the benefit description can be supplemented with the benefit measure.

The benefits dependency network (BDN) introduced by Ward and colleagues (Peppard et al., 2007; Ward & Daniel, 2006) is used as an additional input for MoBeC. Displaying "the chain of causality between IT systems, business changes and project objectives in a graphical format" (H. Wilson et al., 2007, p. 772), BDN guides the visualisation of dependencies in MoBeC's instantiation template (figure 5-3). Also, following BDN, the concept of objectives is incorporated. In order to explain problem versus innovation-based IT implementations, Peppard, Ward, and Daniel (2007) draw a distinction between a) *ends* (results in terms of benefits and investment objectives), *means* (IS/IT enablers, comparable with outputs in the OGC's benefits realisation framework), and *ways* (enabling changes as one off-changes, comparable with capabilities in the OGC's benefits realisation framework, and business changes as permanent changes, comparable with outcomes in the OGC's benefits realisation framework). According to BDN, problem-based investments are primarily ends driven, innovation-based implementations are either ways or means driven. From the analysis of the eXperience base cases it can be identified that organisations have global, more enduring corporate objectives (e.g. product quality, process improvement, productivity improvements, continued corporate growth) that may have an impact on the benefits organisations

and their organisational members with responsibility for the enterprise collaboration platform aim to achieve (e.g. improved collaboration with external partners, enhanced decision making, faster information retrieval). Though, such corporate objectives do not particularly motivate the platform introduction. To model the possible relation with expected enterprise collaboration platform benefits, objectives are displayed on the right side of MoBeC next to the benefits. However, the case study analyses unveil also project-specific drivers (considered by Ward and Daniel (2006, p. 130), and Peppard et al. (2007, p. 12) as investment objectives). Project-specific drivers may be problem-driven (e.g. group work only in small teams, laborious search for data, information, and experts, aging knowledge carriers (staff)) or opportunity-driven (e.g. moving with the times and redesigning the digital workplace). As such drivers motivate the platform implementation and guide the path from related outputs to expected outcomes and benefits, drivers are displayed on the left side of MoBeC.
Due to the interpretive flexibility of enterprise collaboration platforms, the pre-implementation assessment of means and ways are of great uncertainty. While the initial drivers for the platform implementation and the enduring corporate objectives do not change, the ways that the platform is designed with corresponding organisational changes cannot be easily defined a-priori. Since change is an ongoing process with evolving outcomes and benefits, it is necessary to collect outputs, capabilities, outcomes and benefits at regular points in time. This is in conformity with the idea of BDN where developing it is described as an iterative process (Ward & Daniel, 2006, p. 108).

In line with the framework development objectives and as opposed to the OGC's benefits realisation framework and BDN, the MoBeC framework and related instantiation template (figure 5-3) consider not only the expected outcomes and benefits but also the degree to which they are realised. Capturing the degrees to which expected outcomes and benefits are achieved requires the existence of a corresponding measure. Following Ward and Daniel (2006, pp. 129–130), subjective measures related to the perceived achievement levels are considered acceptable. Particularly in enterprise collaboration platform projects, there is seldom objective evidence (Herzog et al., 2013). As proposed in MoBeC's instantiation template, the achievement level (progress) can be specified on a scale from 1 (not achieved/addressed) to 4 (achieved / high success). Using this scale, employees with responsibility for the platform and related project can rate the respective achievement level and provide objective evidence if available (e.g. interaction between employees from different organisational departments via one common platform community, as visible in the platform's event database (Schwade & Schubert, 2017)).

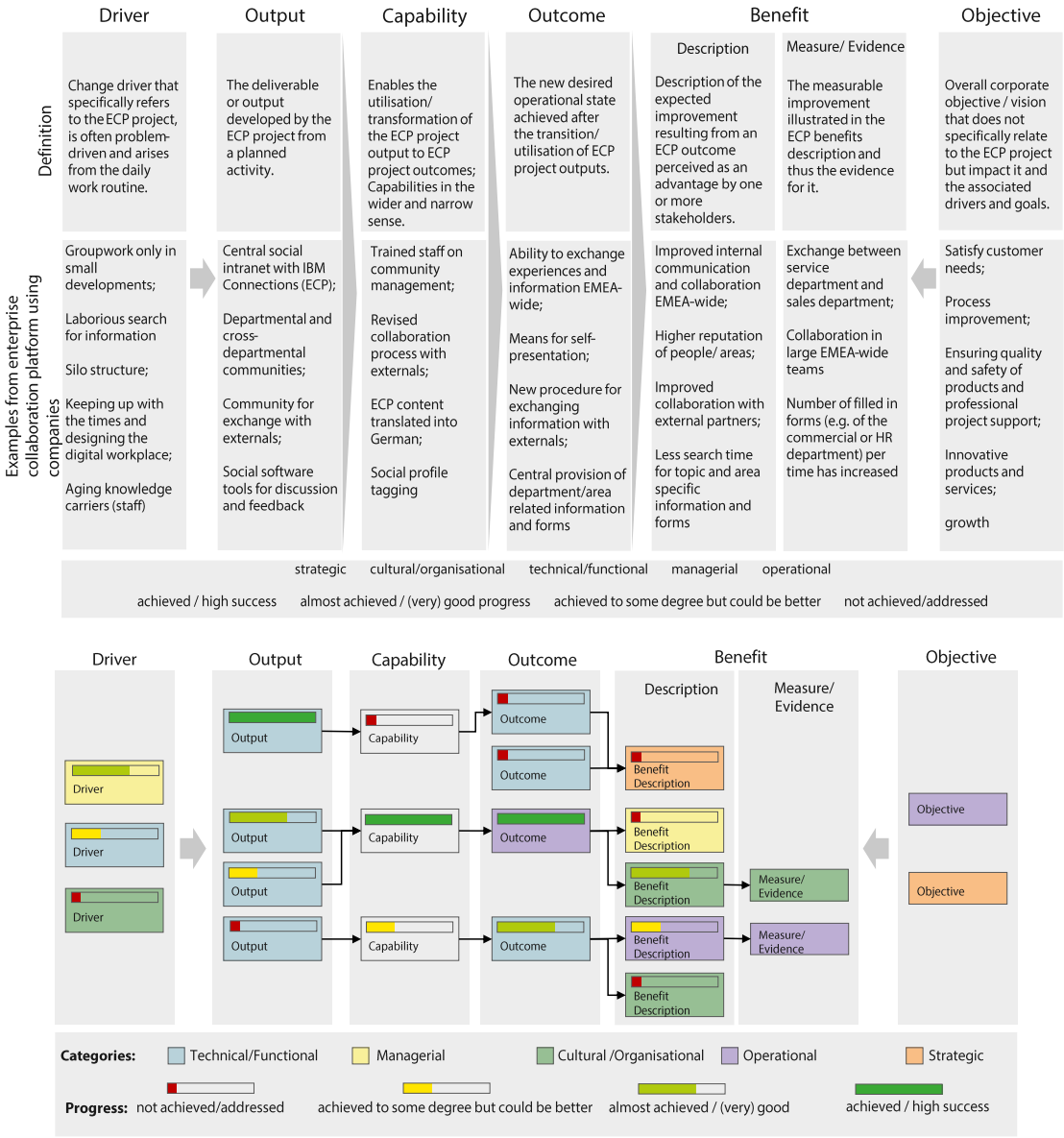


Figure 5-3. MoBeC framework: elements and instantiation template (Nitschke & Williams, 2020, p. 2613)
Legend: ECP is the abbreviated form of enterprise collaboration platform. The categories are in line with the focus group F1 findings.

Based on the base case examination and existing benefits classifications (Schubert & Williams, 2009, 2011; Shang & Seddon, 2002), MoBeC makes a distinction between different dimensions that outputs, outcomes, and benefits etc. can assume. All benefits and related concepts (e.g. outputs, outcomes) documented in the three eXperience base cases could be categorised according to the dimensions of the enterprise system benefits framework by Shang and Seddon (2002) with minor modifications. The dimensions adopted are "operation", "managerial", and "strategic". To account for various IT capabilities also on a micro level of analysis, the dimension "technical/functional" is used instead of "IT infrastructure". Further, the dimension "organisational" is extended by including cultural issues identified particularly relevant in the context of malleable digital platforms; thus, the label "organisational/cultural" is used. Except for the dimension "organisational/cultural", all dimensions can also be mapped onto the expectations-benefits

framework by Schubert and Williams (2009, 2011). The dimensions used in MoBeC can be summarised as follows.

Strategic. The focus is on long-term planning and high-level decisions. Typically, the strategic direction of an organisation is part of the corporate objectives and visions. Examples of strategic objectives that may exist independent of the implemented digital platform are business growth, business alliances, cost leadership, competitive advantage, or capital sourcing. Strategic outcomes and benefits expected with the new digital platform are often stirred by strategic objectives.

Managerial. The focus is on business management activities, including the allocation, control and use of human and material resources, monitoring of operations, and decision making and planning, among others. Examples of managerial outcomes or benefits expected with the new digital platform are, for instance, improved decision-making or certain knowledge management practices.

Operational. The focus is on day-to-day activities and related products, processes and services that are typically repeated periodically and can be evaluated in terms of economics/finance, effectiveness or efficiency. Laborious search for information, process improvement, ensuring quality and safety of products or faster development of strategies are examples of operational drivers, objectives and benefits associated with the new digital platform.

Technical/functional. The focus is on the information technology and the related infrastructure, including the digital platform's components and functions. In the context of enterprise collaboration platforms, particular attention is on the affordances of its collaboration and social software capabilities. This dimension comprises not only technological artefacts on its own but also their use for certain purposes. The use of network drive directories, a new search functionality, a new community type, ability to capture knowledge or less search time for information are examples of technical/functional drivers, outputs, outcomes, and benefits related to the new digital platform.

Cultural/organisational. The focus is on the organisation's specific configuration of the corporate structure and its related information flow as well as corporate and societal values, norms, attitudes, traits, social practices, and goals. This dimension includes the company's sociodemographic setting. Silo mentality, ageing staff, or collaboration between different departments are examples of drivers and outcomes associated with the new digital platform.

Capabilities cannot be easily assigned to a single dimension and category, respectively. This is because they are more complex, where learning and reflection are entangled in the specifics of the organisational context (Andreu & Ciborra, 1996; Dourish, 2004).

Framework application findings

When the enterprise collaboration platform was officially introduced in CPM03 in **June 2016** as part of the new Social Intranet, most employees of the case company neither knew about the global roll-out of the platform nor had gained first experiences with the enterprise-wide accessible platform. An exception were members of CPM03's research and development (R&D) business area often communicating and cooperating with other R&D areas and teams from its parent company and other group subsidiaries. Seeing the chance to reduce the effort required to identify and find appropriate R&D contact persons and experts within the group, members of the German R&D area were interested in using the enterprise collaboration platform. Therefore, the German R&D area was trained in the use of the platform by the parent company on request already in the summer of the preceding year (a small number of people organisationally associated with the German R&D business area (e.g. the head of the Analytics R&D) were even involved in the project during its pilot phase (see chapter 5.1 and chapter 5.3.2)). When the project team from the Communication and Marketing area plus members from the IT department and Human Resources area (described as "extended project team") began actively promoting the enterprise collaboration platform in the German subsidiary in June 2016, different communication measures were prepared and used to raise awareness and plan the successive training of different CPM03 business areas and departments. As the takeover dispute between the company group and one of its competitors (see chapter 5.1) was linked to sales pressure and a limited budget for different CPM03's business areas and departments, the introduction of the collaboration platform in CPM03 was regarded as challenging. In order to be considerate of the employees and management personnel, i.e. not exert any pressure on them and increase their workload, the extended project team decided to gradually familiarise CPM03's business areas and departments with the enterprise collaboration platform and argue with the use of the platform for daily work. Among others, different expected enterprise collaboration platform outcomes and benefits were defined and inscribed into advertising and promotion material (e.g. PowerPoint presentation slides).

Primarily, the enterprise collaboration platform was envisioned as a medium for people, departments and areas of the company to present themselves, e.g. by providing an overview of them and their products and workflows. For this, static, homepage like uses were expected and aimed for, where people, departments, and areas create their own public platform communities (workspaces) to raise awareness and increase their reputation within the case company. Further, it was expected that people, departments, and areas could use their communities to provide information and business forms (e.g. work contract forms or collective agreements uploaded and shared by the Human Resources area) in a structured way to reduce their search time, and thus make work easier, *"what do departments, such as the commercial staff, gain when they store travel expenses documents on the collaboration platform? [...] Sure, you have to provide it somehow, but it only has a real benefit if it is done well, well structured, [...] that people say '[...] you've built a really good homepage'"* (Project Manager, Communication and Marketing, 28/06/2016). Previously, information and forms were primarily stored and shared via email, telephone, personal contact, or network drive directories. The latter were used, among others, to provide information

related to specific target markets and linked business areas. However, reaching for information required an understanding of who knows what and the location of information resources. Without this understanding, the search process was often laborious and, in many cases, unsuccessful. Often, information stayed within the respective business areas and departments, further supporting a silo mentality in the case company (see chapter 5.1). With the enterprise collaboration platform, the project team did not only hope to provide information and forms in a structured form but also to capture knowledge and make it available to all employees. In this way, it was expected that the knowledge of older employees (see chapter 5.1) could be preserved and prepared for future young employees and trainees at CPM03. In terms of the interaction between different people from different business areas, it was hoped that the collaboration platform would facilitate communication and collaboration across different business areas within the German subsidiary. As evidence for communication and collaboration across different business areas, a prospective exchange between the sales team and other business units was envisioned. Further, inspired by the parent company's successful use of the platform for communication and collaboration with externals (e.g. partners), CPM03's project team was also planning platform communities to be used for the exchange and cooperation with externals. For instance, the team had the idea to create a community especially for agencies and service providers (e.g. printing companies) with whom the German subsidiary exchanges large amounts of data. Subcommunities were envisioned for the single target markets. In a scenario conceived by the project team, a graphic designer from CPM03 creates a marketing leaflet for one of the target markets and uploads the necessary data in the respective subcommunity's document library to share it with a printing company.

Being the last subsidiary to introduce the enterprise collaboration platform and more than *"two years behind"* the parent company (Project Manager, Communication and Marketing, 28/06/2016) with regards to platform adoption and use, the project team was driven specifically by the self-imposed goal to achieve a platform usage rate similar to that of the parent company. To achieve this and the desired enterprise collaboration platform outcomes and benefits, a range of measures and activities were planned and prepared by the extended project team. Among others, a training concept was developed to train employees on platform functionality and community management. This included adding metadata to social profiles and social documents (Hausmann & Williams, 2015) in the form of tags to support the search for subject-related experts and information. Further, the training concept incorporated binding usage guidelines covering community management and was developed in collaboration with the case company's works council. CPM03 decided against training through guides/champions known for supporting the adoption process (Alqahtani et al., 2014; Greeven & Williams, 2017) but that were proven to be unsuccessful in the parent company.

In June 2016, there was only little German content created and shared via the global Social Intranet and related enterprise collaboration platform. Most content provided via the Social Intranet were in English and regarded as a deterrent for CPM03's employees preferring the German language (see chapter 5.1). Therefore, the case company founded an editorial team with members from the different business areas responsible for authoring first open platform communities for the German subsidiary's business areas and departments and translating existing content from the global Social Intranet. Among others, CPM03 decided to translate the content provided in the enterprise

collaboration platform community entitled "User Community" that was built by the parent company to provide group companies and their employees guidance and support in the usage of the collaboration platform.

More than two years later, in **November 2018**, CPM03 achieved a usage rate of the enterprise collaboration platform similar to that of its parent company. CPM03 defines the usage rate, and adoption rate, respectively, as the percentage of unique authenticated users who logged into the collaboration platform during a specified time (in this case since the introduction). Whether and how employees actually use the collaboration platform is not measured by the case company that has no administration rights for the platform. However, the enterprise collaboration platform's extended project team has collected a variety of experiences with the platform and observed significant changes in expected and realised outcomes and benefits. In 2018, the platform is seen as successfully integrated into the digital workplace and is increasingly taken for granted by the employees, i.e. it has become background (Bowker et al., 2010), *"[The collaboration platform] is now everyday life among many, many departments"* (Project Manager, Communication and Marketing, 22/11/2018). As expected, different departments and business areas have built their own communities to provide department and area related information and forms. Many of them have used their communities primarily as a means for self-presentation. Introducing themselves, including information on what they do, their employees and functional areas, *"several communities have been set up to show others that they are a great department [or business area]"* and have increased their reputation within the company (Project Manager, Communication and Marketing, 22/11/2018). Members of frequently visited department communities often proudly report, *„this is my department homepage"* (Project Manager, Communication and Marketing, 22/11/2018). The enterprise collaboration platform is increasingly described as a "network of firms" focusing not on the networking of individual employees but of departments and business areas from different CPM03 sites and affiliated companies. Such network of firms is seen as one further outcome of the large number of department and area related communities. Related to multi-site communities, a new fundamental enterprise collaboration platform outcome emerged: By 2018, the organisation of meetings and events and project work have successfully been established. For this, joint more dynamic and interactive work is required where people from different business areas are involved and typically rely on the sharing and collective creation of resources, "*I and my colleagues are so used to it that if, after two or three weeks, the meeting minutes are not in there somewhere, someone is saying 'you've forgotten something'; [It] is really used as a work tool as well"* (Head of IT, 22/11/2018). Though, the organisation of meetings and events, as well as project work, are primarily seen as valuable when employees from different sites of CPM03, the Swiss parent company and its different subsidiaries get together via common platform communities. In this way, communication and collaboration across areas primarily take place organisation-wide and less within the German subsidiary as initially hoped for. After project completion, related platform communities typically fall into disuse and activity in the communities ends. At the individual CPM03 sites, communication and collaboration are still largely realised through telephone and face-to-face contact.

With a new version of the global Social Intranet implemented in the spring of 2018 and employee trained on platform functionality, the case company has made good progress in the search for subject-related information. The new Social Intranet version includes a new search engine which indexes the content from the collaboration platform and connects content from the collaboration platform and multiple other data sources to deliver information from decentralised and structured as well as unstructured data. While fast and stable results can be delivered, it requires knowledge in terms of how to search and what to search for. Often, employees visit known communities to reach for particular information. However, due to new communities regularly being created on the platform, used/familiar communities go further down the platform's list (overview) of communities and therefore are sometimes more difficult to find. Interestingly, while departments and areas use their communities to share various department and area related information that can be searched for, individual employees do not typically share their (expert) knowledge. While they have fully acquired the ability to capture knowledge and make it available to all employees, this ability is not used, and, thus, knowledge transfer and management could not be improved within the German case company. This is due to the attitude that "knowledge is power" is (still) predominant at CPM03.

Figure 5-4 shows the applied MoBeC framework (instantiation template) for the case company. It captures CPM03's enterprise collaboration platform project status from June 2016 (top) and November 2018 (bottom).

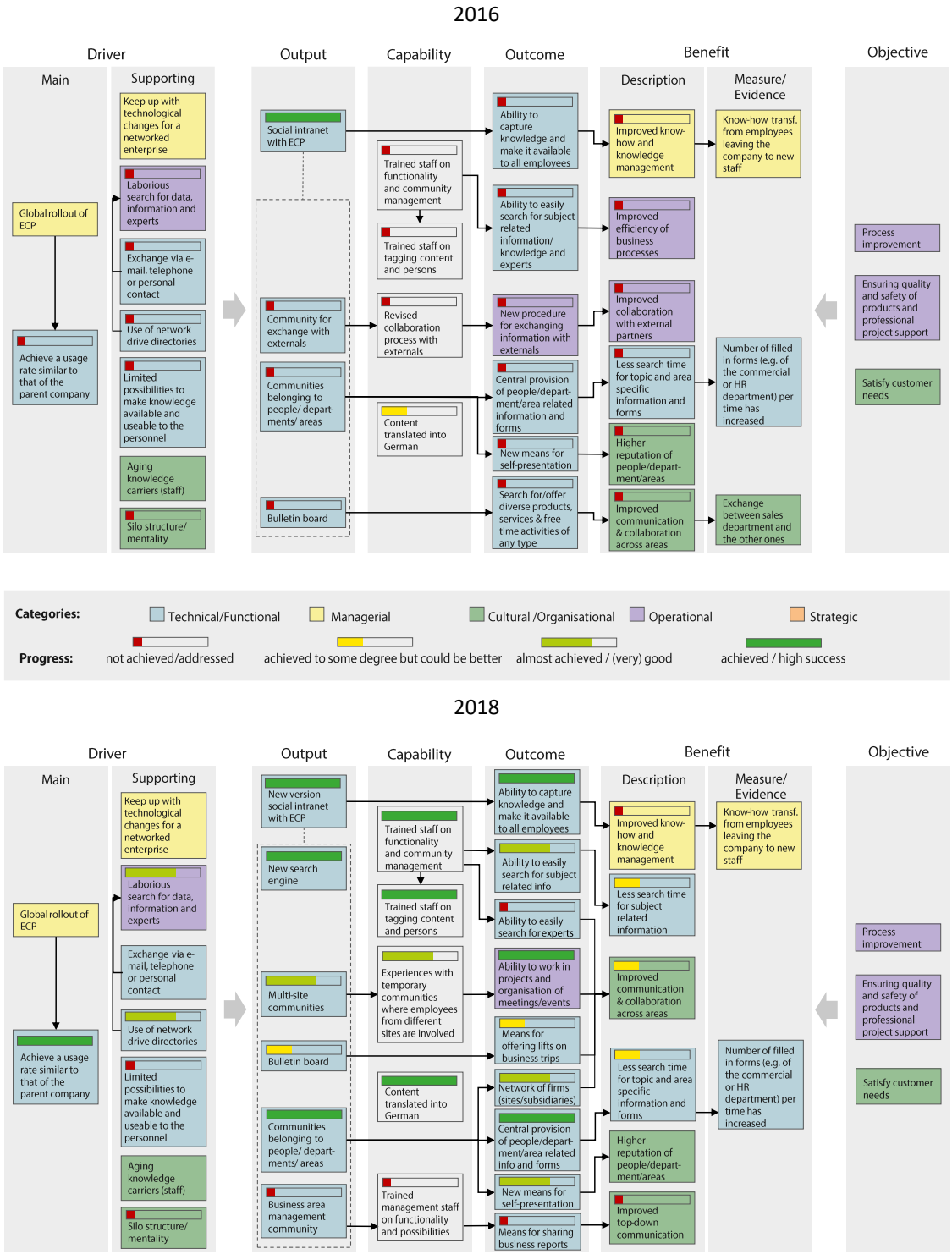


Figure 5-4. Monitoring outcomes & benefits change at CPM03 (Nitschke & Williams, 2020, p. 2615)
Legend: ECP is the abbreviated form of enterprise collaboration platform.

Subsequently, the *changes in enterprise collaboration platform outcomes and benefits*, as shown in figure 5-4 are described in further detail. Because the introduction of the collaboration platform was initiated by the case company's parent company, the drivers (left columns) are separated into main drivers (specifically of the global roll-out) and supporting drivers (as present at CPM03) of the enterprise collaboration platform project.

Between 2016 and 2018 there have been significant changes in CPM03's enterprise collaboration platform outcomes and benefits. As visible in figure 5-4, the following changes can be observed:

1. *Progress in terms of the achievement and addressing* of different drivers, outputs, capabilities, and benefits
2. Emergence of new outputs, capabilities, outcomes, and benefits
3. Disappearance of outputs, outcomes, capabilities, and benefits

Examples to illustrate those changes are elaborated on below.

1. *Progress in terms of the achievement and addressing* of different drivers, outputs, capabilities, and benefits. In 2018, the case company achieved and addressed drivers, outputs, capabilities, and benefits that were expected in 2016. For instance, CPM03 has made good progress in addressing the *driver* of a laborious search for data, information, and experts. Specifically, the search for data and information could be improved. The use of network drive directories has decreased as hoped for, however, some data and information are still stored in such directories. Sometimes, employees stick to established work practices out of habit, thus they prefer the network drive directories over the enterprise collaboration platform or consider certain network drive directories that are not available to all employees a suitable location for confidential information (e.g. personnel-related data). One *output* regarded as fully achieved are communities belonging to people, departments, and areas. As described above, such communities have successfully been built and filled with openly accessible content. Examples of *capabilities* achieved are trained staff on platform functionality and community management or the translation of relevant platform content into German. Despite the perceived success in this regard, a user survey conducted by the case company via the Social Intranet in early 2018 has revealed that a large proportion (60 per cent) of the survey participants (11 per cent of the platform users) do not know about the German-language version of the established User Community developed solely for CPM03 (incl. the usage guidelines and support). One *outcome*, where CPM03 has made good progress, is the ability to easily search for subject related information acquired by most of the platform users via training and related experiences. Of the *benefits* expected in 2016, no benefit could be almost or fully achieved by 2018. Though, a few benefits were delivered to some degree, for example improved communication and collaboration across areas or less search time for topic and area specific information and forms. Department and area related information and forms were successfully provided via communities. However, as described above, it often takes time to find previously visited communities.

2. *Emergence* of new *outputs, capabilities, outcomes, and benefits*. Since 2016, new expected and desired outputs, capabilities, outcomes and benefits emerged. Some of these have not been achieved/addressed until 2018, such as the *output* of a business area management community and related *outcome* of a means for sharing business reports company wide. Sharing such reports is considered a platform use motivation for the employees in general and the middle management in specific.
Others are regarded as highly successful in 2018, for example, the *outcome* of the ability to work in projects and the organisation of meetings and events. When the occasion arises, a project or meeting/event community is created to which relevant people are invited. Often, common work is initiated through a kick-off meeting (e.g. in the form of a telephone conference) and organised through a community folder structure for sharing data. Based on extensive experiences with such enterprise collaboration platform communities, community members require no assistance in the use of the respective community for project work or the organisation of meetings and events.

3. *Disappearance* of *outputs, outcomes, capabilities, and benefits*. Since 2016, some outputs, capabilities, outcomes, and benefits that were expected and desired disappeared. Along with design through use processes, the case company considers them of little to no relevance in 2018. Applying MoBeC, it could be observed that (a) whole paths from output to benefit may disappear, (b) benefits may remain the same but be delivered through different than previously anticipated paths of outputs, capabilities, and outcomes, and (c) outputs may remain the same but result in unanticipated outcomes and benefits, as explained in the following.

(a) The *path from* a *community for the exchange with externals* (*output*) to a revised collaboration process with externals (*capability*) to a new procedure for exchanging information with externals (*outcome*) *to improved collaboration with external partners* (*benefit description*) disappeared (see figure 5-5). Initially, in 2016, it was planned to involve particularly agencies and service providers (e.g. printing companies), i.e. collaborate with them via the enterprise collaboration platform where they can exchange large amounts of data. However, the project team was facing resistance to the use of the collaboration platform for such purpose by different people, including the head of the Communication and Marketing area. One key argument was privacy regulations requiring the building and maintenance of an enterprise collaboration platform community for each partner (e.g. a printing company) the case company is working with. Another main argument was the associated expense to involve the IT department for the granting of authorisations and partners with external email addresses access. Thus, by 2018, CPM03 established the usage of an alternative cloud filesharing software solution for the exchange and related collaboration with externals. For example, when the case company works on a brochure together with one of its agencies, it uploads pictures and texts via the cloud file -sharing software so that the agency can build the brochure based on the provided material.

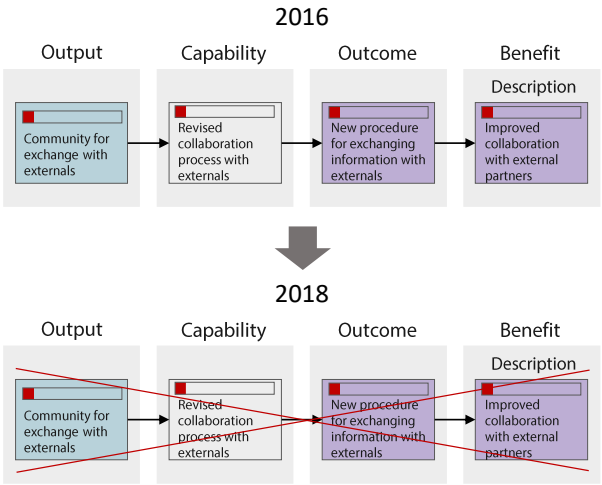


Figure 5-5. Disappearance of a whole path from output to benefit.

(b) One *benefit* that remained the same but is, in 2018, expected to be delivered via a different path of outputs, capabilities and outcomes is *improved communication and collaboration across areas* (see figure 5-6). Initially, in 2016, it was hoped that such improvement in communication and collaboration across areas could be supported by a bulletin board (*output*) allowing to search for and offer various products, services and free time activities (*outcome*). The bulletin board was envisioned as an opportunity to bring people from different areas together in an informal way. A specific capability to achieve the desired outcome was not envisioned. However, by 2018, another key contributing *outcome* to the benefit of improved communication and collaboration emerged, which is the ability to work in projects and the organisation of meetings/events. As described above, project work and the organisation of meetings/events are implemented through platform communities with members from different company sites (*output*) and based on the experiences of enterprise collaboration platform users with such communities (*capability*).

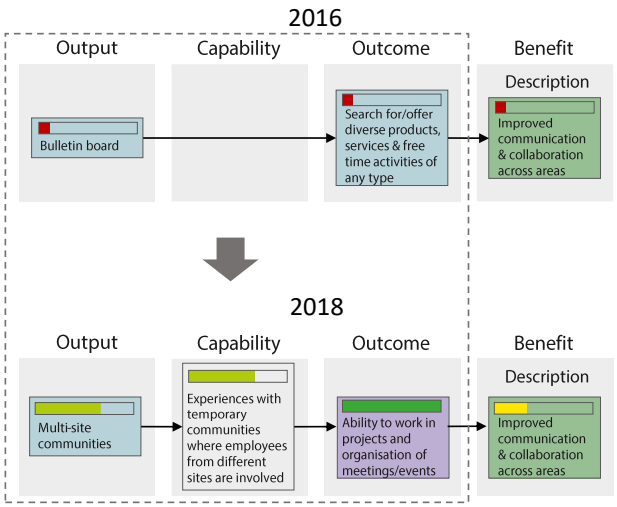


Figure 5-6. The same benefit is achieved through a different than previously anticipated path of outputs, capabilities, and outcomes.

(c) One *output* that stayed the same but lead to a new, unanticipated outcome is the bulletin board (see figure 5-7). In contrast to the expectations from 2016, it is not used to search for and offer diverse products, services and free time activities (*outcome*) to support improved communication and collaboration across areas (*benefit description*). Instead, it was used occasionally to offer lifts on business trips where employees need to travel from one company site to another (*new unanticipated outcome*) in 2018. While such new outcome may foster improved communication and collaboration across areas to some degree, the main contributing outcome to improved communication and collaboration across areas was the emerged ability to work in projects and the organisation of meetings/events (see above, figure 5-6).
For both 2016 and 2018, no specific capability was envisioned that transforms the output of a bulletin board into a desired outcome.

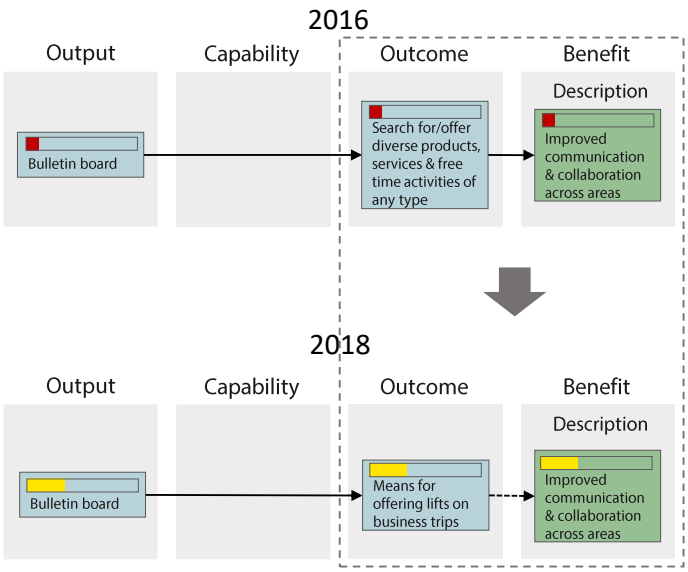


Figure 5-7. The same output leads to an unanticipated outcome.

The framework application findings show that MoBeC can be used to successfully capture, analyse and visualise how outcomes and benefits of enterprise collaboration platforms change over time. Enterprise collaboration platforms offer interpretive flexibility, i.e. they can be used in multiple ways. When such platforms are introduced, organisations have various expectations in terms of what they can gain from the platform. However, once the platform is introduced it is typically being designed through use, as organisations and their employees start exploring its possibilities to make it fit their needs. Over time, expected and realised enterprise collaboration platform outcomes and benefits evolve. As stated above, required capabilities incorporate learning and reflection entangled in the specifics of the organisational context (Andreu & Ciborra, 1996; Dourish, 2004). Therefore, capabilities cannot be easily classified with the outcomes and benefits dimensions of technical/functional, managerial, cultural/organisational, operational, and strategic. Further, the capabilities often cannot be identified and visualised as connecting entities between specific outputs and outcomes due to their complex and relational nature. Some capabilities mentioned by the case company, e.g. content translated into German, create conditions for the design of the enterprise

collaboration platform but may not necessarily determine single outcomes. However, MoBeC can help organisations monitor and understand changes in outcomes and benefits of malleable digital platforms, such as enterprise collaboration platforms, and reflect on the question of what capabilities may be needed for the utilisation of outputs. MoBeC draws attention to the fact that outcomes and benefits of malleable digital platforms are not just there but that transformations of various kinds are necessary. As illustrated in both the previous and subsequent (sub)chapters, this research work focuses on when digital transformation capabilities are built to account for their relational qualities.

5.3 Changes in enterprise collaboration platform uses across and within different working spheres over time

This subchapter deals with enterprise collaboration platform designs and the ways that they are changing over time. In particular, the focus is on evolving platform uses at different locales. Locales are represented from the perspectives of different enterprise collaboration platform users who are engaged in different platform working spheres that are shaping and being shaped.

5.3.1 Research inquiry outline

The aim of this research work part is to *investigate changes in enterprise collaboration platform uses across and within different working spheres over time*.

Specifically, the objectives are to…

i. identify and examine sequences of enterprise collaboration platform use inscriptions across and within different working spheres,
ii. identify and understand reasons for changes in enterprise collaboration platform use inscriptions, and
iii. visualise how and why the enterprise collaboration platform is adopted and used differently.

This research work part is based on qualitative interviews with the selected case organisation. It is organised into three research phases and includes seven different research steps as shown in figure 5-8 and elaborated on below.

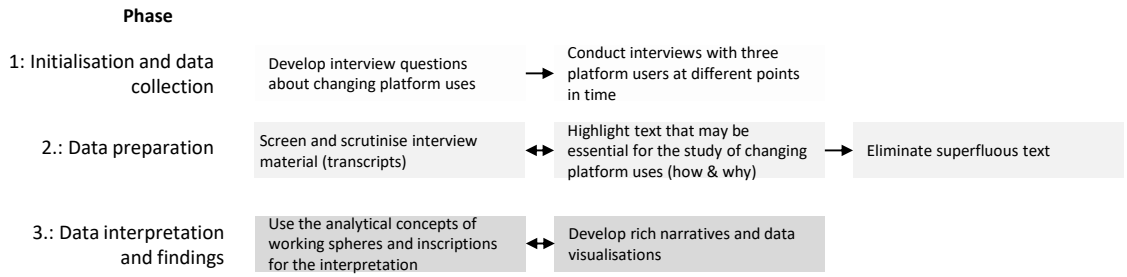


Figure 5-8. Phases and steps of the research inquiry into different enterprise collaboration platform uses within and across different working spheres over time.

Phase 1: Initialisation and data collection

As stated above, this research work part is based on qualitative interviews (see chapter 3.5.1). In the first step of this phase, interview questions are developed for the interviews planned to be conducted separately with different platform users of the case organisation (CPM03). The interview questions are open-ended. Most of them generally ask for individual enterprise collaboration

platform uses and related changes over time. Some of the interview questions are specifically targeted at identifying different platform use inscriptions at different times:

Status quo:

1. How would you define the enterprise collaboration platform at CPM03 in a few words? What is the platform for you?
2. Can you give one to three examples that support this definition of the enterprise collaboration platform?

Retrospective view:

1. What words would you use to define the enterprise collaboration platform at CPM03 as initially perceived by you?
2. Can you give one to three examples that support this definition of the enterprise collaboration platform?

Foresight:

1. Can you observe that the enterprise collaboration platform is transforming at CPM03? If so, in what way?
2. What words would you use to define the enterprise collaboration platform at CPM03 as expected by you for the future?
3. Can you give one to three examples that support this definition of the enterprise collaboration platform?

In the next step of this phase, the planned interviews (I1, I2, I3) are conducted at three different times (June 2016, September 2017, November 2018). The questions developed as part of this research work part are addressed to three enterprise collaboration platform users (Project Manager, Head of IT, Head of Analytics Research and Development) willing to share their experiences and perspectives. In order to preserve the data and use it for the subsequent data analysis, the interviews are digitally recorded and transcribed.

Phase 2: Data preparation

In the first step of this phase, the interview transcripts from 2016, 2017, and 2018 are screened and scrutinised. The thorough reading of the transcripts plays a crucial role in identifying text relevant for the analysis of different enterprise collaboration platform uses at different locales.

The first step is conducted together with the second step of this phase, where text that may be essential for the study of changing platform uses (how and why) is highlighted. Often, the interviewees provide insights into the different platform uses in their answers to interview questions dealing with other, but related, research phenomena (e.g. past and current interactions with the enterprise collaboration platform, actors and challenges in the enterprise collaboration platform change, enterprise collaboration platform outcomes and benefits). Highlighted text is copied into

clean documents. In the third step of this phase, superfluous words and sentences (repetitions, digressions) are eliminated.

Phase 3: Data interpretation and findings

First, the prepared data is interpreted. The interpretation is guided by the theoretical concepts of *inscriptions* (see chapter 3.4.1.3) and *working spheres* (see chapter 3.4.1.4). The concept of inscriptions comes from Actor-Network Theory and can be employed as a tool to study the shaping and transformation of information infrastructures (e.g. Hanseth & Monteiro, 1997; Henningsson & Henriksen, 2011). In this research work part, it is used to understand different patterns of use that the enterprise collaboration platform can embody (Monteiro, 2000, p. 76) and how they may change over time. The concept of working spheres allows for attention to be paid to different locales in which enterprise collaboration platform uses can be emerging and enacted. In this way, multiple possible coexisting uses can be identified and examined. In this research work, the concept of working spheres as proposed by Mark and Poltrock (2004) is used. They argue that "individuals are faced with making adoption decisions in multiple contexts, according to their different working spheres." (p. 319). Working spheres, as understood by them, refer to social worlds within an organisation that deal with organisational work (p. 299). The first step of this phase is conducted in concert with the second step of this phase. In the second step of this phase, rich and reflective narratives and related data visualisations are developed (see chapter 3.5.7). The development process integrates insights from company-internal documents, such as platform promotion material or social business documents in the collaboration platform (see chapter 3.5.2). The narratives constitute descriptions and interpretations of the phenomenon of interest from the perspectives of the interviewees and the researcher (Flyvbjerg, 2006, p. 240) and encompass the complexities inherent in the shaping of the enterprise collaboration platform. From the narratives, visualisations are created that help readers cope with the narrated complexities (Figueiras, 2014). In the visualisations, temporality is incorporated to show adoption and use transitions over time. Design choices are based on the design space dimensions for timelines and corresponding instantiations as introduced by Brehmer, Lee, Bach, Riche, and Munzner (2017). In this research work part, linear representations, chronological scales, and a unified and faceted layout, respectively, are used for the timelines.

5.3.2 Research inquiry findings

In the following, the findings of the research inquiry into different enterprise collaboration platform uses are provided. The findings are presented and structured along the different perspectives and experiences of the three interviewed platform users.

5.3.2.1 Three individuals as a point of departure for the analysis of different working spheres

The professional backgrounds of the three interviewed enterprise collaboration platform users and their roles in the enterprise collaboration platform project at CPM03 are summarised below.

Project Manager, Communication and Marketing

As a long-term employee of CPM03, he has gained extensive marketing and product management expertise. Among others, he worked as market area manager and had been leading several technology introduction projects, *"I did a lot of projects, [...] it was of course the interest in doing something new, and actually it has always been the case that I took the initiative when there was something new [...] I have always been interested in new projects."* (Project Manager, Communication and Marketing, 28/06/2016). He promoted and developed CPM03's first homepage in the mid-1990s and was one of the first to deal with the topic of document management (e.g. creation of PDF files, document archiving) in the company. In early 2015, he was hired at the communication & marketing business area, where he was tasked with the introduction of the enterprise collaboration platform at CPM03 by the head of the communication & marketing area. Generally, the communication and marketing business area is responsible for internal communication (i.e. communication of various information and news within the company) and external communication (incl. public relations, product communication for the different target markets, customer relationship management). The Communication and Marketing business area corresponds a lot with the parent company to receive and provide various information and material (e.g. regarding corporate design, Internet presence of the group and its subsidiaries, available communication tools at different target market business areas). As part of the enterprise collaboration platform project, he works closely with CPM03's IT department and Human Resources area, both supporting him with the introduction of the platform at CPM03. CPM03, like all other subsidiaries, can freely decide on how they design the collaboration platform and the related project and change management measures (see chapter 5.1). However, the enterprise collaboration platform project manager often orients himself to the parent company, who is willing to share their platform use experiences and support him with training measures.

Head of IT

He has a degree as a business economist and has acquired further certificates in the field of Information Technology (IT). As the project manager, he is a long-standing employee of CPM03 and its parent company, where he had been involved in and leading several IT projects. Among others, he developed a reporting system in the production and logistics division, led the conversion of the SAP system landscape, and was responsible for system integrations as part of company acquisitions. In 2014, he became the head of CPM03's IT department. In this position, he had been responsible for IT contingency processes and disaster recovery tests, the IT system landscape, coordinated activities between the group's IT and CPM03's local IT. CPM03's IT department has 17 employees and is divided into two teams with different IT experts. CPM03's IT department does not provide technical support for the introduction of the enterprise collaboration platform. As a company-wide system solution, the cloud-based collaboration platform is managed by the corporate IT (IT company of the group) and the hosting service provider IBM and HCL, respectively. However, the German IT department is part of the enterprise collaboration platform's extended project team at CPM03. In this context, the head of IT supports the project manager in familiarising CPM03 employees with the collaboration platform, communicating platform usage rules, and planning and implementing user training.

Head of Analytics Research and Development

She holds a PhD in physical chemistry. In 2009, after completing her studies and doctorate, she started working for CPM03 as the laboratory manager of the "Analytics Research and Development" department in Stuttgart, Germany. In 2012, she was promoted to the head of the Analytics Research and Development (R&D) department, comprising a small team of eight persons (including her). The Analytics R&D department is organisationally associated with the research and development (R&D) business area and is responsible for chemical analyses, especially in the field of (protective) coatings. They mainly support the R&D business area in development projects and production, for example in terms of quality assurance through raw material analyses. Moreover, they support sales in the event of complaints (e.g. if products do not meet expectations). Within the company group, the Analytics R&D department in Stuttgart belongs to a group of analytics laboratories from different locations of the parent company and its subsidiaries. They are united under the label of "Corporate Analytics Service (CAS)" laboratories. As an early proponent of the enterprise collaboration platform, the CAS group leader recognised the advantages of the platform in terms of communication and collaboration between the laboratories. Long before the official global roll-out of the enterprise collaboration platform, he ensured that the head of Analytics R&D in Stuttgart was involved in the pilot phase of the collaboration platform. In this way, the head of Analytics R&D was not only among the first users of the platform within CPM03's R&D business area but also within the whole group.

5.3.2.2 Sequences of inscribed enterprise collaboration platform uses

In the following, the identified and analysed inscribed enterprise collaboration platform uses are presented for the individual platform users in research narratives and, subsequently, visualised. The corresponding visualisation enables the comparison of the portfolios and sequences of inscriptions between the different platform users.

Project Manager, Communication and Marketing

In 2014, CPM03's Communication and Marketing area was set up to establish a central point of communication. For this, specialists from CPM03's different target markets were engaged, bringing in different perspectives and addressing the existing silo mentality. Since the introduction of the enterprise collaboration platform was a company-wide project, CPM03's chief executive officer tasked the Communication and Marketing area with the official introduction of the platform at the German subsidiary in 2014. However, due to personnel shortage in this area, CPM03 could not start to officially introduce and promote the platform before 2016. A long-term employee of CPM03 with extensive marketing and product management expertise became *CPM03's project manager* of the enterprise collaboration platform introduction. A dedicated project team with people from the Communication and Marketing area was established. For an interdisciplinary perspective, CPM03's IT department and human resources area were included with a consultative and supportive role assigned to them (building an "extended project team", see CPM03's head of IT). Since CPM03 was the last subsidiary to introduce the enterprise collaboration platform and more than *"two years behind"* the parent company (Project Manager, Communication and Marketing, 28/06/2016) with regards to platform adoption and use, CPM03's project manager acted quickly to plan and develop change management measures. With the prior aim to achieve a platform usage rate similar to that of the parent company, CPM03's project manager wanted to pre-fill the platform with content to build a good foundation for the platform adoption. Early on, he founded an editorial team with people from different business areas and departments (e.g. Communication and Marketing, human resources, IT, logistics, commercial administration) who already had a large amount of content published on area and department related webpages in the old Intranet, *"That was actually a tactical measure on my part. I have included [people] from all of the business areas who had already intensively filled the intranet with content [...] because I knew if we transferred the content from the old to the new [social] intranet [with the enterprise collaboration platform] we would need the help and support of these business areas."* (Project Manager, Communication and Marketing, 28/06/2016). Specifically, the task of the editorial team was to transfer the already existing contents to separate enterprise collaboration platform communities for the different areas and departments (e.g. providing an overview about them, their products and processes). With the envisioned purpose of **representation** to be inscribed, CPM03's project manager expected that the individual business areas and departments present themselves well to the other business areas and departments. He described such representative communities as **homepages** used for a user-friendly visualisation of their data and information (static platform use), *"So how can I, my business area, [..], how can I present it in such a way that other people benefit from it? For me, that was*

actually the most important thing at the very beginning" (Project Manager, Communication and Marketing, 11/09/2018). In May 2016, the members of the editorial team were trained on how to create and structure content within their platform communities. Together they developed a skeleton for the new Social Intranet and related enterprise collaboration platform in that they decided on the community hierarchy for their representative enterprise collaboration platform communities and their presentation within the Social Intranet. CPM03's project manager created a community called "Intranet Community" on the enterprise collaboration platform for future platform users in order to raise awareness about the content transfer from the old to the new Social Intranet. The Intranet Community is displayed on the Intranet landing page and serves as a jumping-off point from which platform users can access the representative communities authored by the different business areas and departments of the editorial team. Such area and department related communities were implemented as sub-communities of the Intranet Community. As an owner of the Intranet Community, CPM03's project manager has access to all linked working spheres. He was involved in the building up of the community for the Communication and Marketing area. In this community, sub-communities were set up for CPM03's different target markets that should be responsible for the respective contents. CPM03's project manager acts as a bridge between the social world of the Communication and Marketing area and the social world of the editorial team. Their working spheres intersect.

In order to become more familiar with the platform and to prepare optimally for the introduction of the enterprise collaboration platform at the German subsidiary, CPM03's project manager used the collaboration platform in 2016 primarily to explore its functional possibilities and to search for various information relevant to the implementation project, "*I like to use it to search for information, especially to search for subject-related information related to the launch of the Social Intranet and the enterprise collaboration platform. There are separate [platform] communities that only deal with the launch of the Social Intranet or with the launch of the enterprise collaboration platform. I use the User Community very heavily to simply delve into the topic and recommend it to my network. I comment on posts [...] I use the @mentions*[16] *function to simply draw the attention of different people to it [...] Currently, the exploration of the possibilities is relatively strong for me."* (Project Manager, Communication and Marketing, 28/06/2016). The information search process embraced the scanning of international communities set up by other subsidiaries or the parent company. Thus, CPM03's project manager was active in enterprise-wide working spheres. By recommending and referring to content published in these

[16] The pre-implemented *@mentions* function is an awareness mechanism. It sends a notification to the platform users named after the @-symbol, i.e. to platform users mentioned. In this way, people are quickly informed about new content in the platform (often the function is used in status updates, blog posts, or in comments) (Nitschke & Williams, 2018).

working spheres to people from his extended project team (e.g. through the @mentions function), he prompted them to join such spheres. Thereby, he altered the established working spheres. In the "User Community" created by the parent company, CPM03's project manager found relevant information that guides and supports the group companies and their employees in the usage of the enterprise collaboration platform. He decided to create a "German User Community" for which the contents from the parent company's User Community should be translated by editorial team members by the end of 2016. In this way, the purpose of a **platform manual** in terms of introduction and usage was inscribed into the enterprise collaboration platform itself. Specifically, CPM03's project manager was **searching for and using information to be guided and collecting and providing information to guide**. In his search for information relevant to the implementation project, he discovered different platform adoption and diffusion measures (for example, communication of and rewarding best practices (e.g. best community management, best newcomer / key user, best wiki), tagging of platform posts, filling social profiles with content) that he decided to adopt and transport within the social worlds of the German subsidiary.

In late 2016 and 2017, the extended project team plus colleagues from the parent company provided official training sessions to CPM03's employees. As part of such sessions, successful platform communities were shown for illustrative purposes. These communities were mostly authored by the parent company or other group subsidiaries. At the time of the training sessions, there were only a few open accessible platform communities created by the German subsidiary itself. For example, CPM03's project manager could not access the platform communities created by CPM03's research and development business area and associated departments. However, he and his colleagues from the extended project team could show and explain the purpose of the open accessible area and department related communities created by the editorial team. Such communities seem to have inspired other social worlds within CPM03, i.e. further areas, departments and teams voluntarily created their own representative communities (see also the description for CPM03's Head of IT and Head of Analytics R&D).

In the meanwhile, the scope of some of the department and area related communities built up by the editorial team extended, i.e. their working spheres incorporated new platform uses and did not only serve the purpose of representation. In 2017, some of the related community owners started to use the enterprise collaboration platform as a **news portal**. For this, they increasingly wrote blog posts within their communities for spreading news (information about current events) to members of different intersecting social worlds and workings spheres, respectively. Such news posts can be displayed via a country-specific activity stream on the Social Intranet's landing page. As observed by CPM03's project manager, the human resources area most frequently made use of blog posts at this time, *"And this is mainly used by the human resources area. Sometimes they come to me [, the Project Manager,] and say 'Please, write something about the flu vaccinations', so the content is predefined. In principle, they are handed over to me and I just put them in as news in [the collaboration platform] [...] Or, for example, funeral notices or powers of attorney, so a lot comes from the Human Resources side."* (Project Manager, Communication and Marketing, 11/09/2017). Some blog posts are not written and published by the Human Resources area itself. In

some cases, they task CPM03's project manager with it. In this way, CPM03's project manager does not only author blog posts in the platform community of his own business area (Communication and Marketing), but also in platform communities of other business areas of the editorial team. For more general news (e.g. anniversary of a CPM03 site), he writes blog posts in the Intranet Community (parent community of area and department related communities).
A further purpose of use that emerged and was inscribed into the community of the Communication and Marketing area and its working sphere in 2017 is that of a **file sharing space**. The Communication and Marketing area adapted their working sphere in that they began to provide different short-term use files with up-to-date information and material (e.g. the press review for field workers) on a regular basis. While CPM03's project manager had already expected that business areas and departments could use their communities also for sharing different long-term use business files (e.g. work contract forms or collective agreements uploaded and shared by the human resources area), the sharing of **short-term use files** had not been specifically expected by him and was new.

In 2017, CPM03's project manager still used the enterprise collaboration platform as a platform manual. However, he focused on collecting and providing information to influence CPM03 employees in how they appropriate and use the platform. Specifically, he was actively searching for positive platform use examples (best practices) to communicate via the "German User Community", *"Every month, I present a community of the month. Or a [community] wiki of the month, [...] not only from Germany but also from Switzerland, there are some great pages [...] So every month I have different pages that I personally choose and say 'these are examples, benchmarks'"* (Project Manager, Communication and Marketing, 11/09/2017). However, by 2018, this changed. A user survey conducted by CPM03's project manager via the Social Intranet in early 2018 revealed that the majority (60 per cent) of the survey participants (11 per cent of CPM03's platform users) did not know about the German-language version of the established User Community developed for CPM03. While this was surprising for CPM03's project manager, he found that no further platform use incentives were needed. Thus, he did not communicate further platform use examples via the "German User Community", *"[The collaboration platform] is now everyday life among many, many departments [...they] use [it] on a relatively good level with regard to usage possibilities. If someone new comes along, new colleagues, they ask their other colleagues how it works, and they simply give them information about [it]."* (Project Manager, Communication and Marketing, 22/11/2018). As observed by CPM03's project manager, the enterprise collaboration platform was increasingly adopted as a **project work tool** (also including the organisation of meetings and events). Such purpose of platform use established as dominant inscription, focusing on joint more dynamic and interactive work. He did not have to do anything specific to push this change in use, *"I think that this results from the project group itself, that someone says, 'Well, we have a specific topic here, let's set up a project group'."* (Project Manager, Communication and Marketing, 22/11/2018). By 2018, platform users had learned about the enterprise collaboration platform for project work through one or more social worlds they were a member of and subsequently introduced it into another of their worlds. Corresponding platform

communities are created as needed. For this, people from different sites of CPM03, the Swiss parent company and its different subsidiaries are added and invited to such communities, becoming members of the respective working spheres. In the working spheres, in which CPM03's project manager became a member, material relevant for the project work (e.g. presentation slides, meeting minutes, international container labels, templates) is shared via the files component and organised through a community folder structure. The community forum is applied for finding solutions and voting. For CPM03's project manager, such working spheres constitute positive examples of cross-border collaboration and in a few cases also of collaboration across areas. After project completion related platform communities usually fall into disuse, i.e. activity in the working spheres terminates. However, CPM03's project manager observed that project communities that have long been inactive sometimes revive again. This may be the case when certain material provided in the project communities become relevant again. With possibly new platform members requiring access to the existing material and new activities performed within the communities, new working spheres may emerge within such communities. In other cases, inactive project communities are accessed in order to draw inspiration and learn from other projects. Learnings are then transferred to other social worlds and working spheres, respectively.

CPM03's project manager expects that the inscription of a project work tool will gain further strength in future, *"I can't imagine that there's going to be a big change, rather not. It is becoming more and more commonplace, because now many people know how it works [...] The [yes/no] question will come more and more often. What does it bring me? [...] And I think those who aren't really on projects will actually not use [the enterprise collaboration platform]"* (Project Manager, Communication and Marketing, 22/11/2018).

Head of IT

While other group subsidiaries entrusted their local IT departments and teams with the enterprise collaboration platform introduction, CPM03 decided to task its Communication and Marketing area with the official introduction of the platform in the German subsidiary. For this, the Communication and Marketing area created a dedicated project team. To ensure an interdisciplinary perspective, the project team chose to call in professionals from CPM03's human resources area and CPM03's IT department (building an "extended project team"). In this way, *CPM03's head of IT* first encountered with the enterprise collaboration platform in 2016 through his involvement in the planning and preparation of the official platform introduction at CPM03. While the cloud-based collaboration platform is managed by the corporate IT, the German IT department had to accompany the platform introduction at CPM03 in a consultative and supportive manner (e.g. in terms of the spreading of platform usage rules or the planning and implementing of user training). In April 2016, the extended project team conducted an internal concept workshop to plan the introduction steps. Shortly after this, the German IT department was added to an editorial team that was built by the project team to push platform adoption and diffusion. Since the enterprise collaboration platform should become part of the new global Social Intranet, it was decided to call upon people from different CPM03 business areas and departments that had already web pages and related content in the old local Intranet. Their first assigned key task was to transfer the content

stored on the web pages to separate enterprise collaboration platform communities for the different areas and departments where the purpose of **representation** was inscribed as envisioned by CPM03's Platform Manager. To accomplish this task, the editorial team was trained on how to create and structure content within platform communities in May 2016 when the official introduction of the platform and the new Social Intranet at CPM03 had not started yet. The Communication and Marketing area, as well as the human resources area, were among the first areas and departments filling their communities with content. CPM03's IT department also started to set up its community in summer 2016. In the beginning, CPM03's head of IT did not show much enthusiasm about the enterprise collaboration platform, *"Otherwise, we actually have nothing to do with the Connections system"* (Head of IT, CPM03, 28/06/2016). Also, he voiced criticism of the cloud-based platform solution. However, he was aware that his opinion did not count for the group-wide platform introduction. Nonetheless, the creation of the department and area related communities served as an inspiration for other social worlds. When the Social Intranet with the enterprise collaboration platform was officially introduced at CPM03 at the end of 2016, further communities with the purpose of area/department/team representation were successively set up on a voluntary basis. In other words, through the editorial team's practice of creating representative communities beforehand, CPM03's extended project team inscribed its vision of platform usage into the enterprise collaboration platform. This vision was also expressed via the expected platform benefits CPM03's extended project team communicated to its potential users (see chapter 5.2.2.2). While CPM03 users of the platform were guided by the inscribed programme of action, the way representative platform communities were actually designed, typically differed and also evolved in different working spheres over time (e.g. the representative community by the human resources area was later used to write blog posts with personnel-relevant information directly linked to and shown on the starting page of the Social Intranet; analytics laboratories established their own network of representative CAS laboratory communities providing a comprehensive encyclopaedia with more and more content being added and referenced across its single communities).

After the official roll-out, CPM03's IT department initially did not use the platform as actively as other areas and departments of the editorial team, and largely did not further familiarise themselves with platform usage possibilities.
However, since 2017, platform usage by CPM03's IT department was increasingly pushed by the corporate IT (IT company of the group), *"In our IT department, we are in inverted commas 'forced' by the IT in Switzerland, the corporate IT [...] whereas information exchange had always been bilateral before, we now actually get the advice 'Have a look into Connections, there you'll find everything'"* (Head of IT, CPM03, 22/11/2018). Thus, CPM03's IT department started to use the platform as an **information retrieval tool** in that they used the platform to obtain various IT information shared within the company group. While CPM03's head of IT believes that using the platform does not replace social contact, he discovered various further usage possibilities over time, *"it surely is practical, we [, CPM03's IT department,] are using it more and more"* (Head of IT, CPM03, 22/11/2018). First, CPM03's IT department focused on internal platform usage, i.e. created different closed communities for the German IT department and its different local

sites (e.g. in Stuttgart). In this way, different working spheres emerged with different members of the 17 employees of CPM03's IT department.

In part, the internal communities and related working spheres have common or similar inscriptions, as described below.

One of the first communities they created and started to fill with content is a community for the general IT systems documentation relevant for the whole of CPM03's IT department. The building of the community was stimulated by representative platform communities that were filled with already existing content. By the end of 2018, CPM03's IT department transferred three-quarters of the documentation previously stored in HCL Notes (formerly IBM and Lotus Notes), a document-oriented, distributed database system with functions such as email, or calendars, into the set up collaboration platform community. In this way, the platform became the new **documentation database**.

Other communities that largely were created in parallel, and by 2018, are also intensively used are, among others, the following.

Two communities are used as **schedules**. Among others, the German IT department created a community for their weekly IT applications and resource planning/scheduling (short-term scheduling). A community with a similar purpose of use is one created for providing an overview of all IT service dates scheduled for one calendar year (long-term scheduling). Also, a range of communities on different IT specialist topics were built up. Members are respective specialists of CPM03's IT department. The working spheres are primarily used for the documentation of different system relevant issues (i.e. again as a **documentation database** but with information for different IT specialists, such as about operating systems, technical equipment, operation and usage of smartphones), as well as an **exchange and discussion space** for different IT subject-specific topics.

Further, CPM03's IT department created a community for IT auditors. Members of this working sphere audit each other's work, i.e. they use the platform as a **feedback instrument** to provide each other with mutual feedback on the quality of their work.

CPM03's head of IT summarises the internal uses accordingly, *"In summary, we use Connections in a wide variety of ways at different depths."* (Head of IT, CPM03, 22/11/2018).

Next to the internal platform usage within the German IT department a further purpose of collaboration platform use emerged for CPM03's IT department, and CPM03's head of IT in specific. Over time, the number of multi-site communities in which the CPM03's head of IT is a member has increased. In such multi-site communities working spheres have shaped and been shaped, bringing together transnational IT committees. Such communities are typically used as a **space for the planning and organisation of regular meetings** (incl. follow-ups). For example, there are seven IT departments in three countries of the group (Germany, Switzerland, Austria) meeting twice or three times a year at different locations. In their working sphere, they prepare meeting agendas or store presentation files and meeting minutes, among others. Particularly, the heads of the seven IT departments have developed an awareness of the actions of others within their working sphere, *"I and my colleagues at my level are so used to it that if, after two or three weeks, the meeting minutes are not in there somewhere, someone is saying 'you've forgotten something' [...] [It] is really used as a work tool as well"* (Head of IT, IT department, CPM03, 22/11/2018). Similarly, a community was built for the approx. 50 IT managers of the company

group's EMEA (Europe, the Middle East, and Africa) region for the planning and organisation of their annual IT manager meeting. In this community, the use of folders and a related folder structure (e.g. folder for meeting day one, folder for meeting day two, folder for meeting day three) has proven to be particularly useful to structure the variety of materials (e.g. presentation slides) that are created and shared by the working sphere members.

Head of Analytics Research and Development

CPM03's *head of Analytics R&D* learned about the enterprise collaboration platform from the Corporate Analytics Service (CAS) group leader and remote colleague from Switzerland with whom she shares a social world at the company group level. With her German Analytics R&D department and associated laboratory she is a member of the CAS laboratories. The CAS laboratories are placed at different sites of the parent company and its subsidiaries. As the laboratories share common products, processes, tasks, orders, and challenges in terms of chemical analysis, they have the need to exchange information. Traditionally, this happens largely via face-to-face contact (e.g. at common conferences), email or telephone. With his employment at the Swiss parent company, the CAS group leader came already into contact with the enterprise collaboration platform when it was piloted. Seeing the collaboration platform as a means for communication and collaboration across locations and laboratories, respectively, the CAS group leader pushed the early adoption of the platform by the CAS laboratories in 2013. Hence, CPM03's head of Analytics R&D at Stuttgart was among the first users of the platform, *"it was initiated by the CAS group leader. He himself had already been involved in Zurich at the very beginning, and he brought us in very early, he said 'Come on, let's get involved'. He immediately saw the benefits because we always have to do with each other across locations."* (head of Analytics R&D, CPM03, 22/11/2018), *"[...] he [, the CAS group leader,] made sure that we were able to participate" [...] From the outset, he wanted to give it a push"* (Head of Analytics R&D, CPM03, 11/09/2017).

In the beginning, the head of Analytics R&D was invited to first platform communities with members from a few different laboratories from different sites. They used the communities as a **test facility for information exchange** (i.e. they experimented with the communities to exchange work-related information across different laboratories). Her employees from the Analytics R&D department, i.e. her local team, were largely not involved from the early start. Platform usage developed rather slowly because of limited networking possibilities. Only a few analytics colleagues were registered on the platform, *"you could only exchange ideas with the same people"* (Head of Analytics R&D, CPM03, 11/09/2017). In this way, the slowly emerging working spheres incorporated only a small set of individuals of the group's different analytics laboratories. The number of registered platform users increased through viral distribution and along with the start of the official global roll-out of the collaboration platform in 2014. Over time, the head of Analytics R&D became a member of a growing number of social worlds, i.e. she engaged in different working spheres represented by different platform communities.

Early on, she was a member of communities used as a **space for the planning and organisation of meetings**. This includes group-wide analytics meetings and conferences (e.g. corporate analytics conference requiring the communication of call for papers, decisions on the related conference programme and organisational matters (e.g. location of the conference, hotel reservation)). She also set up her first own platform communities collecting first experiences as a community owner. As such, she learned more about platform functionality and related content creation. Within the group of CAS laboratories, closed communities were used for **know-how storage and distribution**, i.e. working spheres established where different analytics experts and teams stored and shared their know-how. However, in times when the CAS group leader was promoting enterprise collaboration platform usage, platform guidelines were published by the company group clearly prohibiting the exchange of sensitive and confidential data via the platform, affecting especially the wider social group of the company group's R&D business area, *"It's just a bit of a shame because [...] I suggested a community for trouble shooting with different interdisciplinary [R&D] teams [...] but that was scrapped due to this regulation"* (Head of Analytics R&D, CPM03, 11/09/2017). According to the guidelines released at the end of 2014, confidential data, including chemical formulation, production steps and related raw materials, or analysis reports, must not be stored in the enterprise collaboration platform. Thus, CPM03's Analytics R&D department started to use a separate system set up for the analytics laboratories and where access is restricted to authorised personnel only. Primarily, this system, linked to from the Social Intranet, is used for internal chemical analysis orders (issued, for example, by other R&D business units or the sales department of CPM03), comprising, among others, the allocation and coordination of related work tasks. Along with the publication of the guidelines, the **interest** in using the enterprise collaboration platform for day-to-day work and **know-how exchange across locations decreased dramatically** within the R&D business area. Since their release, there has often been uncertainty as to what information is sensitive and should thus not be communicated via the enterprise collaboration platform, *"And then rather not. You don't want borderline cases; you don't want to get in trouble [...] In the beginning, there was more enthusiasm regarding internal exchange between different R&D locations, and then 'Oh, we are not allowed to do this, then we forget about it'"* (Head of Analytics R&D, CPM03, 22/11/2018).

Despite this setback, chemical development colleagues from CPM03 organisationally also associated with the R&D business area heard about the enterprise collaboration platform and were interested in using it. Like the chemical analytics teams, they have the need to communicate and cooperate with other R&D areas and teams from CPM03's parent company and other group subsidiaries. They expected to use the collaboration platform to more easily identify and find appropriate R&D contact persons and experts within the group and across different sites. On request, they were trained in the use of the platform by CPM03's parent company in 2015. In this way, the wider social group of the company' group's R&D business area engaged in the collaboration platform transformation was extended by individuals of chemical development teams of CPM03. Also, the head of CPM03's Analytics R&D department did not stop using the enterprise collaboration platform. Like the chemical development teams, she saw the possibility to get in contact and connect with different distributed employees and colleagues. She started using the

platform as a '**group company Facebook**', *"I call it [CPM03] Facebook, because I find it very useful that I can find colleagues on the platform, of whom I may no longer know whether I have met them [...] and thought 'who was that again?', and then I find it incredibly useful that the profiles are available with pictures of the person."* (Head of Analytics R&D, CPM03, 2017).

At the end of 2016, when the new global Social Intranet with the enterprise collaboration platform was officially rolled out to replace the subsidiaries' old local static Intranets, the uses of the platform further evolved, and a new purpose was inscribed into the collaboration platform, namely that of **representation**. Previously, the local Intranets had the function of internal websites with information about the different R&D teams. With the changeover to the new Social Intranet, the individual CAS laboratories built their own communities. Accordingly, the head of CPM03's Analytics R&D department in Stuttgart transferred content from their old laboratory Intranet page to their own laboratory platform community. A parent community for the whole group of CAS laboratories was created linking to its individual laboratories and related sub-communities. The sub-communities are similarly structured, presenting their key work areas, equipment/products, and employees. In this way, the collaboration platform provides an overview of the different analytics laboratories of the whole group and how they relate. With the laboratory communities, working spaces have emerged in which the head of CPM03's Analytics R&D department is a member. The communities are also open to internal customers, e.g. from different units of the R&D business area, sales or production, so that they can view the information provided about the laboratories and find and get in touch with appropriate contact persons for chemical orders, *"if there is a worldwide problem in terms of coatings and where analytics is required, then the idea here is that they can find [related] information, the right laboratory, the right contact person, and maybe find out in advance what could analytically be done to solve the problem."* (Head of Analytics R&D, CPM03, 11/09/2017). In this way, the purpose of **representation** was **complemented by** the purpose of an **encyclopaedia** through which members of different working spheres can browse to find laboratory related information and people. Over time, the head of Analytics R&D took on more responsibility in terms of content creation. Specifically, she gradually added information about (new) core technologies in the field of (protective) coatings to different representative communities, and in this way extended the encyclopaedia, *"and then I started to add more and more to the representative pages of what used to be in the old intranet or maybe just hidden in some PowerPoint slides"* (Head of Analytics R&D, CPM03, 11/09/2017). For this, she actively oriented herself towards how others present and structure information, i.e. she adopted solutions (e.g. the usage of tables for certain types of content) from different working spheres and passed it to other working spheres.

Driven by the successful representative analytics laboratory communities, further closed communities with the head of CPM03's Analytics R&D department as a member emerged that were set up only for CPM03's site in Stuttgart. Among others, this includes a community exclusively for R&D department heads created with the purposes of collaborative editing of documents and information collection and a community for internal subject matters within

CPM03's Analytics R&D department. However, because of system breakdowns, especially between 2016 and 2017, both communities were not extensively used. With the introduction of a new global Social Intranet version in 2018, system performance improved, and the number of system breakdowns decreased significantly, though, with the negative experiences, the platform usage intensity within the two communities did not grow noticeably. For collaborative editing of documents and information collection, the department heads switched to an alternative notebook application based on CPM03's local server infrastructure. While CPM03's head of Analytics R&D supported this decision, she sees the benefits of the enterprise collaboration platform over email for internal communication within her department. Thus, she started to use the platform as a **medium for internal communication** and tried to maintain at least a sustained level of participation within the respective internal analytics R&D department community. However, communication via the department community has remained largely one-sided. Only a few department employees create content, most of them are just content consumers, which is also due to time restrictions. CPM03's head of Analytics R&D creates community entries to share work-relevant, but non-sensitive, information with her employees (e.g. regarding chemical waste separation and related processes and contact persons, welcoming of new apprentices). In order to make work easier, she also provides links to information (e.g. standards, norms) created and stored in related working spheres. When employees of her department have work-related questions, she often refers to the internal department community, stimulating passive use at least.

By 2018, content creation within the group-wide representative analytics laboratory communities reduced to a minimum, too, *"Information is only changed occasionally, [...] It's like an encyclopaedia that is full."* (Head of Analytics R&D, CPM03, 2018). However, as with her local analytics team, the head of Analytics R&D refers different internal customers to information already stored within the encyclopaedia, "*I tell them, 'take a look there, you will find information about our laboratory, [about] what we offer', so that I do not have to explain to everyone what we do. It is useful for that."* (Head of Analytics R&D, CPM03, 2018). In this way, the **encyclopaedia** reached saturation and is mainly used for the **retrieval of non-confidential information** provided by different business units, departments and teams across the organisation. By that time, the head of CPM03's Analytics R&D and her colleagues no longer describe the enterprise collaboration platform as a 'Company Facebook', because networking between the individual people could not be cultivated further (weak inscription). Based on the latest development, another key pattern of use was inscribed into the platform and came to the fore, namely that of a '**network of firms'**. Such network of firms is characterised through the range of business units, departments, and teams being linked through their individual representative platform communities and engagement in different multi-site communities (e.g. conference/meetings communities).

Portfolios of inscriptions

In this research work, working spheres are typically represented by enterprise collaboration platform communities having unique constellations of community members (with different backgrounds/history, experiences, expertise, attitudes), organisational and environmental

arrangements (e.g. structure (e.g. collocated, distributed, hierarchical), policies, norms, restrictions, resources), and their tasks (e.g. provision of information, self-presentation, project work, intra-departmental communication). They illustrate that the development, use and interpretation of the enterprise collaboration platform are intertwined with context. In other words, the platform's interpretive flexibility is characterised through the platform's sociotechnical relations. New working spheres can emerge but also working spheres themselves can be reconfigured and in continual flux. The studied enterprise collaboration platform provides flexible programmes of action, it has different meanings for different people being engaged in the shaping of and collecting experiences in different working spheres. Figure 5-9 provides an overview of the changing portfolios and sequences of inscriptions[17] according to the emergence and evolution of working spheres related to the three different individuals*: Project Manager*, *Head of IT*, and *Head of Analytics Research and Development* (as outlined above). It draws on Barrett, Oborn and Orlikowski's (2016, p. 710) visualised value creation process in an online community (social media platform). To distinguish between and compare the different purposes of use inscribed into the enterprise collaboration platform different colours are used. In this study, inscriptions often gain strength and become background over time (e.g. means for representation, encyclopaedia, space for the planning and organisation of meetings), i.e. they are increasingly taken for granted and accumulate resistance against change. In this way they become strong inscriptions that are (almost) non-reversible. Other inscriptions turn out to be too weak (e.g. know-how storage and distribution, group company Facebook, platform manual), i.e. they disappear again when being opposed (e.g. by rules introduced prohibiting the sharing of know-how incorporating confidential data) or superseded by competing translations. The way the platform is interpreted by the three different individuals is dependent on the existing inscriptions they are involved in, while, at the same time, the emergence and translation of inscriptions is dependent on the individual's proactive engagement in the understanding of the platform's interpretive flexibility (recursive relationship between interpretative flexibility and inscription).

[17] Some of the inscriptions overlap with the enterprise collaboration platform outcomes captured using the MoBeC framework (see chapter 5.2.2), for example a means for self-presentation/representation. Inscriptions into the enterprise collaboration platform ("the way technical artifacts embody patterns of use" (2000, p. 76)) are in a way outcomes, i.e. new operational states (OGC, 2011, p. 79). However, not all outcomes are also inscriptions, for example, the ability to exchange experiences and information EMEA-wide. In this chapter, the focus is on the different purposes of use inscribed into the enterprise collaboration platform by different individuals, whereas MoBeC aims for an overall view of the enterprise collaboration platform outcomes and benefits expected and achieved for the whole of the case organisation.

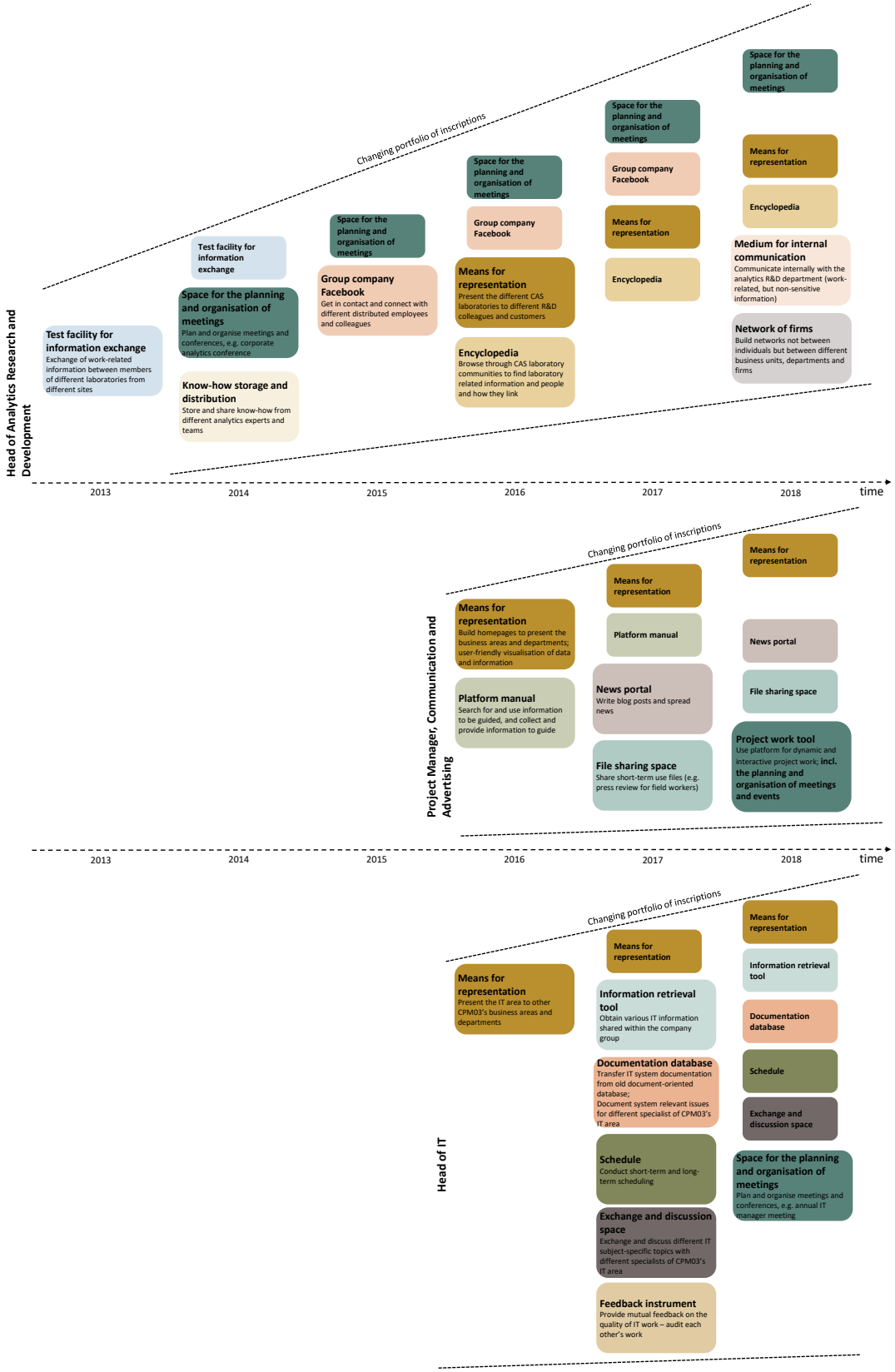


Figure 5-9. Changing portfolios of inscriptions according to the emergence and evolution of working spheres related to three different individuals.

The following section examines how the platform is adopted by the three different individuals who engage in different working spheres and related platform inscriptions.

5.3.2.3 Time curves of adoption quality

Figure 5-9 in chapter 5.3.2.2 shows the range of inscriptions for each of the studied individuals (platform users). All three aforementioned individuals (Project Manager, Head of IT, Head of Analytics Research and Development) have discovered a variety of platform uses that become inscribed in different working spheres. While figure 5-9 illustrates that there can be multiple coexisting perspectives that different organisational members may have on the ways the enterprise collaboration platform can support their work in their local contexts (Dourish, 2003; Iacono & Kling, 1999; Mark & Poltrock, 2004; Pipek & Wulf, 2009), it does not make a point about the adoption quality. The analysis and interpretation of the data provided by the three different individuals in the conducted interviews (I1, I2, I3) reveals that the individuals may inscribe a similar number of purposes into the platform but still adopt the platform to different degrees and at different times. In this section, the focus is on how the adoption quality evolves over time for the three different individuals. In this research work, *adoption quality* is defined as the degree to which individuals show enthusiasm for the enterprise collaboration platform and related intention to accept and use it (Alqahtani et al., 2014, p. 3), actively participate in the shaping of the enterprise collaboration platform (Alqahtani et al., 2014, p. 5), and integrate it in their everyday work (Pipek & Wulf, 2009, p. 457). Changes in the adoption quality are included in the descriptions of the working spheres and related inscriptions of the three individuals (see chapter 5.3.2.2), however, for the purpose of comparability, these are visualised in figure 5-10 (including reasons for changes in the adoption quality (decrease, increase)) and explained in more detail below.

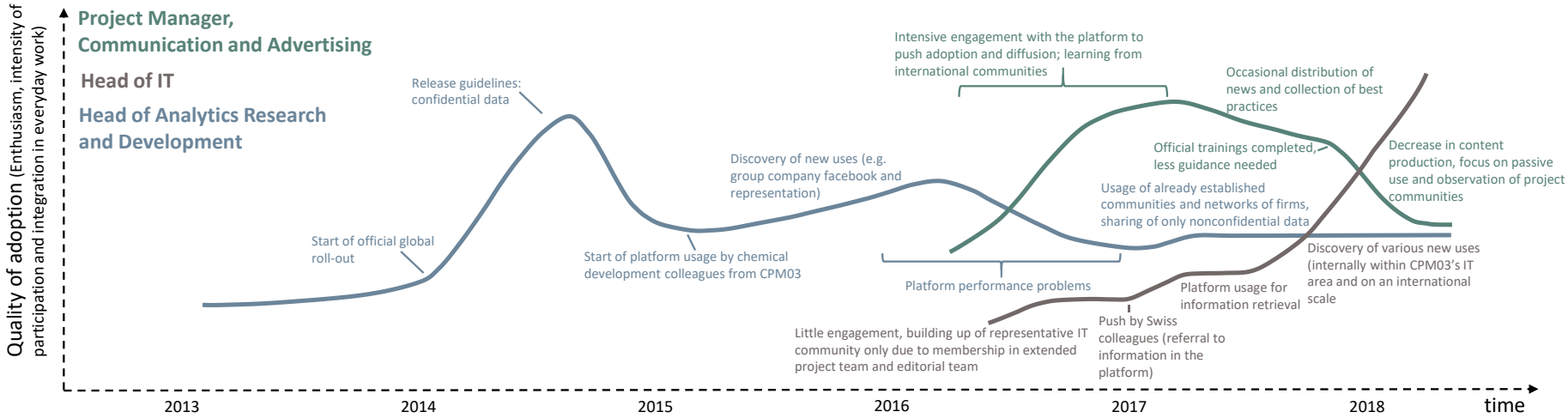


Figure 5-10. Time curves of adoption quality for three different individuals engaged in different working spheres.

In line with Mark and Poltrock (2004), the extent to which a technology is adopted in one social world is dependent on the conditions of the world being more or less favourable to the platform adoption (e.g. existing organisational barriers, resistance of social world members), and the degree to which the platform is considered a fit to the work practices in the respective working sphere(s) (p. 304). In the following, the different adoption quality curves for the three individuals are described in order of the time of platform adoption.

The level of adoption quality is not objectively measured but is based on how the three individuals, and interview participants, respectively, describe their own situations in the shaping of the enterprise collaboration platform, and the researcher's subjective interpretation of it.

Head of Analytics Research and Development

Of the three individuals, the head of Analytics Research and Development (R&D) was the first to adopt and use the enterprise collaboration platform. The Corporate Analytics Service (CAS) group leader from Switzerland introduced the platform to her when it was piloted in 2013. She was added to first platform communities, which were used as a test facility for information exchange between different CAS laboratories. While she was interested in the possibilities of the platform for her daily work, only a small group of individuals of the company group's different laboratories was involved. Because of limited networking possibilities with colleagues from different sites and subsidiaries of the group, she initially spent only little time on the platform. However, until the end of 2013 the number of platform users increased through viral distribution. In 2014, the official global roll-out of the enterprise collaboration platform was started so that the number of users started to increase remarkably. Now having the opportunity to build up and be engaged in working spheres with a variety of geographically distributed members of CAS laboratories, her enthusiasm about the platform increased (network externalities). She discovered new uses, such as the planning and organisation of group-wide analytics meetings, or the sharing of know-how between different analytics experts and teams. However, at the end of 2014, guidelines about the handling of confidential data were released that represented a damper to her enthusiasm about the platform and platform usage intensity. Not being allowed to share confidential data, such as chemical formulation, production steps and related raw materials, the importance of the platform for her everyday work decreased remarkably. However, between 2015 and 2016 she discovered new uses of the platform. In 2015, chemical development colleagues from CPM03 started to use the platform on a voluntary use basis. They hoped to effortlessly identify and find R&D contact persons and experts within the company group. Similarly, and possibly inspired by her chemical development colleagues, the head of Analytics R&D saw the possibility to get in contact and connect with different distributed employees and colleagues ("group company Facebook"). Also, along with the emergence of more and more representative communities built up for the individual CAS laboratories, the level of her platform participation gradually grew again. She spent time to build up a community for her own analytics laboratory and used the other laboratory communities as an encyclopaedia to find laboratory related information and people. Between 2016 and 2017, however, she observed platform performance problems so that the level of her platform participation

decreased another time. Despite this set-back, she saw the advantage in using already established communities (e.g. to connect with different R&D business units, departments and teams, search for product information in the developed encyclopaedia, internally communicate with her team). Her enthusiasm for the platform slightly increased again to then remain on a stable level. Because of the released guidelines about the handling of confidential data, the head of Analytics R&D expects no further changes.

Project manager, Communication and Marketing

When the official introduction of the enterprise collaboration platform started at the German subsidiary (CPM03) in 2016, the project manager responsible for the introduction entered the arena with a relatively high level of platform enthusiasm. With the self-imposed aim to achieve a platform usage rate similar to that of the parent company, he directly started to intensively use the platform and plan and prepare adoption measures. Among others, he built an editorial team to fill the platform with first German contents. For this, representative communities were set up for the different departments and areas (including his Communication and Marketing area) which had already a lot of data stored in the old local Intranet. Further, he increasingly explored the functional possibilities of the platform (e.g. commenting, recommending, using @mentions) and was active in international platform communities to search for various information and measures that could be relevant to the implementation project (e.g. usage etiquettes, rewarding best practices, filling social profiles with content, tagging of platform posts). Inspired by the international „User Community“ that was set up by the parent company to provide platform users with guidance and support, he pushed the development of a German-language version of the established User Community for CPM03 (due to the aversion of CPM03 employees to the English language). In this way, the platform constituted an integral part of his everyday work. Between the beginning of 2016 and late 2017, the project manager offered training to people from different CPM03 areas and departments. The more people were trained, the less engagement on his side was required to experiment with the platform’s IT capabilities and identify adoption measures. In 2017, he adapted the content of the Communication and Marketing area’s community infrequently (e.g. by writing blog posts to spread news) and still communicated best practices identified in different platform communities (often authored by the parent company, other subsidiaries and sites). Between late 2017 and late 2018, the level of his platform participation decreased rapidly. The percentage of his involvement in the enterprise collaboration platform project was first reduced to 70, then to 30 per cent of his working hours. He increasingly became a content consumer and observed activities in communities for project work (more passive use).

Head of IT

In 2016, the head of IT became a member of the enterprise collaboration platform's "extended project team" and related editorial team. Although a supportive and consultative role in the platform introduction project at CPM03 was ascribed to him, the head of IT showed little enthusiasm about the platform at the start. Only because of his memberships that related to the platform introduction he was willing to try out and use the platform. Among others, he was involved in the transfer of IT data from the old local Intranet to the IT department's own representative enterprise collaboration platform community. In 2017, platform usage by CPM03's IT department was pushed by the corporate IT (IT company of the group). Specifically, the corporate IT referred to various IT information relevant to the group's different IT areas and departments and stored in the enterprise collaboration platform. Thus, to retrieve such information, the head of IT had to access and use the platform. Over time, he increasingly used the platform on a voluntary use basis and discovered a range of possibilities in terms of platform appropriation. Between the end of 2017 and 2018 his enthusiasm for the platform grew enormously. He was engaged in inscribing a variety of platform uses for his local IT department (e.g. documentation database, schedule, exchange and discussion, feedback instrument), as well as for geographically dispersed IT teams (e.g. space for the planning and organisation of meetings). The more time he spent on the platform, the more useful he found the platform for his daily work. While he was the last to adopt and use the platform, he is at his peak of adoption quality in 2018. At this time, the other two individuals (project manager, head of Analytics R&D) have already passed their peaks of adoption quality.

5.4 History of relationships and sites implicated in the enterprise collaboration platform evolution

In the previous subchapters, enterprise collaboration platform designs are examined from the perspective of individuals who are members of different social worlds and working spheres, respectively. They give meaning to the platform in their local work contexts over time. However, the way that enterprise collaboration platforms are designed through use embraces multiple sites and settings. Thus, driven by the Biography of Artefacts (BoA) (R. Williams & Pollock, 2012) perspective (see chapter 3.4.1.5), this subchapter deals with a variety of actors and factors linked to and surrounding the enterprise collaboration platform design and its embedding into the digital workplace at CPM03. This includes actors and factors from the broader institutional context and "developments within the wider terrain" (Swanson and Ramiller, 1997, as cited in Monteiro et al., 2013, p. 598), but also from the immediate setting. Some of them and their interactions with the enterprise collaboration platform have already been mentioned (sometimes in passing) in the previous subchapters, others have not been dealt with yet. In the following, their coexistence and interplay are elaborated on.

5.4.1 Research inquiry outline

The aim of this research work part is to *examine actors and factors from multiple time frames and locales attached to the enterprise collaboration platform design and its embedding into the digital workplace.*

Specifically, the objectives are to…

i. identify diverse arrays of local and broader actors and factors part of and surrounding the enterprise collaboration platform design and its embedding into the digital workplace,
ii. capture linkages and interactions between the identified local and broader actors and factors, and
iii. map the distribution of and relations between the different identified actors and factors over time and space.

Again, this research work part draws on qualitative interviews with the selected case organisation. It is organised into three research phases and embraces seven different research steps as shown in figure 5-11 and elaborated on below.

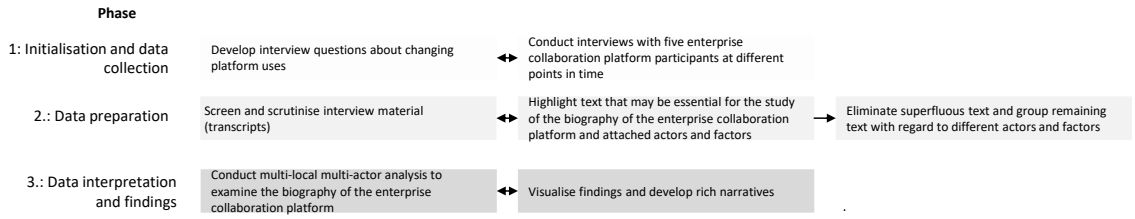


Figure 5-11. Phases and steps of the research inquiry into actors and factors attached to the enterprise collaboration platform design and its embedding into the digital workplace over time and space.

Phase 1: Initialisation and data collection

This research work part builds on qualitative interviews (see chapter 3.5.1). The interviews serve different research purposes (e.g. capturing different platform uses or enterprise collaboration platform outcomes and benefits), however, a set of questions is developed that particularly regards actors and factors from different time frames and settings and how they influence and shape the ways that the enterprise collaboration platform is evolving at the case organisation (CPM03). The questions are open-ended. While some are formulated in-situ depending on received responses and for clarification, others are developed a priori (including follow-up questions to the previously conducted interviews). The following key questions are included in the developed interview guidelines.

Retrospective view:

- What were the reasons for the chosen enterprise collaboration platform **vendor** at CPM03?
- Was there an **implementation partner** for the introduction of the enterprise collaboration platform at CPM03? If so, who was it?
- What are the **histories that surround and influence** the enterprise collaboration platform design and its embedding into the digital workplace at CPM03?

Status quo:

- What is the enterprise collaboration platform's **underlying IT infrastructure** at CPM03?
- Who is currently involved in the enterprise collaboration platform project at CPM03? / Who are **key players** in the **enterprise collaboration platform project** at CPM03?
- Are there **special promoters** for the enterprise collaboration platform project at CPM03?
- Are there **opponents** to the enterprise collaboration platform project at CPM03? If so, what motivates the hostile stance?
- Are there any **change management measures** implemented as part of the enterprise collaboration platform project at CPM03 (e.g. training, guidelines)?

- What are currently your **biggest challenges** with the enterprise collaboration platform design and its embedded into the digital workplace at CPM03 (e.g. competing technologies, works council, mapping of business processes via the enterprise collaboration platform)?
- How is CPM03 **responding to what is happening** as part of the enterprise collaboration platform design and its embedding into the digital workplace at CPM03?

Changes and follow-up:

- **How** has the **enterprise collaboration platform design** and its embedding into the digital workplace at CPM03 **changed** since the project start / our last interview in [06/2016, 09/2017]?
- What (further) **events/incidents** may have **changed** the **enterprise collaboration platform design** and its embedding into the digital workplace at CPM03 since the project start / our last interview in [06/2016, 09/2017] (e.g. personnel turnover, regulations, enterprise collaboration platform updates, measures/events of the parent company)?
    - How has the enterprise collaboration platform design and its embedding into the digital workplace changed thereby? (e.g. discovery of new uses, strategy development, changed/new change management measures), technical adjustments, time delays, etc.)
- What **actors** have **influenced** the **enterprise collaboration platform design** and its embedding into the digital workplace at CPM03?
    - How has the enterprise collaboration platform design and its embedding into the digital workplace changed thereby? (e.g. discovery of new uses, strategy development, changed/new change management measures), technical adjustments, time delays, etc.)
- The official **enterprise collaboration platform roll-out** with training courses has **been completed** by now**, what has happened** as part of the enterprise collaboration platform project **since then** at CPM03? (e.g. tasks accomplished, exchange with people from the parent company)
- You participated in the questionnaire about the role of the **works council** in the enterprise collaboration project[18]. Can you describe the **influences of the works council** on the **enterprise collaboration platform design** and its embedding into the digital workplace at CPM03 (e.g. project delay)? What has been discussed with the works council and why (e.g. measures regarding data protection)?

Some interview questions deliberately overlap to close gaps in answers, delve into more detail or use them as a means of triangulation (cross-check ambiguities and information incongruencies).

[18] See chapter 4.2.1.2.

The interview schedule is not fixed, i.e. the respondent's lead is followed to be able to pursue also unanticipated actors and factors in the enterprise collaboration platform design and its embedding into the digital workplace.

In the second step of the first phase, the planned interviews (I1, I2, I3) are conducted at three different times (June 2016, September 2017, November 2018). The questions developed as part of this research work part are addressed to five enterprise collaboration platform participants (project manager, head of Communication and Marketing, head of IT, head of Analytics Research and Development, chairman of the works council) willing to share their experiences and perspectives. The interviews are digitally recorded and transcribed as a basis for the subsequent data analysis.

Phase 2: Data preparation

The data preparation steps are analogous to how the data is prepared for the analysis of enterprise collaboration platform uses at different locals (see chapter 5.3.1). Accordingly, the first step of this phase deals with the screening and careful reading of the interview transcripts from the interviews conducted in 2016, 2017, and 2018. The screening and careful reading happens along with the second step of this phase, where text that may be relevant for the analysis of the multiple actors and factors attached to the enterprise collaboration platform design and its embedding into the digital workplace is identified and highlighted. Often, the interviewees provide information about different actors and factors in their answers to interview questions dealing with other, but related, research phenomena (e.g. enterprise collaboration platform uses, enterprise collaboration platform outcomes and benefits). The highlighted text is copied into a clean document and includes a plethora of quotes about the biography of the enterprise collaboration platform and its multilocal spaces and various time frames. In the third step of this phase, superfluous text (repetitions, digression) is eliminated, and statements about the biography are reordered and grouped with regard to different actors and factors and their influences.

Phase 3: Data interpretation and findings

First, the data prepared is interpreted. Since the identified actors and factors are attached to the enterprise collaboration platform design and its embedding into the digital workplace via their interactions, cross-references are added to the document of collected and grouped statements to mark their linkages. Further, guided by the Biography of Artefacts (BoA) perspective (see chapter 3.4.1.5), human and nonhuman actors are categorised according to different spaces: the *technological field* (operating models for enterprise collaboration platforms' ECS, trend topics in society and business, big players constituting the market for enterprise collaboration platforms), the *history of collaboration at CPM03* (platforms, network), *actors interacting with the enterprise collaboration platform in the broader setting* (group internal, CPM03 internal, CPM03 external), and *actors interacting with the enterprise collaboration platform in the immediate setting* (*enterprise collaboration platform implementation project* (group internal, CPM03 internal), *enterprise collaboration platform design and usage* (group internal, CPM03 internal)). Time frames are constituted by the years in which the participation and engagement of the actors and related

changes occur. Also, time frames can be assumed by the coexistence of actors serving as points of reference to each other. Next, the findings are visualised and rich narratives developed. The visualised findings incorporate temporality as well as the different spaces to which the identified actors and factors are mapped. As with the research work part presented in chapter 5.3.1, design choices are made on the basis of the design space dimensions for timelines and corresponding instantiations as proposed by Brehmer, Lee, Bach, Riche, and Munzner (2017). In this research work part, a linear representation with a chronological scale and faceted layout is employed. Puzzle pieces with different colours are used as a narrative device (Segel & Heer, 2010) to portray the arrays of actors and interactions between them (actors with matching puzzle pieces of the same colour relate and interact with each other). Further, they guide the reader through the visualised data.

The narratives attached to the visualisation provide explanations for how the actors are related and linked to the enterprise collaboration platform design and its embedding into the digital workplace.

5.4.2 Research inquiry findings

Figure 5-12 provides a simplified representation of how the enterprise collaboration platform design and its embedding into the digital workplace evolve. It includes both human and nonhuman actors from different spaces and time frames (see chapter 5.4.1). On the y-axis (vertical axis) are the different spatial levels which are separated from one another by colour. In line with Pollock and Williams (2009), the spatial levels serve as a means to analyse and understand the biography of the technology, however they need to be understood as relational categories. The x-axis (horizontal axis) represents time. Its chronological scale corresponds to different dates from “before 2014” to after “11/2018” when the last interview with the case company CPM03 was conducted. The identified actors and factors are mapped over time and space. Each actor and event, respectively, is encoded using a line (ongoing involvement) or rhombus (one-off involvement in the form of an event). Actors mapped to the time after 11/2018 are represented by dotted lines which denote doubt in the sense that there is uncertainty about the actor’s involvement in future (S. B. Davis, 2011). As stated above (see chapter 5.4.1), interactions and relations between the different actors are modelled using puzzle pieces.

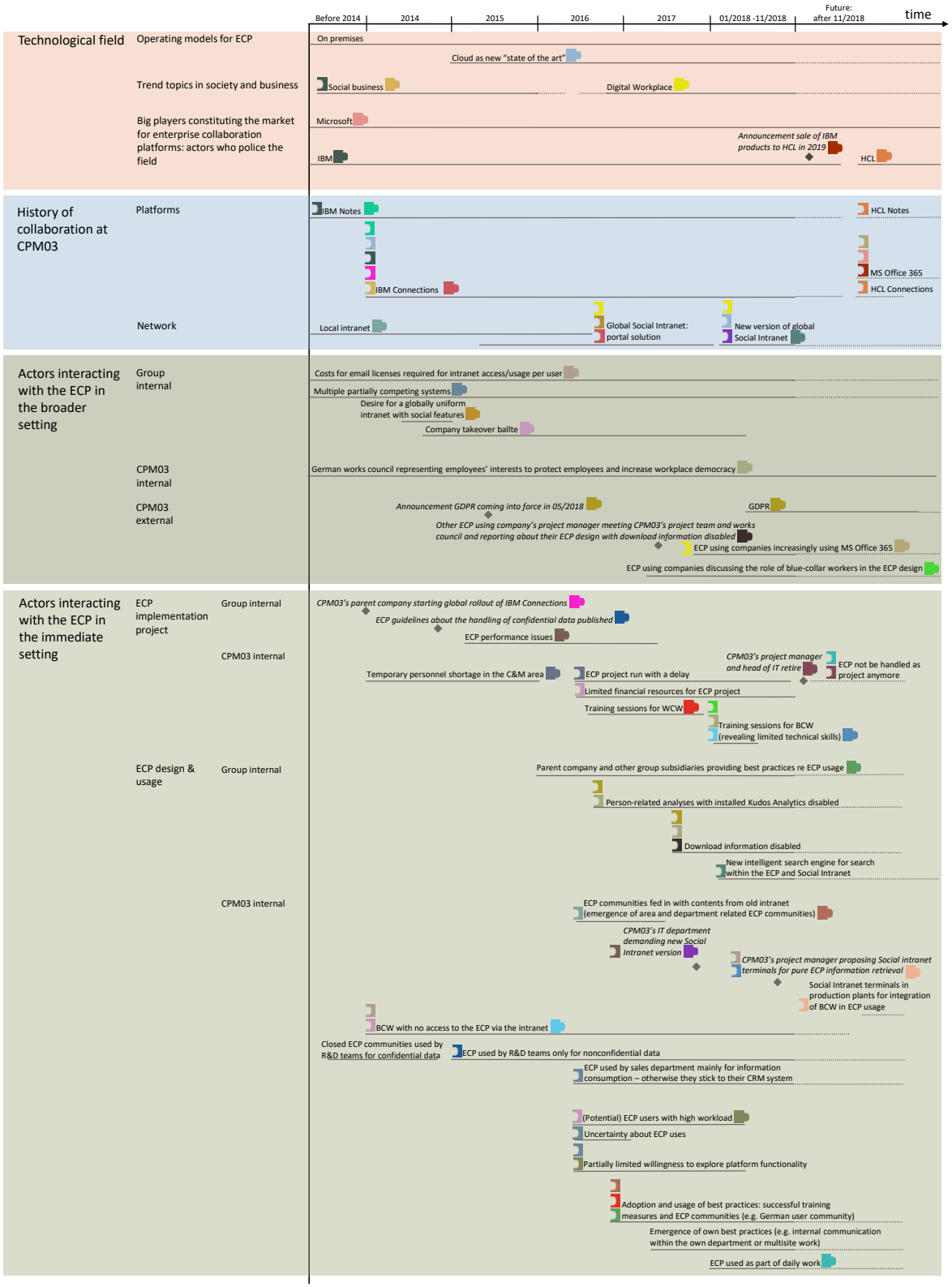


Figure 5-12. Map of interacting actors and factors attached to and surrounding the enterprise collaboration platform over time and space.

Table 5-2 provides information on how to read figure 5-12.

Table 5-2. Legend for figure 5-12.

Axes	
x-axis	Time, using a chronological scale (dates from “before 2014” to after “11/2018”)
y-axis	Different spatial levels which are separated from one another by colour, e.g. history of collaboration at CPM03 (the case company), or actors interacting with the enterprise collaboration platform in the broader setting
Notation	
Puzzle pieces	Matching pieces have the same colour and represent interacting and linked actors and factors. Example 1: GDPR comes with the termination of person-related analysis and deactivation of download information Example 2: Costs for email licenses required for Intranet access and the ongoing company takeover battle that comes with limited financial resources for the enterprise collaboration platform project provide one explanation for why blue-collar workers have no access to the enterprise collaboration platform via the Intranet
Rhombuses	One-off involvement of actors/factors in the form of an event. Example 1: Enterprise collaboration platform guidelines about the handling of confidential data published Example 2: CPM03’s project manager proposing Social Intranet terminals for pure enterprise collaboration platform information retrieval
Lines	Ongoing involvement of actors/factors. In other words, actors and factors are attached to and surrounding the enterprise collaboration platform design and its embedding into the digital workplace over a certain period of time. Example 1: Enterprise collaboration platform communities fed in with contents from the old static Intranet Example 2: Social business as a trending topic Dotted lines denote doubt in the sense that there is uncertainty about the actor’s involvement in terms of interactions and duration. This particularly concerns expected future involvement. Example 1: Multiple partially competing systems Example 2: MS Office 365
Abbreviations	
CPM03	Chemical Products Manufacturer 03 as pseudonym for the case company
ECP	Enterprise collaboration platform
BCW	Blue-collar workers
WCW	White-collar workers
C&M	Communication and Marketing area
GDPR	General Data Protection Regulation
CRM	Customer Relationship Management

The following narratives aim to approach the inherent complexities and reveal the linkages and interactions between the different identified actors and factors.

Enterprise collaboration platform usage in a space of competing options and uncertainty

The enterprise collaboration platform and related global Social Intranet could be accessed by CPM03 from 2014 and 2015, respectively, when the global roll-out started. From the beginning, people from CPM03's research and development (R&D) area were using the platform to communicate with colleagues within the whole company group and across sites (see chapter 5.3.2.2). Some of them were already involved in the pilot phase run by the parent company before 2014. Initially, they used the platform to share also confidential data via closed platform communities. However, this changed with the publication of guidelines about the handling of confidential data in 2014 (see chapter 5.3.2.2). CPM03's head of Analytics R&D commented, *"R&D has a lot to do with confidential content which must not be entered in the enterprise collaboration platform. Before we post too much, it's better not to post it at all. [...] Initially we haven't thought about it so much, can I upload it or not...just thought 'Okay, closed community, I can upload it there'"* (Head of Analytics R&D, CPM03, 2018). Because of the published guideline and associated uncertainties, people from the R&D area started to use their own system for confidential data (e.g. chemical formulation, production steps and related raw materials) (see chapter 5.3.2.2), which is linked to from the Social Intranet.

Nonetheless, the official introduction of the enterprise collaboration platform and its related Social Intranet at CPM03 did not start before 2016. The reason was a shortage of personnel in the Communication and Marketing area entrusted with the platform and Social Intranet introduction in the German subsidiary. Thus, the German subsidiary started the enterprise collaboration platform project with a delay in 2016. In order to catch up, CPM03's project manager had the goal to achieve a usage rate of the platform's ECS similar to that of its parent company in a short time (see chapter 5.2.2.2). However, the manager did not want to pressure the employees and supported voluntary platform usage. This was due to the hostile company takeover battle which had started in 2014 and was still ongoing (see chapter 5.1). For a good shareholder value and to have both small and major shareholders backing the company against the takeover, high sales were required also in the German subsidiary. This came along with uncertainty and an increased workload of employees who were said to have only little time to make themselves familiar with a new platform. At the same time, the company takeover battle was one reason why the budget for the enterprise collaboration platform project was limited at CPM03.

Along with the official enterprise collaboration platform project start at CPM03, the German subsidiary shut off its previous static Intranet. By transferring contents from the old local Intranet to the Social Intranet's enterprise collaboration platform, first business area and department related enterprise collaboration platform communities emerged (see chapter 5.3.2). Such communities were employed as examples in training sessions on the use of the enterprise collaboration platform provided to CPM03's white-collar workers in 2016 and 2017 (see chapter 5.2.2.2 and chapter 5.3.2).

Due to the interpretive flexibility of the enterprise collaboration platform and multiple, sometimes competing systems that were part of the system portfolio in the German subsidiary, there was high uncertainty about the role of the enterprise collaboration platform at the start. Apart from the area and department related platform communities, there were little other use examples from the German subsidiary itself at the beginning. Therefore, best practices from the parent company and other group subsidiaries were collected and regularly shown and communicated either by CPM03's project manager (see chapter 5.3.2.2) or by key persons in charge of the platform introduction at CPM03's parent company, *"The project manager [...] implemented all the training courses [...] and was supported by the holding company in Switzerland, [...] they also did a lot of training here, and so we managed that everybody knows about IBM Connections and what options they have in there"* (Head of Communication and Marketing,11/09/2017).

Over time and as CPM03's employees started to adopt and use existing best practices, uncertainty about the role of the enterprise collaboration platform decreased. Gradually they also "developed their own best practices" and inscribed their individual purposes of platform use in their local work contexts (see chapter 5.3.2). However, some persons did not begin to use the enterprise collaboration platform or used it only to a limited extent. For instance, people from the sales department of CPM03 mainly use the Customer Relationship Management system by Salesforce, with which they can also collaborate and communicate with each other. The enterprise collaboration platform's ECS IBM Connections was used by them only for information consumption and to get in contact with people from different target markets (e.g. to get information about different products) or R&D teams (e.g. to issue chemical analysis orders (see chapter 5.3.2.2). "*For example, those who don't use it [, the enterprise collaboration platform,] very often always argue, '[...] I have so many competing systems', for examples the sales department uses it very little. Because they use Salesforce very intensively. And they are right to say, 'I can't have too many irons in the fire.' Our enterprise collaboration platform is competing with other communication platforms at our company."* (Project Manager, Communication and Marketing, 22/11/2018). CPM03's project manager described the enterprise collaboration platform as only one of many communication tools CPM03's Communication and Marketing area oversees. With the end of the enterprise collaboration platform project in 2019, enterprise collaboration platform training courses were to be included in the catalogue of different training programmes.

The power of the German works council in the enterprise collaboration platform evolution across different sites

In order to prevent a negative attitude of the works council towards the enterprise collaboration platform (see chapter 4.2.2.2), CPM03's project manager decided to actively include the works council in the platform project. However, when the chairman of the works council familiarised himself with the platform and talked to platform users, he was dissatisfied with the platform in terms of the handling of personally identifiable information (PII). Motivated by his task to represent the interests of CPM03's employees and the recent announcement of the new General Data Protection Regulation (GDPR), the new EU-wide data protection instrument (see chapter 4.2.1), he formulated demands on the design and usage of the globally rolled out enterprise collaboration platform. Specifically, he enforced the deactivation of person-related analyses with the IBM Connections plugin Kudos Analytics purchased by CPM03's parent company. Furthermore, he demanded the parent company to deactivate the download information feature (who has downloaded which documents) which, up to this point, was visible to all platform users by default. In 2017, CPM03 met another company that was among the first user companies of IBM Connections. The purpose of the meeting was to exchange experiences on the design of the enterprise collaboration platform, specifically dealing with PII in IBM Connections. When the chairman of CPM03's works council got to know from this company that they had also disabled the display of download information in IBM Connections, he used this as leverage. Also, with his part-time voluntary work as a labour judge, he had the legal background knowledge to threaten the parent company with legal consequences and the shutting down of the enterprise collaboration platform, *"two months ago, a summit talk took place because there had been a legal threat from my works council [...], an injunction really, so that the employer would have had to turn it off, because it was just illegal."* (Chairman, works council, 11/09/2017). Following pressure from the German works council, the functionality to display download information was disabled.

Despite its wide-reaching influence on the whole of the organisation and its globally available enterprise collaboration platform, the German works council is also an important actor in the shaping of the enterprise collaboration platform at the single site of the German subsidiary. With the goal to increase workplace democracy (see chapter 4.2.1), he stood up for the integration of CPM03's blue-collar workers in the enterprise collaboration platform usage. According to the works council, the introduction of the Social Intranet and its enterprise collaboration platform should assume the function of the traditional bulletin board that had particularly been used by the Human Resources area to disseminate various information, including works agreements and job advertisements. However, without a company email address required for access to the Social Intranet, CPM03's blue-collar workers could not use the enterprise collaboration platform. Because of the high licensing fees for email addresses, CPM03 decided to make use of a double-channel solution with regard to information dissemination; while employees with an email address were reached via the enterprise collaboration platform, blue-collar workers were still reached via the traditional bulletin board. CPM03 wanted to keep costs low due to the ongoing hostile takeover battle coming along with strong sales pressure (see chapter 5.1). The works council complained

about how the company dealt with blue-collar workers and pressed for their inclusion in this matter, *"We [, CPM03,] adopted a two-pronged approach because the people who work outside [, in the production plants,] shouldn't access the Intranet. That's the problem [...] Unfortunately, people from the production plants are not appreciated. I have now put a lot of pressure on it [,their inclusion]."* (Chairman, works council, 11/09/2017). As a result, CPM03's project manager conducted a survey with blue-collar workers at the beginning of 2018 to determine their interest for an email address and thus access to the Social Intranet and related enterprise collaboration platform. Since most of the survey participants expressed their interest, CPM03's project manager implemented a series of platform user training for blue-collar workers. Though, the training revealed that blue-collar workers were overwhelmed not only with the functions of the platform but also with the use of the computer keyboard. Therefore, the project manager proposed the introduction of Social Intranet terminals used by blue-collar workers for information retrieval only. In this way, they did not need an email address but still could access the enterprise collaboration platform. CPM03's project manager explained, *"I sent it to the head of the Human Resources and company management, my conclusion is that we are actually on a wrong track when providing blue-collar workers with an email address [...] I have found out that they are simply overwhelmed with the technology. They are even overwhelmed with the use of the computer keyboard [...] I recommended [...] that they put up terminals in the production plants that are freely accessible, mirroring the intranet content, so they can passively use it."* (Project Manager, Communication and Marketing, 22/11/2018).

History of collaboration at CPM03 and related changes in the social fabric of the technological field of enterprise collaboration platforms

Changes in operating models, technology and social software trend topics, and different players that constitute the enterprise collaboration platform market have shaped the decisions regarding the supplier of the enterprise collaboration platform's ECS and its underlying Intranet portal at CPM03 and its parent company. In the same vein, such decisions build upon the history of collaboration at CPM03 and its parent company. In 2014, the global roll-out of the enterprise collaboration platform's ECS IBM Connections was decided bottom-up in CPM03's parent company. The decision to draw on IBM has a historical background, *"We are also in the cloud with email. We've grown a bit historically, we've had Lotus [IBM] Notes [...] for about 20 years, and about four years ago the question was simply whether a server-based solution was still state of the art or whether it was better to follow the Cloud track [...] And then we chose IBM for historical reasons and are now in the so-called IBM Smart Cloud."* (Head of IT, CPM03, 28/06/2016). The document-oriented, distributed database system IBM Notes (formerly Lotus Notes, today HCL Notes) with functions such as email or calendars has been used by the parent company and its subsidiaries, including CPM03, for many years. Thus, with regard to the new enterprise collaboration platform, it seemed logical to continue to draw on the software vendor IBM. Furthermore, IBM was the vendor of the world's leading ECS at this time. Convinced of the trend towards cloud solutions and related cost savings, the collaboration platform should be operated in the cloud with IBM as the hosting partner. IBM was also the company that coined the term Social

Business (see chapter 2.1.2) denoting integrated, large-scale implementations of social software in the enterprise context. In this way, IBM did not only act as a software vendor and hosting partner but also as industry expert policing the field.

Early on, the desire for a globally uniform company Intranet with IBM Connections and its social features became increasingly stronger within the company group. After the start of the official global roll-out of IBM Connections in 2014, the Social Intranet was built based on the portal solution IBM WebSphere in 2015 and made available to all company group employees, including CPM03 employees, who had a company email address. Integrating a variety of different applications and systems accessible via Single Sign-On, the step towards a Social Intranet was in line with the renewed popularity of the Digital Workplace in industry, describing "an integrated technology platform that provides all the tools and services to enable employees to effectively undertake their work" (S. P. Williams & Schubert, 2018, p. 480).

In late 2015, 2016 and early 2017, CPM03 employees complained about regular performance problems of the Social Intranet. Consequentially, CPM03's IT department put pressure on CPM03's parent company to introduce a new Social Intranet version, *"so where we pushed enormously [...is] that a new Social Intranet version was introduced"* (Head of IT, CPM03, 22/11/2018). As the largest subsidiary of the company group, CPM03 has a significant influence on the design of the Social Intranet and integrated enterprise collaboration platform, "*As one of the largest national companies, [...] we certainly have a big say in this matter"* (Project Manager, Communication and Marketing, 22/11/2018). The introduction of the new Social Intranet version was implemented together with IBM's software service provider TIMETOACT GROUP. The Intranet, which was completely migrated into the cloud, included, among others, a new search engine. The new search engine connected to various data sources, including the enterprise collaboration platform, via its connector technology, and allowed the company group to receive various relevant information from decentralised structured and unstructured data.

On December 6, 2018, the sale of IBM software products, including IBM Connections and IBM Notes, to HCL technologies for USD 1.8 billion was announced (see chapter 2.1.2). Hence, a new player with its own platform development plans and service offerings entered the enterprise collaboration platform market. At the time of the last interview with CPM03 in November 2018, CPM03 did not know about the sale of IBM products to HCL, however, it potentially constitutes a point of intervention (terminating the usage of the previously employed enterprise collaboration platform's ECS or going along with the negotiation of new service agreements). Irrespectively, CPM03 observed the increasing role of IBM's competitor Microsoft (MS) in the enterprise collaboration platform market. More and more collaboration platform using companies used

Microsoft's large-scale collaboration suite MS Office 365 (now called Microsoft 365[19]) or switched from IBM Connections to MS Office 365. The latter was seen as the incarnation of the digital workplace in industry. Possibly with the goal of keeping up with the times, CPM03's parent company decided for MS Office 365 and informed CPM03 about the planned introduction in 2019. Although CPM03 described IBM Connections as successfully integrated into the digital workplace (it was used by most CPM03 business areas and departments as part of their daily work (see chapter 5.2.2.2)), the planned introduction of MS Office 365 came with uncertainty in terms of the future role of IBM Connections and collaboration at CPM03, *"At some point, Office 365 will come if it is released by the group management. I don't know whether there will be a link to Connections somehow [...] I know that the corporate IT [(IT company of the group)] wants people from my IT team help shape the roll-out [of Office 365]."* (Head of IT, IT department, CPM03, 22/11/2018). Because of their retirement at the end of 2018, CPM03's project manager and head of IT could not further observe the possibly changing role of IBM Connections at CPM03. Though, at the time of the interview in 2018 (I3), the project manager was concerned that an abandoning of IBM Connections in favour of MS Office 365 might lead to employee frustration and have a negative impact on the adoption of MS Office 365, *„We have [...] taught our colleagues how to use IBM Connections for three years, they have created their communities. And if Office 365 was really introduced and IBM [Connections] expired, if they had to transfer all of [the contents] to Office 365, I suspect that it would leave blood on the carpet [...] I could imagine that this type of system would get a negative connotation"* (Project Manager, Communication and Marketing, 22/11/2018).[20]

Supplement: Findings from an additional interview[21] about the "death of the enterprise collaboration platform built around IBM Connections"

Having acquired the Connections software product, HCL technologies presented CPM03's parent company, who had globally rolled out IBM Connections, with a fait accompli in 2020. They announced that the HCL Connections Cloud would be ceased; the existing contract extension between CPM03's parent company and IBM did not help in this matter. The initial plan of a coordinated step-by-step plan for a long-term transition from the Connections technology enabled enterprise collaboration platform to one built around the Microsoft collaboration suite Microsoft 365 had to be scrapped. In a very short time, the parent company migrated their organisation-wide

[19] https://www.microsoft.com/en-gb/microsoft-365

[20] Along with the acquisition of Connections by HCL, one of Microsoft's biggest service partners, HCL Connections now provides integrations with Microsoft 365 (formerly MS Office 365). (Zeizel, 2020).

[21] See chapter 3.5.1.

IBM Connections data to Microsoft 365. Along with the COVID-19 pandemic and the related push further to digitalised work, CPM03's parent company was under time pressure, *"this was my most extreme project so far"* (Project Leader, IT, Chemical Products Manufacturer 02, 20/01/2021). By July 2020, the data migration was completed. As the enterprise collaboration platform with IBM Connections at its heart had been successfully adopted overall (globally with more than 5,000 platform communities), CPM03's parent company decided for an enterprise collaboration system with a similar user interface and both integrating with and enhancing the Microsoft 365 collaboration suite. The Project Leader, IT reported, *"To make it easier for users, we had evaluated a product that brings the Connections look and feel to the Microsoft world"* (Project Leader, IT, Chemical Products Manufacturer 02, 20/01/2021). Thus, they paved the way for a new enterprise collaboration platform building upon an existing installed base.

5.5 An II perspective on enterprise collaboration platform change across multiple spaces and time frames

Enterprise collaboration platforms as information infrastructures (II) (see chapter 3.4.1) are not limited to spatial or temporal reach, i.e. they embrace a variety of locales and evolve over large periods of time (Hanseth & Monteiro, 1998; Monteiro et al., 2013). In order to do justice to this property, this chapter addresses different locales and moments in the enterprise collaboration platform evolution over extended time frames. This includes three research work parts: the examination of enterprise collaboration platform outcomes and benefits change, the formation of enterprise collaboration platform uses within and across different working spheres, and the history of multiple relationships and sites that are implicated in the enterprise collaboration platform evolution. While the three research parts deal with the same enterprise collaboration platform and how it is shaping and being shaped, they address its different textures.

Because of the open-ended and generative nature of enterprise collaboration platforms, organisations cannot anticipate what the enterprise collaboration platform will exactly bring about (see chapter 2.1.3 and chapter 3.4.1). Enterprise collaboration platforms are "never fully complete, […] they have many uses" (Zittrain, 2008, p. 43), requiring to follow and understand how and why they are transforming and in constant flux.

By means of the Monitoring Benefits Change (MoBeC) Framework (Nitschke & Williams, 2020) (see chapter 5.2), this research examines how expected and actually realised outcomes and benefits of the studied enterprise collaboration platform change. Specifically, snapshots of the enterprise collaboration platform outcomes and benefits at two different points in time (2016, 2018) are presented and compared. However, means-end reasoning from one particular moment in the biography of the enterprise collaboration platform to another is considered not fruitful. The enterprise collaboration platform, as any II, incorporates a series of ongoing adaptions and alternations, "Each shift in practice creates the conditions for further breakdowns, unanticipated outcomes, and innovations, which in their turn are responded to with more variations. And such variations are ongoing" (W. Orlikowski, 1996, pp. 4–5). MoBeC represents a first step towards capturing what happens between two states in the enterprise collaboration platform evolution (see chapter 5.2.2.2). Sometimes expected enterprise collaboration platform outcomes and benefits are achieved over time but through different than previously anticipated paths of transformation. For example, the case organisation expected to improve communication and collaboration across areas with the enterprise collaboration platform. While this aim was achieved to some degree, it was not achieved through the planned bulletin board with which the organisation hoped to bring different people from different business areas together. The organisation had the vision that people use the bulletin board to offer each other various products, services and free-time activities and thereby get in contact. However, this was not the case. In contrast, communication and collaboration across areas could mainly be improved through the unexpected emergence of project work and event organisation via the enterprise collaboration platform. For this, enterprise collaboration platform users started to use multi-site platform communities, set up for single projects and events, and collect experiences with such temporary workspaces. In other cases, expected paths of

transformation led to new unanticipated outcomes and benefits. For instance, platform communities were sufficiently built and maintained by different business areas and departments to present themselves to other areas and departments and provide individual information and business forms as expected. For this, people were trained on platform functionality and community management, among others. However, as people from different areas and departments started to apply what they have learned and retrieve information from other area and department related communities, a "network of firms" emerged, too. This network focuses not on the building of connections between individual employees but between business areas and departments forming the basis of information exchange between them and their coming together in matters of common concerns. As the infrastructure is used, drifts, referring to unexpected outcomes and side effects (cf. Ciborra et al., 2001, pp. 3–5, 137–138; Hanseth & Monteiro, 1998), may happen. They can appear at different scales and are typically not visible to all platform members at once. The MoBeC application findings presented in this chapter are based on the perspective of two persons with responsibility for the enterprise collaboration platform project (Project Manager, Head of IT). Drawing from their observations and perceptions, they assess expected and realised enterprise collaboration platform outcomes and benefits and associated transformations for the whole of the case organisation. Drifting "seams to lie outside the scope of control" (Hanseth & Monteiro, 1998, p. 159) of them and other platform participants. According to Ciborra et al. (2001), various factors, including the instable environment and the changing business, implementation tactics, the power of the installed base, the difficulty of anticipating user behaviour, and the enormous complexity of the II bring a different outcome about (p. 3).

In order to account for multiple, possible coexisting enterprise collaboration platform interpretations, this chapter further draws attention to the contextual shaping inherent in the enterprise collaboration platform design (see chapter 3.4.1.2 and chapter 5.3). The enterprise collaboration platform shapes and is shaped by the conventions of practice (Star & Ruhleder, 1996). Although the platform is "enabling and generic, [it is] not completely independent of use." (Hanseth & Monteiro, 1998, p. 49). This is investigated by means of the enterprise collaboration platform uses inscribed into the enterprise collaboration platform within and across different social worlds and working spheres (see chapter 3.4.1.4), respectively, over time. Thereby, use inscriptions (see chapter 3.4.1.3) are linked to the enterprise collaboration platform's interpretive flexibility (see chapter 3.4.1.1) as a relational attribute referring to the intertwining of platform use and interpretation with context. The contexts of different social worlds and working spheres, respectively, embody unique functions, members, environments, and policies. Correspondingly, the enterprise collaboration platform can have different meanings in different working spheres. In line with Henfridsson and Bygstad (2013), the evolution of an enterprise collaboration platform can be described as a process characterised through sociotechnical relations. Such relations emerge from information technology-mediated activities meaningful in the respective working sphere (p. 8). In this research work, working spheres are typically represented by enterprise collaboration platform communities having unique constellations of community members (with different backgrounds/history, experiences, expertise, attitudes), organisational and environmental arrangements (e.g. structure (collocated, distributed, hierarchical, etc), policies, norms, restrictions,

resources), and their tasks (e.g. provision of information, self-presentation, project work, intra-departmental communication). From an II perspective, people acquire familiarity with the platform and learn about the enterprise collaboration platform and possible uses as part of their membership in different working spheres. Since "infrastructure should be appreciated through the sensemaking of its users" (Henfridsson & Bygstad, 2013, p. 7), the three different individuals (Project Manager, Head of IT, Head of Analytics Research and Development (R&D)) serve as a point of departure for the analysis of different possibly intersecting working spheres and related enterprise collaboration platform adoption and design through use paths (see chapter 5.3.2.1). As shown in the findings, the portfolio and sequences of inscriptions are different for the three individuals due to the different settings (see chapter 5.3.2.2). However, some purposes of use inscribed into the enterprise collaboration platform are the same for the three individuals. For instance, they actively engaged in setting up and building a community for their business area or department (Communication and Marketing, IT, Analytics Research and Development) where, in each case, the use purpose of representation (provision of an overview about the area/department, its products and processes) was inscribed. The three individuals contributed their personal knowledge and experiences shaped also by other (possibly intersecting) social worlds they belong to. For example, the head of IT used the insights gained and learnings as part of his membership in the extended project team and editorial team responsible for the creation of first area and department related platform communities. Also, the project manager itself presented the purpose of the open accessible area and department related communities to various platform users in training sessions, and thereby inspired other social worlds within CPM03. In this way, he inscribed his "vision of (or prediction about) the world in the technical content of the new object" (Monteiro, 2000, p. 76). In other cases, the platform was used in unanticipated ways. For instance, some of the working spheres the project manager belongs to evolved into spaces where short-term use files with up-to-date information and material (e.g. the press review for field workers) were shared. In another example, the communities set up by the group wide analytics laboratories unexpectedly evolved into a company-wide encyclopaedia used by various customers. Such customers were typically people from different business units within the business area R&D, or from the business areas sales or production) who used the encyclopaedia to find laboratory related information and contact persons for chemical orders. As a member of various laboratory communities, the head of Analytics R&D gradually added more and more information about (new) core technologies in the field of (protective) coatings, i.e. she extended the encyclopaedia. For this, she adopted solutions from different working spheres in terms of presenting and structuring information (e.g. usage of tables for certain types of content).

Generally, the flexibility of inscriptions into the II of the enterprise collaboration platform varies (Hanseth & Monteiro, 1997, p. 3). Some inscriptions in the II, whether planned or not, gain strength and become background over time (e.g. means for representation, space for the planning and organisation of meetings). In other situations, inscriptions turn out to be too weak (e.g. know-how storage and distribution, group company Facebook, platform manual), i.e. they disappear again as they are opposed (e.g. by introduced rules prohibiting the sharing of know-how incorporating confidential data) or superseded by competing translations. The way the enterprise collaboration platform is interpreted by the three different individuals depends on the existing inscriptions they are involved in, while, at the same time, the emergence and translation of inscriptions depends on

the individual's proactive engagement in the understanding of the enterprise collaboration platform's interpretive flexibility (recursive relationship between interpretative flexibility and inscription) and its various working spheres (see chapter 5.3.2.2). This also means that working spheres are both the result and basis of interpretation. While some working spheres are more rigid, the boundaries of most working spheres are more fluid and can be marked by evolving distributed teams and fluctuating work practices (Mark & Poltrock, 2004). Such teams may be composed of members of the same organisational home but also of members who cross intra- and inter-organisational boundaries. In this research work, typical examples are teams with members from different sites of CPM03, the Swiss parent company and its different subsidiaries. Members from different sites mostly belong to the same organisational field (e.g. IT, marketing, research and development) and use the platform to provide and exchange information (e.g. regarding existing equipment and experts of different laboratories) and conduct project work and plan and organise common events (e.g. annual IT manager meeting or corporate analytics conference), among others, but in a very few cases may also belong to different organisational fields when they have common customers and clients.

Although all three individuals (project manager, head of IT, head of Analytics Research R&D) have discovered a similar number of enterprise collaboration platform uses that become inscribed in different working spheres, they still adopt the platform to different degrees and at different times. In this research work, *adoption quality* is used as a construct to examine changes in the degree to which the individuals show enthusiasm for the enterprise collaboration platform and related intention to accept and use it, actively participate in the shaping of the enterprise collaboration platform, and integrate it into their everyday work (see chapter 5.3.2.3). The findings reveal that the degree to which the individuals adopt the platform is linked to the conditions of the social worlds being more or less favourable to the platform adoption, such as existing organisational barriers, or resistance of social world members, and the degree to which the platform is considered a fit to the work practices in the respective working sphere(s) (Mark & Poltrock, 2004, p. 304). For instance, the head of Analytics R&D started to use the enterprise collaboration platform already before its official roll-out; however, uses such as networking between individual experts were limited because of the small number of platform users at the start. When the number of platform users increased through viral distribution and along with the official global roll-out of the platform, she was increasingly involved in the shaping of working spheres with a variety of geographically distributed members of analytics laboratories, and her enthusiasm about the platform increased. The working spheres she was involved in evolved into spaces where know-how and expertise between different R&D experts and teams were shared. As the working spheres grew in terms of the number of participants and were increasingly filled with content, a self-reinforcing process by which more users adopt the infrastructure as more resources are invested was started and lead to an increase in the usefulness of the infrastructure (Henfridsson & Bygstad, 2013, p. 24). Though, when company-wide guidelines about the handling of confidential data were released, her enthusiasm about the platform and usage intensity decreased significantly. The guidelines made the established practices and envisioned uses in the working spheres obsolete. For instance, the head of Analytics R&D hoped to build a platform community for trouble shooting with different interdisciplinary R&D

teams. However, confidential data (e.g. chemical formulation, production steps and related raw materials) needed to be shared via an alternative system, thus the importance of the platform for her everyday work decreased remarkably. In contrast, the head of IT was the last among the three individuals to adopt the enterprise collaboration platform. Persuading him to use the enterprise collaboration platform happened by offering immediate and direct usefulness of the II (Aanestad & Jensen, 2011). This includes the retrieval of IT relevant information shared by the corporate IT (IT company of the group). As time passed and the more intensively he was engaged in the platform design, the more usage possibilities he discovered himself (e.g. documentation database, schedule, exchange and discussion, feedback instrument).

To conclude, the enterprise collaboration platform "becomes infrastructure in relation to organized practices" (Star & Ruhleder, 1996, p. 113). Through the individuals' interactions with the platform and their endeavour to incorporate it into their work, the working practices evolve and new meanings are created (Dourish, 2004, p. 13). Put differently, the infrastructure "emerges from people, their daily actions, and technologies" (Star and Ruhleder, 1996, as cited in Cordella, 2010, p. 38).

The third research work part presented in this chapter addresses the multiple actors and factors linked to and surrounding the enterprise collaboration platform design and its embedding into the digital workplace at CPM03 (see chapter 5.4). Since the processes "are dynamic [and…] will change, often in unanticipated ways" (Le Dantec & DiSalvo, 2013, p. 254), attention is given to the different interlocking contexts incorporated in the II evolution over time. For this, this research work part particularly draws on the Biography of Artefacts (BoA) (R. Williams & Pollock, 2012) perspective (see chapter 3.4.1.5), which is "closely tied to an II perspective" (Monteiro et al., 2013, p. 597). It particularly addresses the II properties of being embedded into other structures, social arrangements and technologies, and not being limited to spatial or temporal reach or scope (Star & Ruhleder, 1996, p. 113).

The findings show how the enterprise collaboration platform as II changes over time where new parts are added to what exists (e.g. trainings, new types of platform communities), existing parts are removed from what exists (e.g. person-related analyses), or existing parts are replaced by improved ones (e.g. new Social Intranet version with a new search engine) (cf. Hanseth & Monteiro, 1998, p. 49).

Also, they reveal that the enterprise collaboration platform as II cannot be understood without its environment where changes in the environment may require changes in the II. Moreover, the II is embedded in its environment where strict borders between the II and environment cannot be drawn (cf. Hanseth & Monteiro, 1998, p. 78). To account for the wide reach of the II, BoA suggests to "capture the complex sets of developments taking place across a variety of locales, encompassing both the "local" context of immediate action and interaction, and its patterning by a broader context" (R. Williams & Pollock, 2012, p. 13) when examining the biography of a technology. In this research work part, the actors and factors attached to and surrounding the enterprise collaboration platform and its embedding into the digital workplace are mapped to the *technological field* (e.g. operating models for enterprise collaboration platforms, actors who police the field), the *history of collaboration at the case company* (collaboration systems, such as IBM Notes, and different network solutions), *actors interacting with the enterprise collaboration platform in the broader and*

immediate setting (e.g. systems competing with each other in company group, other enterprise collaboration platform using companies increasingly using an enterprise collaboration platform technology (ECS) from another vendor, enterprise collaboration platform communities filled up with contents from the old Intranet, system breakdowns, social intranet terminals). The different layers serve as a means to analyse and understand the biography of the enterprise collaboration platform and related design levels (see chapter 3.4.1.2); however, they are not naturally given and are blurring and relational (Bowker & Star, 1999; Pollock & Williams, 2009).

As stated in chapter 3.4.1.2, different human and nonhuman actors can have strong or weak ties with the platform. Actors with strong ties show intentionality and consciousness with regard to platform design, hence show any motivated, transformational activity in the design. As seen in figure 5-12 (chapter 5.4.2), such actors often interact with the enterprise collaboration platform in the immediate setting. For example, training sessions seeding initial platform use patterns, or CPM03's project manager trying to enable platform consuming activities by blue-collar workers. Sometimes, actors with strong ties interact with the enterprise collaboration platform in the broader setting. For instance, the German works council addressing employee data protection enforces the removal of download information in the platform. Actors with weak ties with the platform show little to no intentionality and consciousness concerning platform design. Still, they participate in the shaping of the platform in that they influence the way that it evolves over time. In this research work, and as visible in figure 5-12, they typically interact with the enterprise collaboration platform in the broader setting. Examples are the General Data Protection Regulation (GDPR), the ongoing company takeover battle, or costs for email licenses required for Intranet access.

The research findings also illustrate that the process of enterprise collaboration platform formation is complex and in essence an evolving sociotechnical network with arrays of various and heterogeneous actors and factors (Hanseth & Lyytinen, 2010; Hanseth & Monteiro, 1998; R. Williams & Pollock, 2012) that interact and relate. As stated by Henningsson and Henriksen (2011), the development of II "should be seen as an ongoing dynamic interaction rather than a linear evolution" (p. 368). For example, the ongoing hostile company takeover battle comes with high sales required for a good shareholder value to avert the takeover. As a consequence, the case company has limited financial resources for the enterprise collaboration platform project and employees have an increased workload. This initially impacted the willingness of employees to explore platform functionality, also because they were already using a variety of other (partially competing) systems and meant that the case company had to keep the costs for email licenses required for access to the intranet and enterprise collaboration platform low. The latter was achieved by excluding blue-collar workers from the enterprise collaboration platform design, i.e. they had not a company email address to access the platform. Being employees who perform manual labour in production plants typically without sitting at a computer the case company considered it an acceptable solution. However, as the works council's chairman striving to increase workplace democracy entered the arena, he invoked a discussion about the inclusion of blue-collar workers. His efforts were backed by ongoing discussions about the role of blue-collar workers among a range of other enterprise collaboration platform using companies. In order to satisfy the works council's chairman and avoid that he becomes an opponent of the platform, the enterprise collaboration

platform project manager conducted a survey with blue-collar workers to determine their interest for an email address and thus access to the platform. Since the majority of the survey participants expressed their interest, he implemented a series of platform user training courses for blue-collar workers. However, the training revealed that the company's blue-collar workers lacked the required technical skills to fill the platform with content and actively shape it. Thus, the enterprise collaboration platform project manager proposed the introduction of Social Intranet terminals used by blue-collar workers just for consuming information shared via the enterprise collaboration platform.

Another example deals with the future role of the case company's enterprise collaboration platform which was built around IBM Connection operated in the cloud. At a time when a critical mass had adopted IBM Connections, and successfully integrated it into their daily work, the enterprise collaboration platform project manager observed the increasing role of IBM's competitor Microsoft (MS) in the enterprise collaboration platform market. This became visible in the community of enterprise collaboration platform using companies increasingly using Microsoft's collaboration suite MS Office 365 (now called Microsoft 365). MS Office 365 was seen as the incarnation of the digital workplace, a trending topic prevalent in society and business. With the suspected goal of keeping up with the times, the case company's parent company decided to introduce MS Office 365. One concern of the case company's enterprise collaboration platform project manager was that this meant an abandoning of IBM Connections in favour of MS Office 365, implying that the II project would have failed albeit its success. Concomitantly, he expected a negative impact on the adoption of MS Office 365 where employees do not want to put effort into turning a new platform and II, respectively, into something useful again. And indeed, an interview conducted spontaneously with the case company's parent company about two years later revealed that the organisation planned to replace IBM Connections. However, they aimed for a smooth long-term transition from IBM Connections to Microsoft 365. This was not feasible, though. After HCL acquired the Connections technology, the vendor announced in 2020 that the HCL Connections Cloud would be ceased. The existing contract extension between the case company's parent company and IBM did not help in this matter; approaches to data migration proposed to the parent company were considered immature. Because of this and the unforeseen COVID-19 pandemic, which gives a push further to digitalised work, the parent company completely migrated the Connections data to Microsoft 365 in the shortest possible time. Thus, they paved the way for a new enterprise collaboration platform which builds upon an existing installed base but constitutes a new point of departure with uncertain outcomes.

When reflecting on this research work part, the set of the actors and factors and the relationships between them are artificially (but usefully) defined in the way that the level of focus of the investigation is limited based on the shared perspectives of the interviewees and the researcher's interpretation. However, it must be acknowledged that II are open in the sense that there are no limits in terms of the users, stakeholders, vendors, technological components, etc. involved so that a strict border regarding what the II includes and what not cannot be drawn (Cordella, 2010, p. 45; Hanseth & Monteiro, 1998, p. 10). Different aspects of the II are sensed and stressed by different people at different locales (C. P. Lee & Schmidt, 2018; Star & Ruhleder, 1996) (see chapter 3.4.1).

5.6 Insights from enterprise collaboration platform change across multiple spaces and time frames into the building of digital transformation capabilities

In the following, the developed preliminary conceptual model of *when digital transformation capabilities are and emerge* (see chapter 4.4, version 1) is extended based on the findings about enterprise collaboration platform change across multiple spaces and time frames. Specifically, the findings presented in this chapter, stemming from the interviews conducted with the case company (I1-I4) and related case material (see chapter 3.5.2), were reviewed and examined thoroughly employing the theoretical notion of information infrastructure (II) and related sociotechnical perspectives and concepts (interpretive flexibility, design through use, inscriptions, social worlds / working spheres, and BoA) (see chapter 3.4.1) together with the theoretical background of digital transformation capabilities (see chapter 3.4.2). Interpretation is guided by abductive reasoning in that existing theory in the form of the preliminary conceptual model (version 1) and current data from the in-depth case study are considered in tandem (Alvesson & Kärreman, 2007, as cited in Gioia, Corley, & Hamilton, 2013, p. 21). Several iterations of interpretation (see chapter 3.5.8) are required to identify and visualise when digital transformation capabilities are and emerge. The process of interpretation incorporates the writing down, comparing, labelling, relating, and restructuring of ideas and notes.

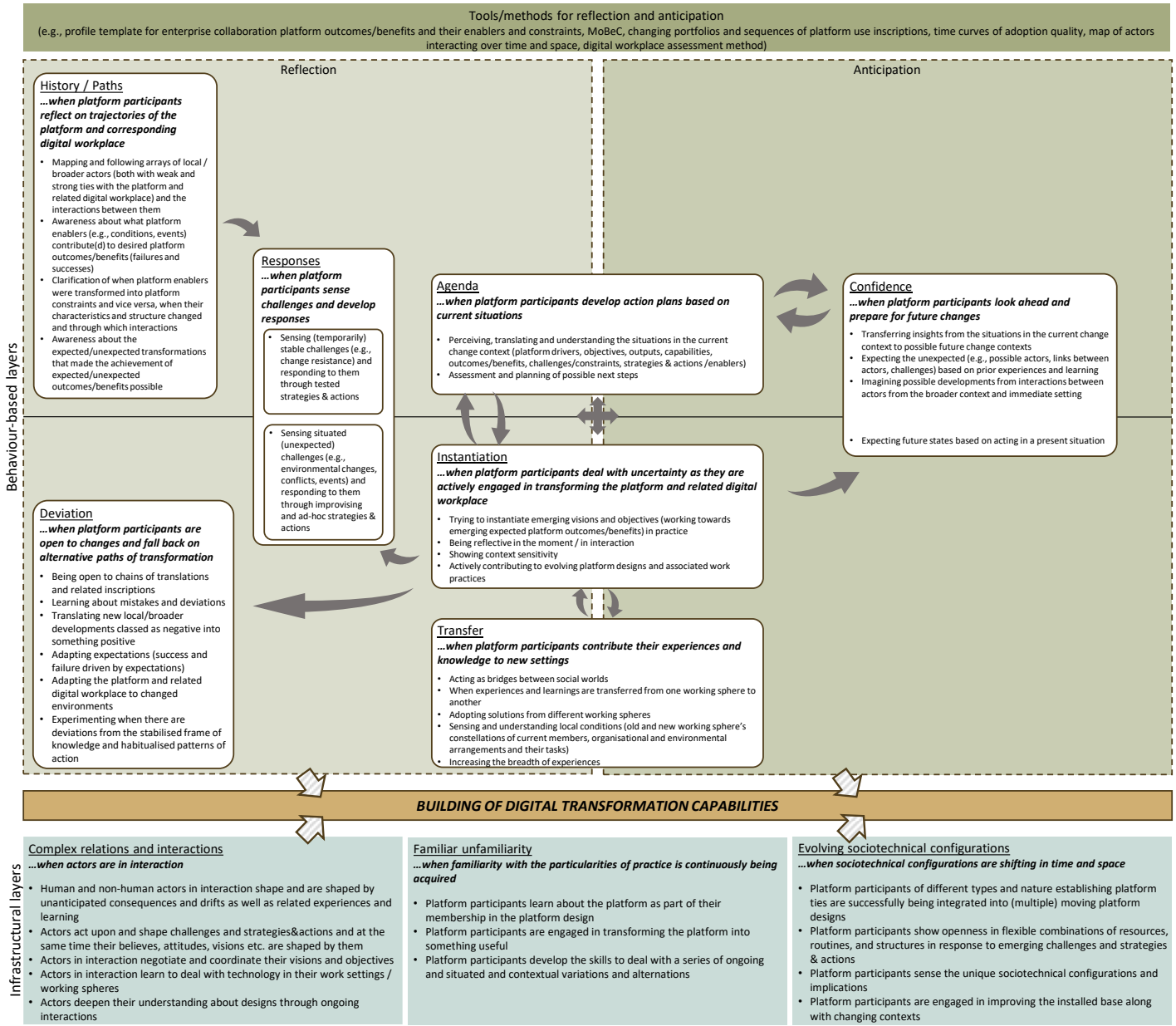


Figure 5-13. Conceptual model of when digital transformation capabilities are and emerge – version 2

Still, at the centre of figure 5-13 is the *building of digital transformation capabilities* framed by two types of layers of explanation for the building of digital transformation capabilities: behaviour-based layers (upper part of figure 5-13) and infrastructural layers (bottom part of figure 5-13). Both layers have not changed with the extension of the conceptual model (see chapter 4.4). However, most of the arenas included in both layers were adjusted or extended. Some arenas are new. The arenas are described below.

Behaviour-based layers

History / Paths. This arena focuses on planned reflection, i.e. digital transformation capabilities can be and emerge when platform participants follow a plan and established practice, respectively, to reflect on trajectories of the platform and digital workplace. This allows them to understand the current change context, acknowledging path-dependency (cf. Hanseth & Lyytinen, 2004; Monteiro et al., 2013). The findings in chapter 5 show how the studied enterprise collaboration platform changes across multiple spaces and time frames. Thereby, platform participants need to pay attention to the evolving sociotechnical setting and understand and learn from the biography of the platform in order to develop the capabilities required for the management of the related digital transformation. The way that the platform changes is shaped by the installed base and the relations between various actors from the immediate setting and broader context. Consequences from the multiple dynamic relations can best be identified when mapping and following the arrays of actors and their linkages. As the platform is in use, multiple new parts can be added to what exists and existing parts removed from what exists, or existing parts substituted by improved ones (Hanseth & Monteiro, 1998, p. 49). Likewise, platform uses can be reinforced or superseded by new ones. While some changes can straightforwardly be referred to platform participant's purposeful actions in the enterprise collaboration platform and related digital workplace design, most are the (unanticipated) result of the web of multiple relations. Documenting how and why the enterprise collaboration platform and corresponding digital workplace evolve, including the achievement of expected and unexpected enterprise collaboration platform outcomes and benefits and the necessary transformations, may help platform participants acquiring relevant competencies and resources for dealing with future changes.

As stated in chapter 4.4, this arena places emphasis on planned reflection through the application of tools and methods, such as MoBeC, changing portfolios and sequences of platform use inscriptions, or the map of actors that guide reflective activities.

Responses. This arena focuses on planned and situated reflection, i.e. digital transformation capabilities can be and emerge when platform participants sense challenges in the enterprise collaboration platform change and related digital workplace and develop responses. Associated activities and behaviour can be categorised as planned when platform participants sense (temporarily) stable challenges (e.g. hostile company takeover battle) and respond through tested strategies and actions. Responses to such challenges may be identified from documented reflections as part of the *History/Paths* arena (e.g. strategies and actions identified as successful for such or

similar challenges the platform participant is familiar with). When platform participants sense situated, unexpected challenges (e.g. environmental changes, conflicts between platform participants, organisational events) and respond to them through improvising and the application of ad-hoc strategies and actions, then their activities and behaviour can be regarded as situated. According to Suchman (Suchman, 1985), situated action "comprises necessarily ad hoc responses to the actions of others and to the contingencies of particular situations" (sec. abstract). Chapter 5 does not particularly deal with the implementation of strategies and actions in response to different challenges. However, it provides information about how the enterprise collaboration platform design is altered by certain challenges and how platform participants adjust their design activities as they are engaged in the situations of the digital transformation (*Instantiation* arena). For instance, when platform participants were faced with the publication of guidelines about the handling of confidential data, they changed their behaviour in platform-enabled working spheres. While the exchange of know-how across locations was significantly reduced, some platform participants (e.g. Head of Analytics Research and Development) focused on building up an encyclopaedia about laboratory related information and people, and internal communication and sharing of work-relevant but non-sensitive information within their department.

Instantiation. This arena focuses on situated reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants deal with uncertainty as they are actively engaged in transforming the platform and related digital workplace. Chapter 5 draws attention to the ways platform participants actively contribute to evolving platform designs and associated work practices. As platform participants try to instantiate expected enterprise collaboration platform outcomes and benefits (as inscribed in digital transformation agendas (*Agenda* arena)), their expectations are reflected on and translated in the specific change context and situations. As examined using the MoBeC framework, outcomes and benefits may sometimes be of no relevance anymore and new outcomes and benefits may emerge as the enterprise collaboration platform is designed through use over time. Also, the specific transformations and local articulations that make for the delivery of expected and unexpected platform outcomes and benefits as well as multiple co-existing platform uses happen in practice. Thereby, practice coins and is coined by the transfer of experiences and knowledge to new settings (*Transfer* arena). As platform participants are engaged in transforming the platform and related digital workplace and both gain and implement experiences and knowledge, they need to be reflective in the moment. Sometimes, there are major deviations from intended paths of transformation (*Deviation* arena).

Transfer. This arena focuses on situated reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants contribute their experiences and knowledge to new settings (cf. Mark & Poltrock, 2004). In other words, platform participants transfer what they have learned about the enterprise collaboration platform and digital workplace design in one setting to other contexts. The findings in chapter 5 reveal that people may act as bridges in transporting the enterprise collaboration platform and possible platform uses across different social worlds. This may also include transferring experiences and learnings from one working sphere to another. For example, experiences and learnings gained from a community set up for a certain project may be transferred to a new community that is being shaped and shaping in

the context of a new project. Also, outcomes of design activities may be reflected on, adopted and passed from different working spheres into other working spheres (e.g. the head of Analytics Research and Development actively oriented herself towards how others present and structure information in different working spheres and transferred solutions (including the usage of tables for certain types of content) to working spheres she was an active member of. The in-situ transfer requires sensing and understanding local conditions (old and new working sphere's constellations of current members, organisational and environmental arrangements, and their tasks), and anticipating results of the transfer. Over time and as both intended and unintended consequences come about in different settings, experiences increase in breadth and are incorporated in the instantiation of emerging visions and objectives (*Instantiation* arena).
It must be noted that transfer may also be planned when plans are developed to prescribe action and behaviour for the transfer. However, this arena places emphasis on transfer, incorporating reflection and anticipation, in a situated fashion.

Deviation. This arena focuses on situated reflection, i.e. digital transformation capabilities can be and emerge when platform participants are open to changes and fall back on alternative paths of transformation. The findings in chapter 5 show that the studied enterprise collaboration platform constantly grows in complexity and deviates from initial plans (cf. Ciborra et al., 2001) as platform participants are instantiating emerging visions and objectives in practice (*Instantiation* arena). For example, expected enterprise collaboration platform outcomes and benefits may be achieved over time but through different than previously anticipated paths of transformation. Also new paths of transformations may yield new outcomes and benefits. While deviations are often inevitable, they are not necessarily negative. They can be linked to mistakes, but most often cannot be controlled due to the many-faceted sociotechnical processes. When the enterprise collaboration platform and related digital workplace are changing in unforeseen ways, platform participants need to be open to the new developments (e.g. platform use translations and related inscriptions, new actors policing the field, changing business tactics) and adapt their expectations and behaviour in the current situation. Developments need to be reflected on as platform participants are engaging in the digital transformation. If they are unfavourable considering original intentions, they need to be viewed from a new angle and translated into something positive to make the best out of the enterprise collaboration platform and related digital workplace. For example, the works council's actions to push the inclusion of blue-collar workers in the enterprise collaboration platform design initially were associated with additional effort (survey, additional training sessions) and regarded inappropriate (e.g. limited technical skills ascribed to blue-collar workers). Though, the project manager used it as a chance to design a computer-mediated solution that enables blue-collar workers to access the enterprise collaboration platform (Social Intranet terminals) and the abandoning of pre-established but nonpractical offline work practices (bulletin board in production plants to disseminate various, often human resources related, information). In another example, the head of Analytics Research and Development started to use the enterprise collaboration platform as a means to get in contact and connect with different distributed employees and colleagues. Though, the platform use inscription, a 'group company Facebook', was not strong enough to be followed. Instead, the unanticipated but desirable inscription of a 'network of firms' emerged

focusing not on the building of connections between individual employees but between business areas and departments via their open accessible representative platform communities. It became increasingly stronger as more business areas and departments were building up their own representative platform communities.
Key to the development of digital transformation capabilities in this arena is that platform participants try out new ways of doing and experiment when there are deviations from the stabilised frame of knowledge and habitualised patterns of action.

Agenda. This arena focuses on planned reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants develop action plans based on the current change context. This involves reflection through perceiving, translating and understanding the situations in the current change context (e.g. platform drivers, objectives, outputs, outcomes/benefits, challenges/constraints, strategies and actions / enablers) and anticipation through the assessment and planning of possible next steps. With the Monitoring Benefits Change (MoBeC) framework presented in chapter 5, platform participants have a tool to do so. Plans for action can be regarded as derivative from the situated engagement of platform participants (*Instantiation* arena). Corresponding agendas become typically inscribed into different material or medium (e.g. formal discussions, roadmaps, platform advertising strategies and texts, training material, platform communities providing guidelines and examples of current best practices) (cf. Holmström & Robey, 2005). For the development of digital transformation capabilities, it is important that such agendas are not static but flexible and dynamic so that changes happening as part of the digital transformation can be taken into consideration.

Confidence. This arena focuses on planned and situated anticipation, i.e. digital transformation capabilities can be and emerge when platform participants look ahead and prepare for future changes. In contrast to the *Agenda* arena, which deals with planned actions based on the current change context, this arena concerns anticipated change contexts and how platform participants can handle them in future. Central to this are experiences with and learning from documented situations in the current change context (*Agenda* arena). Platform participants can transfer insights gained from the situations in the current change context to possible future change contexts. For instance, platform participants from the case organisation knew about the planned introduction of another enterprise collaboration platform (MS Office 365) being part of an anticipated change context. While there were many open questions (e.g. about the relevance of and link to the existing enterprise collaboration platform, positioning of the platform in the IT landscape, or integration with other platforms and applications), platform participants were in the position to transfer insights from the current platform setting, such as the necessity of a low entry threshold for potential platform adopters, e.g. by prefilling the platform with content). This arena also incorporates expecting the unexpected based on prior experiences and learning. Organisations may have faced unexpected challenges (for example, unexpected factors attached to the enterprise collaboration platform design, e.g. platform performance problems, or unexpected links between different actors, e.g. between the company takeover battle, limited financial resources, multiple partially competing systems, and employees with high workload and limited willingness to explore platform functionality) in the past allowing them to expect surprises in the future and be prepared for them.

Chapter 5 illustrates the possibility of imagining possible developments and consequences from the interactions between actors from the broader context and immediate setting (e.g. from interactions between the announced sale of IBM products to HCL, other enterprise collaboration platform using companies increasingly using MS Office 365, and IBM Connections not handled as a project in the case organisation anymore). The forward-looking actions and behaviour involved in this arena may shape how the situations in the current change context are assessed and the next steps planned as part of the digital transformation (*Agenda* arena). Often, possible future states only become clear as platform participants are acting in a present situation (Suchman, 1985, p. 37) and contributing, in situ, to evolving platform designs and associated work practices in different working spheres (*Instantiation* arena).

Arenas categorised as reflection and anticipation can be supported by means of a set of *tools/methods* (bar at the top of figure 5-13) that may be part of planned or situated modes of action. In chapter 5, the Monitoring Benefits Change (MoBeC) framework, the changing portfolios of inscriptions, time curves of adoption quality, and the map of interacting actors and factors were developed and discussed. While they may also support situated reflection and anticipation, they primarily serve planned reflection and anticipation.

Infrastructural layers

These layers concern different, but related and blurring information infrastructure properties explaining when digital transformation capabilities are and emerge. Specifically, they represent the underlying logics of the behaviour-based layers. In this respect, they help organisations and their organisational members understand the different arenas of the behaviour-based layers. In comparison to the behaviour-based layers, infrastructural layers do not distinguish between reflection and anticipation, and planned and situated, respectively.

Three different infrastructural layers come into focus when reviewing and examining the findings presented in chapter 5. The three layers can be described as follows.

Complex relations and interactions. Acknowledging the relational quality of information infrastructure (Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when actors are in interaction. Their interactions are complex and "embedded in open ranges of relationships" (Cordella, 2010, p. 45). Actors discussed in chapter 5 are both human and nonhuman and can be referred to the immediate and broader context as well as different time frames. They range from topics discussed in the technological field to platform and network technologies unfolding in the history of collaboration at the case company, environmental and internal elements and conditions (e.g. other platform using companies or regulations from the outer context, or internal resources, culture or political systems from the inner context), to players with local actions and influences as part of the enterprise collaboration platform implementation project or design and usage at the case company. Their interactions span multiple levels and time frames (see *evolving sociotechnical configurations*) and reflect the information infrastructure's openness (with no limits in terms of the users, stakeholders, vendors, technological components, etc. (Hanseth & Monteiro,

1998)) as well as its embeddedness into other structures, social arrangements and technologies (Star & Ruhleder, 1996). The embeddedness transforms the conditions of practice (see *familiar unfamiliarity*) and affects learning dynamics (Vaast & Walsham, 2009). When actors are in interaction, they shape and are shaped by unanticipated consequences and drifts and related experiences. Through evolving interactions, they can deepen their understanding about designs and adjust their expectations in individual work settings.

Familiar unfamiliarity. Acknowledging that information infrastructure evolves as it links with the conventions of practice and is learned as part of membership (Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when familiarity with the particularities of practice is continuously being acquired. As discussed in chapter 5, platform participants learn about the platform as they contribute to the platform design at different locales and in different working spheres. The ongoing and situated and contextual variations and alternations, incorporating unique constellations of individuals and their tasks as well as organisational and environmental arrangements (see *evolving sociotechnical configurations*), come with a series of ongoing adaptions required to transform the platform into something useful and to generate desirable expected and unexpected outcomes and benefits. This also includes dealing with various actors - sometimes with reach across different local practices (see c*omplex relations and interactions*). In this way, digital transformation capabilities only emerge in practice and as the platform is designed through use, where stability is only temporary and the processes of learning and familiarising with the infrastructure is never complete.

Evolving sociotechnical configurations. Acknowledging the heterogeneous and evolving nature of information infrastructure as well as the reach and scope of information infrastructure (Hanseth & Monteiro, 1998; Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when sociotechnical configurations are shifting in time and space. Thus, understanding when digital transformation capabilities can be and emerge requires an extended view on design not restricted by particular locales and immediate action (R. Williams & Pollock, 2012). The emergence of digital transformation capabilities "is an outcome of multiple paths of interconnected contextual conditions and mechanisms" (El Sawy et al. 2010; Meyer et al. 1993; Pawson and Tilley 1997, as cited in Henfridsson & Bygstad, 2013, p. 5). Chapter 5 reveals that platform participants shape and are shaped by the sociotechnical configurations as they are engaged in transforming the platform and related digital workplace (see *familiar unfamiliarity*). In order to successfully use and gain experiences and knowledge in different settings, platform participants need to sense the unique configurations and implications as well as the related causal complexity (see *complex relations and interactions*).

Chapter 6
Digital Workplace Competencies and Priority Areas

The previous findings chapters (see chapter 4 and chapter 5) focus on how enterprise collaboration platforms are developing over time, comprising multiple different actors and design paths. The research work part presented in this chapter signifies the shift from enterprise collaboration platforms to the broader notion of the digital workplace. Enterprise collaboration platforms with their integrated social software functionality and other business information systems have become the core of today's digital workplace (DWP) (S. P. Williams & Schubert, 2018). Because the affordances of enterprise collaboration platforms offer interpretive flexibility and malleability (see chapter 2.1.3 and chapter 3.4.1.1), the DWP can be envisioned and designed differently, and, correspondingly, different areas in the design of the DWP may be prioritised. Moreover, enterprise collaboration platform using organisations may gain different competencies as they interact with the platform and are engaged in the shaping of the platform according to their DWP visions and experiences.

In order to identify and assess the competencies and priority areas in the design of the enterprise collaboration platform enabled DWP (see objective O4; chapter 1.2), the research work part presented in this chapter develops and applies a method for capturing, assessing, visualising, and comparing the different competencies and priority areas enterprise collaboration platform using organisations might have in the design of the DWP. For the development of the method, this research work part uses insights gained through a focus group (F3; see chapter 3.5.5) on DWP characteristics and elements and required resources and competencies. For the application of the method, it draws on multiple case study research incorporating both within and across company comparisons (Thomas, 2011) (see chapter 3.2). Specifically, different perceptions of individual practitioners / collaboration experts towards their organisations' DWP priority areas and competencies are identified and contrasted (see research question O4-Q1; chapter 1.2) reflecting the flexibility in the design of the DWP. Discrete snapshots are taken at two different points in time (10/2018, 02-03/2019) using questionnaire-based surveys (Q2.1, Q2.2; see chapter 3.5.3) and allowing for over-time comparisons (see research question O4-Q2; chapter 1.2). The data collected with the questionnaire are structured and visualised using spider web diagrams (see chapter 3.5.7).

6.1 Research inquiry outline

The aim of this research work part is *to identify and compare the competencies and priority areas enterprise collaboration platform using organisations have in the design of the enterprise collaboration platform enabled digital workplace (DWP) by developing and applying a suitable DWP assessment method*.

Specifically, the objectives are to…

i. identify and examine characteristics and elements of the DWP as envisioned by enterprise collaboration platform using organisations,
ii. identify and examine the resources and competencies available and needed by enterprise collaboration platform using organisations for the design of a successful DWP,
iii. consolidate the findings about DWP characteristics and elements, as well as required resources and competencies to build a DWP assessment method, and
iv. use the DWP assessment method to collect, visualise, examine, and compare how enterprise collaboration platform using organisations and their organisational members assess their company's competencies and priority areas in the design of the DWP and how the assessments may change over time.

This research work part is divided into two main research phases*: designing the DWP assessment method*, and *applying the DWP assessment method*. The latter incorporates a first and second data collection phase to allow for an over-time comparison of the DWP assessments. The different research phases and their research steps (22 in total) are shown in figure 6-1 and elaborated below.

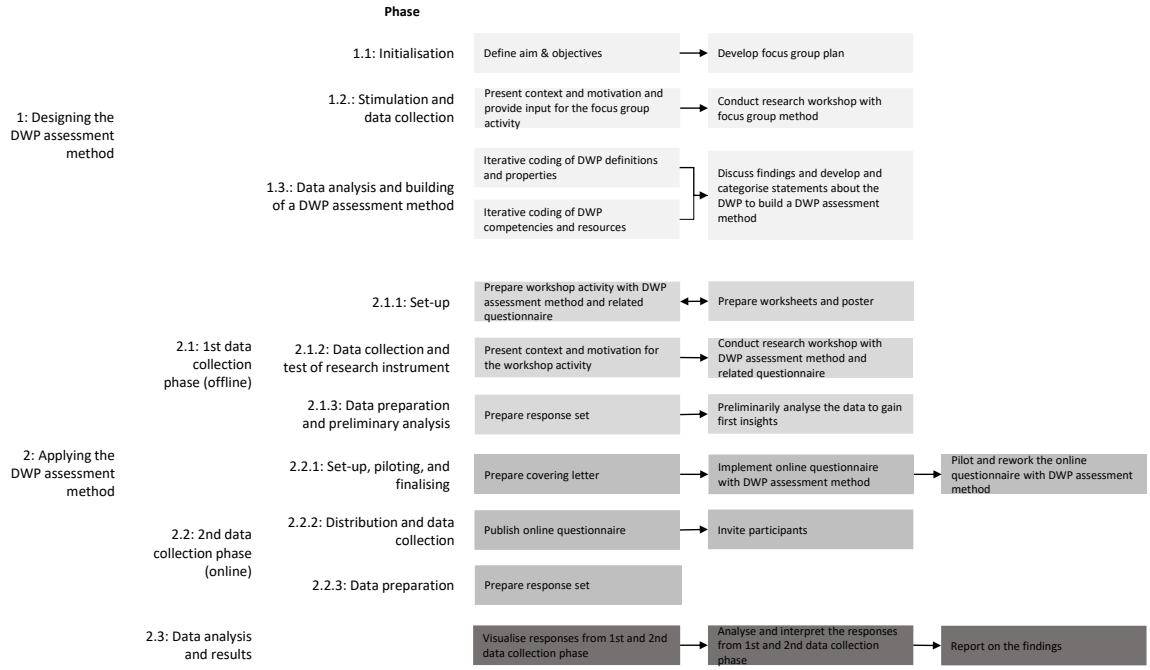


Figure 6-1. Phases and steps of the development and application of a DWP assessment method (F3, Q2.1, Q2.2) informed by Gillham (2000) and Caillaud and Flick (2017).

Designing the DWP assessment method

This phase is split into three subphases, namely 1.1.: Initialisation, 1.2: Stimulation and data collection, and 1.3: Data analysis and building of a DWP assessment method.

Phase 1.1: Initialisation

This research work part is initialised by defining the research aim and objectives (first step). A clear research aim and clear research objectives are required to identify a suitable research approach and outcome. In order to base the planned DWP assessment method on real-world experiences, the focus group method is selected. Specifically, it is considered as a means for gathering characteristics and elements of the DWP as envisioned by enterprise collaboration platform using organisations as well as resources (“stocks of tangible and intangible assets that are available to the organization” (Galavan, 2015, p. 3)) and competencies (“The collective organizational routines used to deploy resources” (Galavan, 2015, p. 3)) that are already available and still needed by such organisations to achieve their DWP visions. A separation into already available and still needed resources and competencies is to provide first insights into the status quo of organisations’ DWP.

In the second step of this phase, a focus group plan is developed and in preparation of an IndustryConnect (see chapter 3.6) research workshop scheduled for April 2018. This includes the creation of required material for the data collection and related instructions: worksheets to collect DWP definitions and keywords (DWP canvas) as well as related DWP resources and competencies.

Phase 1.2: Stimulation and data collection

In the research workshop in April 2018, the workshop participants (see table 9-1, Appendix A), a heterogeneous group of 15 collaboration experts from 12 IndustryConnect member organisations (comprising a range of industries), are stimulated (first step of this phase). The context and motivation of the research project are described to provide input for the focus group activity. Also, the method and related data gathering instrument selected for the focus group activity are presented. In the second step of this phase, data is collected from the workshop participants using the focus group method (F3, see chapter 3.5.5). For the data collection, individual worksheets are handed out to the focus group participants who are instructed with the following guiding questions and tasks:

1. Think about what the current digital workplace means to you and/or your organisation. What does the digital workplace look like, what characteristics should it have?
2. Write down your thoughts on the DWP canvas.
   - Give the DWP a name
   - Write a brief (1-2 sentences) description of the DWP
   - Identify keywords of the DWP
3. What resources and competencies do you have and what do you need to be a successful DWP?

To trigger thinking, examples for a DWP canvas, and for resources and competencies are provided to the focus group participants as shown in figure 6-2.

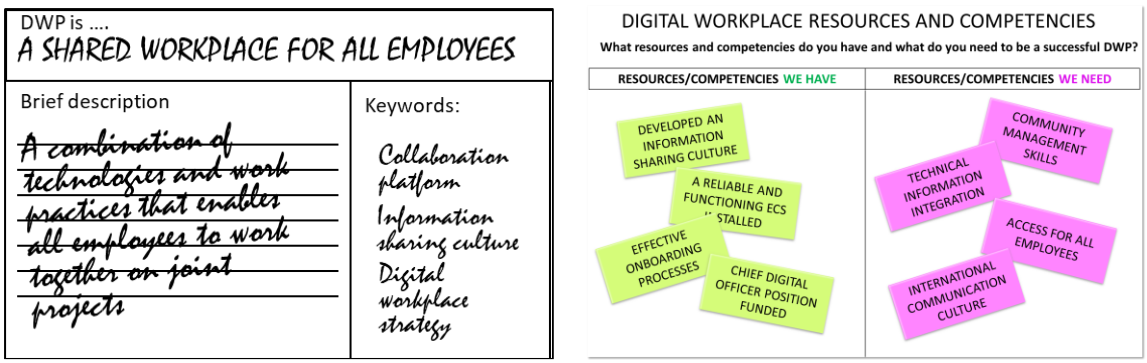


Figure 6-2. Examples for a DWP canvas (DWP description and keywords) and resources/competencies provided to the focus group participants as an input.

Phase 1.3: Data analysis and building of a DWP assessment method

The data from the completed worksheets are entered into two separate excel spreadsheets, one for the DWP descriptions and keywords and one with the resources and competencies. In the first two parallel steps of this phase, both the DWP descriptions/keywords and resources/competencies are iteratively coded by two independent researchers from the IndustryConnect initiative (including the author of this research work).

DWP descriptions/keywords: In the first coding cycle, open codes (Strauss & Corbin, 1998) of DWP characteristics and elements are developed based on in vivo and descriptive coding (Saldaña, 2009) (e.g. AI, process automation, clean, one platform, user-generated content, user-specific filtering, interdisciplinary team). In the second coding cycle, the developed codes are grouped to build inferential/pattern codes (Saldaña, 2009), i.e. themes (e.g. smart/intelligent, business direction, "is", unified, supports, individual/personalised, new way of working). Next, the themes and their codes are assigned to the three thematic categories of DWP characteristics (*organisational strategy and design*, *people and work*, *technology platform*) as identified from the literature (see figure 6-3) by Williams and Schubert (2018).

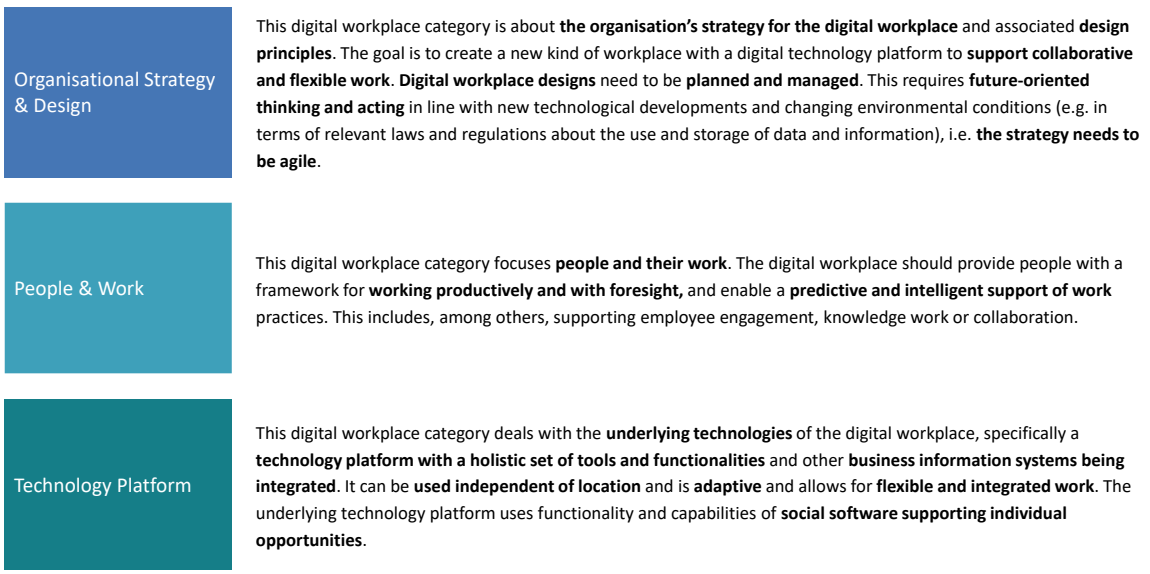


Figure 6-3. Thematic categories of DWP characteristics according to Williams and Schubert (2018).

The thematic categories of DWP characteristics give an idea about the DWP concept and its different dimensions. However, the specific codes (see figure 6-4) developed from the focus group (F3) give more insights into the manifold qualities of today's DWP.

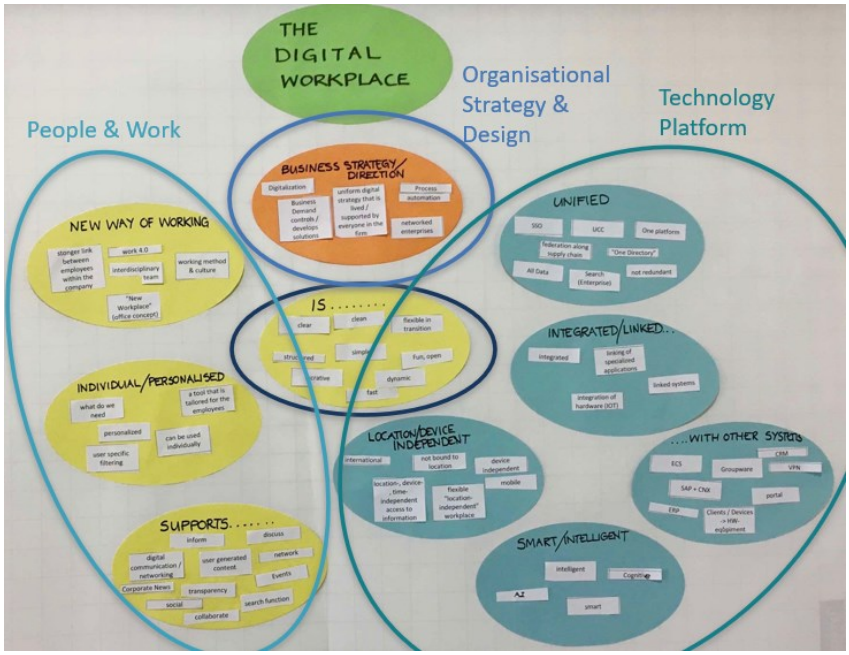


Figure 6-4. Codes of DWP characteristics (developed from focus group (F3) data).

Resources/competencies: In preparation of the first coding cycle, the DWP resources and competencies entered literally into the excel spreadsheet are separated from each other. In the first coding cycle, codes for resources and competencies, respectively, are merged in the case that they are conceptually similar, and in some cases renamed applying descriptive and in vivo coding (Saldaña, 2009). In the second coding cycle, the developed codes of resources (e.g. digital transformation officer, APIs, document management function, workgroup for DWP/digitalisation, innovation hubs) are grouped thematically (e.g. workforce, infrastructure, systems/applications/networks and their functionality, facilities), and, likewise, the developed codes of competencies (e.g. clear DWP vision, consideration of entire supply chain, intelligence in processes, shared work practices, managers as role models) are grouped thematically (e.g. strategy and vision, governance and control, change management), using pattern coding (Saldaña, 2009). Also, it is calculated how often the respective codes and categories of resources and competencies are mentioned and how often they are available or still needed for the design of the envisioned DWP (see table 9-7 and table 9-8 in Appendix C).

Next, the findings about DWP descriptions/keywords and resources/competencies are reviewed and discussed between the two researchers to build a DWP assessment method. Inferences are drawn about required competencies for deploying resources in different areas in the design of the DWP (with different characteristics and elements), and concomitant statements are iteratively formulated. The statements are grouped based on identified commonalities, and conceptual labels are assigned, reflecting common themes of the aggregated statements (Saldaña, 2009). Further, the different themes are attached to the three categories of DWP characteristics (S. P. Williams & Schubert, 2018) representing overarching DWP areas (*organisational strategy and design*: strategy and vision, governance and compliance, change management; *people and work*: individualised/personalised, work group support; *technology platform*: unified platform, integrated with other information systems, location and device independent). Together, the grouped statements

constitute a method for organisations to assess their status quo, i.e. their current competencies and priority areas in the design of the DWP.

Phase 2: Applying the DWP assessment method

This phase is separated into three subphases: 2.1: 1st data collection phase (offline), 2nd data collection phase (online), and 2.3: Data analysis and results. The researcher of this research work has the lead in these phases.

Phase 2.1: 1st data collection phase (offline)

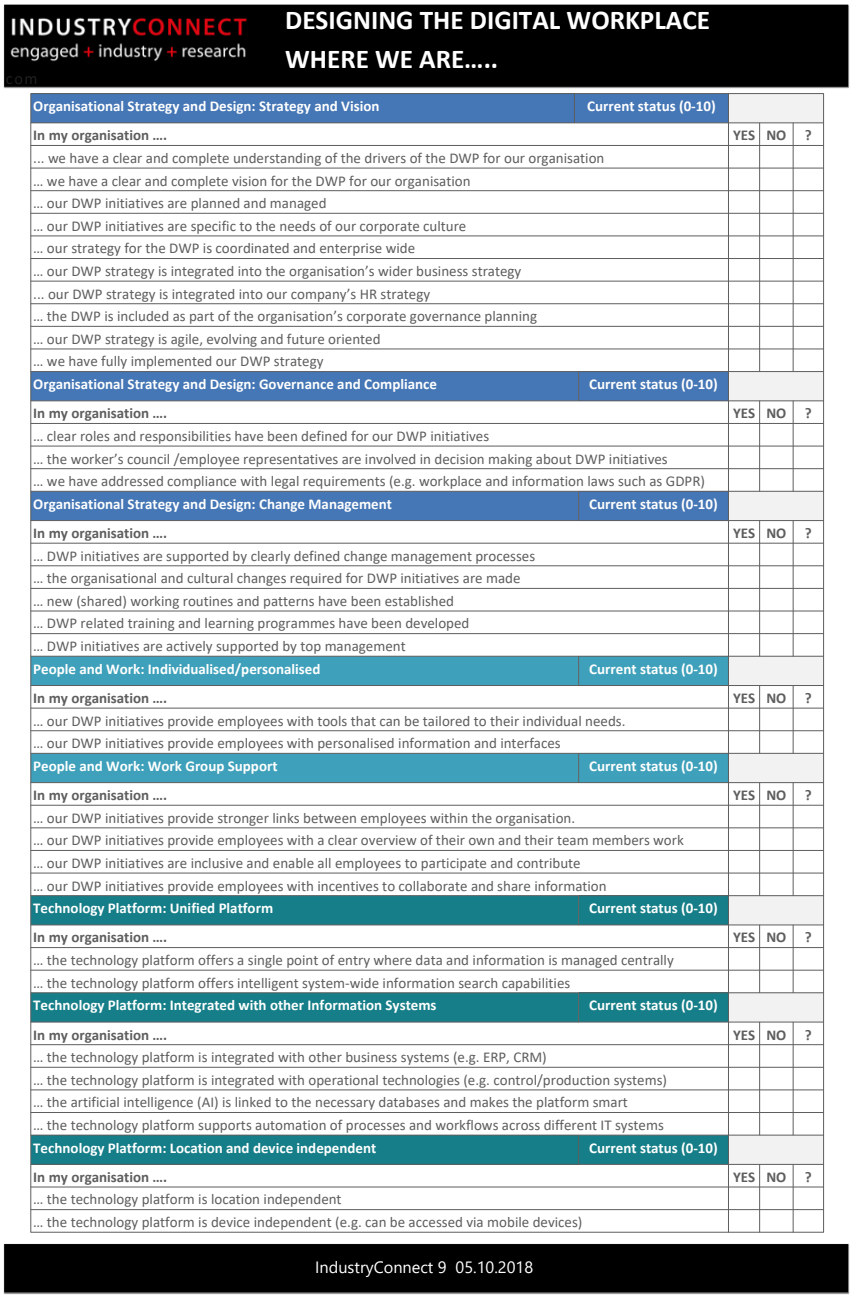
The 1st data collection phase is further divided into three separated subphases, namely 2.1.1: Set up, 2.1.2: Data collection and test of research instrument, and 2.1.3: Data preparation and preliminary analysis.

Phase 2.1.1: Set-up

Having developed the DWP assessment method, the next stage is to plan its application and testing. This phase includes two interrelated steps. In the first step of this phase, another IndustryConnect research workshop with enterprise collaboration platform using organisations (see chapter 3.6) scheduled for October 2018 is prepared to use and test the DWP assessment method. This includes designing workshop slides to present the DWP assessment method and how it was developed. Also, instructions for how to apply the DWP assessment method are noted. In the second step of this phase, material (individual worksheets, poster) required for the workshop activity are designed, and represent together with the developed instructions an offline questionnaire.

Phase 2.1.2: Data collection and test of the research instrument

First, the context and motivation for the workshop activity are presented to stimulate the participants of the workshop in October 2018. Moreover, the method and input for the activity are presented. Then, the research workshop is conducted, using the prepared questionnaire to collect data from 13 collaboration experts from nine IndustryConnect member organisations (see table 9-1, Appendix A). The prepared worksheets with the DWP assessment method (see figure 6-5) are handed out to the individual workshop participants. The worksheets include the developed statements about competencies that organisations can develop in eight different DWP areas. All statements (e.g. “In my organisation we have a clear and complete vision for the DWP for our organisation.”) can be answered with ‘yes’, ‘no’, and ‘don’t know’. Based on the answers, the workshop participants can rate how well their organisation performs in the individual areas (using points between 0 and 10, where 10 is the best). Also, they can think about which of the areas are currently being prioritised by their organisation, and where the organisation may need to improve.



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DESIGNING THE DIGITAL WORKPLACE
WHERE WE ARE.....

Organisational Strategy and Design: Strategy and Vision	Current status (0-10)			
In my organisation		YES	NO	?
... we have a clear and complete understanding of the drivers of the DWP for our organisation				
... we have a clear and complete vision for the DWP for our organisation				
... our DWP initiatives are planned and managed				
... our DWP initiatives are specific to the needs of our corporate culture				
... our strategy for the DWP is coordinated and enterprise wide				
... our DWP strategy is integrated into the organisation's wider business strategy				
... our DWP strategy is integrated into our company's HR strategy				
... the DWP is included as part of the organisation's corporate governance planning				
... our DWP strategy is agile, evolving and future oriented				
... we have fully implemented our DWP strategy				
Organisational Strategy and Design: Governance and Compliance	**Current status (0-10)**			
In my organisation		YES	NO	?
... clear roles and responsibilities have been defined for our DWP initiatives				
... the worker's council /employee representatives are involved in decision making about DWP initiatives				
... we have addressed compliance with legal requirements (e.g. workplace and information laws such as GDPR)				
Organisational Strategy and Design: Change Management	**Current status (0-10)**			
In my organisation		YES	NO	?
... DWP initiatives are supported by clearly defined change management processes				
... the organisational and cultural changes required for DWP initiatives are made				
... new (shared) working routines and patterns have been established				
... DWP related training and learning programmes have been developed				
... DWP initiatives are actively supported by top management				
People and Work: Individualised/personalised	**Current status (0-10)**			
In my organisation		YES	NO	?
... our DWP initiatives provide employees with tools that can be tailored to their individual needs.				
... our DWP initiatives provide employees with personalised information and interfaces				
People and Work: Work Group Support	**Current status (0-10)**			
In my organisation		YES	NO	?
... our DWP initiatives provide stronger links between employees within the organisation.				
... our DWP initiatives provide employees with a clear overview of their own and their team members work				
... our DWP initiatives are inclusive and enable all employees to participate and contribute				
... our DWP initiatives provide employees with incentives to collaborate and share information				
Technology Platform: Unified Platform	**Current status (0-10)**			
In my organisation		YES	NO	?
... the technology platform offers a single point of entry where data and information is managed centrally				
... the technology platform offers intelligent system-wide information search capabilities				
Technology Platform: Integrated with other Information Systems	**Current status (0-10)**			
In my organisation		YES	NO	?
... the technology platform is integrated with other business systems (e.g. ERP, CRM)				
... the technology platform is integrated with operational technologies (e.g. control/production systems)				
... the artificial intelligence (AI) is linked to the necessary databases and makes the platform smart				
... the technology platform supports automation of processes and workflows across different IT systems				
Technology Platform: Location and device independent	**Current status (0-10)**			
In my organisation		YES	NO	?
... the technology platform is location independent				
... the technology platform is device independent (e.g. can be accessed via mobile devices)				

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Figure 6-5. DWP assessment method: statements about competencies in different areas in the design of the DWP (individual worksheet, Q2.1)

After the completion of the individual worksheets, the workshop participants are instructed to use stickers (with individual numbers) to transfer the ratings from their individual worksheets to the shared poster (see figure 6-6). For this, the poster shows a Likert-scale (from 0 to 10, where 10 is the best). Additionally, the poster includes a column where workshop participants can label their organisation's current priority areas in the design of the DWP.

In this way, the workshop participants can assess their organisation's status quo in the design of the DWP individually and compare the assessments with other workshop participants using the poster.

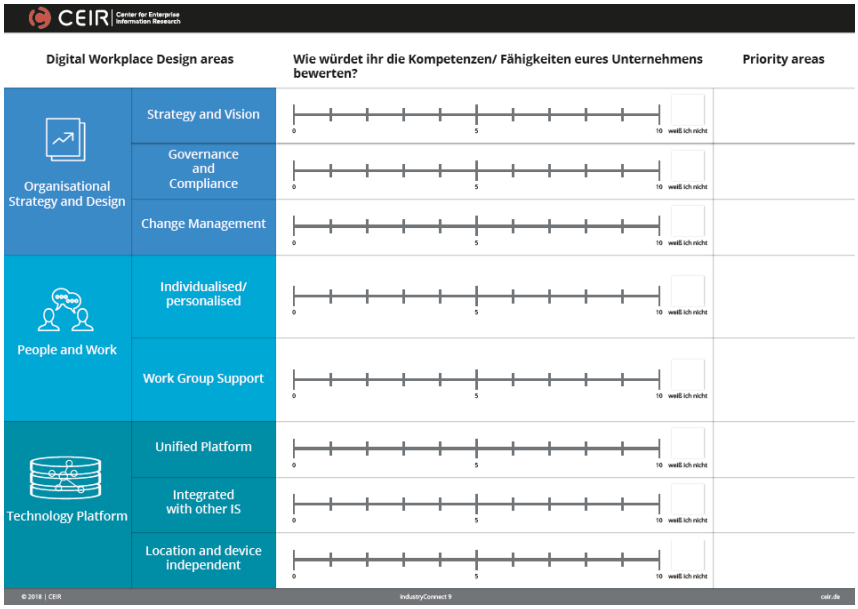

Figure 6-6. DWP assessment method: assessment of DWP competencies and priority areas (poster, Q2.1)

Phase 2.1.3: Data preparation and preliminary analysis

In the first step of this phase, the data collected in the research workshop in October 2018 (data from both the individual worksheets and the poster) is entered into an excel spreadsheet and prepared for later analyses. At this point, the excel spreadsheet is primarily used to capture and archive the workshop participants' ratings of the eight areas in the design of the DWP as well as their selected DWP priority areas. However, as there are discernable patterns in the rated DWP areas and selected priority areas during a first inspection of the poster, a preliminary analysis of the data is conducted in the second step.

Phase 2.2: 2nd data collection phase (online)

Again, the 2ndata collection phase is divided into three separated subphases: 2.2.1: Set up, piloting, and finalising, 2.2.2: Distribution and data collection, and 2.2.3: Data preparation.

Phase 2.2.1: Set-up, piloting, and finalising

In the first step of this phase, the DWP assessment tool and related questionnaire is implemented in the form of an online survey using LimeSurvey[22], which is open source software. The online questionnaire includes the same questions as the offline questionnaire (i.e. questions about the competencies and priority areas in the design of the DWP). However, based on the insights gained from the 1st data collection, the questionnaire is extended by one question that asks for a brief explanation of why the selected areas in the design of the DWP are currently priority areas. Hence,

[22] limesurvey.org

the questionnaire is semi-structured, i.e. both open and closed questions are used. In order to support the selection of the priority areas, a (downloadable) result display of the assessed competencies and rated areas in the DWP design is implemented (see figure 6-7) and is identical in appearance to the individual worksheets used in the prior research workshop.

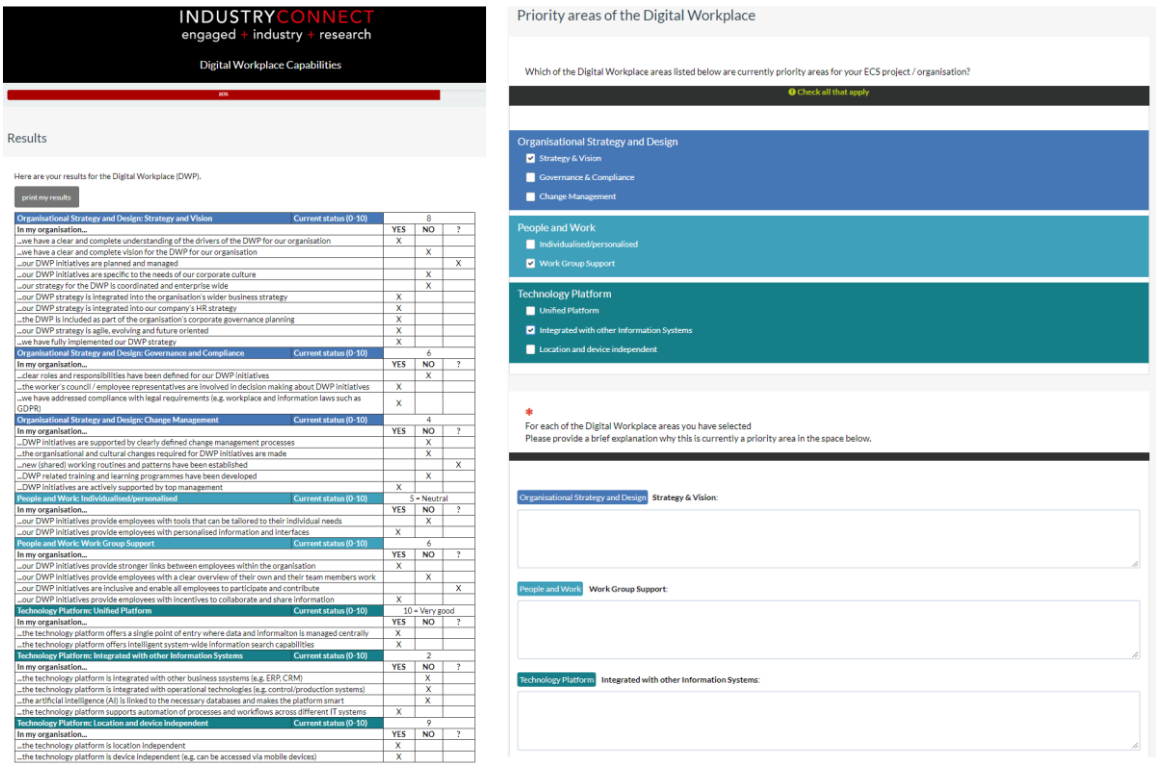

Figure 6-7. Screenshot of the online questionnaire with DWP assessment method: Downloadable result display of assessed competencies and selected priority areas in the design of the DWP (Q2.2)

In the second step of this phase, the questionnaire is piloted. This includes piloting the questionnaire design (e.g. highlighting, indentation), misspelling, and functioning of the online survey. The process is carried out with expert researchers from the IndustryConnect initiative (see chapter 3.6) but who are not members of the target group. Based on their feedback, the questionnaire is reworked. In the third step of this phase, a cover letter explaining the motivation for the questionnaire-based survey is prepared. The letter is used to obtain the informed consent of the respondents and to convey the topic and objectives of the questionnaire.

The final number of questions per question group is shown in table 6-1 below.

Table 6-1. Questionnaire structure: number of questions / question group

Question group	**No. of questions min/max**
Demographics	1/2
Competencies in different digital workplace (DWP) areas	40/40
Priority areas of the Digital Workplace (DWP)	2/2+x, where x∈[1,7] (+x when more than one DWP priority area is selected and explained)

Appendix D provides an overview of the questions, including the respective objective and response type (see table 9-9), as well as screenshots of the final implemented online questionnaire (see figure 9-6).

Phase 2.2.2: Distribution and data collection

In the first step of this phase, the questionnaire is published in February 2019, making it available for the potential survey participants. In the second step, The IndustryConnect's virtual workspace (see chapter 3.6) is used to invite participants. In accordance with Kelley et al. (Kelley et al., 2003) this technique can be referred to as purposive sampling, i.e. only enterprise collaboration platform using organisations that are members of the IndustryConnect initiative are invited to the survey. The (potential) participants are informed that the online survey is used as a follow-up method to the offline survey (research workshop) conducted in October 2018. Due to the language used by the practitioners of the initiative, the survey is distributed under the topic of digital workplace capabilities; however, the German term ("Kompetenzen"/"Fähigkeiten") used in the invitation reflects the definition of competencies as used in this research work ("The collective organizational routines used to deploy resources" (Galavan, 2015, p. 3)). Appendix D (see figure 9-5**)** shows the letter of invitation and the cover letter that participants can see when they begin with the online questionnaire.

While surveys often aim to build a representative picture of a particular population, this questionnaire-based survey aims to achieve an exploratory and comparative picture with enterprise collaboration platform (specifically IBM Connections) using organisations.
Data is collected from 13 collaboration experts from ten IndustryConnect member organisations (see table 9-1, Appendix A); eight of the study participants participated in the research workshop in October 2018 as well.

Phase 2.2.3: Data preparation

In this phase, the .xls data sheet with the survey data collected between 15/02/2019 and 13/03/2019 is extracted from LimeSurvey. The data sheet is checked for missing answers. Incomplete data sets are removed so that only complete data sets serve as an input for the data analysis. Multiple responses from the same company were welcome, allowing for the capturing and comparison of different perceptions within the same organisation.

Phase 2.3: Data analysis and results

In the first step of this phase, the data collected with both the offline questionnaire (05/10/2018) and the online questionnaire (15/02/2019-13/03/2019) are analysed. In the first step, the results of the questionnaires are visually displayed using spider web diagrams. Four different types of spider web diagrams are created showing:

- Competencies for all eight DWP areas as rated by the individual study participant for his/her company compared to the average competency values for all eight DWP areas
- Competencies for all eight DWP areas as rated by all study participants for their company compared to the average competency values for all eight DWP areas
- Competencies for all eight DWP areas as rated by all study participants from the same organisation for their company to the average competency values for all eight DWP areas (only relevant for companies with more than one study participant)

In the second step of this phase, the spider web diagrams are analysed and interpreted (see chapter 3.5.7). This includes the comparison of the competency values between the different study participants (across and within a company) and how the competency values of the study participants having participated in both the offline questionnaire in October 2018 and the online questionnaire in February/March 2019 change. Also, possible reasons for differences in the competency values are identified.
Additionally, the priority areas in the design of the DWP are examined (in comparison to the rated competencies and changes in frequencies between October 2018 and February/March 2019).
In the third step of this phase, the findings are reported back to the study participants as part of another IndustryConnect's collaborative workshop (in October 2019).

6.2 Research inquiry analysis and findings

In the following, the findings gained from the development and application of the digital workplace (DWP) assessment method are presented. This includes a comparison and discussion of competencies and priority areas enterprise collaboration platform using organisations have in the design of the digital workplace (DWP).

6.2.1 Available and still required DWP resources and competencies

Central to the development of the DWP assessment method were the DWP visions with different DWP characteristics and elements as well as the required DWP resources and competencies. As outlined above, enterprise collaboration platform using organisations were asked for the resources and competencies already available and those still needed for a successful DWP. Code frequencies were calculated for both the available and still needed DWP resources and competencies (see table 9-7 and table 9-8, Appendix C). With regard to the resources, the code frequencies show that there is still a need for improvement in terms of the infrastructure and platform's functions and capabilities (e.g. integration with other business systems, embedding of mobile devices into the work environment, document management function). Human resources are largely available, but people with specialised areas of responsibility are required (e.g. for technical developments, the management of the digital transformation). In terms of the competencies required to deploy resources (Galavan, 2015, p. 3), many of the participating enterprise collaboration platform organisations are already successful in the development of DWP related skills and know-how. They have first collaboration successes, however, strategies and concepts for a successful DWP have to be developed and implemented in most cases. This finding is consistent with the findings obtained from the application of the DWP assessment method.

6.2.2 Digital workplace areas

As described in the outline, Williams and Schubert's (2018) categories of DWP characteristics are used as overarching DWP areas (*organisational strategy and design*, *people and work*, *technology platform*) in which enterprise collaboration platform using organisations can gain competencies. From the focus group (F3) data, eight sub-categories, that are more specific DWP areas, could be identified. The areas, described in the following, form the baseline for the DWP assessment method.

Organisational Strategy and Design

Strategy and Vision

This DWP area concerns the development and implementation of a clear vision and related strategy required for planning and managing the DWP. The strategy needs to be in line with the organisation's DWP drivers, coordinated and integrated into the organisation's wider business strategy. Due to the rapidity, scope and unpredictability with which technologies and the environment in which they are embedded evolve, the DWP strategy needs to be agile, evolving, and future oriented.

Governance and Compliance

This DWP area deals with the tasks and responsibilities required for the DWP related practices of governance and compliance. Roles and policies may need to be established that take account of DWP initiatives, different stakeholder perspectives and requirements (e.g. legal).

Change Management

This DWP area addresses the management of changes required for coping with digital transformations and achieving and instantiating DWP visions that are supported by the top management. Changes may regard the organisation and culture and often require DWP related training and learning, as well as the establishment of new shared working routines and patterns.

People and Work

Individualised/personalised

This DWP area concerns tools and functions that can be tailored to individual needs, providing the conditions for individual sensemaking within the digital workspace. Personalised services, including personalised information and interfaces, may be key to support individual and local work practices. Moreover, they may be needed for productivity and employee engagement.

Work Group Support

This DWP area regards the collective of employees within the organisation and how their common work practices can be supported by appropriate DWP initiatives. This may require the provision of strong links between employees who can participate in the design of shared workspaces, share information, cooperate, and collaborate. Awareness and coordination mechanisms may help employees understand the contributions of others in relation to their own activities and effectively manage their dependencies.

Technology Platform

Unified Platform

This DWP area deals with the underlying technologies of the DWP, particularly a unified technology platform with a holistic set of collaboration tools and services that allow employees to effectively do their work. This may include a central access point and intelligent system-wide search over information from numerous interconnected modules and systems.

Integrated with other Information Systems

This DWP area is closely related to the Unified Platform area. It addresses the integration with operational technologies and other business information systems. This may allow automated and specialised workflows and business processes across different systems. Also, a strong integration of different IT systems with a plethora of data sources may support the development and application of the technology platform's artificial intelligence.

Location and device independent

This DWP area refers to the technology platform that can be accessed via different devices (e.g. smart mobile devices, laptop computers) and used independently of location. Location and device independency provide support for more flexible work and autonomy.

6.2.3 Comparison of competencies in the design of the digital workplace

As stated in the outline, the data collected with the questionnaire (offline and online) are structured and visualised using spider web diagrams. The spider web diagrams show the competency values for all eight DWP areas. The spider webs and lines, respectively, show the scale from 0 (minimum value) to 10 (maximum value). The DWP areas ("Strategy and Vision", "Governance and Compliance", "Change Management", "Individualised/personalised", "Work Group Support", "Unified Platform", "Integrated with other Information Systems", "Location and device independent") are shown on a circle around the spider webs and are arranged along the three main DWP categories "Organisational Strategy and Design", "People and Work", and "Technology Platform" with three different colours.

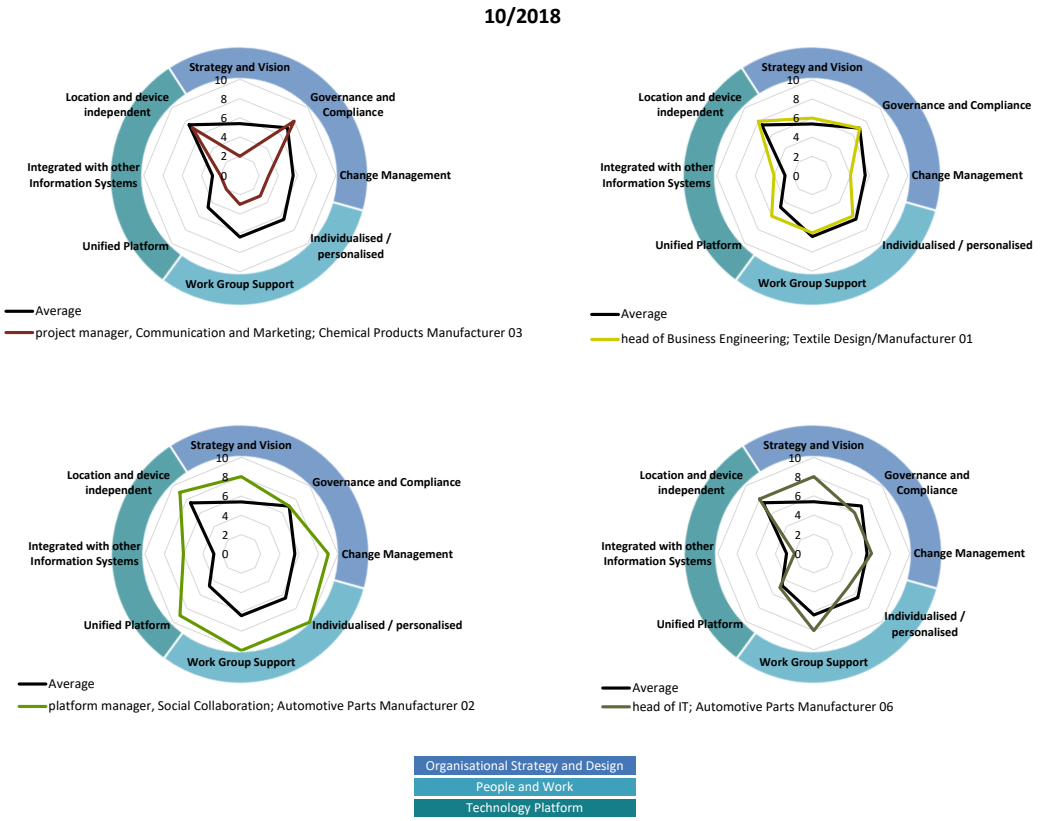

Figure 6-8. DWP competencies as rated by four study participants for their company (data collected in research workshop / with offline questionnaire, 05/10/2018)

Figure 6-8 shows the competencies for all eight DWP areas as rated by four different individual study participants for their company compared to the average competency values for all eight DWP areas. The values were collected in the research workshop in October 2018, using the offline questionnaire. The DWP areas "Location and device independent" and "Governance and Compliance" receive the highest average competency rating, the DWP area "Integrated with other Information Systems" and "Unified Platform" the lowest. As can be taken from figure 6-8, the individual study participants rate the DWP competencies for their company differently. While two participants (top right, bottom right) rate them relatively close to the average values, two participants (top left, bottom left) give ratings that deviate significantly from the average values.

The spider web diagram at the top left reveals a rather pessimistic assessment in such a way that the ratings of the competencies in the eight DWP areas are mostly low compared to the average ratings. The DWP areas "Governance and Compliance" and "Location and device independent" are rated similar to the average, though. By contrast, the bottom left spider web diagram shows an optimistic assessment, i.e. the ratings of the competencies in the DWP areas are high. With a rating of 6, the DWP area "Integrated with other Information Systems" receives the lowest rating. Compared to the average values, the competencies for all DWP areas are rated equally good or better.

The spider diagram at the top right shows a study participant's assessments of the competencies in the DWP areas with almost identical values to the average values. While the assessments by the

study participant shown in the spider diagram at the bottom right are also similar to the average assessments, they are among the few with higher values in the DWP areas “Strategy and Vision” and “Work Group Support”.

With different professional backgrounds, job positions, work histories, and character traits (e.g. sceptical, critical, optimistic), the study participants collect different experiences with their company’s engagement in the design of the DWP. Thus, the study participants interpret and assess their organisation’s DWP competencies in individual contexts. Additionally, the companies adopt different strategies in the design of the DWP, so they develop and strengthen their competencies in different DWP areas.

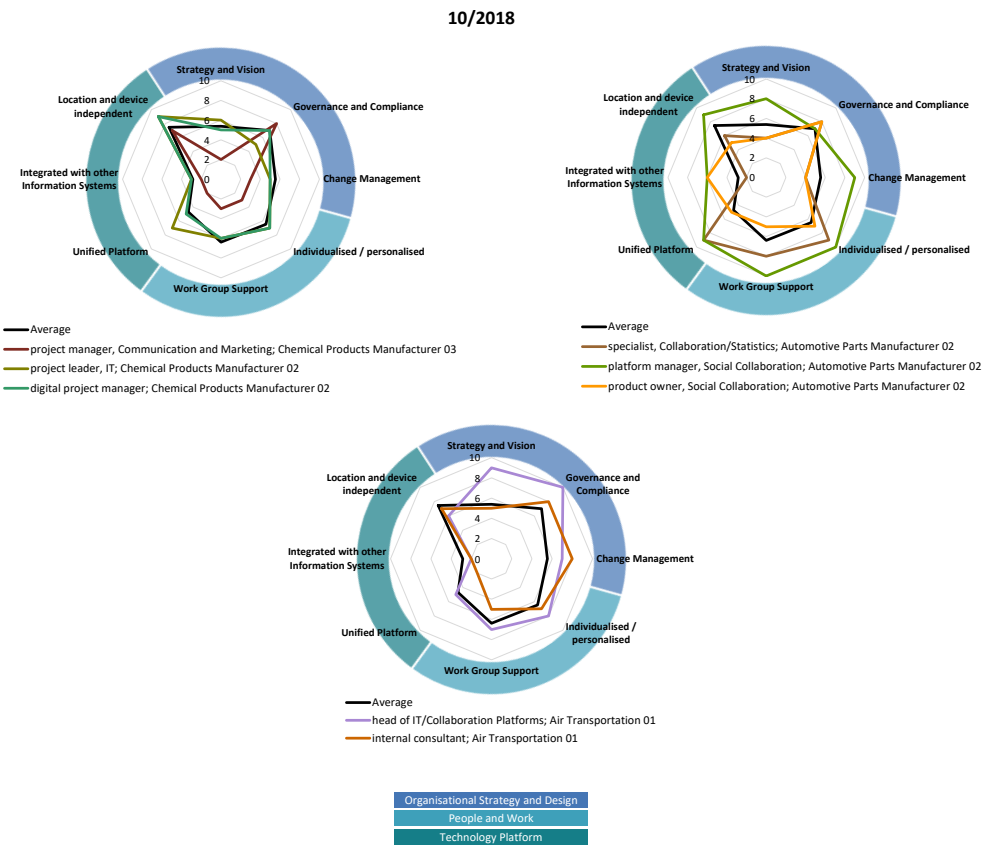

Figure 6-9. Company’s DWP competencies as rated by study participants from three different organisations (data collected in research workshop / with offline questionnaire, 05/10/2018)

Figure 6-9 shows the competency ratings for all eight DWP areas per company. Specifically, it depicts three spider web diagrams, each visualising the competencies for all eight DWP areas as assessed by the study participants of the same organisation. The values are collected in the research workshop in October 2018 and compared to the calculated average competency values.

The spider web diagram at the top left shows the competency ratings for all eight DWP areas by three individual study participants from the same organisation: two from the Swiss parent company, one from its German subsidiary. The study participants from the parent company (Chemical Products Manufacturer 02) assess the company’s competencies in the DWP areas very similarly.

The assessments by the study participant from the German subsidiary (Chemical Products Manufacturer 03), also presented in figure 6-8 (top left), represent a more pessimistic view in comparison. The eXperience base cases (see chapter 3.6) reveal that the different assessments within the organisation are due to different perceptions and different areas of responsibility within the organisation and with regard to the DWP's technical platform. Additionally, the in-depth interviews with Chemical Products Manufacturer 03 (see chapter 5) uncover that the design of the DWP at the German subsidiary is not yet considered as successful as in its parent company. Due to personnel shortage, the German subsidiary was the last company within the group to officially introduce the DWP's technology platform. While it is free in terms project and change management measures, it does not have full insights into the organisation wide DWP initiative and related strategy as designed by the parent company.

The spider web diagram at the top right shows a different picture. The study participants from the same company (Automotive Parts Manufacturer 02) rate the company's competencies in the eight DWP areas differently. The greatest deviation is in the DWP area „Work Group Support". The competencies were rated once with 5, and once with 10. However, there are also overlaps in competency values. For example, the employee with the job description "specialist, Collaboration/Statistics" and the employee with the job description "platform manager, Social Collaboration" rate the company's competencies in the DWP areas "Integrated with other Information Systems" and "Governance and Compliance" similarly. It can be assumed that the ratings are dependent on how optimistic or pessimistic the study participants were. However, study participants can also develop opinions on the DWP based on the different views they have on the DWP's technical platform due to their work tasks (e.g. views on event records stored in databases (Specialist, Collaboration/Statistics), developed functionality and interfaces (Product Owner, Social Collaboration), or perceived platform use cases (Platform Manager, Social Collaboration)).

The spider web diagram at the bottom shows the competency ratings for all eight DWP areas by two individual study participants from the same organisation (Air Transportation 01). As can be taken from the diagram, the ratings by the two participants are similar and close to the average ratings, only the competencies in the DWP areas "Strategy and Vision" and "Governance and Compliance" are rated significantly higher by the Head of IT/Collaboration Platforms than the average.

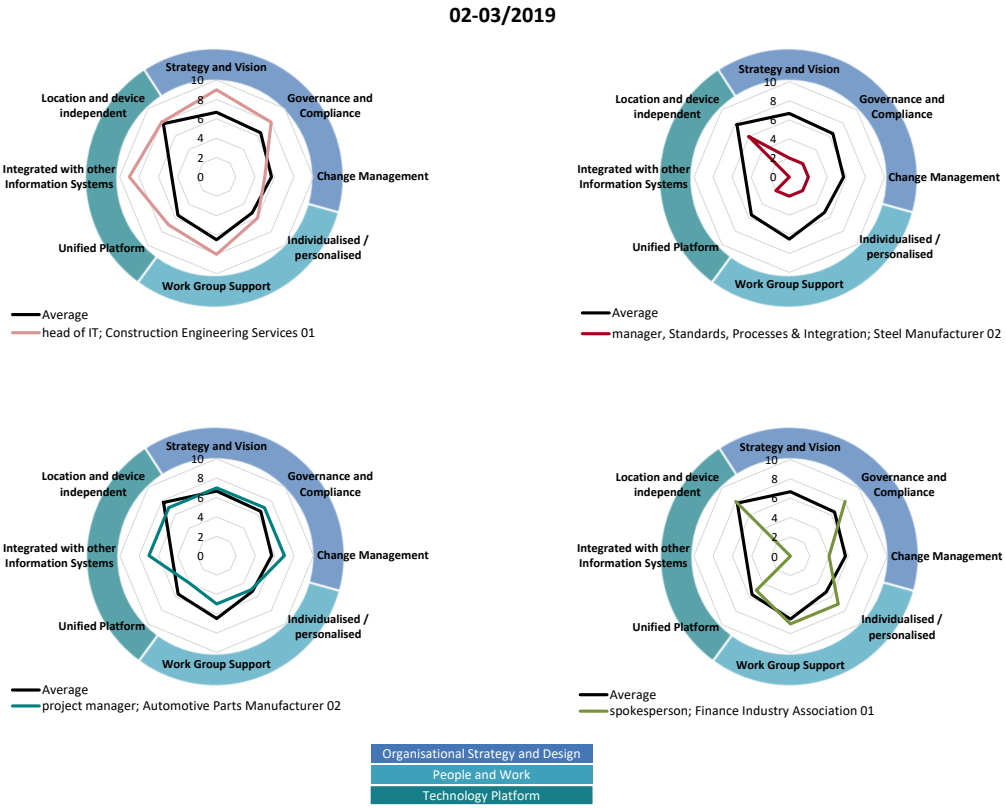

Figure 6-10. DWP competencies as rated by four study participants for their company (data collected with online questionnaire in February/March 2019)
Note: spider web diagram at the bottom right: "don't know" selected for the DWP area "Strategy and Vision".

Figure 6-10 shows the competencies for all eight DWP areas as rated by four different individual study participants for their company compared to the average competency values for all eight DWP areas. The values were collected via the online questionnaire in February/March 2019. Like the case in 2018, the DWP area "Location and device independent" receives the highest average competency rating, and "Integrated with other Information Systems" the lowest. As can be taken from figure 6-10, the study participants rate the DWP competencies for their company differently. Only one study participant (bottom left) gives ratings that are close to the average values for all DWP areas.

The assessment of the study participant which can be seen in the spider web diagram at the top right stands out in particular. Except for the competencies in the DWP area "Location and device independent", the study participant rates the competencies of the other seven DWP areas with a maximum of 2 each (on a scale from 0 to 10, where 10 is the best). It can be presumed that there is room for improvement, i.e. the company needs to develop the skills and competencies to successfully design the DWP.

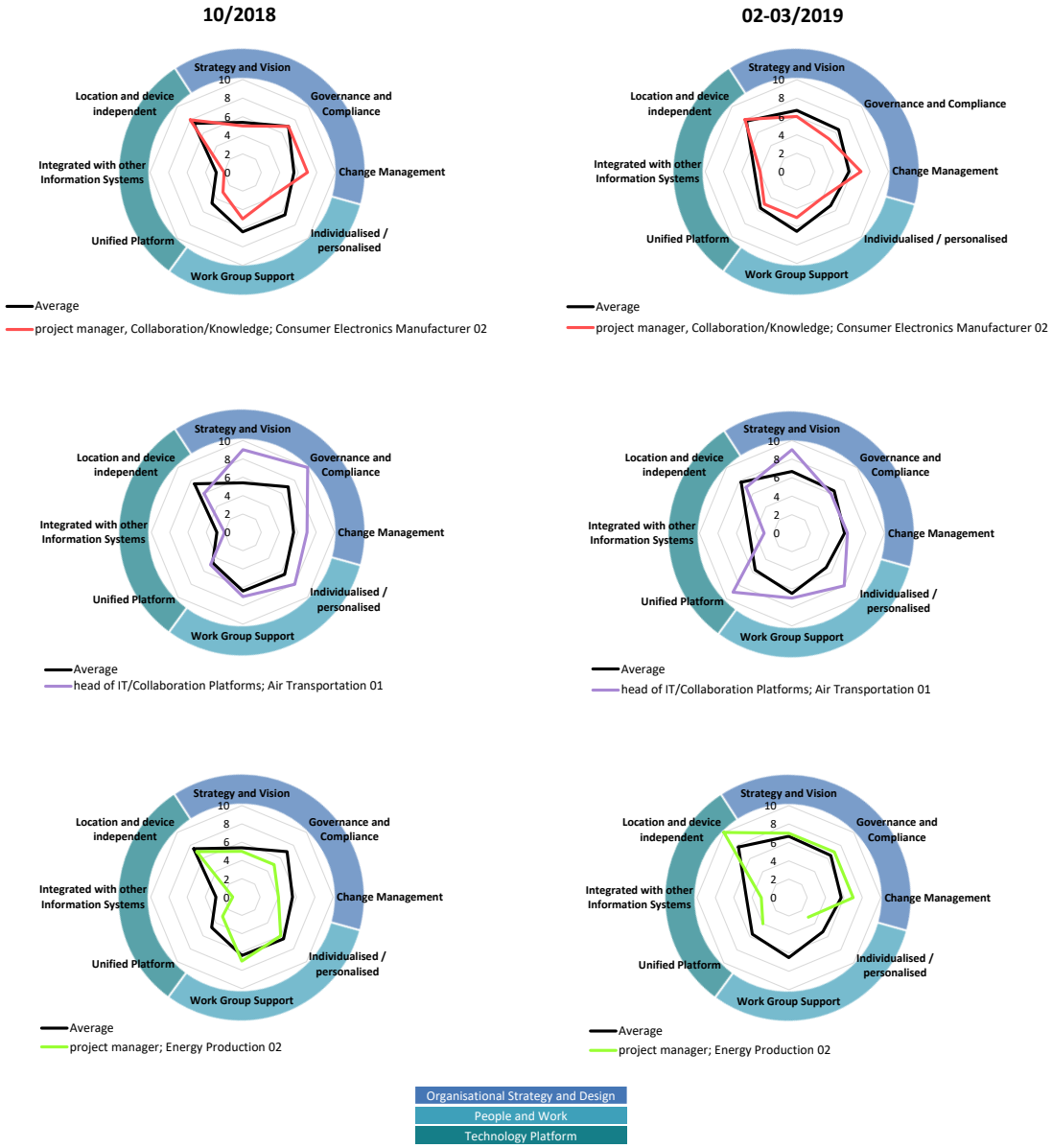

Figure 6-11. Changes in DWP competencies assessed by three study participants (data collected with offline questionnaire in October 2018 and online questionnaire in February/March 2019)
Note: spider web diagram at the bottom right: "don't know" selected for the DWP area "Group Work Support".

Figure 6-11 depicts how the ratings of the company's competencies in all eight DWP areas change over time. Specifically, it shows how three individuals, who have participated both in the research workshop and online survey, assess their company's competencies in October 2018 and February/March 2019. The spider web diagrams presented on the left display the assessments from October 2018, the ones on the right the assessments from February/March 2019. Each row (top, middle, bottom) shows the assessments by one study participant.

Interestingly, the first study participant (Project Manager, Collaboration/Knowledge; Consumer Electronics Manufacturer 02) rates the competencies of its company in the eight DWP areas for both 2018 and 2019 close to the average competency values that show minor changes between the

two data collection points. She rates the competencies in the DWP areas “Change Management”, “Individualised/personalised”, “Work Group Support” and “Location and device independent” the same at both times. In contrast, she provides higher ratings for her company’s competencies in the DWP areas “Strategy and Vision” and “Unified Platform” in February/March 2019. However, the greatest change can be observed in the DWP area “Integrated with other Information Systems”. From October 2018 to February/March 2019, the average competency value in this DWP area has increased by 1,8 points (rounded), the competency value in this DWP area as rated by the study participant by 2 points. Having assessed the DWP competencies, it is the task of the study participant and company, respectively, to critically reflect on the changed values in order to further develop or strengthen the respective competencies. This includes reflecting on what has changed in the design of the DWP and the required steps for the change.

Visually, it appears that the spider web diagrams by the second study participant (Head of IT/Collaboration Platforms; Air Transportation 01) reveal greater changes in the assessed DWP competencies between the two data collection points. However, the competency values for the DWP areas “Strategy and Vision”, “Individualised/personalised”, and “Work Group Support” have not changed. Also, the pattern on the left side of the spider web diagrams remains largely stable. For both survey periods, there is a decrease of the competency value in the DWP area “Integrated with other Information Systems”, and an increase of the competency value in the DWP areas “Unified Platform” and “Location and device independent”, i.e. the relationship between the DWP areas stays about the same. The question arises whether the competencies have changed or whether the competencies for the individual DWP areas are sometimes assessed more strictly, sometimes less strictly. This can only be illuminated by means of more in-depth bilateral discussions.

The third study participant (Project Manager; Energy Production 02) assesses the company’s competencies in the DWP areas differently at both data collection points, but there is a recurring pattern, too. There is an increase in the competency value in the DWP area “Location and device independent” and a decrease in the competency value in the DWP areas “Strategy and Vision” and “Integrated with other information systems”. Consequently, the competency values may not be the same when organisations and their organisational members assess the design of the DWP at two different data collection points, but there may be repeating patterns. Therefore, the competency values should always be considered and analysed in relation to one another.

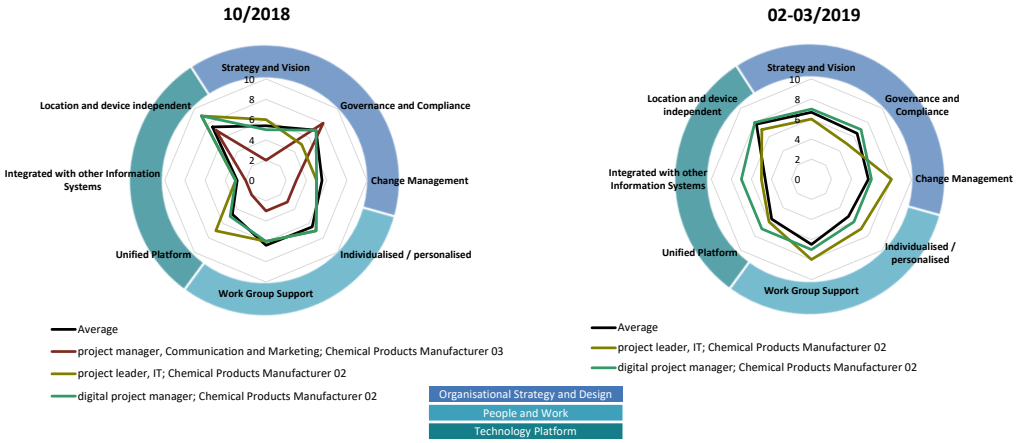

Figure 6-12. Changes in DWP competencies assessed by study participants of the same organisation (data collected with offline questionnaire in October 2018 and online questionnaire in February/March 2019)

Figure 6-12 depicts the competency ratings for all eight DWP areas for October 2018 and February/March 2019 by different study participants of the same organisation. It follows up on figure 6-9 (spider web diagram at the top left) and provides a within-company and an over-time comparison.

The spider web diagram on the left displays the competency values as assessed by two individual study participants from the parent company (Chemical Products Manufacturer 02) and one study participant from its German subsidiary (Chemical Products Manufacturer 03). As stated above, the assessment by the study participant from the subsidiary shows a more pessimistic view in comparison, which may be due to different areas of responsibility or different progress in the design of the DWP, among others. This employee did not participate in the online survey in 2019; thus, the spider web diagram on the right does not include his assessments of his company's competencies in the design of the DWP. Even though the assessments of the competencies by the two other study participants have changed from October 2018 to February/March 2019, the lines of the connected competency values approximate each other, i.e. the company's competencies are rated relatively similar by both participants at both times and similar to the average. It appears that the two study participants from the parent company have collected similar experiences regarding the company's competencies in the design of the DWP despite different job positions and areas of responsibility.

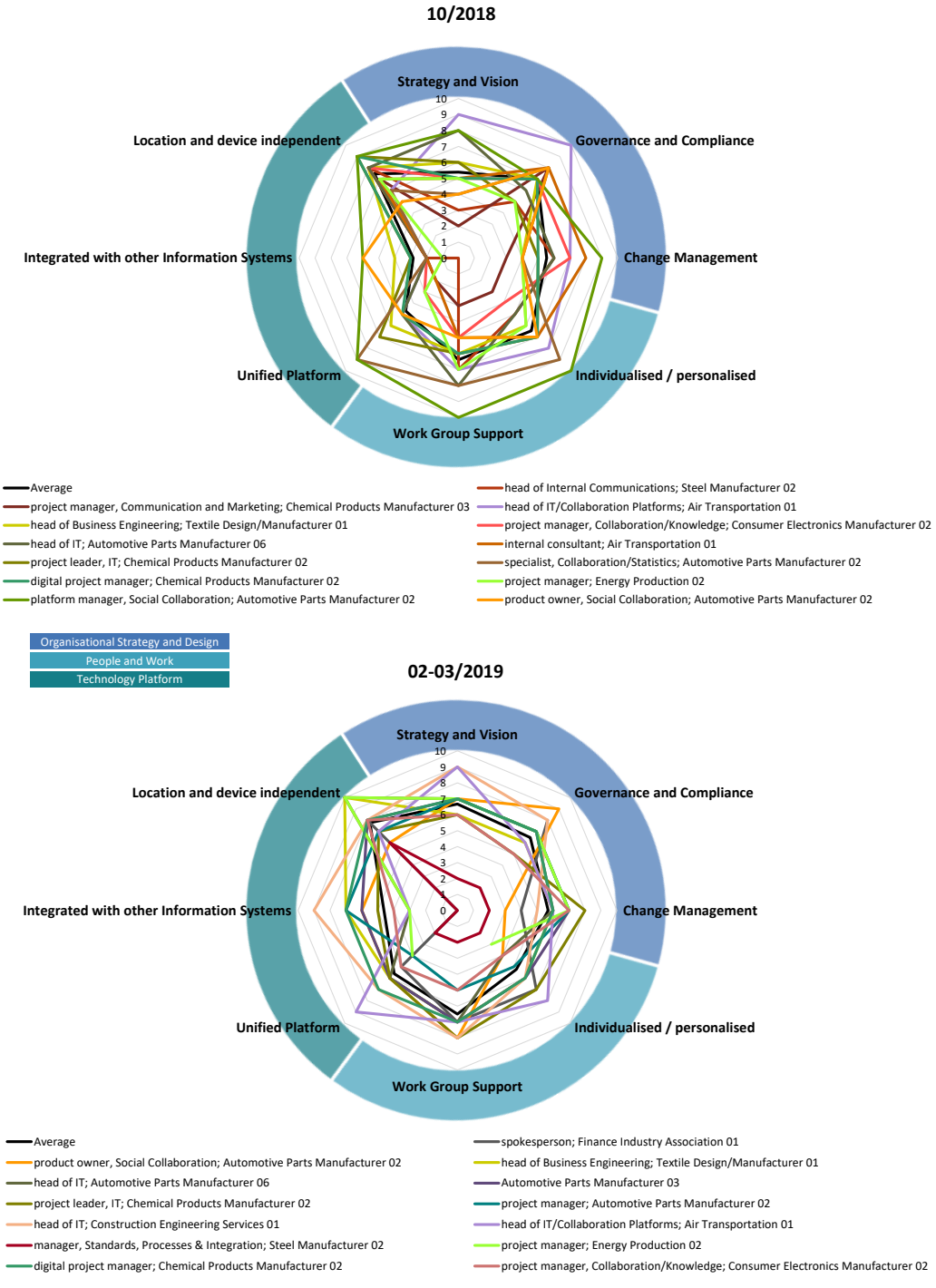

Figure 6-13. Changes in DWP competencies assessed by all study participants (data collected with offline questionnaire in October 2018 and online questionnaire in February/March 2019)

Figure 6-13 shows a comparison of the competency values as rated by all study participants in October 2018 (research workshop, offline questionnaire) and in February/March 2019 (online questionnaire). As stated in the outline of this research work part, there are 13 study participants in each of the data collection efforts. Eight of the study participants have filled in both the offline questionnaire and the online questionnaire.
The spider web diagram at the top of figure 6-13 presents the competency values for October 2018, the spider web diagram at the bottom of figure 6-13 for February/March 2019. In the spider web diagram at the bottom, the DWP competency values (spider webs) deflect more to the left, particularly the competency value for the DWP area “Integrated with other Information Systems” has increased. A look at the data sets reveals that there are a few new participants in February/March 2019 with higher ratings of the respective competencies. However, a few of the study participants assess the competencies for their company more positively in the second survey than in the first survey.
Generally, the spider web diagram at the top shows a greater dispersion of the DWP competency values. Though, the spider web diagram at the bottom incorporates the values of one study participant who is the only one who rates his company’s competencies as poor in all DWP areas (see also figure 6-8), thus represents an outlier case.

Combined cross-company and over-time comparisons, as implemented with the two spider web diagrams, allow study participants to reflect not only on the competencies of their company but also on how their company performs in comparison to other enterprise collaboration platform using companies at different times. Such comparisons can be used as an opportunity for the exchange of experiences and lessons learned with other companies, which apparently perform better in some of the DWP areas, and learn from their engagements in the design of the DWP.

6.2.4 Priority areas in the design of the digital workplace

The DWP assessment method's poster (see figure 6-14) used in the research workshop in October 2018 reveals that "Strategy and Vision", "Change Management" and "Integrated with other Information Systems (IS)" are the DWP areas that were most frequently selected as priority areas by the study participants. The area "Integrated with other Information Systems (IS)" shows the lowest average rating in terms of the associated DWP competencies. Evidently, the organisations' IT landscape has grown and become more complex in the last years. With an increasing number of IT systems that are run by internal IT departments and/or IT service providers, organisations face the challenge of system integrations for obtaining relevant, non-redundant information via a single user interface (Gewehr et al., 2017, p. 905). Currently, there is room for improvement and work, hence the frequent mentioning as a priority area.

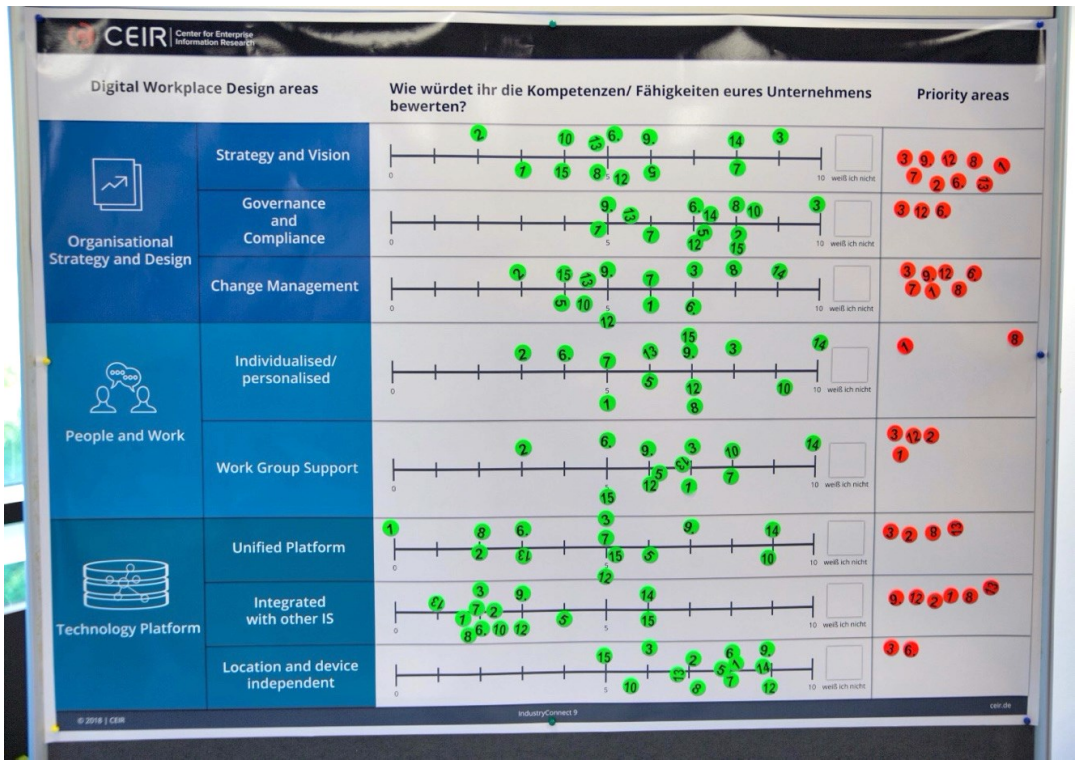

Figure 6-14. DWP assessment method: assessment of DWP competencies and priority areas (screenshot of applied poster, Q2.1)

Interestingly, the competencies in the two DWP areas "Location and device independent" and "Governance and Compliance" have predominantly high scores. However, despite the good ratings in the two DWP areas, a few of the study participants selected them as their company's priority areas. The study participants work at large and global, multinational corporations with demand for business travel, thus they focus on access to the DWP's core technology platform with any device and from any location and have developed the necessary competencies. Further, from the organisations' membership in the IndustryConnect initiative it is known that they are engaged in continuously ensuring and strengthening their governance and compliance competencies. As legislation is evolving (e.g. GDPR (see chapter 4.2)), it is necessary to continually review and

comply methods of governance and compliance (e.g. to ensure GDPR compliant storage and processing of PII). However, since this is a mandatory task, other study participants do not classify "Governance and Compliance" as a priority area characteristic to their organisation.
In general, the poster shows a high degree of dispersion in the ratings of the DWP competencies. Together with the selected priority areas; it reveals and confirms that companies have different goals and visions of the digital workplace and are pursuing different paths to achieve them.

Figure 6-15 presents a bar chart showing how often the individual DWP areas were selected as priority areas in the research workshop / offline survey (05/10/2018) and in the online survey (02-03/2019). Although there are 13 study participants in each of the data collection efforts, only eight of the study participants filled in both the offline questionnaire and the online questionnaire. Thus, it should be noted that figure 6-15 does not assert any claims about true comparability and reliability (see chapter 3.8 for further discussion). Nonetheless, the chart reveals a tendency towards the DWP areas "Strategy and Vision" (selected nine times, and six times, respectively) and "Change Management" (selected seven times, and nine times, respectively). The largest difference between the frequency of mentions is given with the DWP area "Work Group Support".

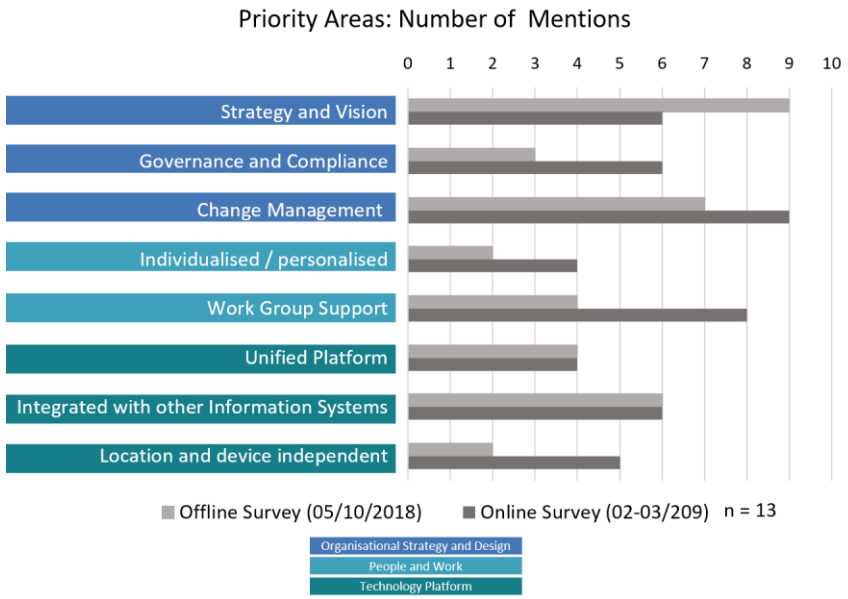

Figure 6-15. Number of mentions of the priority areas in the design of the DWP (comparison between 05/10/2018 and 02-03/2019)

The analysis of the absolute numbers in the data sets allows no conclusions about a relationship between the rating of the competencies and the selected priority areas in the design of the DWP. In contrast, the online questionnaire's open question about explanations for selected priority areas allows for and enables the identification of reasons for why companies may prioritise certain DWP areas to others possible.

Figure 6-16 reveals that reasons are linked to the particular DWP and related enterprise collaboration platform setting. Some of the reasons shown in figure 6-16 are assessed in more detail below.

Organisational Strategy and Design	
Strategy and Vision	*„In comparison to a lot of new collaboration tools like MS Teams, Threema, SharePoint, etc. we have to make our vision, strategy and approach for ECS clear. Furthermore, we have currently some uncertainties, due to the sell of IBM Connections."*
Governance and Compliance	*„We have more and more the request to collaborate with externals, this has an effect on our governance and compliance topics. Furthermore, we still struggle with GDPR and the implementation of IBM DPTK (Legal & Compliance)."*
Change Management	*„That is an ongoing topic and a longer journey. We are on the right track but it takes more time and work to drive the change management within our org."*
People and Work	
Individualised/ personalised	*„depending on the new solution we have to look into new possibilities"*
Work Group Support	*„To collect everything that may be important to a work group (of internal and external collaborators) is important for improving the business outcome of the system."*
Technology Platform	
Unified Platform	*„investments in a more unified platform"*
Integrated with other Information Systems	*„Integration of other systems, inter-cloud integration and 3rd parties is an ongoing topic. User directory synchronisation and single sign on among multiple services are challenges in this area, especially on mobile devices."*
Location and device independent	*„Location and device independent is always a topic. More and more of the users want to use CNX via smartphone, especially the management. Currently we are not that much happy with the mobile app and our security infrastructure (performance), which inhibits the usage and in a long term the acceptance."*

Figure 6-16. Examples of explanations provided by the online survey's study participants about the selected priority areas in the design of the DWP (verbatim quotes as provided by the study participants who answered in English)

For instance, one study participant who selected "Strategy and Vision" as one of the company's priority areas explains that his company needs a clear strategy for IBM Connections, also with regard to other platforms and applications, such as MS SharePoint or Threema, and that the sale of IBM Connections is currently causing uncertainty in this regard. Correspondingly, this DWP area is prioritised as an appropriate strategy for the management of the changing set of multiple coexisting platforms and tools and their conditions is missing.

Another study participant who selected "Change Management" as one of the company's priority areas writes that change management is an ongoing topic and represents a long journey for which high effort is required. Thus, this DWP area is prioritised since the company considers the management of change an ongoing commitment which is not done once. The eXperience base cases developed as part of the IndustryConnect initiative (see chapter 3.6) reveal that organisations must adapt to changing circumstances (e.g. technological, and environmental developments) and, in the course of this, prepare and support platform participants. For this, they try out and use different change management strategies and related platform adoption measures (e.g. guidelines, training, champions).

One explanation for the selected priority area “Individualised/personalised” is that the company endeavours to look for new opportunities along with technological developments. Hence, the company seemingly intends to offer and improve its personalised services, including personalised information and interfaces, to address individual needs.

One of the study participants who selected “Unified Platform” as one of his company’s priority areas states that more investments are required for a unified technology platform. Thus, companies may not only prioritise a certain DWP area to strengthen or improve competencies, but also because they may want to invest more financial resources into it.

6.2.5 Conclusion about competencies and priority areas in the design of the digital workplace

Based on the collected data, categories and areas, respectively, of the digital workplace (DWP) could be identified as well as necessary competencies for their design. This research work part shows how companies’ competencies in different DWP areas are assessed by individual participants and how the assessments may change over time. Pain points in the design of the DWP could be identified as well as the DWP areas that require attention. The assessed competencies in the design of the DWP could be compared within a company and between companies. In a next step, it is necessary to examine priority areas of the DWP in more depth. The developed and applied DWP assessment method represents a means for companies to obtain clarity about their DWP status quo. However, it must be considered that low competency scores do not necessarily mean that a company performs poorly in the design of the DWP; an individual DWP area may not be of importance to a company and yet the company may be successful in designing its DWP. Also, it must be emphasised that organisations and their organisational members may define the DWP differently, and these definitions may change over time, especially with technological developments and changing conditions. Therefore, the DWP assessment method is not a fixed method with set DWP areas and related questions about competencies and priorities but is leading the way to the identification and assessment of strengths and weaknesses in the design of the DWP.

6.3 An II perspective on digital workplace competencies and priority areas

The previous findings chapters (see chapter 4 and chapter 5) have revealed the multifacetedness, richness and evolving nature of enterprise collaboration platforms which are in essence II. Enterprise collaboration platforms, interconnecting multiple modules and systems as well as various human platform participants, are II entangled with other II (Monteiro et al., 2013), specifically the digital workplace (DWP). They constitute the central platform for today's DWP (S. P. Williams & Schubert, 2018). In other words, an enterprise collaboration platform is embedded with the DWP (Star & Ruhleder, 1996; Vaast & Walsham, 2009). The DWP, focused on in this chapter (see chapter 6), is an II further expanded in terms of scale and scope, and inherent complexity (Hanseth & Lyytinen, 2004). It is no stand-alone entity with defined boundaries; it instead incorporates a wide range of interconnected and interwoven technical and non-technical elements (cf. Aanestad & Jensen, 2011; Hanseth & Monteiro, 1998; Star & Ruhleder, 1996). According to DeLanda (2006), II, such as the DWP, can be viewed as assemblages "consist[ing] of various types of components, which in themselves may be assemblages" (DeLanda, 2006, as cited in Bygstad, 2010, p. 4) (see chapter 3.3). The collected and analysed DWP definitions as well as the DWP resources and competencies needed for and included in the design of the DWP reveal a plethora of components (e.g. clients, APIs, tailorable functions, social software, groupware, artificial intelligence, processes, network, culture, interdisciplinary team, digital transformation officer, innovation hubs, work practices) that come together in a web of relations (Bowker et al., 2010; Crabu, 2014; Hanseth & Lyytinen, 2010) and represent "what it [,the DWP,] does" (White, 2012, p. 209). Resources alone do not define the DWP, they need to be deployed via competencies (Galavan, 2015, p. 3), and this in a way to support the design of the DWP in line with DWP definitions and visions, respectively. In this research work part, the findings about DWP definitions and resources/competencies, as provided and specified by multiple different enterprise collaboration platform using organisations, are consolidated yielding eight different DWP areas (*organisational strategy and design*: strategy and vision, governance and compliance, change management; *people and work*: individualised/personalised, work group support; *technology platform*: unified platform, integrated with other information systems, location and device independent). They build the baseline of the developed DWP assessment method and incorporate various components involving people, their agendas and work, and technology artefacts. Reflecting the infrastructural endeavour of designing the DWP, the DWP areas are very much overlapping and interrelated (e.g. the DWP area "Integrated with other information systems", "Individualised/personalised" and "Work Group Support"). However, presented as separate areas with different characteristics, organisations and their organisational members can more easily assess their status quo in the design of the DWP. Since the DWP has a high degree to which its material artefacts can be interpreted flexibly (Doherty et al., 2006, p. 580), different areas in the design of the DWP may be prioritised and different competencies for and in the design of the DWP developed (see chapter 3.4.1.1). The findings from the application of the developed DWP assessment method show that there are different interpretations among individuals, i.e. also among individuals of the same organisation. The study participants represent a range of collaboration experts who are engaged in the design of the DWP and related enterprise collaboration platform

during development and use (see chapter 3.4.1.2). They are human agents with different histories, experiences, motivations, skills, tasks and links to other humans in the design of the DWP (W. J. Orlikowski, 1992b). Thus, different strengths and weaknesses organisations have in the design of the DWP become visible to the different platform participants and members of the II (Star & Ruhleder, 1996). The DWP assessment method helps them to critically reflect on where the organisation may need to improve in terms of the DWP. In this way, the employment of the DWP assessment method embraces outcomes of current practices and instantiations of the DWP as well as future directions. When applied, it mediates the digital transformation process.

Since II are developing phenomena, this research work part considers how DWP assessments change over time. The application of the method at two different points in time (10/2018, 02-03/2019) leads to snapshots of the DWP assessments that can be compared so that both (temporary) stability and transformations from the perspective of different (groups of) people are identifiable. Reasons for both unchanged and changed DWP assessments need to be uncovered by the respective companies.

Due to its generative nature, the DWP is never complete (Zittrain, 2008, p. 43), new uses may arise over time along with the flexibility of digitising (Tilson et al., 2010). In this respect, Tilson, Lyytinen, and Sørensen (2010) address II's paradox of change, "defined by the opposing logics of stability and flexibility" (p. 753). In order to allow for the enrollment of new infrastructural components (both human and nonhuman), II have to provide stability through its installed base. At the same time, II have to offer flexibility for unbounded growth. In other words, "change is enabled and constrained by the very stability of […] sociotechnical formations" (p. 754). Enterprise collaboration platform using organisations are confronted with different conditions and circumstances when they are engaged in the design of the DWP; they connect to different installed bases. This includes a set of existing DWP competencies and priorities (incorporating various structures, social arrangements, and technologies (Star & Ruhleder, 1996, p. 113)) they can build on and use as a foundation for the development of new DWP competencies and areas of focus. Thus, stability is needed for the generativity of the DWP. In a transferred sense, the DWP assessment method reflects stability by providing a set of DWP areas and related statements about competencies and priorities. Regular assessments of organisations' DWP constitute anchor measures to extend and improve, i.e. to change configurations in the design of the DWP. However, major changes in the II, including adaptions to evolving environmental conditions (e.g. technological innovations, changing markets, new legal policies, and regulations), need to be incorporated in the DWP assessment method to ensure stability. New DWP areas and related competencies may be of importance at some point. Organisations and their organisational members are affected by alternations in the II; however, through the building and utilisation of competencies "they are also forces that produce these changes." (Cordella, 2010, p. 34).

6.4 Insights from digital workplace competencies and priority areas into the building of digital transformation capabilities

The developed preliminary conceptual model of *when digital transformation capabilities are and emerge* (see chapter 5.6, version 2) is further extended based on the findings about competencies and priority areas in the design of the digital workplace.

For the final extension of the conceptual model, the findings presented in this chapter (chapter 6) were thoroughly examined using the theoretical notion of information infrastructure (II) and related sociotechnical perspectives and concepts (esp. interpretive flexibility) (see chapter 3.4.1) together with the theoretical background of digital transformation capabilities (see chapter 3.4.2). Again, the examination includes several iterations of interpretation (see chapter 3.5.8) with abductive reasoning, where existing theory in the form of the preliminary conceptual model (version 2) and current data from the focus group (F3; see chapter 3.5.5 and chapter 6.1) and questionnaire-based surveys (Q2.1, Q2.2; see chapter 3.5.3 and chapter 6.1) are regarded in concert (Alvesson & Kärreman, 2007, as cited in Gioia et al., 2013, p. 21). Specifically, the process of interpretation encompasses the writing down, comparing, labelling, assembling, and linking, as well as restructuring of ideas and notes.

For the avoidance of repetitions, the gained insights are incorporated in the subsequent chapter theorising about digital transformation capabilities. Chapter 7 presents the final conceptual model of when digital transformation capabilities are and emerge (version 3), where the outcomes of this research are considered in its entirety (see chapter 4, chapter 5, chapter 6).

Chapter 7
Theorising about Digital Transformation Capabilities

This chapter summarises and visualises the insights gained from the research work into the building of digital transformation capabilities (see research objective O5; chapter 1.2). In the following, the developed *conceptual model of when digital transformation capabilities are and emerge* (version 3/final) is presented and explained. As presented in chapter 4, chapter 5 and chapter 6, it incorporates the interpreted results of a range of methods applied, including interviews, focus groups, questionnaire-based surveys and document analyses. The theoretical notion of information infrastructure (II) and related sociotechnical perspectives and concepts (interpretive flexibility, design through use, inscriptions, social worlds / working spheres, biography of artefacts) (see chapter 3.4.1), as well as the theoretical foundation of digital transformation capabilities (see chapter 3.4.2), guided the process of interpretation (see chapter 4.4, chapter 5.6, and chapter 6.4). In other words, the model is a conceptual artefact that presents and encapsulates the knowledge gained in answering the research aim, objectives, and questions (see chapter 1.2). The explanation of the model includes non-abstract knowledge in the form of real-world stories and examples of enterprise collaboration platform and related digital workplace change. In this way, the model and linked explanation address the purpose of combining scientific rigour and practical relevance (Kurt Lewin, as cited in Burnes & Cooke, 2013, p. 412). It assists organisations and their organisational members in understanding the building of digital transformation capabilities from a theoretical and practical viewpoint and implement the depicted knowledge in organisations' unique digital transformation processes.

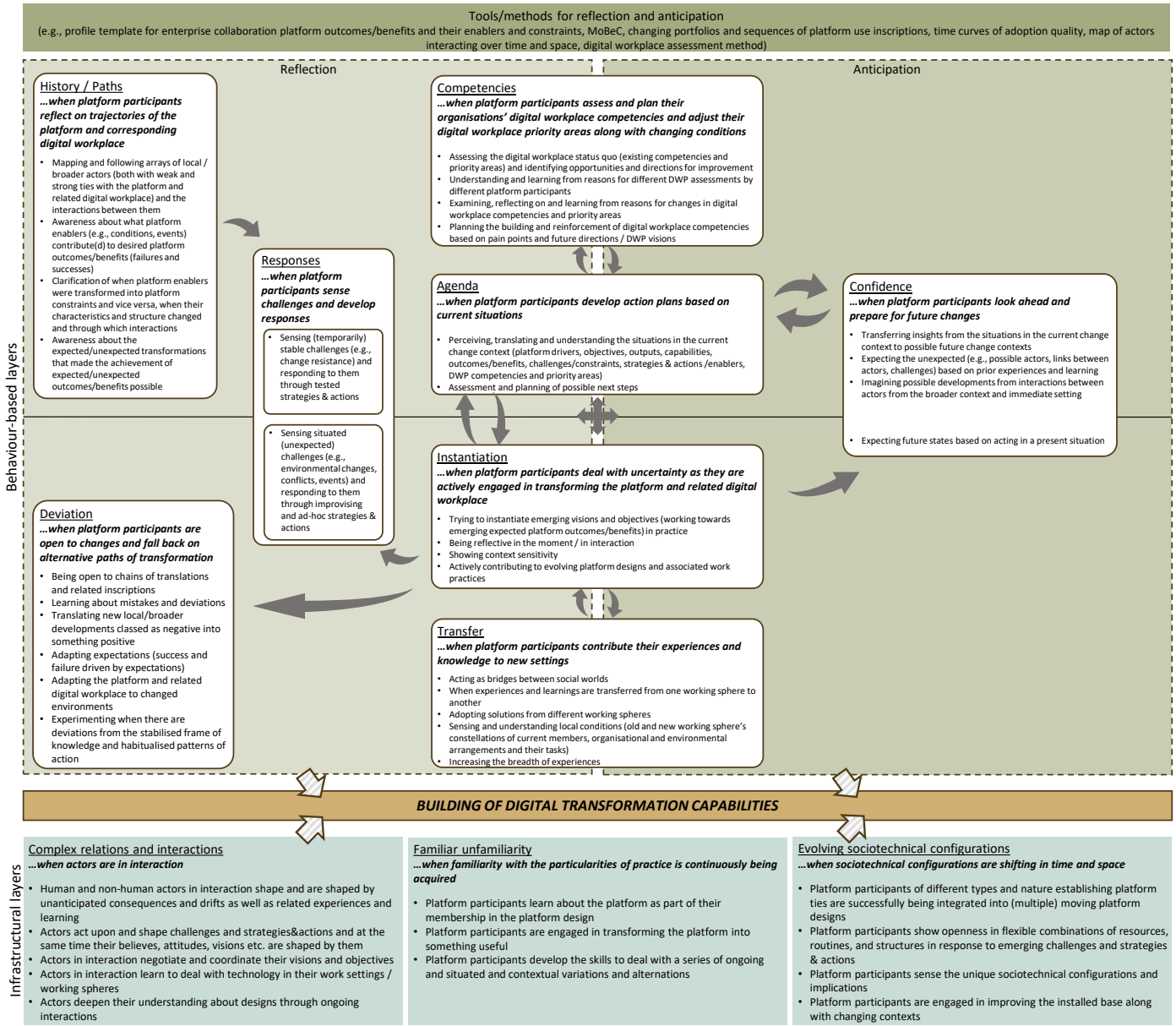

Figure 7-1. Conceptual model of when digital transformation capabilities are and emerge – version 3/final

At the centre of the developed conceptual model (figure 7-1) is the *building of digital transformation capabilities,* which functions as the jumping-off point for the reader and is framed by two types of layers of explanation for the building of digital transformation capabilities: behaviour-based layers (upper part of figure 7-1) and infrastructural layers (bottom part of figure 7-1).

The nature of the layers has not changed since the first version of the conceptual model (see chapter 4.4). For the sake of completeness, the layers are described again in the following; however, they are extended by different building blocks and associated concrete real-world examples from all research parts (see chapter 4, chapter 5, and chapter 6).

Behaviour-based layers

Behaviour-based layers consider human platform participants and their relations with and role within the ongoing digital transformation. The focus is on their actions and linked behaviour thematically grouped into a set of interwoven arenas, where "multiple actors are present and active" (R. Williams & Pollock, 2012, p. 12). In line with Williams and Pollock (2012, p. 12), arenas are spaces where human platform participants are construed within the same problem area and where digital transformation capabilities can be and emerge. Following the theoretical background of digital transformation capabilities (see chapter 3.4.2), digital transformation capabilities can be categorised according to two different types of capabilities: *reflection* (left section of the upper part of figure 7-1), i.e. the capability to reflect on and learn from the digital transformation process and identify and develop the relevant competencies and resources, and *anticipation* (right section of the upper part of figure 7-1), i.e. the capability to look ahead and anticipate future changes shaping the digital workplace and to build the knowledge, skills and resources for enabling digital change (Nitschke et al., 2019). The two types of capabilities can be mutually dependent, i.e. deliberate considerations of their digital transformation endeavours, experiences, and learning (reflection) can be the baseline for and incorporated in the predictions and reasoning about the future and related improvements (anticipation) and vice versa. Put differently, the ways that an organisational member reflects on the digital transformation are typically configured by the member's anticipated changes as part of the digital transformation. Likewise, the ways that an organisational member looks ahead and anticipates changes as part of the digital transformation are typically shaped by the member's reflections on the digital transformation. Whether an arena is defined as reflection or anticipation depends on the focus of the involved actions and related behaviour as shown in this research. Some arenas cover actions and related behaviour that (possibly concurrently) involve reflection and anticipation.

In addition, arenas can be assigned to two different modes of action: planned (top section of the upper part of figure 7-1) and situated (bottom section of the upper part of figure 7-1). Arenas categorised as *planned* incorporate actions and related behaviour of people that follow or generate plans and related organisational structures and procedures (Magalhães, 2011, p. 39). The recognition of intent to successfully manage and understand digital transformation is characteristic of plans. Plans can be applied both to reflect on and prescribe action and behaviour and related

change (Suchman, 1985). In other words, they provide retrospective accounts of action and "are resources for people's practical deliberations about action." (Suchman, 1985, p. 35). By contrast, arenas categorised as *situated* describe actions and related behaviour of people who interact in "emergent ways […where] learning [is] taking place in a situated fashion" (Magalhães, 2011, p. 39). Situated action places emphasis on the improvisational nature of human behaviour and is shaping and shaped by the particularities of situations (Suchman, 1985) of the digital transformation. As with reflection and anticipation, planned and situated can be mutually dependent ensembles, i.e. plans can be considered a derivative from situated action (Suchman, 1985) just like situations may become less challenging with the acquisition of experiences and familiarity of contexts resulting in a possible decrease in deviations from plans (Ng, 2002, p. 618). The researcher Ng (2002) refers to Schutz' (1962) phenomenological standpoint according to which context and plan, and "indexicality and habitualised recipes of actions", respectively, must be seen as interwoven (p. 618).

Based on the research findings (see chapter 4, chapter 5 and chapter 6), the behaviour-based layers encompass the following identified arenas.

History/Paths. This arena focuses on planned reflection, i.e. digital transformation capabilities can be and emerge when platform participants follow a plan and established practice to reflect on trajectories of the platform and related digital workplace. This allows an understanding of the current change context, acknowledging path-dependency (cf. Hanseth & Lyytinen, 2004; Monteiro et al., 2013).
The research work part presented in chapter 4 provides snapshots of organisations' different enterprise collaboration platform change routes where organisations encounter various *challenges* (e.g. GDPR, works council) and apply different *strategies and actions* in response to them (e.g. checklists and actions for dealing with personally identifiable information, edited works agreement). Challenges, as well as strategies and actions, are not linked to the mere existence of actors, whether human or non-human, it is the interactions between actors that provide explanations for the different challenges and strategies and actions (e.g. the works council who wants to implement GDPR requirements is deliberately included in the enterprise collaboration platform project to discuss changes in the technology platform with the platform manager). Therefore, platform participants should be mapping and following arrays of actors and their interactions if they want to understand and learn from the biography of the enterprise collaboration platform and if they intend to develop the capabilities to manage the related digital transformation. This is also relevant when platform participants aim to take advantage of the history of successes and failures of desired enterprise collaboration platform outcomes and benefits (e.g. "breaking down silos"). With regard to enterprise collaboration platform outcomes and benefits, chapter 4 looks at two different types of actors that cover various challenges and strategies/actions and are considered as assemblages: *enterprise collaboration platform enablers* that support and enable the attainment of enterprise collaboration platform outcomes and benefits (e.g. "make cross-divisional use cases visible"), and *enterprise collaboration platform constraints* that make the achievement of enterprise collaboration platform outcomes and benefits more difficult (e.g. " 'knowledge is power' attitude"). Identifying and documenting them allows platform participants to reflect on reasons for anticipated and

unanticipated enterprise collaboration platform change routes. As enterprise collaboration platform enablers and constraints are complex, relational and evolving, platform participants should also pay attention to when platform constraints were transformed into platform enablers and vice versa, when their properties and structure (e.g. objective, controllability, source, project-relation, change design) changed and through which interactions.

The research work part presented in chapter 5 addresses how one enterprise collaboration platform changes over multiple spaces and time frames. This includes multiple dynamic relations between various actors from the immediate setting and broader context. Consequences from the relations can best be captured by monitoring and tracking their acting (Mol, 2010) and linkages. As the platform is in use, various new elements can be added to what exists, existing elements removed from what exists, or existing elements replaced by improved ones (Hanseth & Monteiro, 1998, p. 49). In the same vein, inscribed platform uses can be reinforced or superseded by new and competing ones. Sometimes, changes can directly be referred to platform participants' deliberate actions in the enterprise collaboration platform and related digital workplace design. However, in most cases, they are the (unanticipated) result of the web of multiple relations. Documenting how and why the enterprise collaboration platform and the digital workplace in which it is embedded evolve, may help platform participants acquiring the resources and competencies that are relevant for dealing with future changes. As shown in this research work part, this also includes awareness about the transformations that are necessary for the delivery of positive, possibly unexpected, enterprise collaboration platform outcomes and benefits.

Responses. This arena focuses on planned and situated reflection, i.e. digital transformation capabilities can be and emerge when platform participants sense challenges in the enterprise collaboration platform change and related digital workplace and develop responses. Related activities and behaviour can be categorised as planned when platform participants sense (temporarily) stable challenges (e.g. change resistance, hostile company takeover battle) and respond through tested strategies and actions. Responses to such challenges may be identified from documented reflections as part of the *History/Paths* arena (e.g. strategies and actions identified as successful for such or similar challenges the platform participant is familiar with). When platform participants sense situated, often unexpected, challenges (e.g. environmental changes, conflicts between platform participants, organisational events) and respond through improvising and the usage of ad-hoc strategies and actions, then their activities and behaviour can be regarded as situated. Following Suchman (1985), situated action "comprises necessarily ad hoc responses to the actions of others and to the contingencies of particular situations" (sec. abstract). The findings presented in chapter 4 and chapter 5 show that platform participants draw on established strategies and actions (e.g. usage of platform ambassadors, platform training courses). Often, however, platform participants' responding is part of their engagement in the situations of the digital transformation (*Instantiation* arena). Platform participants' actions are not independent of the conditions and events surrounding them (Sawyer & Jarrahi, 2013, p. 4).

Among others, chapter 4 reports on the role of the works council. The ways the works council interacts with and within the enterprise collaboration platform change are often unexpected and emerge in context (the raising of certain topics, such as platform contents or monitoring/control,

and linked requirements regarding platform functionality). To deal with the unexpected, platform participants with responsibility for the collaboration platform may have to improvise (e.g. involving the works council in the identification of platform use cases to convey benefits).
Chapter 5 does not explicitly address the implementation of strategies and actions in response to different challenges but provides information about how the enterprise collaboration platform design is transformed by certain challenges and how platform participants adjust their design activities as they are engaged in the situations of the digital transformation. For example, when platform participants were confronted with the emergence of guidelines about the handling of confidential data, they changed their behaviour in platform-enabled working spheres, i.e. they changed the ways they used the platform. Overall, the exchange of know-how across locations significantly decreased, yet some platform participants, such as the head of Analytics Research and Development, were increasingly engaged in creating an encyclopaedia about laboratory-related information and people, and internal communication and sharing of work-relevant but non-sensitive information within their department.

Instantiation. This arena focuses on situated reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants deal with uncertainty as they are actively engaged in transforming the platform and related digital workplace.
The research work parts presented in chapter 4 and chapter 5 reveal that organisations start their enterprise collaboration platform implementation projects with a set of individual expected enterprise collaboration platform outcomes and benefits that may be inscribed in digital transformation agendas (*Agenda* arena). However, enterprise collaboration platforms and the related digital workplace can only to a limited extent be planned and designed in advance, as they are open-ended. They unfold as platform participants try to instantiate their individual visions and objectives in practice.
Chapter 4 shows that enterprise collaboration platform using organisations have to deal with a range of situated platform constraints and make sense of situated platform enablers when they are trying to achieve certain enterprise collaboration platform outcomes and benefits. The analysis of enterprise collaboration platform outcomes and benefits and their constraining and enabling factors has revealed that they are relational and evolving in interaction, with changing characteristics and structure. For example, enterprise collaboration platform enablers or constraints may change from controllable to uncontrollable, or from project-unrelated to project-related, and manifest depending on the use context. Furthermore, the findings presented in chapter 4 indicate that enterprise collaboration platform using organisations collect similar experiences with the same actor (works council) and related challenges but apply individual tactics to deal with the experiences. For the development and implementation of successful ad-hoc responses (*Responses* arena), platform participants need to be reflective in the moment and be sensitive to the contextual developments. Responding in situation is both reason for and a portrayal of unique enterprise collaboration platform change routes.
Chapter 5 focuses on the ways different platform participants actively contribute to changing platform designs and associated work practices. Thereby, their expectations are reflected on and translated in the specific change context and situations. As examined using the MoBeC framework,

expected enterprise collaboration platform outcomes and benefits may decrease in importance (e.g. new procedure for exchanging information with externals) and new enterprise collaboration platform outcomes and benefits (e.g. ability to work in projects and organisation of meetings/events) may emerge over time. The specific transformations and local articulations that contribute to the achievement of expected and unexpected platform outcomes and benefits as well as multiple co-existing platform uses (e.g. news portal, file sharing space, schedule) happen in practice. The analysis of platform uses within and across different working spheres has shown that practice coins and is coined by the transfer of experiences and knowledge to new settings (*Transfer* arena). As platform participants are engaged in transforming the platform and related digital workplace, there are sometimes major deviations from intended paths of transformation (*Deviation* arena).

Transfer. This arena focuses on situated reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants contribute their experiences and knowledge to new settings (cf. Mark & Poltrock, 2004). More specifically, platform participants transfer what they have learned about the enterprise collaboration platform and digital workplace design in one setting to other contexts. The findings in chapter 5 reveal that people may be member of different social worlds and working spheres on the enterprise collaboration platform, respectively. They may act as bridges in conveying the enterprise collaboration platform and discovered platform uses across different working spheres. This may also involve transferring experiences and learnings from one working sphere to another. For instance, experiences and learnings gained from a platform community created and used for a certain project may be transferred to a new community that is being shaped and shaping within the context of a new project. In another, concrete example, the case company's platform project manager was a member of a parent company's platform community used to help platform newbies ("User Community"). He adopted what he had learned about user guidance and engagement to shape the case company's own platform working spheres.

Sometimes, outcomes of design activities from different working spheres may be reflected on and, if considered useful also in other settings, passed into other working spheres. This was the case when the head of Analytics Research and Development actively oriented herself to how others display and structure information in different working spheres and transferred solutions (for example, the usage of tables for certain types of content) to working spheres she was an active member of.

The in-situ transfer demands sensing and understanding local conditions (the unique constellations of old and new working sphere's current members, organisational and environmental arrangements, and their tasks), and anticipating results of the transfer. Over time and as both intended and unintended consequences emerge in different settings, experiences increase in breadth and are integrated into the instantiation of arising and developing visions and objectives (*Instantiation* arena).

It must be pointed out that transfer may also be planned when plans are developed to prescribe action and behaviour for the transfer. Notwithstanding the possible planned mode of action, this arena focuses on transfer, incorporating reflection and anticipation, in a situated fashion.

Deviation. This arena focuses on situated reflection, i.e. digital transformation capabilities can be and emerge when platform participants are open to changes and fall back on alternative paths of transformation. The findings in chapter 5 reveal how one enterprise collaboration platform changes over time and space and with increasing complexity. As platform participants are instantiating emerging visions and objectives in practice (*Instantiation* arena), the platform typically deviates from initial plans (cf. Ciborra et al., 2001). In some cases, expected transformations lead to unexpected enterprise collaboration platform outcomes and benefits, and in other cases, expected enterprise collaboration platform outcomes and benefits are achieved through unexpected paths of transformations. For instance, the case organisation had envisioned that a platform bulletin board would be used company-wide for offering and searching for various products, services and free-time activities and thereby support forming contacts needed for their desired benefit of improved inter-area communication and collaboration. However, the bulletin board did not significantly contribute to the improvement in communication and collaboration across areas. In contrast, the improvement was achieved through the unexpected emergence of multi-site platform communities that were used for project work and event organisation. Although deviations are often inevitable, they are not necessarily negative. They may be due to mistakes, but most often cannot be controlled because of the many-faceted sociotechnical processes. When the enterprise collaboration platform and related digital workplace are evolving in unforeseen ways, the platform participants need to be open to the new developments (e.g. platform use translations and related inscriptions, new laws and regulations, new actors policing the field, changing business tactics) and flexibly adjust their expectations and behaviour in the current situation. As platform participants are engaging in the digital transformation, developments need to be reflected on. Sometimes, the developments may be unfavourable in view of original intentions. However, holding on to beliefs and plans is not fruitful, especially in the case of generative and open-ended platforms. Thus, developments need to be viewed from a new angle and translated into something positive, so that platform participants can make the best out of the enterprise collaboration platform and related digital workplace. For example, the case company did not expect and favour the works council's actions in the enterprise collaboration platform design. The actions of the works council's chairman to push the inclusion of blue-collar workers were initially associated with extra work (survey, additional training sessions) and considered inappropriate (e.g. poor technical skills ascribed to blue-collar workers). Though, the platform project manager took this as an opportunity to design a computer-mediated solution that allows blue-collar workers to access the enterprise collaboration platform (Social Intranet terminals in production plants) and the abandoning of pre-established but impractical offline work practices (physical bulletin board used in production plants for the dissemination of various, typically human resources related, information).

In another instance, the case company's head of Analytics Research and Development began to use the enterprise collaboration platform as a means for getting in contact and connecting with distributed employees and colleagues from different group companies and sites. Inspired by externally hosted, public and open social networking platforms, she was engaged in building a 'group company Facebook'. However, the platform use inscription was too weak to be followed in the organisation. Instead, the unanticipated but precious inscription of a 'network of firms' emerged. Its focus was not on establishing connections between individual employees but between

different business areas and departments via open accessible representative platform communities. The inscribed use became increasingly stronger as more business areas and departments were building their own representative platform communities.
Trying out new ways of doing and experimenting when there are deviations from the stabilised frame of knowledge and habitualised patterns of actions is essential for the development of digital transformation capabilities in this arena.

Agenda. This arena focuses on planned reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants develop action plans based on the current change context. This includes i) reflection through perceiving, translating and understanding the situations in the current change context and ii) anticipation through the related assessment and planning of possible next steps. The change context includes a multiplicity of components, such as enterprise collaboration platform drivers, objectives, outputs, outcomes/benefits (focused on in chapter 4 and chapter 5), or challenges/constraints, strategies and actions / enablers in the enterprise collaboration platform change (focused on particularly in chapter 4). Chapter 6 specifically deals with the organised assessment of organisations' current competencies in the design of the digital workplace and incorporated enterprise collaboration platform (*Competencies* arena). For this, the digital workplace assessment method is developed allowing platform participants to identify pain points and areas for improvement in the design of the digital workplace. Plans for action can also be seen as derivative from the situated engagement of platform participants (*Instantiation* arena). For example, with the Monitoring Benefits Change (MoBeC) framework developed and applied as part of the research work strand presented in chapter 5, platform participants have a tool for planning the next steps in the light of the current change context. Corresponding agendas become typically inscribed into different material or medium (e.g. formal discussions, roadmaps, platform advertising strategies and texts, training material, platform communities providing examples of current best practices). For the development of digital transformation capabilities, it is essential that such agendas are not static but are flexible and dynamic to account for changes happening as part of the digital transformation.

Competencies. This arena focuses on planned reflection and anticipation, i.e. digital transformation capabilities can be and emerge when platform participants assess and plan their digital workplace competencies and adjust their digital workplace priority areas along with changing conditions. This arena does not look at how competencies are developed in situation but platform participants' deliberate actions in evaluating their organisations' status quo in the design of the digital workplace (DWP). Specifically, it is about reflecting on organisations' current competencies and priority areas in the design of the DWP (in short, DWP competencies and DWP priority areas), and looking ahead based on identified pain points in their organisations' design of the DWP. This includes the assessment of available and required resources that need to be successfully deployed via suitable competencies. For this, competencies may have to be reinforced or built. Assessment results may be both shaped by and shaping current agendas (*Agenda* arena). In chapter 6, a DWP assessment method is presented, which was developed based on enterprise collaboration platform using organisations' DWP visions, as well as resources and competencies. The application of the DWP assessment method reveals that individuals, even of the same organisation, may assess their

organisations' DWP competencies differently. In order to identify directions for improvement and derive future actions, platform participants need to understand and learn from the reasons for different assessments by different platform participants (e.g. different experiences in the design of the DWP, different character traits (e.g. pessimistic vs. optimistic), different views and areas of responsibility in the design of the DWP, different professional backgrounds). Likewise, platform participants need to examine, reflect on, and learn from the reasons for changes in DWP competencies and priority areas. The findings in chapter 6 visually present changes between two points in time, where changes may be due to organisations' improvement in DWP competencies or new settings where the assessing individual is situated in (including local and immediate sites (e.g. new tasks and interactions with other platform participants) and the broader context (e.g. technological or market developments)). Also, an individual's assessments at different times may simply be sometimes more, sometimes less gentle.

Confidence. This arena focuses on planned and situated anticipation, i.e. digital transformation capabilities can be and emerge when platform participants look ahead and prepare for future changes. While the *Agenda* arena concerns planned actions based on the current change context, this arena deals with anticipated change contexts and how platform participants can handle them in future. For this, drawing from experiences with and learning from documented situations in the current change context (*Agenda* arena) is essential. Platform participants can transfer insights gained from the situations in the current change context to possible future change contexts. Chapter 4 and chapter 5 provide examples of anticipated change contexts. Chapter 4 reports about one enterprise collaboration platform using organisation that comments on a planned migration of the platform to a cloud environment. Thus, the migration will be one anticipated element in a future change context. From the current change context, the organisation and its platform participants have learned about the demands by the works council and complementing GDPR requirements concerning the enterprise collaboration platform design (for example, display and usage of personally identifiable information). They can envision the ways these actors may interact with the migrated platform (for example, privacy topics raised, requests for platform functionality, discussions with platform participants with responsibility for the platform). Chapter 5 deals with the evolution of one enterprise collaboration platform. Platform participants from the case organisation were informed about the planned introduction of another, potentially competing, enterprise collaboration platform (built around Microsoft Office 365) being part of an anticipated change context. While there was uncertainty among the platform participants as to the other platform's role within the digital workplace (e.g. about the relevance of and link to the existing enterprise collaboration platform and its ECS, positioning of the platform in the IT landscape, or integration with other platforms and applications), platform participants were in the position to transfer insights from the current platform setting, such as the necessity of a low entry threshold for potential platform adoptions by prefilling the platform with content.

Anticipation in this arena also covers expecting the unexpected based on prior experiences and learning. Organisations may have encountered unforeseen challenges and incidents in the past allowing them to expect and prepare for surprises in the future. Challenges may range from unexpected constraining factors to enterprise collaboration platform outcomes or benefits (see

chapter 4) to unexpected factors attached to the enterprise collaboration platform design (e.g. platform performance problems) to unexpected interactions between different actors (e.g. between the company takeover battle, poor financial resources, multiple partially competing systems, and employees with high workload and low willingness to explore platform functionality) (see chapter 5). The findings of the research work part presented in chapter 5 reveal the possibility of imagining potential future developments and consequences from the current interactions between actors from the broader context and immediate setting (e.g. from interactions between the announced sale of IBM products to HCL, other enterprise collaboration platform using companies increasingly using MS Office 365, and IBM Connections not handled as a project in the case organisation anymore). The forward-looking actions and behaviour implicated in this arena may shape how the situations in the current change context are assessed and the next steps planned as part of the digital transformation (*Agenda* arena). Often, possible future states only become clear to platform participants as they are acting in a present situation (Suchman, 1985, p. 37) and contributing, in situ, to changing enterprise collaboration platform designs and incorporated work practices in different working spheres (*Instantiation* arena).

Arenas categorised as reflection and anticipation can be supported by means of different tools and methods (bar at the top of figure 7-1) that may be part of planned or situated modes of action. In this research work, a range of tools and methods were developed (the profile template of enterprise collaboration platform outcomes/benefits and their enabling and constraining factors (see chapter 4.1), the Monitoring Benefits Change (MoBeC) framework and method (see chapter 5.2), the changing portfolios of inscriptions (see chapter 5.3), time curves of adoption quality (see chapter 5.3), the map of interacting actors and factors (see chapter 5.4), and the digital workplace assessment method (see chapter 6)). While they may also support situated reflection and anticipation, they primarily serve planned reflection and anticipation.

Infrastructural layers

Infrastructural layers complement the behaviour-based layers by providing explanations for them. In other words, they constitute the underlying logics of the behaviour-based layers. They address related information infrastructure (II) properties indicating when digital transformation capabilities are and emerge. Due to the relational nature of II, the described characteristics are blurring but emphasise different II qualities. In contrast to behaviour-based layers, infrastructural layers make no distinction between reflection and anticipation, and planned and situated, respectively.

From the research findings, three different infrastructural layers were identified. The three layers can be described as follows.

Complex relations and interactions. Acknowledging the relational quality of information infrastructure (Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when actors are in interaction. Their interactions are complex and "embedded in open ranges of relationships" (Cordella, 2010, p. 45). In this research work, a variety of human and nonhuman actors and their interactions are discussed. Actors addressed in chapter 4 incorporate enterprise collaboration platform enablers and strategies/actions, enterprise collaboration platform constraints and challenges, or different organisational members (with responsibility for the enterprise collaboration platform) who are striving for the achievement of certain enterprise collaboration platform outcomes and benefits. Two specific challenges were examined more closely, that is GDPR and the works council, both identified as key actors in the enterprise collaboration platform change at different case companies. Chapter 5 does not focus on specific actors but on a range of actors identified and examined as part of the in-depth case study. They can be referred to the immediate site and broader context. Examples are trend topics discussed in the technological field (e.g. social business), platform and network technologies unfolding in the history of collaboration at the case company (e.g. global social intranet), both environmental and internal elements/conditions (e.g. other platform using companies or regulations from the outer context, or internal resources, culture, political systems from the inner context), local players with actions and influences as part of the enterprise collaboration platform implementation project and design and usage at the case company.
Actors can be involved in multiple interactions. For example, GDPR may be in interaction with the works council, different enterprise collaboration platform workspaces, or enterprise collaboration platform usage guidelines. Actors of the evolving information infrastructure (II) shape and are shaped by experiences and learning as they are in interaction. For instance, collaboration experts act upon and shape challenges and strategies and actions, and, at the same time, their beliefs, attitudes, visions, etc. are shaped by such challenges and strategies and actions. Interactions between actors with conflicting interests (e.g. the works council and platform managers) are specifically challenging. In this case, it is necessary that the interacting actors negotiate and coordinate their visions and objectives (e.g. through a works agreement). As discussed in chapter 4, the majority of the enterprise collaboration platform using case organisations and their organisational members interacts with the same actors, however their interactions with such actors

and resulting experiences in the enterprise collaboration platform change differ. Both positive and negative experiences are part of the ongoing learning process.
Chapter 5 shows that interactions may span multiple levels and timescales (see *evolving sociotechnical configurations*). The interactions reflect II's openness (with no limits in terms of the users, stakeholders, vendors, technological components etc. (Hanseth & Monteiro, 1998)) as well as II's embeddedness into other structures, social arrangements and technologies (Star & Ruhleder, 1996). The embeddedness transforms the conditions of practice (see *familiar unfamiliarity*) and affects learning dynamics (Vaast & Walsham, 2009). When actors are interaction, they shape and are shaped by unanticipated consequences and drifts and related experiences. Through evolving interactions, they can deepen their understanding of designs and adjust their expectations in individual work settings.

Familiar unfamiliarity. Acknowledging that information infrastructure evolves as it links with the conventions of practice and is learned as part of membership (Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when familiarity with the particularities of practice is continually being acquired. When platform participants start using the enterprise collaboration platform, there are many open questions, particularly regarding its role and uses. Over time, uncertainty may decrease at certain locales and in some respects (e.g. when platform use inscriptions in individual working spheres increase in strength and are transported to further working spheres); however, the setting incorporating different challenges is permanently shaping and being shaped. As examined in the research work presented in chapter 5, platform participants learn about the platform through their ongoing contributions to the platform design at different locales and in different working spheres. The ongoing and situated and contextual variations and alternations, encompassing unique constellations of individuals and their tasks as well as organisational and environmental arrangements (see *evolving sociotechnical configurations*), go along with a series of ongoing adaptions required to transform the platform into something meaningful and to deliver desirable expected and unexpected outcomes and benefits. Along the way, platform participants encounter, interact with, and deal with new and unfamiliar actors – sometimes with reach across different local practices (see c*omplex relations and interactions*). Correspondingly, digital transformation capabilities only emerge in practice and as the platform and related digital workplace is designed through use, where stability is only temporary and the processes of learning and familiarising with the infrastructure is never complete.

Evolving sociotechnical configurations. Considering the heterogeneous and evolving nature of information infrastructure (II) as well as its reach and scope (Hanseth & Monteiro, 1998; Star & Ruhleder, 1996), digital transformation capabilities can be and emerge when sociotechnical configurations are shifting in time and space. Therefore, understanding when digital transformation capabilities can be and emerge requires an extended view on design not confined by particular sites and time frames (R. Williams & Pollock, 2012). The emergence of digital transformation capabilities "is an outcome of multiple paths of interconnected contextual conditions and mechanisms" (El Sawy et al. 2010; Meyer et al. 1993; Pawson and Tilley 1997, as cited in Henfridsson & Bygstad, 2013, p. 5). Such paths require the successful integration of new actors and platform participants (e.g. GDPR), respectively, into moving enterprise collaboration platform and

related digital workplace (DWP) designs at different locales and different points in time, reconfiguring the constellations in which actors interact (see *complex relations and interactions*). The constellations include, among others, different change motivations, expectations, sources, business tactics (see, for example, enterprise collaboration platform outcomes, enablers, and constraints in chapter 4), intentionality in actions (see, for instance, works council's platform ties with the enterprise collaboration platform in chapter 4 or chapter 5), resources and competencies (see chapter 6), platform uses and related work practices (see, for example, platform use inscriptions within and across different working spheres in chapter 5), or environmental and organisational arrangements and conditions (see for instance, market players, collaboration history, rules and regulations from the immediate setting and broader context in chapter 5). Platform participants shape and are shaped by the sociotechnical configurations as they are continuously engaged in transforming the platform and related digital workplace into something meaningful, i.e. in improving and extending the heterogeneous installed base (Star & Ruhleder, 1996). Since II tend to drift (Ciborra et al., 2001) with emerging challenges, platform participants need to show openness to and deal with the unanticipated and unfamiliar (see familiar *unfamiliarity*) and adjust their intended goals (see MoBeC Framework in chapter 5) and current platform designs (see, for example, changing portfolio of inscriptions in chapter 5). In order to successfully use and gain experiences and knowledge in different evolving settings, platform participants need to sense the unique sociotechnical configurations and implications as along with the related causal complexity (see *complex relations and interactions*).

Chapter 8
Conclusion

This chapter describes the major outcomes and findings of this research. It starts with a recap of the research questions and presentation of their responses, as developed throughout this work. Then, it details how this research contributes both to theory and practice and discusses research limitations. It ends with a research outlook, as well as concluding remarks.

8.1 Addressing the research questions

The following sections provide answers to the research questions described in chapter 1.2. The questions and answers are presented according to the five thematic categories of research objectives: *Identification of outcomes and benefits*, *changing nature*, *platform designs*, *competencies and priority areas*, and *capabilities model*.

Identification of outcomes and benefits

As enterprise collaboration platforms afford interpretive flexibility (Doherty et al., 2006), they can be used for multiple purposes. Thus, enterprise collaboration platform using organisations have different visions in terms of enterprise collaboration platform *outcomes* ("what organisations expect to gain from them" (Nitschke & Williams, 2020, p. 2609)) and enterprise collaboration platform *benefits* ("the contributions of the outcomes to the business" (Nitschke & Williams, 2020, p. 2609)). In order to unveil and understand the open design space of enterprise collaboration platforms, the first research question (O1-Q1) concerns the identification and examination of enterprise collaboration platform outcomes and benefits and their diversity.

> Question O1-Q1: What outcomes and benefits do organisations expect to achieve with the enterprise collaboration platform introduction?

Drawing from multiple case studies and one single in-depth longitudinal case study (see chapter 3.2), a range of expected positive enterprise collaboration platform outcomes and benefits from a variety of organisations were identified and examined thoroughly. More specifically, expected outcomes and benefits were gathered from different organisations' collaboration experts applying the focus group method (F1; see chapter 3.5.5 and chapter 4.1.1), and then inductively and iteratively coded as part of a qualitative content analysis following Saldaña (2009). The findings (see chapter 4.1.2) reveal a plethora of multifaceted enterprise collaboration platform outcomes and benefits (e.g. highly networked company, faster on-boarding of employees, breaking down silos, overcome a fragmented IT infrastructure, facilitate international and cross-divisional communication, improved knowledge documentation) that can be of different *type* (e.g. company

group, culture, design, communication/collaboration, knowledge and information management), have different *objectives* (e.g. optimisation, substitution, achievement), have different *sources* (problem-driven vs opportunity-driven), incorporate different *resources* (e.g. human resources, processes, values/norms), and be of different *nature* (e.g. managerial, technical/functional, operational). Thus, each enterprise collaboration platform outcome and benefit is a unique constellation of different characteristics (see profile template for enterprise collaboration platforms outcomes/benefits and their enabling and constraining factors in chapter 4.1.2.1). The analysed focus group data is complemented by in-depth interviews (I1, I3; see chapter 3.5.1) conducted with one enterprise collaboration platform using organisation and analysed through the Monitoring Benefits Change (MoBeC) framework (see chapter 5.2.2.2). MoBeC was developed as part of this research and captures both expected and realised enterprise collaboration platform outcomes and benefits (see also answer to research question O2-Q2). In line with the Office of Government Commerce (OGC, 2011), it further specifies enterprise collaboration platform outcomes as new desired operational states and benefits as a result from an outcome perceived as an advantage (p. 79). However, MoBeC makes a distinction between *benefit description*, explaining an observable change, and *benefit measure*, a specific metric or evidence for that change. For example, the case organisation hoped to reach a central provision of people/department/area related information and forms (outcome). From this, it expected less search time needed for topic and area specific information and forms (benefit description). As evidence for this, the case organisation envisaged an increase in filled-in forms (e.g. of the commercial or HR department) per time (benefit measure).

Changing nature

Enterprise collaboration platforms cannot only be used for multiple different purposes, they are also open-ended (Ciborra et al., 2001; Richter & Riemer, 2009), i.e. end manifestations cannot be foreseen since they typically expand and evolve over time (Greeven & Williams, 2017) as they are designed through use (Nitschke & Williams, 2018, 2020). The following research questions (O2-Q1 – O2-O4) build on the first research question (O1-Q1). They address how enterprise collaboration platform outcomes and benefits change over time and the ways that organisations manage enterprise collaboration platform change and inherent challenges.

Question O2-Q1: To what extent and how are outcomes and benefits change being addressed in the enterprise collaboration platform literature?

To answer this research question (O2-Q1), the extant enterprise collaboration platform and related enterprise social software (ESS) literature about outcomes and benefits was reviewed and examined (see chapter 3.5.4 and chapter 5.2.1.1) adopting a critical literature review approach (Paré et al., 2015; Torraco, 2016). Five different streams of research (*associations of outcomes and benefits*, *identification and classification of outcomes and benefits*, *measurement of outcomes and benefits*, *use cases as outcomes*, and *technology affordances and resulting outcomes*) were identified and elaborated, each having its own strengths and limitations. Strengths include insights into general success factors, different types of outcomes and benefits, the assignment of outcomes and benefits

to different project stages, or technology affordances changing across different contexts. However, while the examined research publications (between 2008 and 2019) highlight the importance of studying the evolutionary nature of enterprise collaboration platforms and ESS, their limitations (e.g. structural models with a priori definitions of outcomes and benefits, no consideration of unanticipated outcomes and benefits, no insights into the transformative nature of outcome and benefits) reflect that they do not address outcomes and benefits change in any depth (see chapter 5.2.1.2).

Question O2-Q2: How do outcomes and benefits of enterprise collaboration platforms change?

The findings obtained in answering the preceding research question (O2-Q1) stress the importance of this research question (O2-Q2) which deals with the ways that enterprise collaboration platform outcomes and benefits evolve over time. To answer this research question, a longitudinal qualitative case study design was adopted to capture and monitor how expected and realised outcomes and benefits change. For this, the Monitoring Benefits Change (MoBeC) framework was developed (see chapter 5.2.2), which generally can be applied both by organisations and practitioners to study the evolutionary nature of malleable digital platforms. MoBeC incorporates findings from the benefits realization framework by the Office of Government Commerce (OGC, 2011), benefits dependency network by Ward and colleagues (Peppard et al., 2007; Ward & Daniel, 2006), and enterprise collaboration platform implementation projects examined in the scope of the wider university-industry research programme IndustryConnect (see chapter 3.6). In this way, it integrates theoretical and practical findings, encompassing a temporal flow from expected outputs to expected outcomes to expected benefits as well as organisational changes and capabilities needed to deliver change. The developed framework was used as a guideline to interview (I1, I3; see chapter 3.5.1, and chapter 5.2.2.1) the project manager and head of IT of the case study organisation in 2016 and 2018. The application of MoBeC in the empirical setting (see chapter 5.2.2.2) reveals significant changes in outcomes and benefits, among others: i) *progress in terms of the achievement* of expected outcomes and benefits (e.g. the majority of the platform users have developed the ability to easily search for subject-related information), ii) *new outcomes and benefits* emerged (e.g. ability to work in projects and organisation of meetings/events, improved top-down communication), while other *outcomes and benefits disappeared* because they were not of importance anymore (e.g. improved efficiency of business processes), iii) *whole new paths from output to benefit emerged* (e.g. from business area management community (output) to means for sharing business reports (outcome) to improved top-down communication (benefit description)), while other *whole paths from output to benefit dissolved* (e.g. from a community for the exchange with externals (output) to new procedure for exchanging information with externals (outcome) to improved collaboration with external partners (benefit description)). Further, MoBeC draws attention to the fact that outcomes and benefits are not simply IT-enabled but that transformations of different kinds are necessary (e.g. training staff on tagging content and persons, gaining experiences with temporary communities where employees from different sites are involved, translating contents).

Question O2-Q3: What challenges do organisations deal with in the enterprise collaboration platform change?

Research question O2-Q3 concerns challenges organisations have to deal with in the enterprise collaboration platform change and towards the delivery of expected enterprise collaboration platform outcomes and benefits. In order to capture and examine the multiplicity and complexity of enterprise collaboration platform challenges, a multiple case study design was adopted. More specifically, two focus groups (F1, F2; see chapter 3.5.5) and one questionnaire-based online survey (Q1; see chapter 3.5.3) were conducted with collaboration experts with different educational backgrounds and from different enterprise collaboration platform using organisations representing a range of industries.

The first focus group (F1), which also served for answering research question O1-Q1 and O2-Q4, was conducted to capture enterprise collaboration platform outcomes and benefits and their enabling and constraining factors via a force-field (Lewin, 1943) activity (see chapter 4.1.1). Constraining factors and *enterprise collaboration platform constraints*, respectively, constitute challenges in that they make the achievement of enterprise collaboration platform outcomes and benefits more difficult. Through an in-depth content analysis (see chapter 3.5.6) of the focus group material and transcripts, enterprise collaboration platform constraints (e.g. time for documentation, poor management support, competing systems, language barrier) of different characteristics and nature were identified (see chapter 4.1.2). Like enterprise collaboration platform enablers, enterprise collaboration platform constraints show a different structure (e.g. condition ((temporarily) stable or evolving), event, strategies/actions (one-off or ongoing; entities and artefacts in use) and can be distinguished in terms of their change design, i.e. they can represent a reason for change (driver, e.g. project expires), actually constraint change (constraint, e.g. project resource savings) or make change that has happened or is happening visible (embodiment, e.g. enterprise collaboration platform users are becoming more passive). Moreover, they can have different sources (internal, external), and can be project or non-project related as well as controllable or uncontrollable. The identified characteristics were grouped and integrated into a profile template for enterprise collaboration platform outcomes and their enabling and constraining factors. Thus, the profile template allows organisations to structure and understand their nature and complexity. In their analysis, organisations need to consider that constraints to specific enterprise collaboration platform outcomes and benefits typically co-evolve and may change in importance (as shown in this research work for one exemplary enterprise collaboration platform outcome).

In a follow-up research work, two challenges in the enterprise collaboration platform change were examined in-depth: the *General Data Protection Regulation (GDPR)* and the *works council*. Both challenges were intensively discussed as key actors by IndustryConnect (see chapter 3.6) member organisations in IndustryConnect's virtual workspace, bilateral research work and collaborative workshops. To address their interest and gain further insights into the influence and management (see also research question O2-Q4) of these actors, the above-mentioned online survey (Q1) was used (see chapter 4.2.1.1). The survey data was analysed using descriptive statistics with "graphical techniques used to organise, present and analyse [the] data" (Fisher & Marshall, 2009, p. 95) (see

chapter 3.5.7). Among others, the findings reveal that GDPR urges organisations to understand and monitor their enterprise collaboration platform contents so that GDRP compliant storage and processing of personally identifiable information can be achieved. The works council was involved at different stages in the enterprise collaboration platform project (most often in the platform implementation and roll-out phases). What makes the works council a challenge, are its initiated discussions about different topics and issues and actions related to the enterprise collaboration platform project (e.g. discussions and actions as to access equality for employees, anonymisation of downloaded information, performance monitoring/control, workload). However, although enterprise collaboration platform using organisations need to find ways to deal with the works council, it often influenced the enterprise collaboration platform change initiatives positively (e.g. by providing new insights, being a role model, active support) (see chapter 4.2.1.2). In order to deepen the insights gained about the experiences with the works council, the second focus group (F2) (the majority of the participating collaboration experts also participated in the preceding survey) was carried out (see chapter 4.2.1). The findings indicate reasons for negative experiences, including project delay, prohibition of certain platform functionality, conflict of interests between the works councils of a group's affiliated companies (see chapter 4.2.2).

Further challenges (e.g. guidelines about the handling of confidential data, system performance issues, integration of blue-collar workers) were discussed in this research work as part of the in-depth case study (see chapter 5). For more details, see the answer to the research questions O3-Q1 and O3-Q2.

Question O2-Q4: What strategies and actions do organisations apply in managing enterprise collaboration platform change?

The last question of this question group (O2-Q4) was answered in concert with the preceding research question (O2-Q3) and deals with the management of enterprise collaboration platform change. It pays attention to the strategies and actions applied for the achievement of desired enterprise collaboration platform outcomes and benefits and generally the addressing of challenges organisations encounter in the enterprise collaboration platform change. The adopted multiple case study design supports capturing the richness and multifacetedness of enterprise collaboration platform change routes. Since challenges and strategies/actions commonly occur together, they are captured and examined using the same methods of data collection and analysis. As can be taken from the answer to research question O2-Q3, two focus groups (F1, F2; see chapter 3.5.5) and a questionnaire-based online survey (Q1; see chapter 3.5.3) were conducted with collaboration experts from different enterprise collaboration platform using organisations from different industries and with different educational backgrounds.

The first focus group (F1), which also served for answering research question O1-Q1 and O2-Q3, was carried out for the identification of enterprise collaboration platform outcomes and benefits and their enabling and constraining factors via a force-field (Lewin, 1943) activity (see chapter 4.1.1). Strategies and actions are covered by enabling factors, also labelled *enterprise collaboration*

platform enablers that support and enable the attainment of enterprise collaboration platform outcomes and benefits. Applying methods of qualitative content analysis (descriptive coding in first coding iterations and pattern and axial coding in second coding iterations (Saldaña, 2009)) of the collected and transcribed data, enterprise collaboration platform enablers (e.g. ambassadors, generation change, mobile access options, make cross-divisional use cases visible) of different characteristics and nature were identified (see chapter 4.1.1). Like enterprise collaboration platform constraints, enterprise collaboration platform enablers are many-layered and show different structure, i.e. they can be a condition ((temporarily) stable or evolving), an event, or strategies/actions (one-off or ongoing; entities and artefacts in use). Additionally, they can be of different change design, i.e. they can represent a reason for change (driver, e.g. need for information exchange), actually enable change (enabler, e.g. the displaying of positive enterprise collaboration platform use case) or make change that has happened or is happening visible (embodiment, e.g. users are increasingly accepting enterprise social software). Furthermore, enablers can have different sources (internal, external) and can be either project-related or non-project-related as well as either controllable or uncontrollable. The identified characteristics were clustered and integrated into a profile template for enterprise collaboration platform outcomes and their enabling and constraining factors. As enterprise collaboration platform enablers and constraints can be regarded as counterparts of enterprise collaboration platform outcomes/benefits in line with the force-field analysis method, the same profile characteristics for them were considered adequate. This decision was supported through the finding that some enablers in one enterprise collaboration platform change initiative might pose constraints in another enterprise collaboration platform change initiative and vice versa. Also, constraints might become enablers alongside one enterprise collaboration platform change initiative. The profile template can be used by enterprise collaboration platform using organisations to structure and understand the nature and complexity of different enterprise collaboration platform enablers in relation to enterprise collaboration platform outcomes and constraints. Moreover, changes in the manifestations of the characteristics (e.g. from uncontrollable to controllable) can be identified by applying the profile template. When organisations apply the profile template, they also need to factor in that enablers to specific enterprise collaboration platform outcomes and benefits typically co-evolve and may change in importance (as shown in this research work for one exemplary enterprise collaboration platform outcome). Enterprise collaboration platform enablers may be tried out and prove to be more or less successful. Over time, organisations may discover means to address certain challenges and contribute to desired enterprise collaboration platform outcomes and benefits.

As outlined in the answer to research question O2-Q3, two challenges, and key actors, respectively, in the enterprise collaboration platform change were examined in-depth including different approaches and tactics to deal with them: the *General Data Protection Regulation (GDPR)* and the *works council*. For this, the above-mentioned questionnaire-based online survey (Q1) was conducted. The findings of the survey reveal that the majority of the participating organisations were prepared to meet the GDPR requirements with regard to their enterprise collaboration platform; however, only 56 per cent of the respondents reported that their organisation had plans or measurements/actions for monitoring personally identifiable information stored in their enterprise collaboration platform. Implemented and proposed plans and measurements/actions include written

documents and related practices (e.g. guidelines, checklists, confidentiality agreement) guiding and controlling platform participants, and changes to the software functionality (hiding the PII attached to downloaded files). Regarding the works council, the survey revealed that enterprise collaboration platform using organisations collect similar experiences with the works council but seem to deal differently with the experiences. Similar experiences may lead to a positive influence of the works council in the enterprise collaboration platform change and in other cases, to a negative influence. For example, the works council may initiate discussions and negotiations with people responsible for the enterprise collaboration platform (e.g. relating to platform functionality, works agreement, performance monitoring/control) leading to a delay of the enterprise collaboration platform implementation project. While some organisations consider the project delay a negative influence in the enterprise collaboration platform change, other organisations see it as a chance to understand, reconsider or improve existing processes, procedures, and (related) artefacts (e.g. address user concerns for a better platform adoption, identify platform use cases, drawing up platform benefits for potential platform users, develop group works agreement, illuminate employee protection). In order to gain further insights into the ways that enterprise collaboration platform using organisations deal with the works council, the second focus group (F2) (the majority of the participating collaboration experts also participated in the preceding survey) was carried out (see chapter 4.2.1). The findings reveal different strategies and actions to deal with the works council. When organisations address the concerns of the works council (e.g. disabling certain enterprise collaboration platform functionality to prevent behaviour monitoring/control), the works council may modify its behaviour in the enterprise collaboration platform change (e.g. works council starts adopting and using the enterprise collaboration platform and acts as a role model).

Further strategies and actions applied in managing enterprise collaboration platform change (e.g. transferring learnings from different working spheres to new settings, training sessions for blue-collar workers, Social Intranet terminals) were discussed in this research work as part of the in-depth case study (see chapter 5). For more details, see the answer to the research questions O3-Q1 and O3-Q2.

Platform design

Enacted enterprise collaboration platform designs go beyond enterprise collaboration platform outcomes and benefits, related challenges, and strategies and actions they are entangled with. Platform designs incorporate changes across multiple time frames and settings and the embedding of enterprise collaboration platforms into the broader digital workplace. The following two research questions (O3-Q1, O3-Q2) concern platform designs and extend the findings related to MoBeC (see the answer to research question O2-Q2). They are addressed by means of the in-depth longitudinal interpretive case study (see chapter 3.2). Data was collected via interviews (I1, I2, I3; see chapter 3.5.1) with different platform users and people with responsibility for the platform at three different times (June 2016, September 2017, November 2018).

Question O3-Q1: How and why do the uses of an enterprise collaboration platform change across and with-in different working spheres over time?

The first research question of this question group (O3-Q1) addresses the ways that enterprise collaboration platform uses change over time and space. In order to answer the research question, the concepts of *working spheres* (Mark & Poltrock, 2004) (see chapter 3.4.1.4), as indicated by the research question, and *inscriptions* from Actor-Network Theory (see chapter 3.4.1.3) are used, allowing for the study of multiple coexisting perspectives and uses that can be inscribed (Henningsson & Henriksen, 2011; Holmström & Robey, 2005) into one and the same collaboration platform over time. The working spheres, different locales typically represented by enterprise collaboration platform communities, have unique constellations of community members (with different backgrounds/history, experiences, expertise, attitudes), organisational and environmental arrangements (e.g. structure (collocated, distributed, hierarchical), policies, norms, restrictions, resources), and their tasks (e.g. provision of information, self-presentation, project work, intra-departmental communication). Inscribed purposes of use into the working spheres were examined from the perspective of individual community members of the case organisation who were interviewed (Project Manager, Head of IT, Head of Analytics Research and Development) (see chapter 5.3.1 and chapter 5.3.2.1). The findings (see chapter 5.3.2.2) reveal that the portfolio of identified inscriptions evolves over time for each of the individuals. While some of the identified inscriptions, whether planned or not, gained strength and became background over time (e.g. encyclopaedia, space for the planning and organisation of meetings), i.e. they were increasingly taken for granted and accumulated resistance against change, others were too weak (e.g. know-how storage and distribution, group company Facebook, platform manual), i.e. they disappeared as they were opposed (e.g. by rules introduced prohibiting the sharing of know-how incorporating confidential data) or superseded by competing translations. Changes in inscriptions also include learning as part of membership, and contributing personal knowledge and experiences shaped also by other (possibly intersecting) social worlds the individuals belonged to. In this research work, the sequences of inscriptions for each individual were visualised (see chapter 3.5.7) and compared using a faceted timeline (Brehmer et al., 2017) and drawing from Barret et al's (2016, p. 710) visualised value creation process in an online community (social media platform). Although the individual portfolios of inscriptions incorporate a similar number of platform uses with some uses in common (e.g. means for representation), the findings show that the individuals still adopted the enterprise collaboration platform to different degrees and at different times. This was examined using the concept of *adoption quality* (see chapter 5.3.2.3), which is defined in this research work as the degree to which individuals show enthusiasm for the enterprise collaboration platform and related intention to accept and use it (Alqahtani et al., 2014, p. 3), actively participate in the shaping of the enterprise collaboration platform (Alqahtani et al., 2014, p. 5), and integrate it in their everyday work (Pipek & Wulf, 2009, p. 457). Changes in the adoption quality were extracted from the shaping of working spheres and related inscriptions. For the purpose of comparability, changes in the adoption quality (decrease, increase) were visualised (using a unified timeline (Brehmer et al., 2017)) and elaborated on, including identified reasons for changes (e.g. network externalities, platform value conveyed by individuals of other, intersecting social worlds, roles ascribed to the

individuals in the enterprise collaboration platform change (e.g. membership in an editorial team), increase in geographically dispersed teams, release of guidelines about the handling of confidential data).

Question O3-Q2: What actors and factors are attached to the enterprise collaboration platform design and its embedding into the digital workplace over time and space?

The previous research question (O3-Q1) pays attention to the ways that individuals of different social worlds and working spheres, respectively, give meaning to the enterprise collaboration platform in their local work contexts over time. This research question (O3-Q2) complements the previous research question in that it concerns the identification of various spatiotemporal actors and factors attached to and surrounding the enterprise collaboration platform design and the embedding of the platform into the digital workplace. As stated above, a longitudinal case study design was adopted for answering the research question. The corresponding qualitative interviews entailed a set of interview questions that had been developed to particularly address research question O3-Q2. The questions (see chapter 5.4.1) were addressed to five enterprise collaboration platform participants (Project Manager, Head of Communication and Marketing, Head of IT, Head of Analytics Research and Development, Chairman of the works council) who were willing to share their experiences and perspectives. The transcribed interviews were analysed drawing from the Biography of Artefacts (BoA) (R. Williams & Pollock, 2012) perspective (see chapter 3.4.1.5), which "go[es] beyond the study of technology at a single locale or moment and […] follow[s] it through space and time" (R. Williams & Pollock, 2012, p. 1). More specifically, human and nonhuman actors both from the broader context and immediate setting were identified and examined next to their coexistence and interactions and related consequences (see chapter 5.4.2) They were mapped to different time frames (constituted by the years in which the participation and engagement of the actors and related changes occur) and spatial frames: *technological field* (e.g. operating models for enterprise collaboration platforms, actors who police the field), the *history of collaboration at the case company* (platforms, such as IBM Notes, and different network solutions), ac*tors interacting with the enterprise collaboration platform in the broader setting* – company internal and external (e.g. systems competing with each other in company group, other enterprise collaboration platform using companies increasingly using an enterprise collaboration platform from another vendor, other enterprise collaboration platform using company's project manager meeting the case company to exchange information about the platform design) and *actors interacting with the enterprise collaboration platform in the immediate setting* (e.g. (potential) enterprise collaboration platform users with work pressure, enterprise collaboration platform communities filled with content from the old Intranet, enterprise collaboration platform performance problems, Social Intranet terminals). The spatial and temporal distribution of and relations between the different identified actors were visualised (see chapter 3.5.7) using a faceted timeline (Brehmer et al., 2017). Puzzle pieces with different colours were used as a narrative device (Segel & Heer, 2010) to portray the arrays of actors and guide the reader through the visualised data. Text narratives were developed to unveil the linkages and interactions between the different identified actors and address the inherent complexities. The narratives were communicated around

three topics: *enterprise collaboration platform usage in a space of competing options and uncertainty*, *the power of the German works council in the enterprise collaboration platform evolution across different sites*, and *history of collaboration at CPM03 [, the case company,] and related changes in the social fabric of the technological field of enterprise collaboration platforms*. Some of the described actors were addressed as part of other research work strands, such as those about changes in enterprise collaboration platform uses or enterprise collaboration platform outcomes at the case company. However, this research work part developed a more holistic and comprehensive picture that shows the web of relations surrounding the enterprise collaboration platform design and its embedding into the digital workplace.

Competencies and priority areas

The preceding questions focus on the evolution of enterprise collaboration platforms and corresponding design paths with multiple different actors. The following two questions signify the shift from enterprise collaboration platforms to the broader notion of the digital workplace (DWP). This shift is considered a reasonable next step in the research inquiry since enterprise collaboration platforms have become the core of today's DWP. In other words, an enterprise collaboration platform is embedded with the DWP, which is further expanded in terms of scale and scope, and inherent complexity (Hanseth & Lyytinen, 2004; S. P. Williams & Schubert, 2018). With the enterprise collaboration platform embedded, DWP are also malleable and can be envisioned and designed differently by different organisations. Thus, in the following, the focus is on the different DWP areas organisations may have developed competencies (see chapter 2.2) in and prioritise. In order to capture the variety of different DWP visions and instantiations, and in this way draw on aggregated information from several sites, the subsequent questions were addressed adopting a multiple case study design (see chapter 3.2).

Question O4-Q1: What are the organisations' competencies and priority areas in the design of the digital workplace?

The first research question of this question group (O4-Q1) deals with the identification of the organisation's competencies and priorities in different areas in the design of the digital workplace (DWP). To address the question, a DWP assessment method that encompasses common areas of today's DWP was developed and then applied (see chapter 6.1). For the development, a focus group (F3; see chapter 3.5.5) was conducted with a heterogeneous group of collaboration experts from different enterprise collaboration platform using organisations to identify i) characteristics and elements of the DWP as envisioned by the organisations, and ii) the resources and competencies available and needed by the organisations for the design of a successful DWP. The collected data was examined using methods of qualitative content analysis (see chapter 3.5.6), including descriptive, in vivo and pattern coding (Saldaña, 2009). Findings of the data analysis were discussed between two researchers of the IndustryConnect (see chapter 3.6) initiative, including the author of this research work. In the discussions, inferences were drawn about competencies required for deploying resources in different DWP areas (with different characteristics and elements), and

concomitant assessment statements (e.g. “In my organisation we have a clear and complete vision for the DWP for our organisation.”) were iteratively formulated and grouped. In total, eight DWP areas were identified and attached to the three categories of DWP characteristics described by Williams and Schubert (S. P. Williams & Schubert, 2018): *organisational strategy and design*: strategy and vision, governance and compliance, change management; *people and work*: individualised/personalised, work group support; *technology platform*: unified platform, integrated with other information systems, location and device-independent. They build the baseline of the DWP assessment method and incorporate various components including people, their agendas and work, and technology artefacts. For the application of the DWP assessment method, i.e. the gathering of organisations’ current competencies and priority areas in the design of the DWP, the DWP assessment method was implemented via a questionnaire (see chapter 3.5.3). The questionnaire was used for two data collection phases, i.e. for conducting two surveys with collaboration experts from different enterprise collaboration platform using organisations: offline in an IndustryConnect *collaborative workshop* (see chapter 3.6) in October 2018 (Q2.1), online where participants were invited via IndustryConnect’s *virtual workspace* in February and March 2019 (Q2.2). The assessed competencies and priority areas in the design of the DWP were compared within a company and between companies. The findings, which were visualised using spider web diagrams (see chapter 3.5.7 and chapter 6.2), show a high dispersion in the ratings of the DWP competencies. The organisations’ competencies were not only rated differently by the various organisations but, in most cases, also differently by the individuals of the same organisation. This may be due to their divergent histories, experiences, motivations, skills, tasks and links to other humans in the design of the DWP (W. J. Orlikowski, 1992b). Accordingly, different strengths and weaknesses organisations apparently have in the design of the DWP became visible to the different study participants. For both data collections, “Strategy and Vision” and “Change Management” were among the areas most often selected as a priority area. However, the data sets allowed no conclusions about a relationship between the rating of the competencies and the selected priority areas in the design of the DWP. The requested explanations for priority areas implicate that the selection is linked to the specific DWP and related enterprise collaboration platform setting.
It should be noted that organisations and their individual organisational members may define the DWP differently. These definitions may evolve over time, especially with technological developments and changing conditions. New DWP areas and related competencies may be of importance at some point. Thus, the developed DWP assessment method is not a fixed method with set DWP areas and related questions about competencies and priorities. Still, it is leading the way to the identification and assessment of organisations’ strengths and weaknesses in the design of the DWP and the deriving of the next steps.

Question O4-Q2: How may the organisations’ competencies and priority areas in the design of the digital workplace change?

Research question O4-Q2 was addressed in concert with research question O4-Q1. It deals with the ways that organisations’ competencies and priority areas in the design of the digital workplace (DWP) may change over time. To identify and examine changes, the developed DWP assessment

method (see the answer to research question O4-Q1) was applied at two different points in time (10/2018, 02-03 2019) via a questionnaire that was filled in by collaboration experts from different enterprise collaboration platform using organisations. In this way, snapshots of DWP assessments were taken, allowing for over-time comparisons. The collected data were prepared using spider web diagrams (see chapter 3.5.7) that show the ratings of the organisations' competencies in eight different DWP areas (*organisational strategy and design*: strategy and vision, governance and compliance, change management; *people and work*: individualised/personalised, work group support; *technology platform*: unified platform, integrated with other information systems, location and device-independent).

The findings reveal both stability and transformations in DWP competencies and priority areas.

In case of changes in DWP competencies, both increases and decreases in DWP competency ratings were captured. Reasons for changes can be attributed, among others, to progress in the design of the DWP, improvement of DWP competencies, further experiences collected in the design of the DWP, current personal stance (pessimistic/optimistic), and the setting the assessing individual is situated in. Organisations were encouraged to critically reflect on reasons for changes (e.g. what had to be done to improve in the given DWP area?) so that they can further develop or strengthen the respective DWP competencies. In some cases, the spider web diagrams with the individual DWP competency ratings show different values between the two data collection points but discernable stable patterns (e.g. a decrease of the competency value in the DWP area "Integrated with other Information Systems", and an increase of the competency value in the DWP areas "Unified Platform" and "Location and device independent"), i.e. the relationship between the DWP areas is stable over time. A reason for this may be assessments that are sometimes more, sometimes less gentle at different times. However, this can only be illuminated by means of more in-depth interviews and bilateral discussions.

In this research work, the analysis of changes in assessments of DWP competencies also included within-company-comparisons. In one case, two study participants of the same company rated their company's competencies in the design of the DWP different in 2018 and 2019, however their ratings are similar for each of the data collection time points. The eXperience base cases developed as part of the IndustryConnect initiative (see chapter 3.6) reveal that the two study participants had collected similar experiences with regard to their company's competencies in the design of the DWP despite different job positions and areas of responsibility within the company.

Although the data allowed no conclusions about a relationship between DWP competencies and DWP priority areas (see the answer to research question O4-Q1), the majority of the study participants rated their organisation's competencies in the DWP area "Integrated with other Information Systems" as relatively low, many of which selected this DWP area as priority area at both data collection points. Though, the DWP areas selected most often as priority areas at both times are "Strategy and Vision" and "Change Management". The largest difference between the frequency of mentions is given with the DWP area "Work Group Support".

Capabilities model

Although the related digital workplace (DWP) and its embedded enterprise collaboration platform offer a high degree of ambiguity, the ambiguity can "be an asset not an obstacle" (Ackerman et al., 2013, p. 25; Nitschke et al., 2020) if organisations and their organisational members develop the necessary competencies and capabilities (Andreu & Ciborra, 1996) to make the most of the DWP and its technology platform (Bødker et al., 2017). For this, organisations need to reflect on the digital transformation process and anticipate future changes (Nitschke et al., 2019, p. 1648). Inspired by Star and Ruhleder (1996), this research work accounts for the relational quality of the DWP and its enterprise collaboration platform. Thus, the interest is not on the identification of different types of digital transformation capabilities but on the ways that such capabilities emerge. The final two research questions address this interest and reflect the major contribution of this research work.

Question O5-Q1: When are digital transformation capabilities?

Research question O5-Q1 is addressed in tandem with research question O5-Q2, both of which are interwoven with all preceding research questions. It pays attention to when, not what, digital transformation capabilities are. The underlying premise for answering this research question is that enterprise collaboration platforms and the related digital workplace (DWP) are large and dynamic sociotechnical systems, i.e. *information infrastructures* (Bygstad, 2010, p. 2; de Reuver et al., 2017) (see chapter 3.4.1). Therefore, to address this research question all findings gained in answering the previous questions (e.g. about enterprise collaboration platform outcomes, inscribed enterprise collaboration platform uses, spatiotemporal actors and factors in the enterprise collaboration platform design and its embedding into the digital workplace) were successively reviewed and reflected on adopting an information infrastructure (II) perspective (see chapter 4.3, chapter 5.5, and chapter 6.3). As identified, each of the different main research work strands (see chapter 4, chapter 5, chapter 6) highlights different, in part complementing but also seemingly paradoxical, II dimensions and properties (e.g. shaped by an installed base of existing systems and practice, embedded into other structures, social arrangement and technologies, generative, not limited to spatial or temporal reach or scope, learned as part of membership, links with conventions of practice, open in terms of the users, stakeholders, vendors, technological components, etc., entangled with other II (cf. Ciborra et al., 2001; Hanseth & Monteiro, 1998; Monteiro et al., 2013; Star & Ruhleder, 1996; Tilson et al., 2010; Zittrain, 2006)). Interlinked with this was the ongoing screening of the research findings with due regard to the theoretical background of *digital transformation capabilities* (see chapter 3.4.2). Linking up with II and related sociotechnical perspectives and concepts (interpretive flexibility (see chapter 3.4.1.1), design through use (see chapter 3.4.1.2), inscriptions (see chapter 3.4.1.3), working spheres (see chapter 3.4.1.4), biography of artefacts (see chapter 3.4.1.5)) as well as key aspects of digital transformation capabilities (reflection and anticipation, learning, dealing with the unexpected, competencies, work practices, and context) a conceptual model of when digital transformation capabilities are and emerge was developed in stages with abductive reasoning (see chapter 4.4, chapter 5.6, and chapter 6.4). The

iterative process of interpretation incorporated the writing down, comparing, labelling, relating, and restructuring of ideas and notes. The final conceptual model includes non-abstract knowledge in the form of real-world stories and examples of enterprise collaboration platform and related digital workplace change. In this way, it helps organisations understand the building of digital transformation capabilities both from a theoretical and practical viewpoint and constitutes a rationale in their unique digital transformation processes. In the developed conceptual model (see chapter 7), the building of digital transformation capabilities is framed by two layers of explanation: *behaviour-based layers* and *infrastructural layers*.

Behaviour-based layers regard human platform participants (see chapter 3.4.1.2) and their relations with and role within the ongoing digital transformation. The focus is on their actions and linked behaviour thematically grouped into a set of interwoven arenas, where "multiple actors are present and active" (R. Williams & Pollock, 2012, p. 12). The identified arenas, labelled *agenda*, *instantiation*, *history/paths*, *responses*, *transfer*, *deviation*, *competencies*, and *confidence*, were categorised according to the two mutually dependent but different types of digital transformation capabilities: *reflection*, i.e. the capability to reflect on and learn from the digital transformation process and identify and develop the relevant competencies and resources, and *anticipation*, i.e. the capability to look ahead and anticipate future changes shaping the digital workplace and to build the knowledge, skills and resources for enabling digital change (Nitschke et al., 2019) (see chapter 3.4.2). Moreover, the arenas were assigned to two different modes of action: *planned*, incorporating actions and related behaviour of people that follow or generate plans and related organisational structures and procedures (Magalhães, 2011, p. 39), and *situated*, describing actions and related behaviour of people who improvise and interact in "emergent ways […where] learning [is] taking place in a situated fashion" (Magalhães, 2011, p. 39; Suchman, 1985). Considering the classifications, the identified arenas postulate the following. Digital transformation capabilities can be and emerge when…

- platform participants deal with uncertainty as they are actively engaged in transforming the platform and related digital workplace (*instantiation*, situated reflection and anticipation)
- platform participants develop action plans based on the current change context (*agenda*; planned reflection and anticipation)
- platform participants follow a plan and established practice, respectively, to reflect on trajectories of the platform and related digital workplace (*history/paths*, planned reflection)
- platform participants contribute their experiences and knowledge to new settings (*transfer*, situated reflection and anticipation)
- platform participants are open to changes and fall back on alternative paths of transformation (*deviation*, situated reflection)
- platform participants assess and plan their digital workplace competencies and adjust their digital workplace priority areas along with changing conditions (*competencies*; planned reflection and anticipation)

- platform participants look ahead and prepare for future changes (*confidence*; planned and situated anticipation)

In this research work, a range of tools and methods were developed that can support organisations in the instantiation of the different arenas (see the answer to research question O5-Q2).

Infrastructural layers constitute the logics behind the behaviour-based layers. They concern different but related II properties explaining when digital transformation capabilities are and emerge. Consequentially, they support organisations in understanding the different arenas of the behaviour-based layers. In contrast to the behaviour-based layers, infrastructural layers do not make a distinction between reflection and anticipation and planned and situated. Three different infrastructural layers, i.e. themes, came into focus when reviewing and examining the findings presented in chapter 4, chapter 5 and chapter 6: *complex relations and interactions*, *familiar unfamiliarity*, and *evolving sociotechnical configurations*. The three layers postulate the following. Digital transformation capabilities can be and emerge when…

- actors are in interaction (*complex relations and interactions*)
- familiarity with the particularities of practice is continuously being acquired (*familiar unfamiliarity*)
- sociotechnical configurations are shifting in time and space (*evolving sociotechnical configurations*)

Question O5-Q2: How can the ways digital transformation capabilities emerge be visualised?

Research question O5-Q2 concerns the visualisation of the building of digital transformation capabilities and was addressed together with research question O5-Q1. As stated in the answer to research question O5-Q1, a conceptual model of when digital transformation capabilities are and emerge (see chapter 7) was developed successively and through several iterations of interpretation (see chapter 3.5.8). The structure of the model's components, elements and their relations is described in the following.

At the centre of the final conceptual model is the *building of digital transformation capabilities*, which is framed by two layers of explanation, namely *behaviour-based layers* and *infrastructural layers*.

The behaviour-based layers are presented on the upper side of the building of digital transformation capabilities. According to the two different types of digital transformation capabilities, they are separated lengthwise into *reflection* and *anticipation* (see chapter 3.4.2), and according to different modes of action split crosswise into *planned* and *situated*. Thus, the behaviour-based layers are described by quadrants: planned reflection (top left quadrant), planned anticipation (top right quadrant), situated reflection (bottom left quadrant) and situated anticipation (bottom right quadrant).

The behaviour-based layers incorporate different *arenas* that concern human platform participants and their actions and linked behaviour in the ongoing digital transformation (*agenda*, *instantiation*, *history/paths*, *responses*, *transfer*, *deviation*, *competencies*, and *confidence*) (see the answer to research question O5-Q1). The arenas are arranged according to matching quadrants, the relations between arenas and their entanglements are indicated by arrows guiding the reader through the conceptual model. With the different arenas, behaviour-based layers help organisations adjust their behaviour in their digital transformation processes. For organisations' actions of reflection and anticipation in the digital transformation, the behaviour-based layers suggest the usage of suitable tools and methods. The tools and methods developed as part of this research (the profile template of enterprise collaboration platform outcomes/benefits and their enabling and constraining factors (see chapter 4.1), the Monitoring Benefits Change (MoBeC) framework and method (see chapter 5.2), the changing portfolios of inscriptions (see chapter 5.3), time curves of adoption quality (see chapter 5.3), the map of interacting actors and factors (see chapter 5.4), and the digital workplace assessment method (see chapter 6)) are presented at the top of the quadrants.

The infrastructural layers, which show different but related information infrastructure properties explaining when digital transformation capabilities are and emerge (*complex relations and interactions*, *familiar unfamiliarity*, and *evolving sociotechnical configurations*), are presented on the bottom side of the building of digital transformation capabilities. Constituting the underlying logics of behaviour-based layers, they help organisations understand the different arenas of the behaviour-based layers.

8.2 Theoretical and practical research contributions

This research work makes substantial scholarly and practical contributions as explained in the following.

8.2.1 Literature this research contributes to

The findings of this research work extend the current literature on i) enterprise collaboration platforms and incorporated enterprise social software (ESS) / enterprise social networks (ESN) , ii) digital platforms, iii) digital workplace, and iv) digital transformation in two ways.

1) Monitoring change over time

Although researchers of the distinct, but interrelated, literature streams have emphasised the importance of longitudinal research studies to provide an evolutionary perspective of enterprise collaboration platforms/ESS/ESN, digital platforms, the digital workplace, and digital transformation, respectively, prevalent literature has, to date, largely studied snapshots in time and developed local pictures of the respective phenomenon. The following quotes are exemplary for the shortcoming and related research imperative in this regard.

Enterprise collaboration platforms/ESS/ESN

> *"this part of the study offers* ***only a snapshot of ESN use at a certain point in time****. Hence,* ***future research*** *could adopt a* ***longitudinal design*** *and* ***focus on investigating the changes in the patterns of how people use, and create value from ESN****."* (Mäntymäki & Riemer, 2016, p. 1050)

> *"****Future studies*** *could benefit from a* ***longitudinal approach*** *that* ***compares*** *the* ***behavioral intention with the actual, continuous engagement*** *in the ESN."* (Meske, Wilms, & Stieglitz, 2019, p. 13)

Digital platforms

> *"As we* ***typically study platforms as a snapshot in time****, the* ***understanding of platform dynamics is generally lacking****. The dynamics of digital platforms and ecosystems* ***can only be observed within*** *a* ***sufficiently long time horizon****. […] the* ***generative principles*** *of a platform imply that the effect of design choices on the platform in the long run cannot be reliably predicted at its inception.* ***Longitudinal studies on the evolution of digital platforms*** *and ecosystems are, therefore,* ***required****."* (de Reuver et al., 2017, p. 128)

> *"In general,* ***research on*** *the* ***evolution of platforms over time is still immature****. While this article has focused on only two phases of platform evolution, launch and maturity, a* ***fuller examination of platform evolution*** *(which is outside the scope of this paper) would also consider what happens after platform firms achieve maturity."* (Gawer, 2020)

Digital workplace

> *"The research study presented in this paper reveals that the* ***digital workplace is being interpreted and shaped differently*** *by different organizations to meet their specific organizational requirements. […] The next phase of work is to examine these differences and the factors that led to them in more depth to* ***understand the transformative characteristics****"* (S. P. Williams & Schubert, 2018, p. 484)

Digital transformation

> *"it is important to emphasize that the* ***cross-sectional data-collection approach*** *does not define an optimal lag between IT capability, digital transformation, and firm performance. This issue is* ***prevalent in most extant research****,* ***given the complexities*** *and noise involved in gauging an exact* ***temporal lag between the cause and the outcome****. Therefore****, future studies*** *can dig deeper […] to* ***examine the longitudinal path of digital transformation****."* (Nwankpa & Roumani, 2016, pp. 11–12)

The quotes underline the significance of this research work in which the above-described limitation is addressed. This research work provides a detailed account of the changing nature of enterprise collaboration platforms, considered as malleable digital platforms at the heart of the digital workplace (Nitschke et al., 2020; S. P. Williams & Schubert, 2018), and driving and building on digital transformation (Kumar et al., 2016; Nwankpa & Roumani, 2016). For this, it methodologically draws on multiple and single case study research (see chapter 3.2). The former provides several discrete snapshots of time with comparative elements (e.g. enterprise collaboration platform challenges (see chapter 4), digital workplace competencies (see chapter 6)). The latter deals with the ways that one enterprise collaboration platform is shaping and being shaped over time at one case study organisation. Data capture occurred between 2016 and 2018 (and 2021, respectively (see chapter 3.5.1)), with focus on current states but interest also in retrospective states reaching back to the year 2014. Consequently, the enterprise collaboration platform is followed through time. The findings exemplify the generativity and multifacetedness of enterprise collaboration platforms with different unanticipated interactions and consequences. More specifically, this research work examines enterprise collaboration platform outcomes and benefits change over time (see chapter 5.2), sequences of inscribed enterprise collaboration platform uses across and within different working spheres over time (see chapter 5.3), and the history of relationships and sites (with actors and factors from the broader context and immediate setting) implicated in the enterprise collaboration platform evolution (see chapter 5.4). Hence, the enterprise collaboration platform is also followed through space in that this research work considers multiple interconnected and interwoven locales with multiple actors and perspectives.

2) Marrying different streams of literature

This research work integrates literature on *enterprise collaboration platforms* with the literature on *digital platforms*, literature on the *digital workplace*, and literature on *digital transformation.* As stated above, this research work considers enterprise collaboration platforms (see chapter 2.1.2 and chapter 2.1.3) to be malleable digital platforms (see chapter 2.1) at the heart of the digital workplace (Nitschke et al., 2020; S. P. Williams & Schubert, 2018) (see chapter 1, chapter 2.1.2, chapter 6) and driving and building on digital transformation (Kumar et al., 2016; Nwankpa & Roumani, 2016) (see chapter 3.4.2).

While social media platforms, closely related to enterprise collaboration platforms (see chapter 2.1.3), have explicitly been dealt with in the academic literature on digital platforms (Alaimo & Kallinikos, 2017; Boudreau & Hagiu, 2009; Constantinides et al., 2018; de Reuver et al., 2017; P. C. Evans & Gawer, 2016; Gawer, 2014; Tiwana, 2014), limited attention has been directed towards the role of enterprise collaboration platforms as digital platforms. This research work focuses on enterprise collaboration platforms. They are no single instances of IT; they are large-scale heterogeneous digital platforms (de Reuver et al., 2017) built around an enterprise collaboration system (ECS) and encompassing multiple contexts and time frames (S. P. Williams & Schubert, 2018). However, in contrast to social media platforms, enterprise collaboration platforms are internal and company-specific platforms (Gawer & Cusumano, 2014); they are not accessible for potentially any Internet user but can only be accessed by authorised users (Schubert & Williams, 2013b; Schwade & Schubert, 2017). Access to enterprise collaboration platforms is enforced by hosting the platform behind the company's firewall or by using/contracting dedicated hosted solutions (Leonardi et al., 2013; Schubert & Williams, 2013b). The core functionality is typically extended by in-house or outsourced IT support, e.g. through the inclusion of a system-wide search engine, and the end-users largely configure and build their own platform communities over time (see chapter 2.1.3).

As stated by Williams and Schubert (2018), the concept of the digital workplace (DWP) has been researched already since the late-1990s. Through a literature review and included coding of existing DWP definitions, the authors identified 15 broad DWP characteristics and developed three thematic categories of the DWP: organisational strategy and design, people and work, and technology platform. They summarise the DWP as "an integrated technology platform that provides all the tools and services to enable employees to effectively undertake their work, both alone and with others, regardless of location and is strategically coordinated and managed through DWP designs that are agile and capable of being adapted to meet future organizational requirements and technologies." (S. P. Williams & Schubert, 2018, p. 480). Building on this definition, they provide new insights to the DWP literature by identifying and examining enterprise collaboration platforms as the core technology platform of the DWP. This research takes this novel notion up and adds to it by an in-depth analysis of enterprise collaboration platform and related DWP change. This dissertation considers enterprise collaboration platforms as embedded with the DWP (see, for example, chapter 1.1. and chapter 6.3).

Likewise, digital transformation is not a new research concept (Li, Su, Zhang, & Mao, 2018) and has focused on a variety of different technologies, including big data, analytics, cloud, mobile and social media platforms (Nwankpa & Roumani, 2016, p. 2) that organisations have to cope with. This research work concerns organisations' need to develop a variety of capabilities for a successful digital transformation (Reis et al., 2018, p. 412). The extant literature has paid attention to resources and capabilities required in the digital transformation (Li et al., 2018). However, since "digital transformation is a continuous complex undertaking" (Matt et al., 2015, p. 341), the author of this research work deems it more fruitful to examine the building of digital transformation capabilities (see chapter 1.2 and chapter 3.4.2) rather than identify different types of digital transformation capabilities. Understanding how and why digital transformation capabilities are and emerge helps organisation prepare for future IT-enabled changes (see chapter 3.4.2). In this research work, the building of digital transformation capabilities is the research object, and the shaping and evolution of enterprise collaboration platforms and related digital workplace the research subject. Thus, the shaping and evolution of enterprise collaboration platforms and related digital workplace is a case of the building of digital transformation capabilities (see chapter 3.2). Given the high degree of complexity and evolvability, enterprise collaboration platforms are considered a valuable research subject contributing to the digital transformation literature.

8.2.2 What the research work claims to offer

The preceding subchapter focuses specifically on what this research work adds to the academic literature. The following sections highlight inherent strengths of this work and additional contributions to Information Systems (IS) research and practice.

Strong theoretical and methodological component

Methodologically, this research draws on case study research (see chapter 3.2). According to Flyvbjerg (2006), the merits of case studies include their closeness to real-life situations and offering of a multiple wealth of details (2006, p. 223). In this dissertation, interpretive case studies were conducted yielding rich data sets and in-depth insights into the different facets and textures of enterprise collaboration platform change and the building of digital transformation capabilities. This includes the provision of a plethora of small real-world examples (Gupta, 2018, p. 782). Given the inherent complexities, this dissertation strives for a holistic understanding (Davison & Martinsons, 2011, p. 289) – which can never be fully achieved but approached – using a range of methods for data collection and analysis from different epistemological perspectives where "each reveals part of the phenomenon" (Davison & Martinsons, 2011, p. 290). This includes, among others, a critical literature review, questionnaire-based surveys, face-to-face semi-structured interviews, focus groups with different kinds of structure and involvement of the study participants, qualitative content analysis, descriptive statistics, and data visualisations (see chapter 3.5). Some of the methods were used for either data collection (e.g. questionnaires) or analysis (e.g. qualitative content analysis); however, most of them incorporate (in some cases simultaneously / recursively) data collection and analysis/interpretation (e.g. interviews, focus groups, surveys). Also, they were largely not applied as stand-alone methods but as follow-up methods to deepen insights gained and follow up on changing or emerging circumstances in the case studies (e.g. challenges such as GDPR or the works council). The multi-method research design was complemented by the use of and linking up with multiple theoretical frameworks that allow to "make sense of rich empirical data from multiple layers and perspectives" (Avison & Malaurent, 2014, p. 329). In particular, the data collection and especially analysis and interpretation were guided by an information infrastructure (II) lens. The lens was used together with II compatible sociotechnical concepts and perspectives that allow for different levels of analysis and to traverse across the II space and account for multiple different viewpoints: interpretive flexibility, design through use, inscription, working spheres, biography of artefacts (see chapter 3.4.1). In addition, digital transformation capabilities, as conceptualised in this research work (see chapter 3.4.2), guided the reasoning.

Engagement with practice and vigorous consolidation and integration of research findings

One key contribution of this research work is the consolidation and integration of the insights gained into enterprise collaboration platform change and the *building of digital transformation capabilities* in the form of a *conceptual model* (see chapter 7). The model was developed through several iterations of interpretation to identify and visualise when digital transformation capabilities are and emerge. Ideas and notes were written down, compared, labelled, and related using the theoretical notion of information infrastructure (II) and related sociotechnical concepts and perspectives, as well as the concept of digital transformation capabilities (see above). Stepwise, it was adjusted and extended based on the outcomes of the engagement with practice. Through abductive reasoning new research findings were integrated. Embodying non-abstract knowledge in the form of real-world stories and instances of enterprise collaboration platform and digital workplace change, assumptions and inferences are justified. In this way, the model combines scientific rigour with practical relevance. The upper part of the model presents behaviour-based layers with different arenas (e.g. history / paths, responses, agenda, instantiation, transfer), i.e. spaces where human platform participants are active in the ongoing digital transformation through planned and situated reflection and anticipation. The bottom part of the model presents infrastructural layers that focus on II properties and provide explanations for the behaviour and actions of the human participants in the digital transformation. While the bottom part does not point to any II property identified in this research work, it emphasises those where digital transformation capabilities are assumed to emerge (e.g. when actors are in interaction coming with unanticipated consequences and drifts and shaping experiences and learning, when platform participants continuously acquire familiarity with the particularities of practice). By addressing the question of when - not what - digital transformation capabilities are, it follows the pioneering research work of Star and Ruhleder (1996) who focus on the relational qualities of II. In this way, the conceptual model assists researchers and practitioners in understanding the ways that organisations develop the necessary capabilities in the shaping of enterprise collaboration platforms and related digital workplace, and in any other digital transformation endeavour. Practical value is further achieved through the model's reference to a range of monitoring change tools and methods developed in this research (see below).

Tool / method set

A further product of this research work considered highly valuable are the visualisations/timelines and *tools and methods* developed as part of the interpretive investigations and which allow researchers and organisations to *monitor and understand the shaping of enterprise collaboration platforms and linked digital workplace (DWP)*. This research work comprises three major findings chapters each of which provides its individual tools and methods that both emerged from and supported the sense making of the research data.

The first findings chapter (chapter 4) addresses diverse routes to enterprise collaboration platform change adopting a multiple case study research design. Resulting from a focus group with different enterprise collaboration platform using organisations, it proposes a *profile template* that can be used both by researchers and practitioners to *analyse outcomes/benefits* of digital platforms, such as

enterprise collaboration platforms, and *their enabling and constraining factors*. The profile template was applied and its usability for structuring and understanding digital platform outcomes/benefits and their enablers and constraints was shown. Also, the application provided insights into their evolvability and multiple relations.

The second findings chapter (chapter 5) concerns a longitudinal in-depth case study on enterprise collaboration platform change across multiple spaces and time frames. As part of this, the *Monitoring Benefits Change (MoBeC) framework* was developed, which can be used for *capturing, following, and visualising outcomes and benefits* of enterprise collaboration platforms, and generally malleable digital platforms, *over time*. The application of MoBeC as part of the case study reveals that expected and realised enterprise collaboration platform outcomes and benefits evolve as the platform is designed through use. Next to MoBeC, the second findings chapter provides three different visualisations/timelines (changing portfolio of inscriptions, time curves of adoption quality, map of interacting actors and factors) that may guide researchers and practitioners in monitoring and reflecting on digital platform change and its embedding into the digital workplace.

The third findings chapter (chapter 6) again draws on multiple case study research and specifically focuses on *priority areas and competencies in the design of DWP*. In order to capture, assess, visualise, and compare organisations' different competencies and priority areas over time, a *DWP assessment method* was developed and applied using a questionnaire. The DWP assessment method represents a means for organisations to get clarity of their DWP status quo, related strengths, and pain points. When used at two different points in time, organisations can identify changes in their DWP priority areas and competencies.

8.3 Research limitations and reflection

Adopting the interpretive research philosophy (see chapter 3.1), this research work assumes that reality and related knowledge are social products, i.e. they are socially constructed. The interpretive stance was purposefully selected to address the set research aim through an in-depth investigation of the "complex world of lived experience from the point of view of those who live it" (Schwandt, 1994, p. 118). Striving for integral research, the perspectives of different individuals within and across enterprise collaboration platform using organisations were considered as part of the case studies conducted. While the different perspectives reveal interesting insights into the facets of enterprise collaboration platform change and the building of digital transformation capabilities, the individuals' experiences and interpretations are assumed to reflect personal constructions of the world. Moreover, the researcher's own, often theory-laden (Alvesson & Sköldberg, 2009), conceptions are included in the sense making of study participants' shared experiences and interpretations. Thus, the narratives, tools and methods, and also the conceptual model developed in this research work are "ways of making sense of the world, and [if accepted by other researchers and practitioners constitute] shared meanings […as] a form of intersubjectivity rather than objectivity." (Walsham, 2006, p. 320). Social constructionism is not a limitation in itself – it is considered just another side of the coin. Still, it must be acknowledged that the researcher is implicated in the research outcomes (W. J. Orlikowski & Baroudi, 1991). The units of analysis (e.g. enterprise collaboration platform outcomes and benefits, platform uses) and theoretical frameworks (information infrastructure and related sociotechnical concepts and perspectives) selected by the researcher shape the outcome as much as her beliefs, values, and interests. Consequentially, other research endeavours with interest in the same research phenomenon will yield other research outcomes.

One major limitation of this research work is that only selected pieces of the transcribed and coded data are presented so that other researchers cannot properly interpret it within the context of the whole research endeavour. One reason for this is the sheer amount of data – its inclusion would go beyond the scope; however, the main reason is the decision to not share sensitive data so that both the author of this research work and study participants do not breach the confidentiality of business data. Still, to achieve confirmability in line with Shenton (2004), this research work includes descriptions about how research results were derived from the data (see chapter 3.8 which deals with how research quality is achieved and how research ethics are addressed).

Although the adopted multi-method approach constitutes a strength in this research work (see chapter 8.2.2), one limitation concerns the data collection. Often, data collection methods were used as follow-up methods to follow up on emerging topics, deepen insights gained, or identify changes over time. However, the set of study participants was variable. For example, a questionnaire-based survey about the role of the works council and its influence in the enterprise collaboration platform change was conducted between July and September 2017 (see chapter 4.2.1.1). To obtain further details about how organisations deal with the works council and associated challenges, a focus group was conducted shortly afterwards in September 2017 (see chapter 4.2.2.1). The majority of

the study participants participated also in the preceding survey; however, it was not possible to catch up on works council issues raised by the survey participants who did not take part in the focus group activity. Likewise, the digital workplace assessment method was used twice via a questionnaire in two different surveys (in 2018 and in 2019) to assess, among others, how DWP assessments (competencies and priority areas) may change over time (see chapter 6.1). The sample size remained the same and the majority of the study participants filled in the questionnaire at both time points, however a small proportion did only fill in the questionnaire once. This research limitation is due to the valuable but volatile research context (see chapter 3.6). This research work is embedded in the IndustryConnect initiative (Schubert & Williams, 2020; S. P. Williams & Schubert, 2017), a growing community of collaborating researchers and practitioners. As outlined in this research work, IndustryConnect comprises three work strands: a virtual workspace, bilateral research work with individual practitioners / organisations, and biannual collaborative workshops. The member organisations and their participating employees are voluntarily engaged in the exchange of knowledge and experiences between other participants and the researchers. Hence, the group of participants of the collaborative workshops (comprising, for instance, focus group activities or member checks) changes between the workshops and different practitioners may respond to survey invitations via the virtual workspace. While the inclusion of different perspectives may allow for a more comprehensive picture of the research phenomenon, it makes the identification of changes and obtaining of an in-depth understanding more difficult.

Another (de-)limitation refers to the study of enterprise collaboration platforms and their shaping from an information infrastructure (II) perspective. This perspective was intentionally selected since it fits the nature of enterprise collaboration platforms that cannot be planned a priori; they unfold as they are designed through use and come with unanticipated consequences. In II terms, they "evolve continuously and unexpectedly in that their boundaries are not fixed beforehand." (Hanseth & Lyytinen, 2004, p. 214). Without fixed boundaries enterprise collaboration platforms can be "follow[ed] through space and time" (R. Williams & Pollock, 2012, p. 1) and interesting emerging circumstances can be paid attention to throughout the research work. However, II's openness "in the sense that there is no strict limit between what is included in the infrastructure and what is not, and who can use it and for which purpose or function" (Hanseth & Lundberg, 2001, p. 349) comes with a considerable shortcoming in this research work. As an "all-encompassing" view can never be achieved, the author had to make choices in terms of which elements to "foreground" for detailed examination (e.g. GDPR, works council, platform uses, adoption quality) and which elements to "background" (e.g. role of the CRM system in the in-depth case) (R. Williams & Pollock, 2012, p. 16). The choices were not only influenced by the related sociotechnical concepts and perspectives applied (e.g. working spheres, inscriptions) but also by the elements' relevance in the enterprise collaboration platform change as assumed by the researcher and the researcher's interests. Further, the choices were directed by the language used by the informants and their weighting of different elements. In chapter 5.4, identified actors and factors attached to and surrounding the enterprise collaboration platform design and its embedding into the digital workplace at the case company were discussed and their occurrences and interactions visualised. Throughout the analysis of the case study interview data, the researcher decided to disregard certain

actors she considered worth a closer examination but beyond the scope (e.g. email, platform test communities). Human and nonhuman actors were assigned to different spatial layers (e.g. technological field, history of collaboration at the case company), which are in essence artificial boundaries set by the researcher.

Lastly, it should be noted that this research has a clearly defined research scope. The research outcomes are considered valuable in understanding the shaping of enterprise collaboration platforms and related digital workplace (DWP); however, this research work is embedded in a wider research programme (see chapter 3.6), and thus, complemented by further research phenomena not discussed in this dissertation. For instance, research conducted around metrics for enterprise collaboration platform benefits (Grams, Schwade, & Mosen, 2020) and collaboration activities (e.g. Schwade & Schubert, 2017, 2019) complement the MoBeC framework developed in this research work. Likewise, the identification and conceptualisation of social documents and coordination mechanisms (e.g. Mosen, Williams, & Schubert, 2020; Nitschke & Williams, 2018; S. P. Williams, Mosen, & Schubert, 2020) add to this research work's study of evolving working spheres.

8.4 Future work

This research work primarily focuses on the shaping of enterprise collaboration platforms including human platform participants (e.g. people with responsibility for the platform, collaboration experts, members of different working spheres, stakeholders such as the works council), nonhuman platform participants (e.g. GDPR, trend topics in society and business, platform vendor companies), and related platform outcomes, challenges, and uses. Findings were interpreted using an information infrastructure perspective. Despite the underlying sociotechnical assumptions, multiple platform technologies were left aside (e.g. UIs, APIs with integrated modules, services, and other business systems). Future research could extend this research work by making technological aspects and elements interior to the enterprise collaboration platform design through use processes more visible and in this way contribute to a more holistic understanding.

Although this dissertation considers enterprise collaboration platforms at the heart of today's digital workplace (Nitschke et al., 2019; S. P. Williams & Schubert, 2018), the digital workplace (DWP) is evolving with different technologies embedded (e.g. smart mobile devices, AI, internet of things, augmented reality) (cf. Constantinides et al., 2018; de Reuver et al., 2017; Funk et al., 2017; S. P. Williams & Schubert, 2018). Not only will enterprise collaboration platforms increase in scale and complexity, the author of this research work expects that the DWP will also grow and shift including a range of entangled but also loosely coupled elements. The DWP may become a web of completely integrated systems, which may require a shift from a mere platform perspective to a complex ecosystem perspective (cf. Kallinikos et al., 2013). Finding means to study the ways that the DWP is changing along with the digital transformation processes remains an ongoing challenge. Digital technologies rapidly evolve, new business opportunities and digitally-enabled practices emerge (White, 2012; S. P. Williams & Schubert, 2018) and may require new kinds of digital transformation capabilities to successfully achieve and manage the changes.

In this research work, tools and methods for monitoring and understanding enterprise collaboration platform and digital workplace change were developed and applied (e.g. Monitoring Benefits Change (MoBeC) framework, profile template for enterprise collaboration platform outcomes and their enabling and constraining factors, digital workplace assessment method). Future studies might use such tools and methods in other digital transformation related change contexts to test and modify/extend them. Both combined tools and methods for multi-level analyses and a meta-framework would be conceivable. Also, the further development towards interactive data visualisations that show and animate change processes over time may particularly support practitioners in their digital transformation efforts.

In order to gain further research insights into the facets and textures of enterprise collaboration platform and digital workplace change and thus the building of digital transformation capabilities, future studies can draw on ethnographic research using observational methods in particular. It is very time-consuming (Walsham, 2006, p. 322), however ethnography can yield an in-depth understanding about the field. Rich stories can be produced about "events as they occur in their natural settings" (LeCompte & Schensul, 2010, p. 13) and may be used to "ascertain […] an empirical regularity" (Helfat, 2007, p. 186). For this, ethnographers may examine human behaviour, beliefs, attitudes, and people's interpretation of their experiences as they are engaged in everyday work (Petty et al., 2012, p. 380; W. J. Wilson & Chaddha, 2009, p. 550). Ethnographers may benefit from an infrastruring perspective to embrace even more the processual qualities (Karasti & Blomberg, 2018; Star & Bowker, 2002) of digital workplaces and their digital platforms. They may discover new aspects and dimensions of the building of digital transformation capabilities which may substantially add to the knowledge captured in the developed conceptual model of when digital transformation capabilities are and emerge. For more "refined tests and extensions" (Helfat, 2007, p. 185), researchers can "probe how [the knowledge captured in the model] manifest […] in [different] organizational settings, which in turn can lead to additional research" (Helfat, 2007, p. 189). As part of this, it would be interesting to see whether organisations consider the model useful for understanding and improving their digital transformation endeavours.

8.5 Concluding remarks

This dissertation addresses the identified research imperative for longitudinal studies observing how malleable digital platforms, particularly enterprise collaboration platforms and incorporated enterprise social software (ESS), change over time. This research adopts an interpretive research stance to investigate the evolution of enterprise collaboration platforms as an instance of the building of digital transformation capabilities.

Multiple case studies were conducted to capture and compare moments in the enterprise collaboration platform and related digital workplace change. Data was collected applying the focus group method and questionnaire-based surveys with key practitioners (with different professional backgrounds and experiences) from different enterprise collaboration platform using organisations. The findings reveal significant differences in the enterprise collaboration platform outcomes and benefits expected, as well as challenges encountered, and strategies and actions applied towards their achievement. Further, individual competencies in the design of the enterprise collaboration platform enabled digital workplace were developed.

The multiple case studies were complemented by an in-depth longitudinal case study to follow the trajectories of one specific enterprise collaboration platform over time and space and its embedding into the digital workplace. For this, intensive interviews were conducted with different platform participants at different points in time. Rich case narratives and visualisations were developed that emphasise different perspectives and locales in the enterprise collaboration platform change, pointing to its spatiotemporal and complex nature. Although the study participants described the platform as successfully embedded into the digital workplace, with a variety of different platform uses inscribed into it and positive expected and unexpected platform outcomes and benefits achieved, small and large contingencies and failures occurred. This includes disputes with the works council, system breakdowns, and the publication of guidelines about the handling of confidential data restricting enterprise collaboration platform uses. The enterprise collaboration platform eventually collapsed due to changes in the environmental and technological field (acquisition of the platform's collaboration technology by another vendor with altered offerings, new collaboration suite on the market). The way was paved towards a new enterprise collaboration platform which extends the installed base of existing systems and practices and developed digital transformation capabilities.

From the gained case insights and case analyses drawing on Information Infrastructure (II) theory, a *conceptual model of the building of digital transformation capabilities* was developed. The model encompasses *behaviour-based layers* that concern human platform participants and their actions and linked behaviour in the ongoing digital transformation (*agenda*, *instantiation*, *history/paths*, *responses*, *transfer*, *deviation*, *competencies*, and *confidence*), and *infrastructural layers* that show different but related II properties explaining when digital transformation capabilities are and emerge (*complex relations and interactions*, *familiar unfamiliarity*, and *evolving sociotechnical configurations*) and constitute the underlying logics of behaviour-based layers.

The model links to developed monitoring change tools and timelines developed as part of this research work (profile template for enterprise collaboration platform outcomes/benefits and their enabling and constraining factors, Monitoring Benefits Change (MoBeC) framework, changing portfolios of inscriptions, time curves of adoption quality, map of interacting actors and factors, digital workplace (DWP) assessment method). The conceptual model assists researchers and practitioners in understanding the building of digital transformation capabilities from a theoretical and practical viewpoint.

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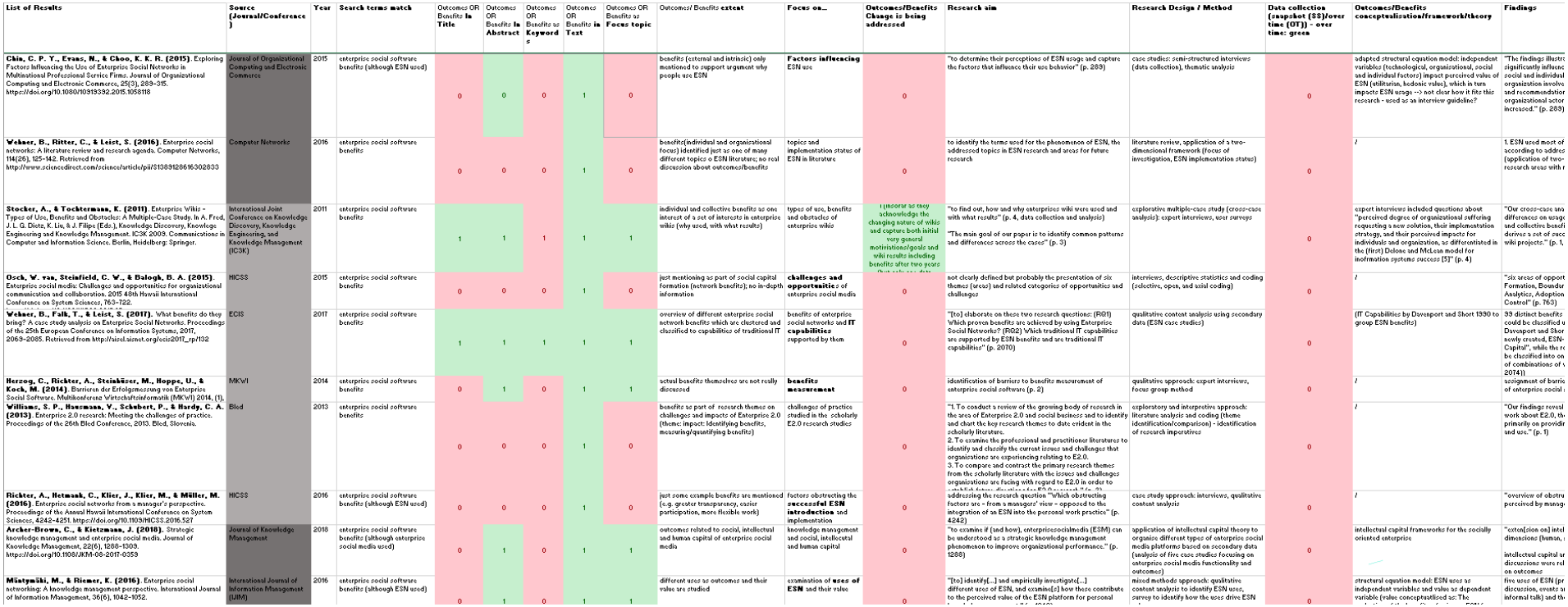
Appendices

Appendix A: Study participants

Table 9-1. Study participants (pseudonymised) / research methods.

Study participant / Job alias	**Company alias**	**Participant of**											
		Interview (ID)					**Questionnaire-based survey (ID)**			**Focus group (ID)**		
		I1	I2	I3	I4	I5	Q1	Q2.1	Q2.2	F1	F2	F3
Project Manager, Communication & Marketing	Chemical Products Manufacturer 03	x	x	x	x		x	x			x	
Head of IT	Chemical Products Manufacturer 03	x		x								
Chairman, Works Council	Chemical Products Manufacturer 03		x									
Head of Communication and Marketing	Chemical Products Manufacturer 03		x									
Head of Analytics Research and Development (R&D)	Chemical Products Manufacturer 03		x	x								
Project Leader, IT	Chemical Products Manufacturer 02					x		x	x		x	
Head of Digital Learning & New Technologies	Chemical Products Manufacturer 02						x			x	x	x
Digital Project Manager	Chemical Products Manufacturer 02							x	x		x	
Project Manager, Collaboration/Knowledge	Consumer Electronics Manufacturer 01						x					
Head of Communications/Knowledge	Consumer Electronics Manufacturer 02						x			x		
Project Manager, Collaboration/Knowledge	Consumer Electronics Manufacturer 02							x	x			x
Spokesperson	Finance Industry Association 01									x		
Spokesperson/Internal Communication	Insurance Industry Association 01								x			
Head of Team Association Committees	Finance Industry Association 01						x					
Project Manager, IT	Automotive Parts Manufacturer 01						x			x	x	x
Project manager, Lean Administration	Automotive Parts Manufacturer 01											x
Head of IT	Construction Engineering Services 01						x		x	x	x	x
Project Manager, Information Architecture	Logistics Services 01						x					
Senior Manager, HR	Logistics Services 02									x		
Project Manager	Automotive Parts Manufacturer 02						x			x		
Senior Manager, IT	Automotive Parts Manufacturer 02						x			x		
Project Manager	Automotive Parts Manufacturer 02								x		x	x
Senior Manager, Social Collaboration	Automotive Parts Manufacturer 02											x
Community Manager	Automotive Parts Manufacturer 02							x	x			
Specialist, Collaboration/Statistics	Automotive Parts Manufacturer 02							x				
Platform Manager, Social Collaboration	Automotive Parts Manufacturer 02							x				
nd (participated anonymously)	Automotive Parts Manufacturer 03								x			
Head of Internal Communications	Steel Manufacturer 02							x		x		
Senior Manager, IT	Steel Manufacturer 02								x			
Specialist, Collaboration	Steel Manufacturer 01						x			x		
Strategic IT Management Employee Networking	Automobile Manufacturer 01											x
Project Manager	Automotive Parts Manufacturer 04											x
Service Owner (IT)	Automotive Parts Manufacturer 05						x					
Head of IT	Automotive Parts Manufacturer 06							x	x			x
Internal Consultant	Air Transportation 01							x				x
Head of IT/Collaboration Platforms	Air Transportation 01							x	x		x	x
nd (participated anonymously)	Air Transportation 01						x					
IT Manager, Collaboration/Knowledge	Technical Inspections						x				x	x
Project Manager, Intranet	Retail Grocery 01											x
Consultant, Hotel Management Systems	Travel Operator 01						x					x
nd (position unknown)	Travel Operator 01											x
Project Manager, IT	Clothing Manufacturer/Retail 02						x				x	
Head of Business Engineering	Textile Design/Manufacturer 01						x	x	x			
Head of IT	Textile Design/Manufacturer 01						x					
Head of IT	Public Administration Services 01						x					
Head of IT	Metals Industry Association 01						x					
Project Manager	Energy Production 02							x	x			
	Number participants (representing companies)	**2(1)**	**4(1)**	**3(1)**	**1(1)**	**1(1)**	**20(18)**	**13(9)**	**13(10)**	**10(9)**	**10(9)**	**16(12)**

Appendix B: Literature review



List of Results	Source (Journal/Conference)	Year	Search terms match	Outcomes OR Benefits in Title	Outcomes OR Benefits in Abstract	Outcomes OR Benefits as Keywords	Outcomes OR Benefits in Text	Outcomes OR Benefits as Focus topic	Outcomes/ Benefits extent	Focus on...	Outcomes/Benefits Change is being addressed	Research aim	Research Design / Method	Data collection (snapshot (SS)/over time (OT)) - over time: green	Outcomes/Benefits conceptualisation/framework/theory	Findings
Chin, C. P. Y., Evans, N., & Choo, K. K. R. (2015). Exploring Factors Influencing the Use of Enterprise Social Networks in Multinational Professional Service Firms. Journal of Organizational Computing and Electronic Commerce, 25(3), 289–315. https://doi.org/10.1080/10919392.2015.1058118	Journal of Organizational Computing and Electronic Commerce	2015	enterprise social software benefits (although ESN used)	0	0	0	1	0	benefits (external and intrinsic) only mentioned to support argument why people use ESN	**Factors influencing** ESN use	0	"to determine their perceptions of ESN usage and capture the factors that influence their use behavior" (p. 289)	case studies: semi-structured interviews (data collection), thematic analysis	0	adapted structural equation model: independent variables (technological, organizational, social and individual factors) impact perceived value of ESN (utilitarian, hedonic value), which in turn impacts ESN usage --> not clear how it fits this research - used as an interview guideline?	"The findings illustrate significantly influenc social and individual organization involve and recommendation organizational actor increased." (p. 289)
Wehner, B., Ritter, C., & Leist, S. (2016). Enterprise social networks: A literature review and research agenda. Computer Networks, 114(26), 125–142. Retrieved from http://www.sciencedirect.com/science/article/pii/S1389128616302833	Computer Networks	2016	enterprise social software benefits	0	0	0	1	0	benefits(individual and organizational focus) identified just as one of many different topics o ESN literature; no real discussion about outcomes/benefits	topics and implementation status of ESN in literature	0	to identify the terms used for the phenomenon of ESN, the addressed topics in ESN research and areas for future research	literature review, application of a two-dimensional framework (focus of investigation, ESN implementation status)	0	/	1. ESN used most of according to addres (application of two- research areas with r
Stocker, A., & Tochtermann, K. (2011). Enterprise Wikis - Types of Use, Benefits and Obstacles: A Multiple-Case Study. In A. Fred, J. L. G. Dietz, K. Liu, & J. Filipe (Eds.), Knowledge Discovery, Knowledge Engineering and Knowledge Management. IC3K 2009. Communications in Computer and Information Science. Berlin, Heidelberg: Springer.	International Joint Conference on Knowledge Discovery, Knowledge Engineering, and Knowledge Management (IC3K)	2011	enterprise social software benefits	1	1	1	1	1	individual and collective benefits as one interest of a set of interests in enterprise wikis (why used, with what results)	types of use, benefits and obstacles of enterprise wikis	I ignorse as they acknowledge the changing nature of wikis and capture both initial very general motivations/goals and wiki results including benefits after two years	"to find out, how and why enterprises wiki were used and with what results" (p. 4, data collection and analysis) "The main goal of our paper is to identify common patterns and differences across the cases" (p. 3)	explorative multiple-case study (cross-case analysis): expert interviews, user surveys	0	expert interviews included questions about "perceived degree of organizational suffering requesting a new solution, their implementation strategy, and their perceived impacts for individuals and organization, as differentiated in the (first) Delone and McLean model for information systems success [5]" (p. 4)	"Our cross-case ana differences on usage and collective benefi derives a set of succ wiki projects." (p. 1,
Osch, W. van, Steinfield, C. W., & Balogh, B. A. (2015). Enterprise social media: Challenges and opportunities for organizational communication and collaboration. 2015 48th Hawaii International Conference on System Sciences, 763–722.	HICSS	2015	enterprise social software benefits	0	0	0	1	0	just mentioning as part of social capital formation (network benefits); no in-depth information	**challenges and opportunities** of enterprise social media	0	not clearly defined but probably the presentation of six themes (areas) and related categories of opportunities and challenges	interviews, descriptive statistics and coding (selective, open, and axial coding)	0	/	"six areas of opport Formation, Boundar Analytics, Adoption Control" (p. 763)
Wehner, B., Falk, T., & Leist, S. (2017). What benefits do they bring? A case study analysis on Enterprise Social Networks. Proceedings of the 25th European Conference on Information Systems, 2017, 2063–2085. Retrieved from http://aisel.aisnet.org/ecis2017_rp/132	ECIS	2017	enterprise social software benefits	1	1	1	1	1	overview of different enterprise social network benefits which are clustered and classified to capabilities of traditional IT	benefits of enterprise social networks and **IT capabilities** supported by them	0	"[to] elaborate on these two research questions: (RQ1) 'which proven benefits are achieved by using Enterprise Social Networks?' (RQ2) 'Which traditional IT capabilities are supported by ESN benefits and are traditional IT capabilities'" (p. 2070)	qualitative content analysis using secondary data (ESN case studies)	0	(IT Capabilities by Davenport and Short 1990 to group ESN benefits)	99 distinct benefits could be classified u Davenport and Shor newly created, ESN-Capital", while the re be classified into on of combinations of v 2074))
Herzog, C., Richter, A., Steinbüßer, M., Hoppe, U., & Koch, M. (2014). Barrieren der Erfolgsmessung von Enterprise Social Software. Multikonferenz Wirtschaftsinformatik (MKWI) 2014, (1),	MKWI	2014	enterprise social software benefits	0	1	0	1	1	actual benefits themselves are not really discussed	**benefits measurement**	0	identification of barriers to benefits measurement of enterprise social software (p. 2)	qualitative approach: expert interviews, focus group method	0	/	assignment of barrie of enterprise social
Williams, S. P., Hausmann, V., Schubert, P., & Hardy, C. A. (2013). Enterprise 2.0 research: Meeting the challenges of practice. Proceedings of the 26th Bled Conference, 2013. Bled, Slovenia.	Bled	2013	enterprise social software benefits	0	0	0	1	0	benefits as part of research themes on challenges and impacts of Enterprise 2.0 (theme: impact: Identifying benefits, measuring/quantifying benefits)	challenges of practice studied in the scholarly E2.0 research studies	0	"1.To conduct a review of the growing body of research in the area of Enterprise 2.0 and social business and to identify and chart the key research themes to date evident in the scholarly literature. 2. To examine the professional and practitioner literatures to identify and clarify the current issues and challenges that organisations are experiencing relating to E2.0. 3. To compare and contrast the primary research themes from the scholarly literature with the issues and challenges organisations are facing with regard to E2.0 in order to	exploratory and interpretive approach: literature analysis and coding (theme identification/comparison) - identification of research imperatives	0	/	"Our findings reveal work about E2.0, th primarily on providir and use." (p. 1)
Richter, A., Hetmank, C., Klier, J., Klier, M., & Möller, M. (2016). Enterprise social networks from a manager's perspective. Proceedings of the Annual Hawaii International Conference on System Sciences, 4242–4251. https://doi.org/10.1109/HICSS.2016.527	HICSS	2016	enterprise social software benefits (although ESN used)	0	0	0	1	0	just some example benefits are mentioned (e.g. greater transparency, easier participation, more flexible work)	factors obstructing the **successful ESN introduction** and implementation	0	addressing the research question "which obstructing factors are - from a managers' view - opposed to the integration of an ESN into the personal work practice" (p. 4242)	case study approach: interviews, qualitative content analysis	0	/	"overview of obstru perceived by manag
Archer-Brown, C., & Kietzmann, J. (2018). Strategic knowledge management and enterprise social media. Journal of Knowledge Management, 22(6), 1288–1309. https://doi.org/10.1108/JKM-08-2017-0353	Journal of Knowledge Management	2018	enterprise social software benefits (although enterprise social media used)	0	1	0	1	1	outcomes related to social, intellectual and human capital of enterprise social media	knowledge management and social, intellectual and human capital	0	"to examine if (and how), enterprisesocialmedia (ESM) can be understood as a strategic knowledge management phenomenon to improve organizational performance." (p. 1288)	application of intellectual capital theory to organize different types of enterprise social media platforms based on secondary data (analysis of five case studies focusing on enterprise social media functionality and outcomes)	0	intellectual capital frameworks for the socially oriented enterprise	"extot[sion on] intel dimensions (human, intellectual capital ar discussions were rel on outcomes
Mäntymäki, M., & Riemer, K. (2016). Enterprise social networking: A knowledge management perspective. International Journal of Information Management, 36(6), 1042–1052.	International Journal of Information Management (IJIM)	2016	enterprise social software benefits (although ESN used)	0	1	0	1	1	different uses as outcomes and their value are studied	examination of **uses of ESN** and their value	0	"[to] identify[...] and empirically investigate[...] different uses of ESN, and examine[s] how these contribute to the perceived value of the ESN platform for personal	mixed methods approach: qualitative content analysis to identify ESN uses, survey to identify how the uses drive ESN	0	structural equation model: ESN uses as independent variables and value as dependent variable (value conceptualised as: The	five uses of ESN (pr discussion, events u informal talk) and th

Figure 9-1. Excerpt from the critical literature review spreadsheet (enterprise collaboration platform / ESS outcomes and benefits change).
Note: For yes/no answers (e.g. existence of the terms "outcomes" or "benefits" in the text (outcomes and benefits terminology) or over-time data collection (research study)), colours are used (red for "no", green for "yes") to simplify the assessment.

Appendix C: Coding

Enterprise collaboration platform outcomes/benefits and their enablers and constraints

Table 9-2. Different types of enterprise collaboration platform outcomes/benefits: codes and categories.

Description	Code category	Code
All desired outcomes/benefits that involve communication and/or collaboration either within the company (inter and intra) or with external stakeholders.	communication/ collaboration	open communication/collaboration within the organisation
		communication/collaboration across borders within the organisation (between divisions, countries, departments, sites, hierarchies)
		communication/collaboration with externals (customers, suppliers, partners)
All desired outcomes/benefits that deal with the creation, use and preservation of information and knowledge as well as related information and knowledge keepers within the company.	knowledge and information management	expert search
		transfer/exchange of knowledge/information
		documentation (knowledge, information, projects)
		information consolidation
All desired outcomes/benefits that cover cultural values and norms that exist within the company.	culture	company spirit (company identification, value, norms etc.)
		generational change
		silo mentality
All desired outcomes/benefits that consider digital workplace design including the necessary information technology and IT infrastructure (e.g. introduction of a Social Intranet).	design	digital workplace
		intranet replacement/design
		IT infrastructure design
All desired outcomes/benefits that focus on the organisational structure and its inter-unit relations.	company group	integration (e.g. of new companies or employees)
		networked company
All desired outcomes/benefits that have economic relevance for the company.	economic	productivity
		speed of innovation

Table 9-3. Different objectives of enterprise collaboration platform outcomes/benefits: codes and categories (word classes adopted from the given answers)

Description	Code category	Code
Desired optimisation (e.g. generally or in efficiency) of practices, processes, procedures, resources and/or configurations in the company, such as improved/optimised Knowledge Management.	optimisation	improved
		improve
		improvement
		simplified
		highly
		faster
Old practices, processes, procedures, resources and/or configurations in the company are to be replaced by new ones, such as the use of external applications, e.g. messengers such as WhatsApp, by the use of the enterprise collaboration platform IBM Connections.	substitute	substitute
		replacement
Addressing challenges in the current practices, processes, procedures, resources and/or configurations, e.g. breaking down silos.	solution	breaking down
		overcome
Needs or requirements that exist and should be met. These might refer to necessary actions or changes but also to the demand to comply with established norms, standards, attitudes, procedures and the like, e.g. need for a new intranet.	demand	need for
		meet
Creating completely new practices, processes, procedures, resources and/or configurations or taking existing ones to create something new, e.g. through reorganisation.	creation	offer
		possibility
		make
		creation
		consolidation
Achieving a new state enabled by the introduction and use of new practices, processes, procedures, resources and/or configurations, e.g. becoming an innovative company.	achievement	become
Supporting desired changes or keeping with established norms, standards, attitudes, procedures.	facilitation	Promotion
		nucleus
		facilitate
		lifting
		support
		strengthening

Table 9-4. Enterprise collaboration platform enablers/constraints: Structure codes and examples.

Enterprise collaboration platform enablers/constraints: *Structure*					
Description Code Category	**Code Category**	**Description code**	**Code**	**Example enablers codes (In Vivo)**	**Example constraints codes (In Vivo)**
Enablers/Constraints of the category *condition* cover context in the narrow sense, i.e. where context is viewed as a representational problem. They can be (temporarily) stable or evolving but continuously shape the ECP change. Enablers Conditions may be of different type, for example they may refer to resources (e.g. human, financial, time, processes, or IT resources), requirements (e.g. legal, compliance), technological aspects (e.g. IT portfolio with competing systems), or cultural aspects (e.g. certain values or norms within the company).	**Conditions**	Enablers/Constraints of the category *condition* that are *(temporarily) stable* endure over time without many changes.	**(Temporarily) stable**	Communication-based working; Working out Loud (WoL); Innovation-driven; Great team; Own budget; Top management support; Time to deliver; Need for information exchange	Budget constraints; Time for documentation; 'Knowledge is power' attitude; Poor willingness for change; Silo mentality; Tool constraints; Competing systems; Microsoft tradition;
		Enablers/constraints of the category *condition* that are *evolving* constantly frame the ECP change but are themselves subject to change/evolving.	**Evolving**	Customers increasingly accept participation without email; Users are more and more accepting of enterprise social software (ESS); Generation change	Poor platform acceptance; Unloved activity;
Enablers/Constraints of the category *event* are always one-off enablers/constraints that shape the ECP change and corresponding achievement of ECP outcomes/benefits. They happen or take place at some point in time and are typically unique and not part of daily routine.	**Events**			IBM improves the API; new system is integrated; mobile access options [are added]	Company takeover attempt by another company; Reduction of the resources; ECP project expires
Enablers/Constraints of the category *strategies and actions* refer to enablers/constraints that represent how a company deals with the ECP change, i.e. methods and actions it performs and entities/artefacts it uses in the ECP change. The term strategy does not only cover plans developed in advance to deal with ECP change, but also represents the responsiveness to the contingencies of ECP change. Sometimes, existing or nonexistent entities/artefacts or actions can make it more difficult to achieve ECP change. There can be active decisions also referred to constraints, possibly shaped by other existing/occurring constraints such as missing resources (conditions).	**Strategies and actions**	Enablers of the category *strategies and actions* that are *entities/artefacts (not) in use* are part of the ECP change strategy (intentionally or unintentionally). Entities, e.g. executives, might perform actions to support the ECP project by promoting ECP use, for instance. Artefacts, on the other hand, might be created and used as part of actions, e.g. a best practice use case to train ECS usage.	**Entities/artefacts in use**	Ambassadors; Trendsetters; Use case that affects almost all employees	ECP use restrictions through usage guidelines
		Actions as enablers of the category *strategies and actions* are actions performed one-off/onetime or continuously (over a certain period of time). They are part of the ECP change strategy and can be planned for or performed in relation to a specific ECP change situation that had possibly not been anticipated.	**Actions**	Identification of expertise; Identification of all killer applications; High quality training and materials	No active training of social skills

Table 9-5. Enterprise collaboration platform enablers/constraints: Change design codes and examples.

Enterprise collaboration platform enablers/constraints: *Change design*			
Description code category	**Code category**	**Example enablers codes (In Vivo)**	**Example constraints codes (In Vivo)**
Enablers/Constraints of the category *change driver* do themselves not enable/constraint ECP change. Instead, they represent the motivation for ECP change. Change drivers can be opportunity- or problem-driven.	**Change driver**	Innovation-driven company; "Transparency as default"; Time to deliver; Need for information exchange; Demand by target groups	Project expires
Enablers/Constraints of the category *change enabler/constraint* actually enable/constraint the ECP change. They can be controllable (typically created intentionally with the possibility to actively design the change enabler/constraint) or uncontrollable (typically created unintentionally with little possibility to actively design the change enabler/constraint).	**Change enabler/constraint**	Making positive examples visible; Inclusion of externals	'Knowledge is power' attitude; Poor communication skills; Missing management support; Convenience
Enablers/Constraints of the category change embodiment make change that has happened / is happening visible. This can be, for example, a new way of working, a new ECP acceptance level or new business processes emerging as part of the ECP change.	**Change embodiment**	Users are more and more accepting of enterprise social software (ESS); Customers increasingly accept participation without email;	*No example available*

Table 9-6. Coding of focus group transcript excerpts (evolving enterprise collaboration platform enablers and constraints).

"Then we had a **use case** that affects all employees**,** the committee work. It's like that **after about 1 1/2 years, after the Go Live** [...] **We've tried** from the beginning **to make positive examples** [cross-divisional use cases, as mentioned before] **visible, have used the 'Use Case of the Month',** and that has also **helped others try to transfer that to their work.** […] [We have **learned from the enablers and constraints**], in particular **because colleagues have dared to make their work visible**, that it is perceptible and visible**.** A colleague blogging […]" (Finance Industry Association 01, Spokesperson / Internal Communication)	*ENABLER*: FIND AND COMMUNICATE A USE CASE THAT AFFECTS ALL EMPLOYEES TIME FRAME: 1 ½ YEARS AFTER GO-LIVE *ENABLER*: MAKE CROSS-DIVISIONAL USE CASES VISIBLE TIME FRAME: FROM THE BEGINNING IMPORTANCE DIRECTION: → ONGOING, ↑ INCREASING *ENABLER*: SELECTION OF USE CASE OF THE MONTH TIME FRAME: FROM THE BEGINNING IMPORTANCE DIRECTION: → ONGOING
"Of course, we have the classic [constraint], **permanently from the beginning**, and that is also **decreasing slowly**. […] I have the feeling that it **has increased again**, that the **knowledge** for the sake of action or control should be **preserved** in the departments or even by the executives." (Finance Industry Association 01, Spokesperson/ Internal Communication)	*CONSTRAINT*: 'KNOWLEDGE IS POWER' ATTITUDE TIME FRAME: FROM THE BEGINNING IMPORTANCE DIRECTION 1: → ONGOING, ↓ DECREASING IMPORTANCE DIRECTION 2: → ONGOING, ↑ INCREASING

DWP resources and competencies

Table 9-7. Available and required DWP competencies (counts).

DWP Area	Competencies	HAVE	NEED	SUM HAVE&NEED
Organisational Strategy and Design	**Strategy and Vision**	**2**	**9**	**11**
	Complete and clear DWP vision	1	2	3
	DWP strategy	0	4	4
	HR strategy for DWP	1	0	1
	DWP in business strategy	0	1	1
	Digital transformation strategy	0	1	1
	Mobile strategy	0	1	1
	Governance and Compliance	**1**	**3**	**4**
	Distributed Governance	0	1	1
	Consideration of the entire supply chain	0	1	1
	Clear responsibilities	1	0	1
	Community management	0	1	1
	Change Management	**20**	**17**	**37**
	Collaboration mindset	2	5	7
	Change orientation	5	4	9
	Management support	3	1	4
	Change guides and multipliers	4	0	4
	Change-related skill set	3	3	6
	Training and learning programmes	3	4	7
People and Work	**Individualised/Personalised**	**1**	**0**	**1**
	Agile, demand-driven approach	1	0	1
	Work Group Support	**1**	**4**	**5**
	Interdepartmental teams	1	0	1
	Unified work practices	0	2	2
	Concrete projects/objectives	0	1	1
	Sharing information and documents	0	1	1
Technology Platform	**Unified Platform**	**1**	**3**	**4**
	Unified tool	0	1	1
	Uniform work environment	1	0	1
	Minimising parallel solutions	0	1	1
	Overview of “everything there is”	0	1	1
	Integrated with other Information Systems	**0**	**3**	**3**
	Automation of Processes	0	2	2
	Multifunctional approach	0	1	1
	Location and device independent	**0**	**0**	**0**

Table 9-8. Available and required DWP resources (counts).

Resources	**HAVE**	**NEED**	**SUM HAVE&NEED**
Workforce	**4**	**3**	**7**
Manpower	1	1	2
Employees with talents/potential/skills	1	0	1
Long-term employees (know-how)	1	0	1
Internal IT service provider	1	0	1
Digital Transformation Officer	0	1	1
Developers	0	1	1
Groups/Teams	**5**	**1**	**6**
DWP/digitalisation working group	1	1	2
Powerful team	2	0	2
Skilled IT team	1	0	1
Interdisciplinary working group	1	0	1
Infrastructure	**7**	**11**	**18**
Mature infrastructure	1	0	1
Stable system environments	1	0	1
APIs	1	3	4
SSO	0	2	2
Central user directory	1	0	1
Equal technical baselines	0	2	2
Access management	0	1	1
Integrated collaboration tools	0	1	1
Shop floor integration	0	1	1
Worldwide access	1	0	1
Access for externals	2	1	3
Systems/Applications/Networks and their functionality	**13**	**4**	**17**
Intranet	2	0	2
Global network	2	0	1
Collaboration platform	4	0	4
Collaboration tools	3	0	3
User friendly ECS vanilla version	0	1	1
Document management system	1	0	1
Mobile App	0	2	2
Different possibilities of communication	1	0	1
Document management function	0	1	1
Functionality for externals	0	1	1
Time and financial resources	**0**	**2**	**2**
HR resources for visions and projects	0	1	1
Time resources for planning	0	1	1
Facilities	**1**	**0**	**1**
Innovation hubs for digitalisation and new technology	1	0	1

Appendix D: Questionnaires

ECS acceptance survey

Table 9-9. GDPR/Works council: Questionnaire questions and their objectives and response types (Q1). **Note:** The questions labelled with a star (D2, D3, B1) are mandatory questions; the remaining questions are optional.

ID	Question	Objective	Response type
Demographics			
D1	*Your name:*	Identify the name of the survey participant, which might be helpful, particularly when more than one person per company participates in the survey.	Open question
D2	*I fill out the questionnaire for the following company:*	Identify the company name which is required to link the questionnaire responses to a specific company and interpret the findings	Single choice question, nominal
D3	*Which operating model does your company use for IBM Connections?*	Identify possible differences between the different operating models in how the actors GDPR and the works council are perceived and dealt with in the enterprise collaboration platform change.	Single choice question, nominal
GDPR			
G1	*Do your company's plans to meet the GDPR requirements include the IBM Connections platform used by your company?* *Please select "don't know" if you are not (yet) informed about the GDPR plans.*	Identify whether GDPR is an issue for the enterprise collaboration platform in the respective company	Single choice question, nominal
G2	*Has your company stored personally identifiable information (PII) in the IBM Connections communities?* *Possible examples of PII: Photos of an event where people can be identified, (temporary) table of files with customer data, copies of letters, CVs, lists of employee or customer data.*	Identify whether the respective company knows about PII in its enterprise collaboration platform; PII is a fundamental issue in GDPR	Single choice question, nominal
G3a	*Does your company have any plans or measurements/actions (implemented or proposed) for monitoring personally identifiable information (PII) in IBM Connections?*	Identify whether the respective company is prepared for dealing with PII in its enterprise collaboration platform; PII is a fundamental issue in GDPR	Single choice question, dichotomous

G3b	*Please briefly explain these plans or measurements/actions.*	Gain deeper information about the plans or measurements/actions the respective company has implemented or proposed for monitoring PII in its enterprise collaboration platform	Open question
Works council			
B1	*Does your company have a works council?*	Identify whether the respective company has a works council who potentially might have an influence on the enterprise collaboration platform change	Single choice question, dichotomous
B2	*Has the works council been involved in your IBM Connections project yet?*	Identify whether the works council has been involved in the enterprise collaboration platform change	Single choice question, dichotomous
B3	*When was the works council involved*	Identify in which phase of the enterprise collaboration platform change (e.g. planning the implementation phase, adoption phase) the works council was involved in the respective company (Is it still involved?)	Multiple choice question, nominal
B4	*What topics have been discussed with the works council (e.g. privacy, data protection, workload, project scope, functionality or usage of IBM Connections, IBM Connections content)?*	Identify the issues and actors linked to the works council and that are incorporated in the enterprise collaboration platform change in the respective company	Open question
B5	*How has your company perceived the works council in the IBM Connections project so far?*	Identify whether and how the works council has influenced the enterprise collaboration platform change (not influenced, positively/negatively influenced / enabler vs constraint) as perceived by the respective company	Single choice question, ordinal
B6	*Please give one or two examples to explain your experiences with your works council in the IBM Connections project.*	Gain deeper information about how the works council positively/negatively influenced the enterprise collaboration platform change of the respective company	Open question

Concluding questions (end)			
E1	*Are you interested in investigating compliance issues and questions related to your IBM Connections platform, such as social document management or business document handling?*	Identify whether we can contact the respective participant for more detailed information or questions regarding responses	Single choice question, dichotomous
E2	*Is there a person in your company who might be interested in compliance issues (related to IBM Connections) and willing to talk?*	Identify other persons in the company who might be contacted for more detailed information	Open question

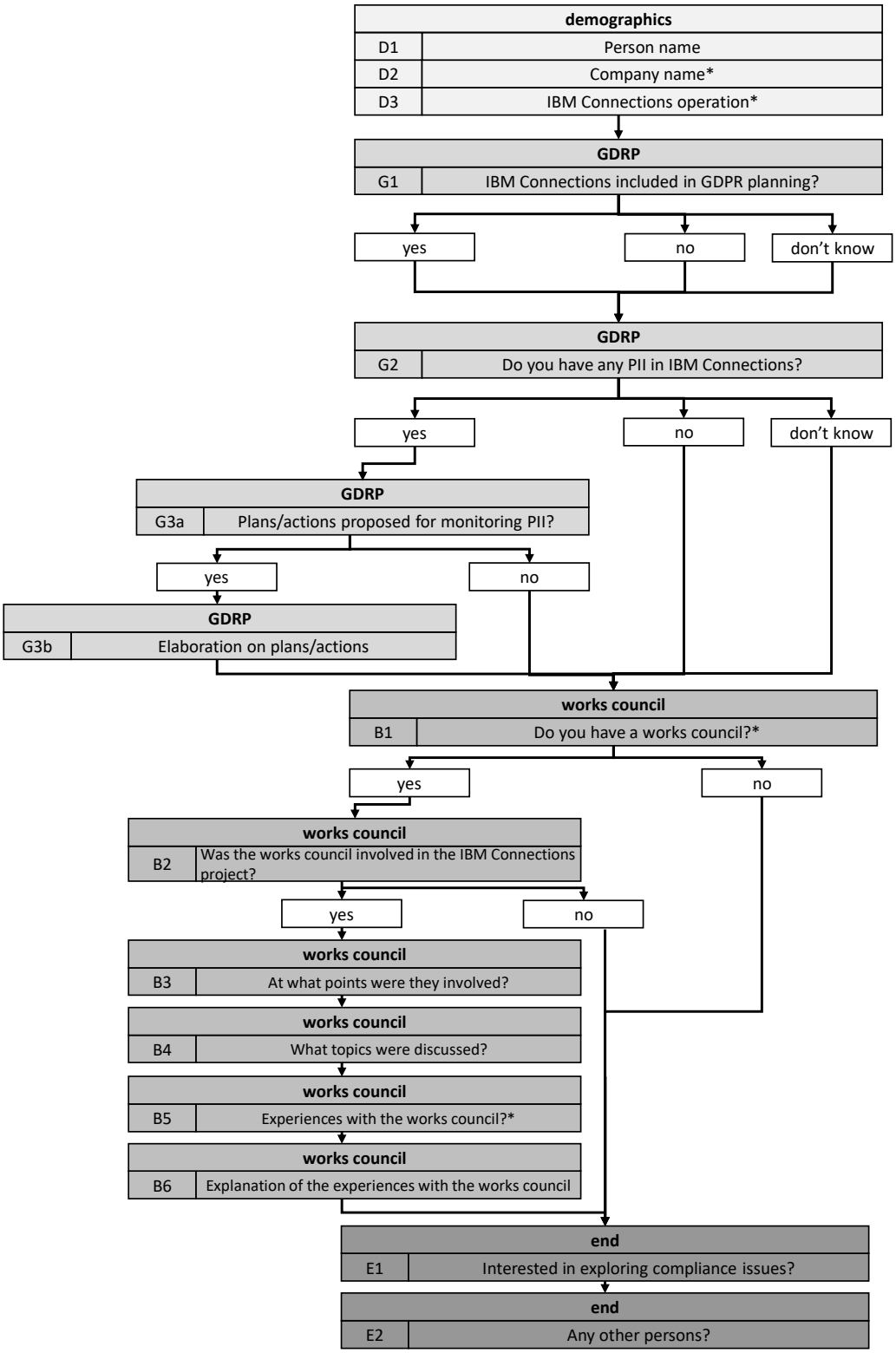
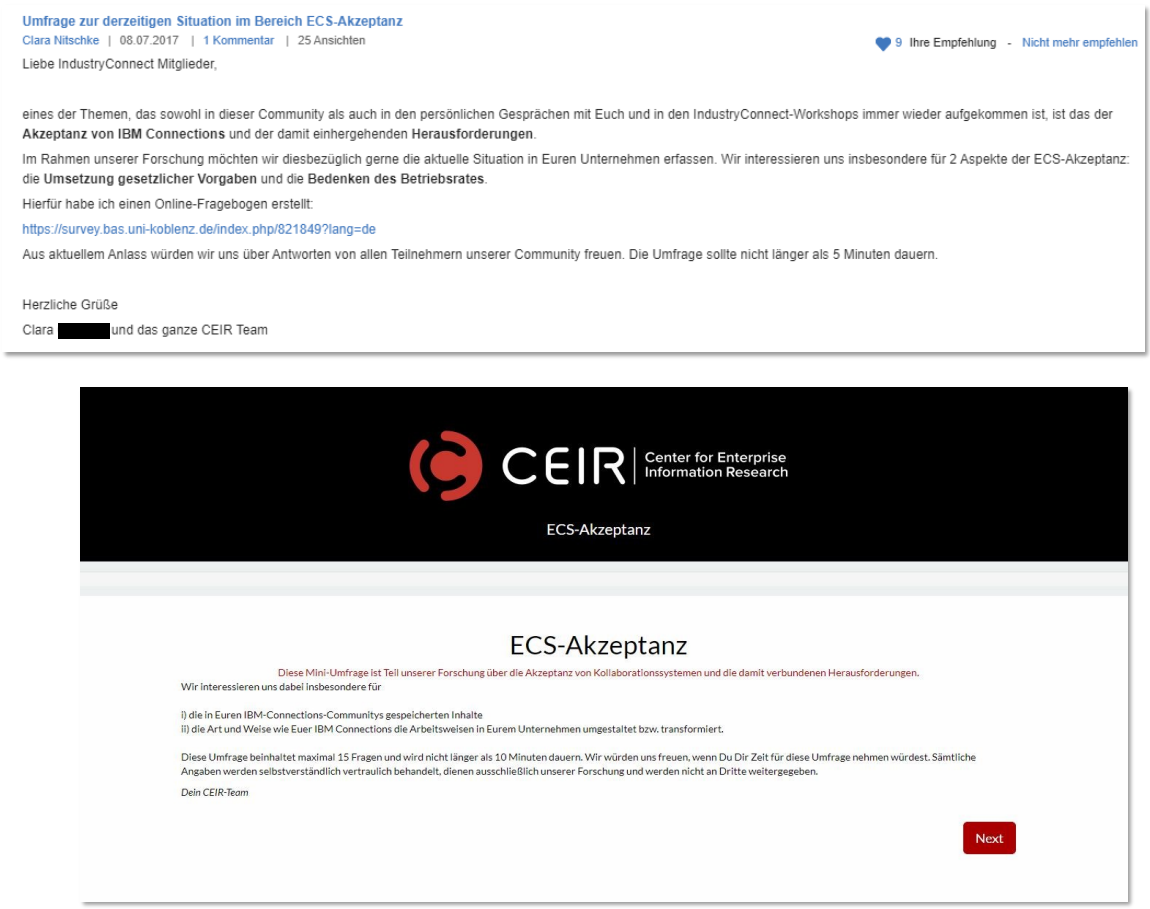


Figure 9-2. GDPR/Works council: Structure of the online questionnaire (Q1)
Note: The questions labelled with a star (D2, D3, B1) are mandatory questions; the remaining questions are optional.



Umfrage zur derzeitigen Situation im Bereich ECS-Akzeptanz

Clara Nitschke | 08.07.2017 | 1 Kommentar | 25 Ansichten

9 Ihre Empfehlung - Nicht mehr empfehlen

Liebe IndustryConnect Mitglieder,

eines der Themen, das sowohl in dieser Community als auch in den persönlichen Gesprächen mit Euch und in den IndustryConnect-Workshops immer wieder aufgekommen ist, ist das der **Akzeptanz von IBM Connections** und der damit einhergehenden **Herausforderungen**.

Im Rahmen unserer Forschung möchten wir diesbezüglich gerne die aktuelle Situation in Euren Unternehmen erfassen. Wir interessieren uns insbesondere für 2 Aspekte der ECS-Akzeptanz: die **Umsetzung gesetzlicher Vorgaben** und die **Bedenken des Betriebsrates**.

Hierfür habe ich einen Online-Fragebogen erstellt:

https://survey.bas.uni-koblenz.de/index.php/821849?lang=de

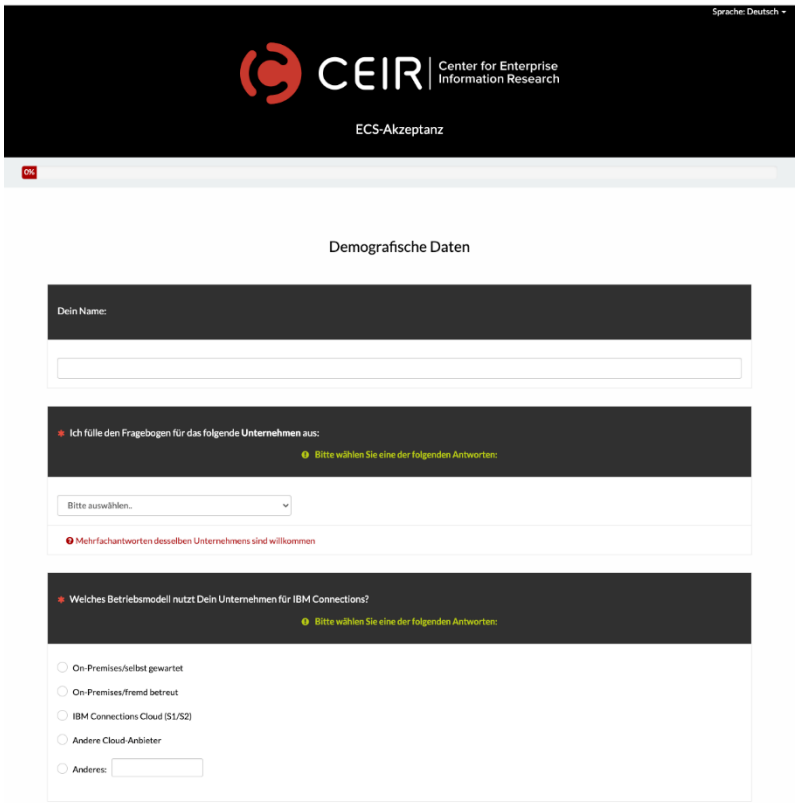
Aus aktuellem Anlass würden wir uns über Antworten von allen Teilnehmern unserer Community freuen. Die Umfrage sollte nicht länger als 5 Minuten dauern.

Herzliche Grüße

Clara [redacted] und das ganze CEIR Team

Figure 9-3. Invitation letter (top) and cover letter (bottom) of the ECS acceptance survey (role and influences of GDPR and the works council in the enterprise collaboration platform project) (Q1).

Figure 9-4. Screenshots of the ECS acceptance online questionnaire (Q1).




Sprache: Deutsch
CEIR
Center for Enterprise Information Research
ECS-Akzeptanz
50%
Betriebsrat
Hat Dein Unternehmen einen Betriebsrat?
Ja
Nein
War der Betriebsrat in Eurem IBM-Connections-Projekt bisher involviert?
Ja
Nein
Weiß ich nicht
Wann war der Betriebsrat involviert?
Bitte wählen Sie die zutreffenden Antworten aus:
1. Bedürfnisidentifikation/ Anforderungsdefinition (Ziele, Use Cases)
2. Softwareevaluation/Angebotsevaluation (Festlegung der Software und der Einführungspartner)
3. Planung des Einführungsprojektes (Schritte zum Go-Live)
4. Roll-out (Start Onboarding, ggf. Pilot-Gruppe(n), Gewinnung Key Users)
5. Adoption-Phase (Schulungen, Motivationsmaßnahmen)
Anderer Zeitpunkt:
Falls der Betriebsrat zu einem anderen Zeitpunkt involviert war, gib dies bitte im Kommentarfeld neben "Anderer Zeitpunkt" an.
Welche Themen wurden mit dem Betriebsrat diskutiert (z.B. Privatsphäre, Datenschutz, Arbeitsbelastung, Projektrahmen, Funktionalität oder Nutzung von IBM Connections, IBM-Connections-Inhalte)?
Wie hat Dein Unternehmen den Betriebsrat im IBM-Connections-Projekt bislang wahrgenommen?
In meinem Unternehmen war die Erfahrung mit dem Betriebsrat im IBM Connections Projekt...
hat zum Scheitern des IBM Connections-Projektes geführt
hat das IBM Connections-Projekt negativ beeinflusst
hat das IBM Connections-Projekt nicht beeinflusst
hat durch konstruktive Kritik das IBM Connections-Projekt positiv beeinflusst
hat durch konstruktive Kritik zum Erfolg des IBM Connections-Projektes geführt

GDPR

Die General Data Protection Regulation (GDPR) der Europäischen Union, auf Deutsch EU-Datenschutz-Grundverordnung (EU-DSGVO), tritt im Mai 2018 in Kraft. Diese geht mit neuen Anforderungen hinsichtlich des Managements und Umgangs von personenbezogenen Informationen einher und beschäftigt sich u.a. mit dem persönlichen Recht auf "Vergessen-werden" oder dem Zugriff auf personenbezogene Daten.
Hierzu haben wir ein paar Fragen an Dich.

Umfassen die Pläne Deines Unternehmens zur Erfüllung der GDPR-Anforderungen auch die von Deinem Unternehmen genutzte Plattform IBM Connections?
Bitte wähle "Weiß ich nicht", falls Du über die Pläne bezüglich DGPR (noch) nicht informiert bist.

Ja | Nein | Weiß ich nicht

Hat Dein Unternehmen personenbezogene Informationen in den IBM-Connections-Communitys gespeichert?
Mögliche Beispiele für personenbezogene Informationen: Fotos von einer Veranstaltung, auf denen Personen identifiziert werden können, (temporäre) Tabellen oder Dateien mit Kundendaten, Kopien von Briefen, Lebensläufe, Listen mit Mitarbeiter- oder Kundendaten, u.a.

Ja | Nein | Weiß ich nicht

Hat Dein Unternehmen irgendwelche Pläne oder Maßnahmen/Aktionen (umgesetzt oder vorgeschlagen) für die Überwachung von personenbezogenen Informationen in IBM Connections?

Ja | Nein | Weiß ich nicht

Bitte erläutere diese Pläne oder Maßnahmen/Aktionen kurz.

Abschließende Fragen

Hast Du daran Interesse, dass Compliance-Themen und -Fragestellungen bezogen auf Eure IBM-Connections-Plattform untersucht werden (z.B. im Bereich von Social Document Management oder zum Umgang mit Geschäftsdokumenten)?

Ja | Nein

Gibt es in Deinem Unternehmen eine Person mit möglichem Interesse an Compliance-Themen (bezogen auf IBM Connections) und die für ein Gespräch bereit wäre?

Falls Du eine Person kennst, die Interesse haben könnte, gib bitte den entsprechenden Namen an.

Digital Workplace Areas and Competencies Questionnaire

For the purpose of international research, the questionnaire (Q2.2) was developed in English.

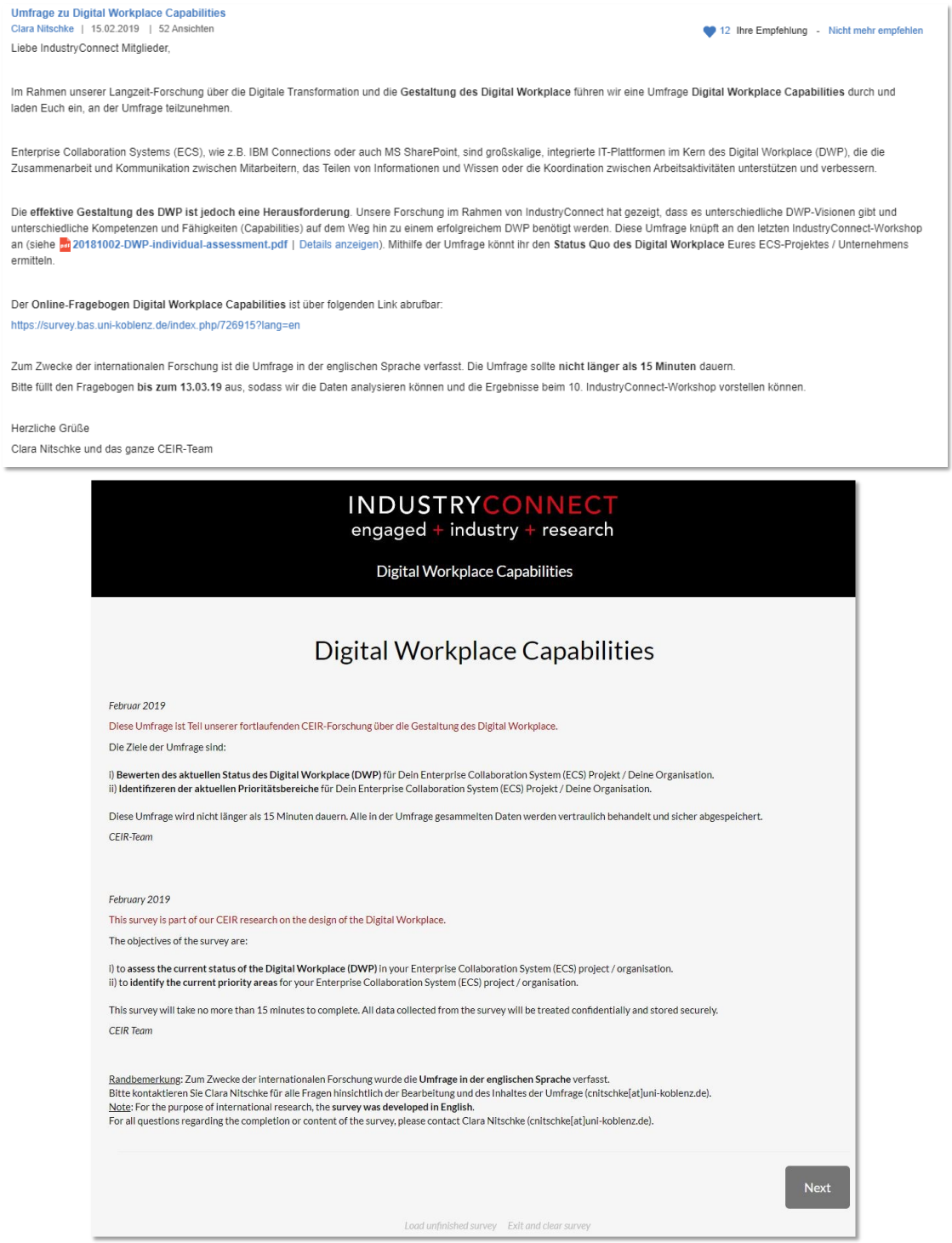
Table 9-10. DWP competencies and priority areas: Questionnaire questions and their objectives and response types (Q2.2).

ID	Question		Objective	Response type
Demographics				
D1	*Your name:*		Identify the name of the survey participant, which might be helpful particularly when more than one person per company participates in the survey	Open question
D2	*I fill out the questionnaire for the following company:*		Identify the company name which is required to link the questionnaire responses to a specific company and interpret the findings	Single choice question, nominal
Competencies in the different digital workplace (DWP) areas				
Organisational Strategy and Design				
	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Strategy and Vision**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Strategy and Vision area according to the individual participants	Single choice question, dichotomous
	SV1.1	*… we have a clear and complete understanding of the drivers of the DWP for our organisation*		
	SV1.2	*… we have a clear and complete vision for the DWP for our organisation*		
	SV1.3	*… our DWP initiatives are planned and managed*		
	SV1.4	*… our DWP initiatives are specific to the needs of our corporate culture*		
	SV1.5	*… our strategy for the DWP is coordinated and enterprise-wide*		
	SV1.6	*… our DWP strategy is integrated into the organisation's wider business strategy*		
	SV1.7	*... our DWP strategy is integrated into our company's HR strategy*		
	SV1.8	*… the DWP is included as part of the organisation's corporate governance planning*		
	SV1.9	*… our DWP strategy is agile, evolving and future-oriented*		
	SV1.10	*… we have fully implemented our DWP strategy*		
SV2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Strategy and Vision**?*		Identify how companies' competencies in the DWP Strategy and Vision area are rated by the individual participants	Single choice question, ordinal

	*Please complete the following statements about your organisation's **Digital Workplace (DWP) Governance and Compliance**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Governance and Compliance area according to the individual participants	Single choice question, dichotomous
	GC1.1	*… clear roles and responsibilities have been defined for our DWP initiative*		
	GC1.2	*… the worker's council /employee representatives are involved in decision making about DWP initiatives*		
	GC1.3	*… we have addressed compliance with legal requirements (e.g. workplace and information laws such as GDPR)*		
GC2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills/abilities for the area **Digital Workplace (DWP) Governance and Compliance**?*		Identify how companies' competencies in the DWP Governance and Compliance area are rated by the individual participants	Single choice question, ordinal
	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Change Management**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Change Management area according to the individual participants	Single choice question, dichotomous
	CM1.1	*… DWP initiatives are supported by clearly defined change management processes*		
	CM1.2	*… the organisational and cultural changes required for DWP initiatives are made*		
	CM1.3	*… new (shared) working routines and patterns have been established*		
	CM1.4	*… DWP related training and learning programmes have been developed*		
	CM1.5	*… DWP initiatives are actively supported by top management*		
CM2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills/abilities for the area **Digital Workplace (DWP) Change Management**?*		Identify how companies' competencies in the DWP Change Management area are rated by the individual participants	Single choice question, ordinal
People and Work				
	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Individualised/personalised**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Individualised/personalised area according to the individual participants	Single choice question, dichotomous
	IP1.1	*… our DWP initiatives provide employees with tools that can be tailored to their individual needs.*		
	IP1.2	*… our DWP initiatives provide employees with personalised information and interfaces*		
IP2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills/abilities for the area **Digital Workplace (DWP) Individualised/personalised**?*		Identify how companies' competencies in the DWP Individualised/personalised area are rated by the individual participants	Single choice question, ordinal

	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Work Group Support**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Work Group Support area according to the individual participants	Single choice question, dichotomous
	WS1.1	*… our DWP initiatives provide stronger links between employees within the organisation*		
	WS1.2	*… our DWP initiatives provide employees with a clear overview of their own and their team members work*		
	WS1.3	*… our DWP initiatives are inclusive and enable all employees to participate and contribute*		
	WS1.4	*… our DWP initiatives provide employees with incentives to collaborate and share information*		
WS2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Work Group Support**?*		Identify how companies' competencies in the DWP Work Group Support area are rated by the individual participants	Single choice question, ordinal
Technology Platform				
	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Unified Platform**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Unified Platform area according to the individual participants	Single choice question, dichotomous
	TP1.1	*… the technology platform offers a single point of entry where data and information is managed centrally*		
	TP1.2	*… the technology platform offers intelligent system-wide information search capabilities*		
TP2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills/abilities for the area **Digital Workplace (DWP) Unified Platform**?*		Identify how companies' competencies in the DWP Unified Platform area are rated by the individual participants	Single choice question, ordinal
	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Integrated with other Information Systems**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Integrated with other Information Systems area according to the individual participants	Single choice question, dichotomous
	IIS1.1	*… the technology platform is integrated with other business systems (e.g. ERP, CRM)*		
	IIS1.2	*… the technology platform is integrated with operational technologies (e.g. control/production systems)*		
	IIS1.2	*… the artificial intelligence (AI) is linked to the necessary databases and makes the platform smart*		
	IIS1.3	*… the technology platform supports automation of processes and workflows across different IT systems*		
IIS2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills/abilities for the area **Digital Workplace (DWP) Integrated with other Information Systems**?*		Identify how companies' competencies in the DWP Integrated with other Information Systems area are rated by the individual participants	Single choice question, ordinal

	*Please complete the following statements about your **organisation's Digital Workplace (DWP) Location and device independent**.* *Select one of (Yes/No/Don't know)* *In my organisation…*		Identify the competencies the companies have in the DWP Location and device independent area according to the individual participants	Single choice question, dichotomous
	LDI1.1	*… the technology platform is location independent*		
	LDI1.2	*… the technology platform is device independent (e.g. can be accessed via mobile devices)*		
LDI2	*On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills/abilities for the area **Digital Workplace (DWP) Location and device independent**?*		Identify how companies' competencies in the DWP Location and device independent area are rated by the individual participants	Single choice question, ordinal
Priority areas of the Digital Workplace (DWP)				
PA1	*Which of the Digital Workplace areas listed below are currently priority areas for your ECS [enterprise collaboration system/platform] project / organisation?*		Identify the areas that companies prioritise in the design of the DWP (e.g. Strategy & Vision, Work Group Support, Unified Platform)	Multiple choice question, nominal
PA2.x	*For each of the Digital Workplace areas you have selected, please provide a brief explanation of why this is currently a priority area in the space below.*		Gain deeper information about why the individual participants think that the selected areas in the design of the DWP are currently priority areas in their organisation	Open question



Umfrage zu Digital Workplace Capabilities

Clara Nitschke | 15.02.2019 | 52 Ansichten

12 Ihre Empfehlung - Nicht mehr empfehlen

Liebe IndustryConnect Mitglieder,

Im Rahmen unserer Langzeit-Forschung über die Digitale Transformation und die **Gestaltung des Digital Workplace** führen wir eine Umfrage **Digital Workplace Capabilities** durch und laden Euch ein, an der Umfrage teilzunehmen.

Enterprise Collaboration Systems (ECS), wie z.B. IBM Connections oder auch MS SharePoint, sind großskalige, integrierte IT-Plattformen im Kern des Digital Workplace (DWP), die die Zusammenarbeit und Kommunikation zwischen Mitarbeitern, das Teilen von Informationen und Wissen oder die Koordination zwischen Arbeitsaktivitäten unterstützen und verbessern.

Die **effektive Gestaltung des DWP ist jedoch eine Herausforderung**. Unsere Forschung im Rahmen von IndustryConnect hat gezeigt, dass es unterschiedliche DWP-Visionen gibt und unterschiedliche Kompetenzen und Fähigkeiten (Capabilities) auf dem Weg hin zu einem erfolgreichem DWP benötigt werden. Diese Umfrage knüpft an den letzten IndustryConnect-Workshop an (siehe **20181002-DWP-individual-assessment.pdf** | Details anzeigen). Mithilfe der Umfrage könnt ihr den **Status Quo des Digital Workplace** Eures ECS-Projektes / Unternehmens ermitteln.

Der **Online-Fragebogen Digital Workplace Capabilities** ist über folgenden Link abrufbar:

https://survey.bas.uni-koblenz.de/index.php/726915?lang=en

Zum Zwecke der internationalen Forschung ist die Umfrage in der englischen Sprache verfasst. Die Umfrage sollte **nicht länger als 15 Minuten** dauern.

Bitte füllt den Fragebogen **bis zum 13.03.19** aus, sodass wir die Daten analysieren können und die Ergebnisse beim 10. IndustryConnect-Workshop vorstellen können.

Herzliche Grüße

Clara Nitschke und das ganze CEIR-Team

INDUSTRYCONNECT

engaged + industry + research

Digital Workplace Capabilities

Digital Workplace Capabilities

Februar 2019

Diese Umfrage ist Teil unserer fortlaufenden CEIR-Forschung über die Gestaltung des Digital Workplace.

Die Ziele der Umfrage sind:

i) **Bewerten des aktuellen Status des Digital Workplace (DWP)** für Dein Enterprise Collaboration System (ECS) Projekt / Deine Organisation.
ii) **Identifizeren der aktuellen Prioritätsbereiche** für Dein Enterprise Collaboration System (ECS) Projekt / Deine Organisation.

Diese Umfrage wird nicht länger als 15 Minuten dauern. Alle in der Umfrage gesammelten Daten werden vertraulich behandelt und sicher abgespeichert.

CEIR-Team

February 2019

This survey is part of our CEIR research on the design of the Digital Workplace.

The objectives of the survey are:

i) to **assess the current status of the Digital Workplace (DWP)** in your Enterprise Collaboration System (ECS) project / organisation.
ii) to **identify the current priority areas** for your Enterprise Collaboration System (ECS) project / organisation.

This survey will take no more than 15 minutes to complete. All data collected from the survey will be treated confidentially and stored securely.

CEIR Team

Randbemerkung: Zum Zwecke der internationalen Forschung wurde die **Umfrage in der englischen Sprache** verfasst.
Bitte kontaktieren Sie Clara Nitschke für alle Fragen hinsichtlich der Bearbeitung und des Inhaltes der Umfrage (cnitschke[at]uni-koblenz.de).
Note: For the purpose of international research, the **survey was developed in English.**
For all questions regarding the completion or content of the survey, please contact Clara Nitschke (cnitschke[at]uni-koblenz.de).

Next

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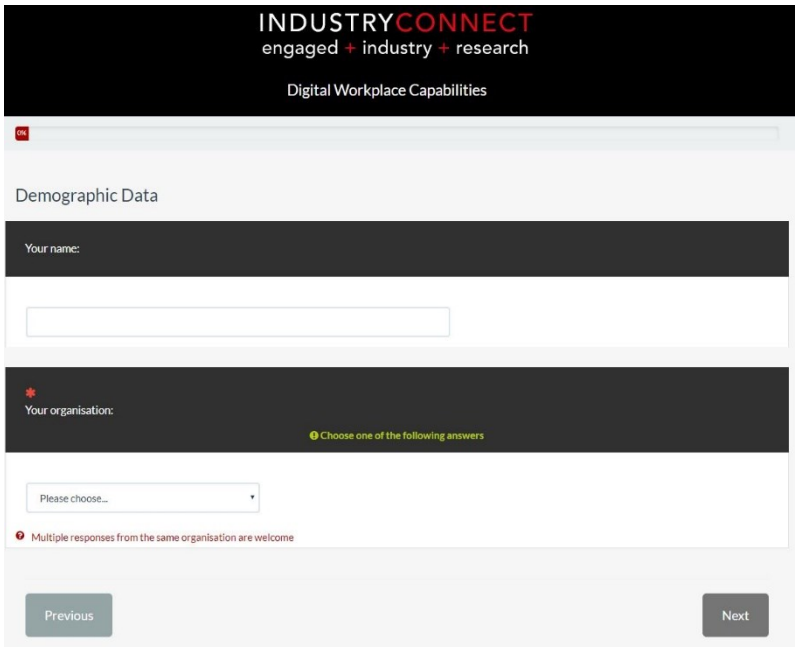
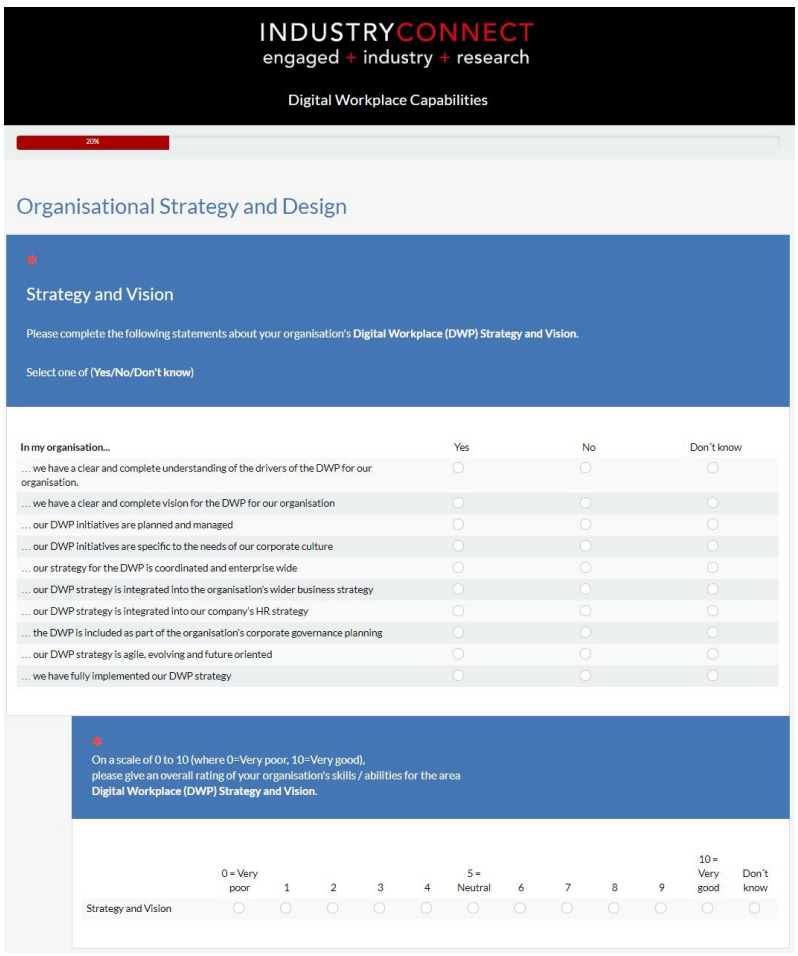
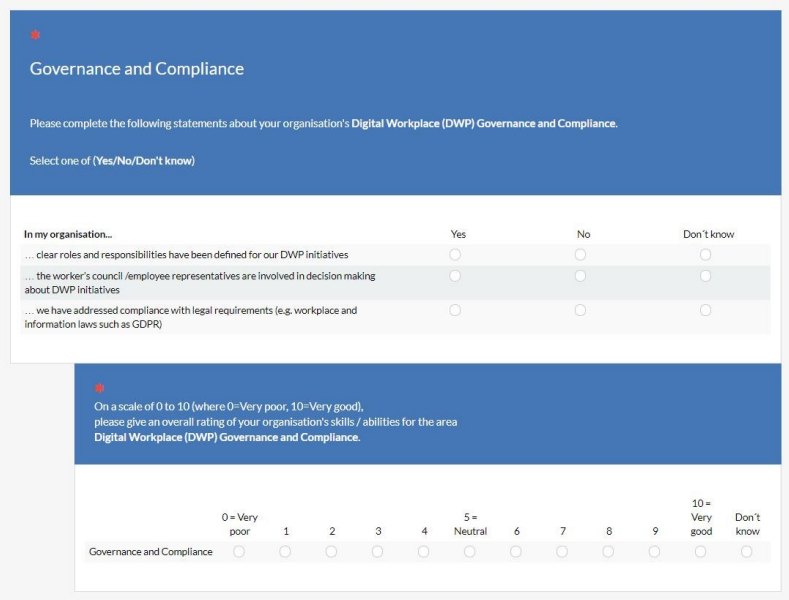
Figure 9-5. Invitation letter (top) and cover letter (bottom) of the DWP assessment survey (Q2.2).

Figure 9-6. Screenshots of the DWP competencies and priority areas online questionnaire (Q2.2).







*

Governance and Compliance

Please complete the following statements about your organisation's **Digital Workplace (DWP) Governance and Compliance.**

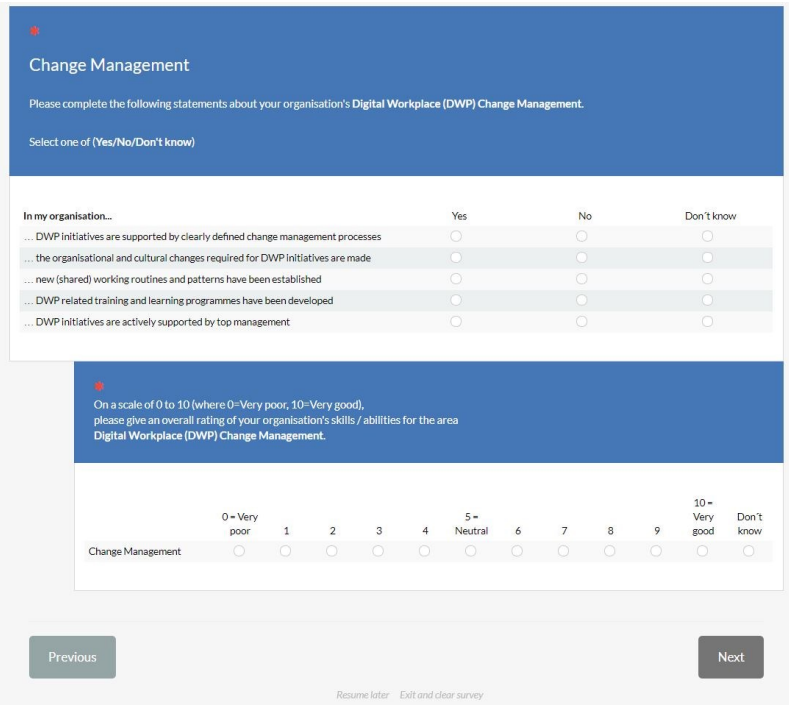
Select one of **(Yes/No/Don't know)**

In my organisation...	Yes	No	Don´t know
… clear roles and responsibilities have been defined for our DWP initiatives	○	○	○
… the worker's council /employee representatives are involved in decision making about DWP initiatives	○	○	○
… we have addressed compliance with legal requirements (e.g. workplace and information laws such as GDPR)	○	○	○

*

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Governance and Compliance.**

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don´t know
Governance and Compliance	○	○	○	○	○	○	○	○	○	○	○	○



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Change Management

Please complete the following statements about your organisation's **Digital Workplace (DWP) Change Management.**

Select one of **(Yes/No/Don't know)**

In my organisation...	Yes	No	Don´t know
… DWP initiatives are supported by clearly defined change management processes	○	○	○
… the organisational and cultural changes required for DWP initiatives are made	○	○	○
… new (shared) working routines and patterns have been established	○	○	○
… DWP related training and learning programmes have been developed	○	○	○
… DWP initiatives are actively supported by top management	○	○	○

*

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Change Management.**

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don´t know
Change Management	○	○	○	○	○	○	○	○	○	○	○	○

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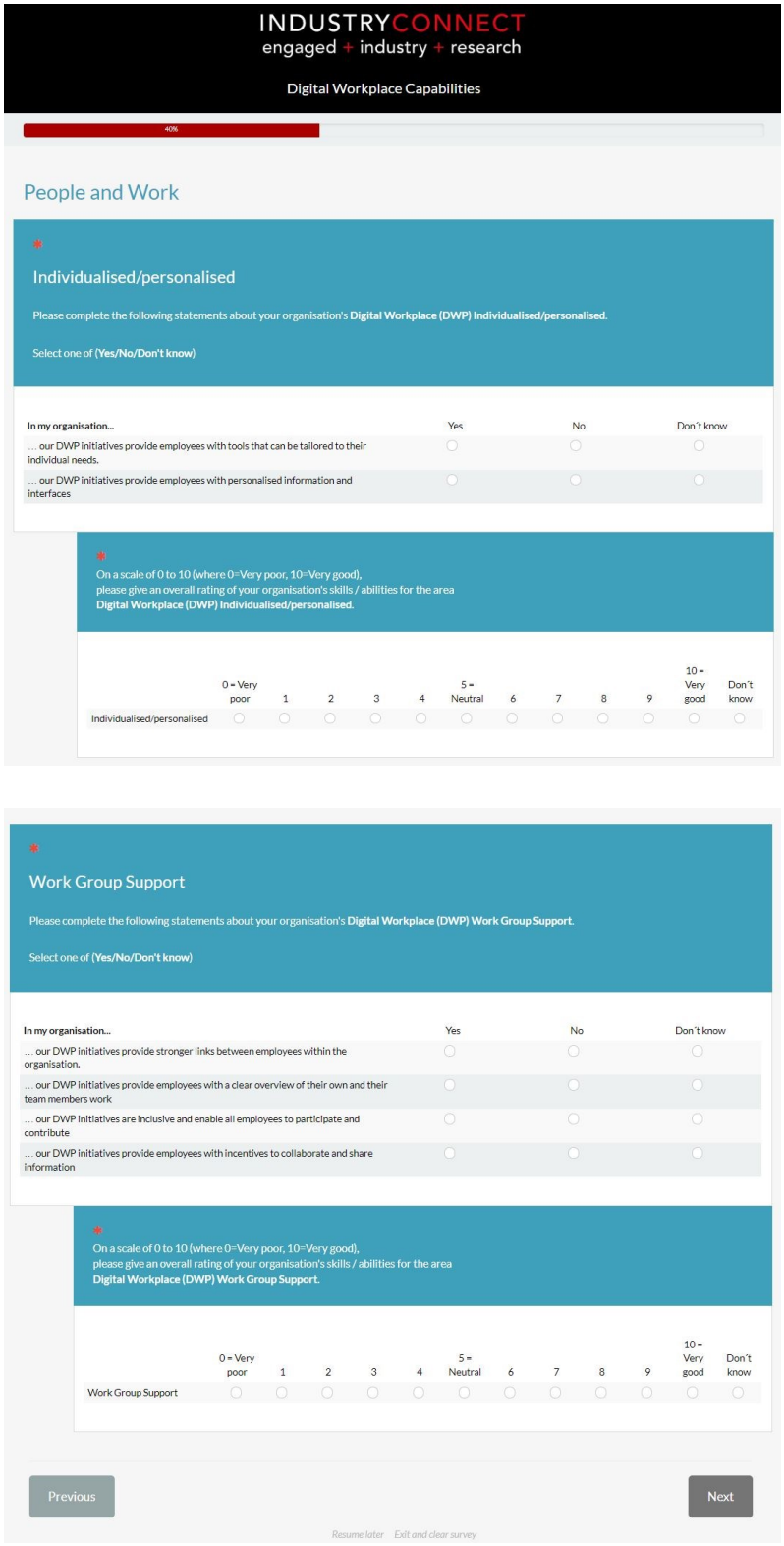

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Digital Workplace Capabilities

40%

People and Work

*

Individualised/personalised

Please complete the following statements about your organisation's **Digital Workplace (DWP) Individualised/personalised**.

Select one of **(Yes/No/Don't know)**

In my organisation...	Yes	No	Don't know
... our DWP initiatives provide employees with tools that can be tailored to their individual needs.	○	○	○
... our DWP initiatives provide employees with personalised information and interfaces	○	○	○

*

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Individualised/personalised**.

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don't know
Individualised/personalised	○	○	○	○	○	○	○	○	○	○	○	○

*

Work Group Support

Please complete the following statements about your organisation's **Digital Workplace (DWP) Work Group Support**.

Select one of **(Yes/No/Don't know)**

In my organisation...	Yes	No	Don't know
... our DWP initiatives provide stronger links between employees within the organisation.	○	○	○
... our DWP initiatives provide employees with a clear overview of their own and their team members work	○	○	○
... our DWP initiatives are inclusive and enable all employees to participate and contribute	○	○	○
... our DWP initiatives provide employees with incentives to collaborate and share information	○	○	○

*

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Work Group Support**.

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don't know
Work Group Support	○	○	○	○	○	○	○	○	○	○	○	○

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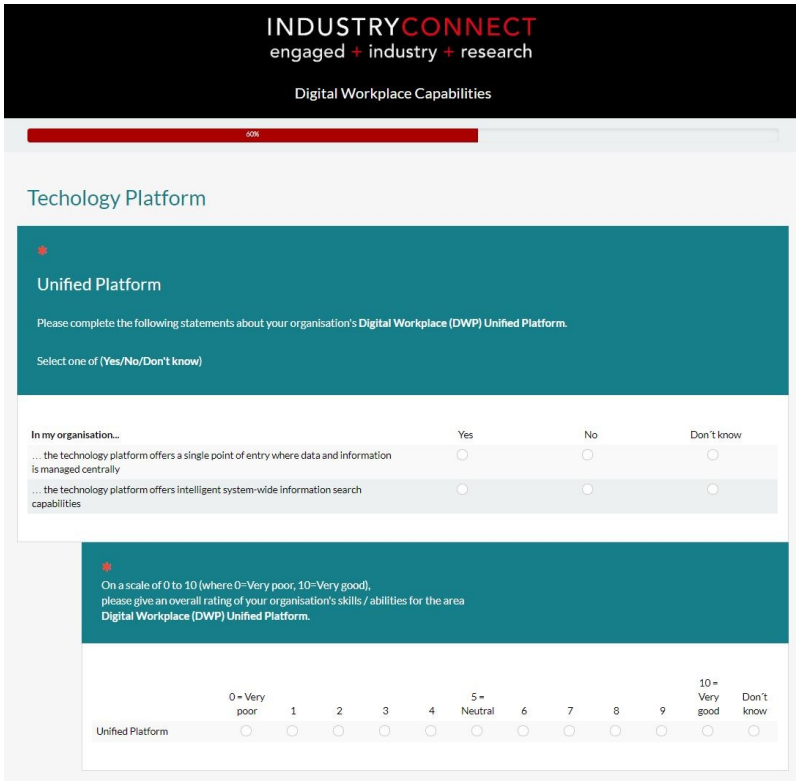

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Digital Workplace Capabilities

60%

Techology Platform

Unified Platform

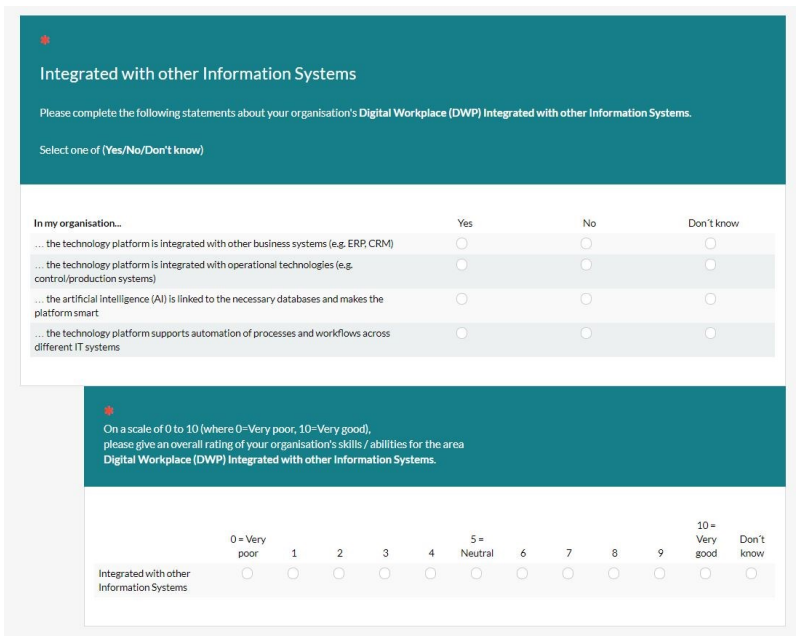
Please complete the following statements about your organisation's **Digital Workplace (DWP) Unified Platform.**

Select one of **(Yes/No/Don't know)**

In my organisation...	Yes	No	Don't know
... the technology platform offers a single point of entry where data and information is managed centrally	○	○	○
... the technology platform offers intelligent system-wide information search capabilities	○	○	○

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Unified Platform.**

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don't know
Unified Platform	○	○	○	○	○	○	○	○	○	○	○	○



Integrated with other Information Systems

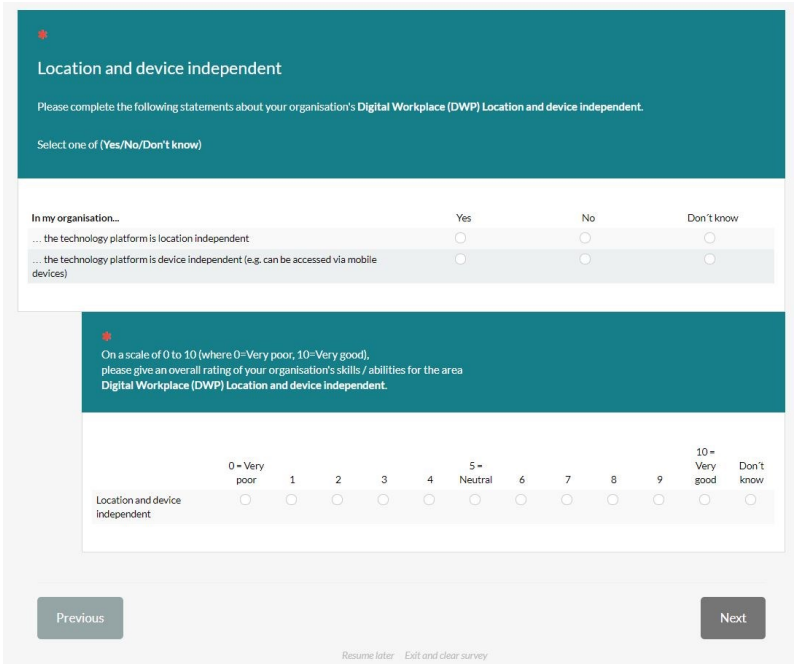
Please complete the following statements about your organisation's **Digital Workplace (DWP) Integrated with other Information Systems.**

Select one of **(Yes/No/Don't know)**

In my organisation...	Yes	No	Don't know
... the technology platform is integrated with other business systems (e.g. ERP, CRM)	○	○	○
... the technology platform is integrated with operational technologies (e.g. control/production systems)	○	○	○
... the artificial intelligence (AI) is linked to the necessary databases and makes the platform smart	○	○	○
... the technology platform supports automation of processes and workflows across different IT systems	○	○	○

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Integrated with other Information Systems.**

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don't know
Integrated with other Information Systems	○	○	○	○	○	○	○	○	○	○	○	○



Location and device independent

Please complete the following statements about your organisation's **Digital Workplace (DWP) Location and device independent.**

Select one of (**Yes/No/Don't know**)

In my organisation...	Yes	No	Don't know
... the technology platform is location independent	○	○	○
... the technology platform is device independent (e.g. can be accessed via mobile devices)	○	○	○

On a scale of 0 to 10 (where 0=Very poor, 10=Very good), please give an overall rating of your organisation's skills / abilities for the area **Digital Workplace (DWP) Location and device independent.**

	0 = Very poor	1	2	3	4	5 = Neutral	6	7	8	9	10 = Very good	Don't know
Location and device independent	○	○	○	○	○	○	○	○	○	○	○	○

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Digital Workplace Capabilities

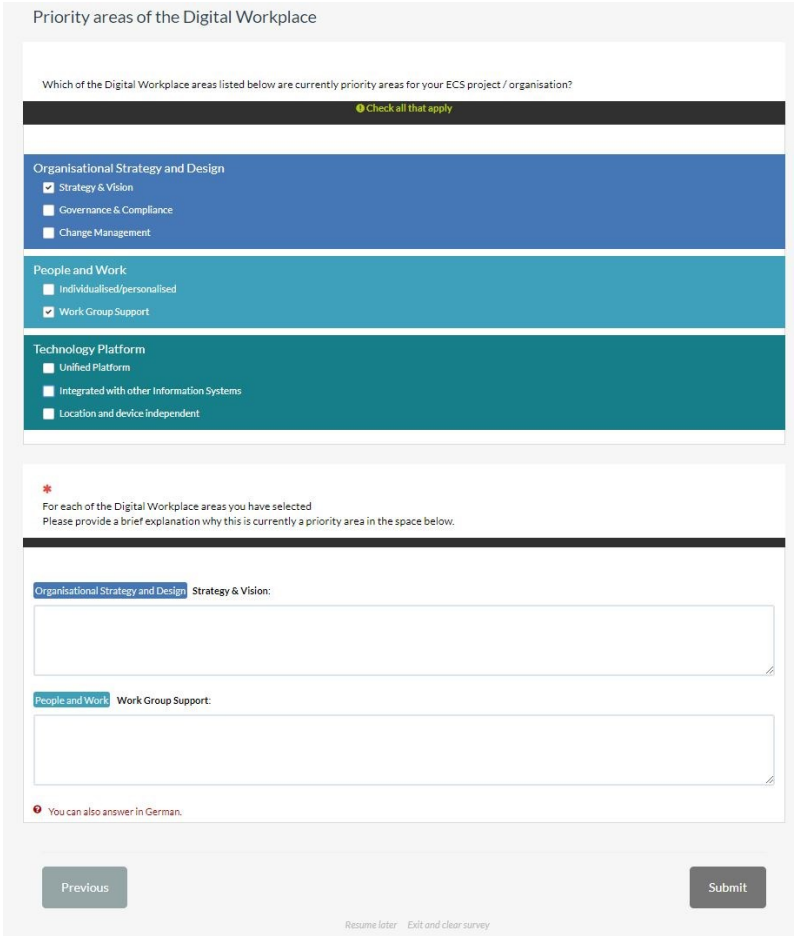
80%

Results

Here are your results for the Digital Workplace (DWP).

print my results

Organisational Strategy and Design: Strategy and Vision	Current status (0-10)	7		
In my organisation...		**YES**	**NO**	**?**
...we have a clear and complete understanding of the drivers of the DWP for our organisation		X		
...we have a clear and complete vision for the DWP for our organisation			X	
...our DWP initiatives are planned and managed			X	
...our DWP initiatives are specific to the needs of our corporate culture				X
...our strategy for the DWP is coordinated and enterprise wide			X	
...our DWP strategy is integrated into the organisation's wider business strategy		X		
...our DWP strategy is integrated into our company's HR strategy		X		
...the DWP is included as part of the organisation's corporate governance planning			X	
...our DWP strategy is agile, evolving and future oriented			X	
...we have fully implemented our DWP strategy			X	
Organisational Strategy and Design: Governance and Compliance	**Current status (0-10)**	10 = Very good		
In my organisation...		**YES**	**NO**	**?**
...clear roles and responsibilities have been defined for our DWP initiatives		X		
...the worker's council / employee representatives are involved in decision making about DWP initiatives		X		
...we have addressed compliance with legal requirements (e.g. workplace and information laws such as GDPR)		X		
Organisational Strategy and Design: Change Management	**Current status (0-10)**	4		
In my organisation...		**YES**	**NO**	**?**
...DWP initiatives are supported by clearly defined change management processes			X	
...the organisational and cultural changes required for DWP initiatives are made				X
...new (shared) working routines and patterns have been established			X	
...DWP related training and learning programmes have been developed		X		
...DWP initiatives are actively supported by top management			X	
People and Work: Individualised/personalised	**Current status (0-10)**	0 = Very poor		
In my organisation...		**YES**	**NO**	**?**
...our DWP initiatives provide employees with tools that can be tailored to their individual needs			X	
...our DWP initiatives provide employees with personalised information and interfaces			X	
People and Work: Work Group Support	**Current status (0-10)**	8		
In my organisation...		**YES**	**NO**	**?**
...our DWP initiatives provide stronger links between employees within the organisation		X		
...our DWP initiatives provide employees with a clear overview of their own and their team members work			X	
...our DWP initiatives are inclusive and enable all employees to participate and contribute		X		
...our DWP initiatives provide employees with incentives to collaborate and share information		X		
Technology Platform: Unified Platform	**Current status (0-10)**	Don't know		
In my organisation...		**YES**	**NO**	**?**
...the technology platform offers a single point of entry where data and informaiton is managed centrally			X	
...the technology platform offers intelligent system-wide information search capabilities				X
Technology Platform: Integrated with other Information Systems	**Current status (0-10)**	9		
In my organisation...		**YES**	**NO**	**?**
...the technology platform is integrated with other business ssystems (e.g. ERP, CRM)		X		
...the technology platform is integrated with operational technologies (e.g. control/production systems)		X		
...the artificial intelligence (AI) is linked to the necessary databases and makes the platform smart			X	
...the technology platform supports automation of processes and workflows across different IT systems		X		
Technology Platform: Location and device independent	**Current status (0-10)**	5 = Neutral		
In my organisation...		**YES**	**NO**	**?**
...the technology platform is location independent			X	
...the technology platform is device independent (e.g. can be accessed via mobile devices)		X		


Priority areas of the Digital Workplace
Which of the Digital Workplace areas listed below are currently priority areas for your ECS project / organisation?
Check all that apply
Organisational Strategy and Design
Strategy & Vision
Governance & Compliance
Change Management
People and Work
Individualised/personalised
Work Group Support
Technology Platform
Unified Platform
Integrated with other Information Systems
Location and device independent
For each of the Digital Workplace areas you have selected
Please provide a brief explanation why this is currently a priority area in the space below.
Organisational Strategy and Design Strategy & Vision:
People and Work Work Group Support:
You can also answer in German.
Previous
Submit
Resume later Exit and clear survey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Digital Workplace Capabilities
Vielen Dank, dass Du Dir die Zeit für unsere Umfrage genommen hast.
Die Ergebnisse der Umfrage werden analysiert und an die IndustryConnect-Mitglieder zurückgespielt.
CEIR-Team
Thank you for taking the time to complete our survey.
The results of the survey will be analysed and provided to IndustryConnect members.
CEIR team

Own Publications

Within the scope of digital platforms, particularly enterprise collaboration platforms, and related sociotechnical change, the following conference papers and journal article have been published by Clara S. Nitschke (née Greeven) over the last years.

2021

Williams, S. P., Nitschke, C. S., & Hardy, C. A. (2021). Analytical framework for social media risk analysis in organizations. *Procedia Computer Science*, *181*(2019), 302–309.

2020

Nitschke, C. S., & Williams, S. P. (2020). Monitoring and Understanding Enterprise Collaboration Platform Outcomes and Benefits Change. *53rd Hawaii International Conference on System Sciences*, 2609–2618. Maui, Hawaii.

Nitschke, C. S., Vallo Hult, H., & Bigolin, F. (2020). Shared Workspaces of the Digital Workplace: From Design for Coordination to Coordination for Flexible Design. *53rd Hawaii International Conference on System Sciences*, 451–460. Maui, Hawaii.

2019

Nitschke, C. S., Williams, S. P., & Schubert, P. (2019). A Multiorganisational Study of the Drivers and Barriers of Enterprise Collaboration Systems-Enabled Change. *International Conference on Wirtschaftsinformatik (WI)*. Siegen, Germany.

2018

Nitschke, C. S., & Williams, S. P. (2018). Traces of design activity: the design of coordination mechanisms in the shaping of enterprise collaboration systems. *CENTERIS - Conference on ENTERprise Information Systems*. Lisbon, Portugal.

2017

Greeven, C. S., & Williams, S. P. (2017). Enterprise collaboration systems: Addressing adoption challenges and the shaping of sociotechnical systems. *International Journal of Information Systems and Project Management*, *5*(1), 5–23.

2016

Greeven, C. S., & Williams, S. P. (2016). Enterprise collaboration systems: An analysis and classification of adoption challenges. *CENTERIS - International Conference on ENTERprise Information Systems*, 179–187. Porto, Portugal.

Curriculum Vitae

Clara Sabine Nitschke was a Research Assistant at the institute for IS Research, University of Koblenz-Landau from 01/10/2015 to 30/10/2020. During this time, she was member of the Enterprise Information Management (EIM) Research Group, Enterprise of Things (EoT) Lab, and Center for Enterprise Information Research (CEIR). She has a bachelor's degree in Information Management and a master's degree in Information Systems from the University of Koblenz-Landau. Between 2014 and 2020 she was involved in an ongoing research programme on social media risks and vulnerabilities. Her current research focuses on enterprise collaboration platforms as integral part of the digital workplace and associated sociotechnical change. Of particular interest to her is how enterprise collaboration platforms are shaping and being shaped through use.

Personal Data

Date of birth:	15/12/1988
Place of birth:	Bonn
Nationality:	German
Contact:	cnitschke@uni-koblenz.de

Studies

10/2015 – 07/2021	**Doctoral programme** at the Enterprise Information Management (EIM) Research Group, University of Koblenz-Landau, Campus Koblenz, Germany
04/2013 – 09/2015	**Master programme Wirtschaftsinformatik** / Information Systems, (Master of Science) Master thesis topic: „The effective adoption, appropriation, and usage of enterprise collaboration systems and content"
10/2008 – 12/2012	**Bachelor programme Information Management**, (Bachelor of Science) Bachelor thesis topic: „Das Vertrauen von jungen Erwachsenen in politische Beiträge aus Rundfunk, Print- und Digitalmedien"

Work Experience

01/2015 – 09/2020	**Research assistant** at the Enterprise Information Management (EIM) Research Group, University of Koblenz-Landau, Campus Koblenz, Germany Research and teaching Research focus: enterprise collaboration platforms and sociotechnical change Researcher in the IndustryConnect initiative
11/2013 – 09/2015	**Research assistant** at the Enterprise Information Management (EIM) Research Group, University of Koblenz-Landau, Campus Koblenz, Germany Social media risks research Enterprise content management administration
01/2013 – 02/2014	**Working student** at German eForensics GmbH, Koblenz, Germany CRM administration Marketing
12/2012 – 02/2013	**Research assistant** (project work) at the Institute for Management, University of Koblenz-Landau, Campus Koblenz, Germany Statistical data analysis

Presentations

04/04/2019	Digital workplace competencies: Survey findings, 10th IndustryConnect (IC) workshop, Koblenz, Germany
03/04/2019	Milestories & eXperience: Report on company visits, 10th IndustryConnect workshop, Koblenz, Germany
05/10/2018	Follow-up: Digital workplace designs, 9th IndustryConnect workshop, Seeheim-Jugenheim, Germany
24/06/2018	The shaping of an information infrastructure, European Conference on Information Systems, Doctoral Consortium, Portsmouth, UK
05/04/2018	Identified successful enterprise collaboration system (ECS) introduction approaches: An analysis of ECS projects over a six-year period, 8th IndustryConnect workshop, Koblenz, Germany
14/09/2017	Transforming the digital workplace, 7th IndustryConnect workshop, Zürich, Switzerland
13/09/2017	Enterprise collaboration system acceptance: Survey findings (data protection legislation - relevance for IBM Connections), 7th IndustryConnect workshop, Zürich, Switzerland
06/04/2017	Sociotechnical change, 6th IC workshop, Koblenz, Germany
15/09/2016	Drivers, barriers, motivations, pain points, 5th IndustryConnect workshop, Koblenz, Germany
07/04/2016	Milestories & eXperience: Report on company visits, 4th IndustryConnect workshop, Koblenz, Germany
07/04/2016	Alternative view on activities in IBM Connections: Kudos Boards, 4th IndustryConnect workshop, Koblenz, Germany

Internships

08/2011 – 10/2011	Social Entrepreneurship Initiative, Phnom Penh, Cambodia Market research Fundraising Project management
03/2006	St. Nikolaus-Stiftshospital GmbH, Andernach, Germany Patient care
03/2004	Architekturbüro Johannes Klein (Architect's office), Neuwied, Germany Developing floor plans Visiting construction sites

Engagement

11/2017 – 01/2020	Membership in German Search and Rescue Dogs Association (BRH Bundesverband Rettungshunde e.V.)
01/2016 – 06/0217	Student guidance Wirtschaftsinformatik / Information Systems
10/2015 – 05/2017	Supervision of elderly people with dementia / attending church services with them, Seniorenzentrum St. Barbara, Koblenz, Germany
10/2013 – 03/2014	Student support, University of Koblenz-Landau, Campus Koblenz, Germany
09/2011	Construction of a road for an orphanage in Phnom Penh, Cambodia
05/2011 – 07/2011	Elderly care, Deutscher Caritasverband (German Caritas Association), Koblenz, Germany
09/2010 – 09/2011	AIESEC membership
01/2003 – 01/2004	Cellist, Junge Philharmonie, Neuwied, Germany
08/2000 – 05/2004	School orchestra (piano, alto flute, cello) and choir at the Bertha-von-Suttner Gymnasium (grammar school)