A Multiorganisational Study of the Drivers and Barriers of Enterprise Collaboration Systems-Enabled Change

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Abstract. Enterprise Collaboration Systems (ECS) are emerging as the de facto technology platform for the digital workplace. This paper presents findings from an in-depth, multiorganisational study that examines the drivers and barriers of ECS-enabled change from two perspectives: i) the company initiating and driving the project and ii) key practitioners responsible for delivering the change. Data is collected from ECS using companies via a survey and face-to-face workshops, analysed using qualitative content analysis methods to identify categories of change and then synthesised to provide a rich classification and visualisation of the drivers, barriers, motivations and pain points (DBMP) to ECS-enabled change. This is followed by a discussion of the similarities and differences between drivers and barriers from both personal and company perspectives. The paper concludes by exploring the potential of the research and visualisation methods used in this work to provide the foundation for the longitudinal study of ECS-enabled change.

Keywords: Enterprise Collaboration System (ECS); Enterprise Social Software (ESS); ECS-Enabled Change; Drivers; Barriers.

1 Introduction

The transformation of work and new ways of working are essential for organisational success in the digital era [1]. Based on the success of social media platforms in everyday life [2], socially-enabled Enterprise Collaboration Systems (ECS) have emerged to extend traditional groupware (e.g. email, shared calendar) through the integration of social software features (e.g. wikis, blogs, social profiles) and provide large-scale integrated platforms to connect people, work practices, activities and structures [3], [4]. ECS have become the de facto IT platform at the heart of the digital workplace [5] and are generating significant interest for both researchers and practitioners [6].

Recent research has identified that initiatives for the introduction of ECS are being driven by company-specific objectives, including, for example, improved innovation management, better collaboration between employees, improved knowledge transfer and improved search for experts [7], [8]. However, individual organisations have differing drivers for introducing an ECS platform and are also experiencing a variety of barriers to system adoption and use, including for example cultural changes, reliance on other systems [9], [10] and poor formalisation of ECS communication protocols

14th International Conference on Wirtschaftsinformatik,
February 24-27, 2019, Siegen, Germany

[11]. Current research into the drivers and barriers of ECS projects typically draws from cross-sectional case studies conducted at a single point in time [10]. Both quantitative and qualitative research methods have been used to examine the adoption of ECS and enterprise social software (ESS) to identify and investigate ECS/ESS adoption drivers and barriers [12–19]. Nielsen and Razmerita [20] found that while ECS have the potential to support a variety of objectives, their adoption is affected by factors including individual (e.g. technical skills), organisational (e.g. management support) and technical factors (e.g. usability). By studying uncertainties as barriers for knowledge sharing in ECS, Trier et al. [18] place emphasis on the individual perceptions impacting and constituting barriers to ECS adoption, such as uncertainties regarding the purpose of the collaboration platform. While not making a distinction between ECS adoption barriers from a personal and a company perspective, Forstner and Nedbal [19] identified five problem areas: project management, technology, culture, top/middle management and employees. They also argue that organisations need to identify problems with the adoption of ESS at an early project stage and address them through project management. Similarly, Diehl et al. [2, p. 247] state that "cultural challenges can be anticipated and should be managed ex ante, not ad hoc." However, in line with the evolving and sociotechnical nature of ECS, the drivers and barriers organisations and their employees experience are emerging over time as they make sense of ECS and embed them into their digital workplace.

While current research provides insights into the importance of studying ECS adoption drivers and barriers, we see the need to establish appropriate means for capturing and investigating these drivers and barriers and building the foundation for studying the ways that they change over time. In their study on ECS adoption, Greeven and Williams [10] show that ECS adoption challenges and barriers are multifaceted and exemplify the complexity of ECS projects which organisations and the involved stakeholders are facing over time. In this paper, we build on our previous research and literature reviews on ECS adoption [8-10] and present the findings from an in-depth, multiorganisational empirical study that identifies drivers and barriers to ECS-enabled change from both the viewpoint of the company initiating the project and key practitioners involved in the everyday implementation and management of the project. Our goal is to extend existing work and lay the foundation for a long-term, longitudinal view of ECS-enabled change by following the introduction and use of ECS platforms over time.

2 Research Design and Data Analysis

This study is part of IndustryConnect, a long-term university-industry research program in the field of collaboration technologies and the design of the digital workplace [21]. IndustryConnect brings a team of researchers from a German University together with key practitioners from 31 German/Swiss companies. The organisations participating in the study are leaders in the introduction and use of ECS and have implemented IBM Connections, currently the largest, most integrated ECS platform [5]; all are committed to participating in interactive research to examine ECS-enabled change in their

organisations. The IndustryConnect member companies are typically medium- and large-sized (1,000-300,000 employees) representing a range of industry sectors including: manufacturing, transport/logistics, retailing, government services and financial services. The key practitioners are all employees with responsibility for the introduction and use of the ECS in their organisation and represent a range of professional backgrounds including: information technology, information/ knowledge management, internal communications, organisational processes and business development.

The aim of this study is to identify and understand the drivers (D), barriers (B), motivations (M) and pain points (P) to ECS-enabled change and the adoption and ongoing development of ECS in organisations. Our objective is to examine ECS-enabled change from two perspectives:

i) Company perspective. The focus is on the company context and the broader reasons for initiating and driving the ECS project. From the company perspective we identify: *drivers (D)*, reasons why the company originally initiated the ECS project (e.g. expressed in strategy documents or strategic plans); and *barriers* (B), challenges/problems encountered that are constraining the ECS project and making the achievement of the company's ECS-enabled change objectives more difficult, and

ii) Personal perspective. The focus is on the everyday motivations and challenges of ECS-enabled change from the perspective of the key practitioners responsible for delivering the change. This perspective is shaped by individual experiences and the everyday activity in the organisation [22]. From the personal perspective we identify: *motivations (M),* reasons the ECS project is being supported or pushed forward by the individual practitioner and *pain points (P),* current challenges, problems, issues in the ECS project that the individual practitioner experiences in his/her daily work on the project and making the achievement of ECS-enabled change objectives more difficult.

The research study design is structured into four phases as shown in Figure 1 and discussed below.

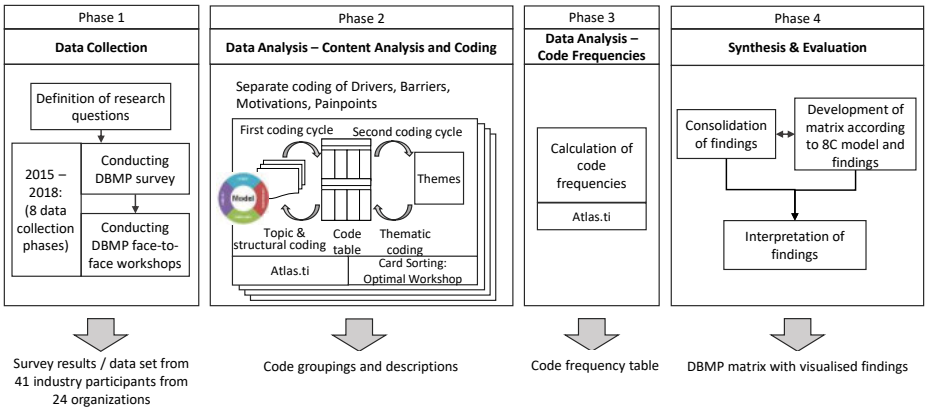

Figure 1. Research design phases

Phase 1: Data Collection. Primary data about drivers, barriers, motivations and pain points (DBMP) related to ECS introduction and use were collected between 2015 and 2018 from 41 practitioners representing 24 companies from the IndustryConnect program. Data was first collected via an online questionnaire comprised of four questions addressing both the company perspective ("What are the original *drivers* for your company initiating the ECS project?", "What are the key *barriers* encountered by your company constraining the ECS project?") and the personal perspective ("What are your current personal *motivations* for supporting the ECS project or pushing it forward?", "What are your personal *pain points* in the ECS project you experience in your daily work on the project?") of key practitioners involved in the respective ECS-enabled change projects. After completing the questionnaire respondents presented their DBMP in one of a series of face-to-face workshops. The objective of the workshop presentation is for each respondent to elaborate on their answers, clarify meanings and for the researchers to gather further examples. The presentations and discussions were digitally recorded and transcribed for analysis.

Phase 2: Data Analysis – Content Analysis and Coding. The drivers, barriers, motivations and pain points (DBMP) identified by each respondent were listed and coded. Using content analysis methods and following Saldaña [23] the data was coded through two iterative coding cycles using the qualitative data analysis tool ATLAS.ti. In the first coding cycle, topic and structural coding was applied to provide four basic code tables for the DBMP. Guided by the elements of the 8C model [24], the codes in the individual tables were then structured into two categories: i) functional DBMP codes relating to the ECS platform, its functionality and performance and ii) business DBMP codes relating to the organisation and its corporate objectives.

In the second coding cycle the card sorting method for thematic coding was applied [25]. To ensure research quality and reliability three researchers worked independently on the coding and reviewed the codes in joint workshops to clarify the emerging DBMP categories and to achieve a high level of intercoder reliability. Following the coding process, tables containing DBMP code groupings and code descriptions were created.

Phase 3: Data Analysis – Code Frequencies. Code frequencies, that is the total number of occurrences of each code, were calculated in ATLAS.ti and the code frequency table was created. The code frequency table provides an additional means for examining similarities and differences between drivers, barriers, motivations and pain points for different practitioners and companies.

Phase 4: Synthesis and Evaluation. In the final phase of the study the findings were synthesised and consolidated. The DBMP matrix (Figure 2) was developed to display the consolidated findings in a visual form. These consolidated results were presented to the study participants in a review workshop. The DBMP matrix itself was also evaluated as a method for visualising and consolidating the drivers, barriers, motivations and pain points data and as a method for presenting the data to the participants. The feedback from the participants was positive and the matrix provoked constructive discussions between the researchers and the study respondents.

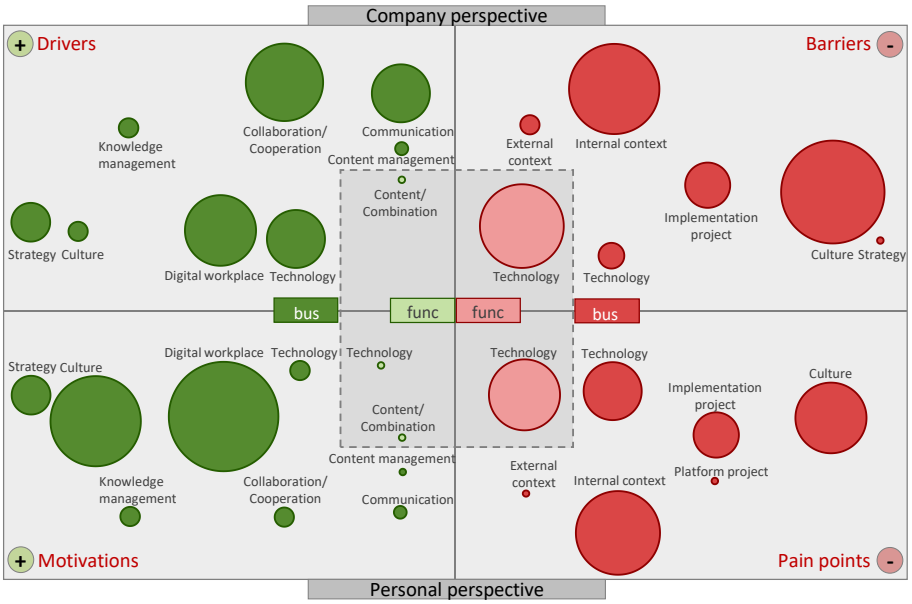

Figure 2. Drivers, barriers, motivations and pain points of ECS-enabled change

3 Findings and Discussion

The derived DBMP categories were visualised in a 2x2 matrix (Figure 2). The top two quadrants represent the company view, the bottom two quadrants the personal view; the quadrants on the left show the issues driving the project forward (*drivers* and *motivations*, green) and the quadrants on the right show the issues constraining the project (*barriers* and *pain points*, red). In total, 108 different DBMP codes were identified in the final coding iteration. The identified DBMP codes and categories were separated into *functional* (light green / light red at the centre of Figure 2) and *business* (dark green / dark red in Figure 2). The size of the bubbles represents the sum of the frequencies of the codes within a category. To enhance readability, bubbles of similar categories are placed next to each other (e.g. content management and communication, that can be found in the 8C model [24], or internal and external context). Furthermore, the matrix lines work roughly as mirror axes to improve comparability between the single quadrants and between functional and business DBMP within one quadrant.

Table 1. Drivers/Motivations: category descriptions and frequencies

Category		*Description*	*D*	*M*
Collaboration / Cooperation	bus	Relate to new or changing collaboration and cooperation practices and processes for business improvement	12	3
Communication	bus	Relate to new or changing communication practices and processes for business improvement.	9	2
Content Management	bus	Relate to new or changing content management practices and processes for business improvement.	2	1
Knowledge Management	bus	Relate to new or changing knowledge management practices and processes for business improvement.	3	3
Digital Workplace	bus	Relate to an integrated collaboration platform and what it is expected to enable regarding the support of organisational members and their work.	11	17
Technology	bus	Relate to the improved management and usage of IT within the corporate context and desired changes to business IT (architecture) solutions and concepts.	9	3
Strategy	bus	Relate to corporate strategy/ strategic objectives.	6	6
Culture	bus	Relate to the corporate culture, where cultural changes need to be enabled through the introduction of new technology and work practices and/or are needed for the successful embedding of new technology and work practices into the work environment.	3	14
Content / Combination	func	Relate to content creation, use, and management functionally supported by the collaboration platform.	1	1
Technology	func	Relate to expected or perceived positive characteristics and affordances of the collaboration platform itself and its functionality, e.g. ease of use or integration capability.	x	1

A similar set of categories emerged for the drivers (D) and motivations (M), and for the barriers (B) and pain points (P). Table 1 and Table 2 show the descriptions of the business (bus) and functional (func) categories identified for the four quadrants (DBMP) and the associated frequencies of the code categories. A cross is used in the tables when a category is not present in the respective DBMP quadrant. Each category description is comprehensive to cover a wide range of different DBMP codes. For example, the barriers and pain points category *implementation project* covers ten codes: *lack of systematics in the introduction*, *neglect of the head quarter*, *missing business link*, *poor transparency*, *low awareness level*, *poor training*, *missing binding rules*, *different target visions*, *missing use cases*, and *poor project management*.

Table 2. Barriers/Pain points: category descriptions and frequencies

Category		*Description*	*B*	*P*
External context	bus	Relate to actors and influences from outside the company that are restricting, constraining or otherwise negatively impacting the ECS project and its development (e.g. laws, regulations, customers, vendors, market developments).	3	1
Internal context	bus	Relate to actors and influences from inside the company that are restricting, constraining or otherwise negatively impacting the ECS project and its development (e.g. poor management support of the ECS project, work council, company structures, missing resources).	14	13
Implementation project	bus	Relate to the ECS implementation project itself and corresponding implementation strategy design decisions.	7	7
Platform management	bus	Relate to the ways the collaboration platform is managed and the consequences thereof.	x	1
Technology	bus	Relate to the management and usage of IT within the corporate context and unsatisfactory business IT (architecture) solutions and concepts.	4	9
Strategy	bus	Relate to the embedding/alignment of the collaboration platform into/with the corporate strategy.	1	x
Culture	bus	Relate to corporate culture, where cultural changes are needed for the successful embedding of new technology and work practices into the work environment.	16	11
Technology	func	Relate to perceived deficiencies in the collaboration platform itself and its functionality and usability, e.g. security, missing functionality, external access.	13	11

As can be taken from Table 1 and Table 2, there are differences between the personal and the company view in terms of the total number of mentions within a category. In the following sections we describe and discuss each of the four quadrants with illustrative examples of associated codes.

3.1 Drivers

Eight business driver categories and one functional driver category were identified as shown in Table 1. Each driver category contains a set of driver codes, for example, the driver category *collaboration/cooperation* contains driver codes such as: *increase of inter-site collaboration* or *support of international collaboration.*

The frequency of occurrence of the single driver codes indicates a stronger focus on business drivers and less on functional-oriented drivers for the introduction of an ECS. Since the drivers represent the company perspective, it is not surprising that there are more business-oriented driver codes and categories reflecting overall corporate objectives and visions, such as globalisation, business performance, productivity improvement, or support of organisational changes [26], [27]. The analysis reveals that ECS drivers may be i) opportunity-driven (e.g. support of international communication, improvement of cross-divisional collaboration, sharing of information) or ii) problem-driven (e.g. usage of external social media applications, communication hierarchy, reduction of e-mails).

Table 3. Driver examples

Quote	*Driver code*
"A global collaboration tool for all employees to bring colleagues from around the world closer together, in a flexible, forward-looking network culture" (Service Owner (IT), Automotive Parts Manufacturer 05)	D: bus: collaboration/cooperation: global collaboration tool; D: bus: digital workplace: networking
"The communication hierarchy did not fit; turn hierarchies upside down" (Head of IT, Security/Infrastructure, Clothing Manufacturer/Retail 02)	D: bus: communication: communication hierarchy
"Support cross-border collaboration" (Head of Communications/Knowledge, Consumer Electronics Manufacturer 02)	D: bus: collaboration/cooperation: support of international collaboration

In general, the main focus of drivers is on business achievements and improvements. In particular, organisations are striving to enable and improve collaboration and communication between employees as well as becoming a digital workplace and having the right technology in place to achieve this. The collaboration platform itself and its functionality and performance are of less concern as drivers of change. Table 3 shows examples of typical drivers expressed by the study participants.

3.2 Barriers

Six categories of business barrier and one functional barrier category were identified (Table 2). As with the drivers, each barrier category contains a set of barrier codes. For example, the barrier category *implementation project* contains barrier codes such as *missing binding rules* and *poor transparency*. The barrier code frequencies reveal that the biggest groups of responses relate to the business categories *internal context* and *culture* and to the functional category *technology*. Internal context largely refers to people who constrain the project (e.g. managers not supporting the project or the works council demanding specific requirements regarding personally identifiable information being captured in the ECS) and is seen as particularly problematic. Culturally, change

management and the development of a new mindset is perceived as challenging. Functional barriers pointing to weaknesses in the collaboration platform (e.g. in terms of usability) and functional limitations (e.g. insufficient analytics measurement capabilities) were identified as major barriers to the ECS-enabled change projects.

Table 4. Barrier examples

Quote	*Barrier code*
"Knowledge is seen as property from the employees' point of view. Knowledge is not shared because this [new] attitude is not rooted yet. Also, this has something to do with the notion of performance. The employee thinks ,If I advance something, I will be in the favour of my boss'" (Specialist, Collaboration, Steel Manufacturer 01)	B: bus: culture: corporate culture that makes collaboration difficult
"Financial and human resources" (Project Manager, Information Architecture, Logistics Services 01*)*	B: bus: internal context: missing resources
"The ECS is far too extensive, security and privacy requirements destroy the usability of the product. The app is not at all user-friendly." (Head of Corporate Portals, Air Transportation 01)	B: func: technology: system complexity; B: func: technology: usability

Barriers relate primarily to business issues, however, in contrast to the drivers, functional barriers are also of importance. The identified codes and categories show that some barriers only became visible in ECS use; they were unanticipated and organisations only recognized them through using the platform. For example, a missing killer app or system complexity that only becomes visible when the system is in use (Table 4). Functional deficiencies of the collaboration platform make achieving expected ECS benefits and outcomes, e.g. improved communication, more difficult.

3.3 Motivations

The motivation categories identified in the data analysis are similar to the driver categories, however they represent the personal view of the key practitioners and include different objectives. Eight business motivation categories and one functional motivation category were identified (Table 1). As with the drivers and barriers, each category contains a set of motivation codes. For example, for the motivation category *digital workplace* the motivation codes *creating transparency* and *establishing modern ways of working* were identified. These motivations focus on opportunities, such as designing the workplace of the future, establishing new ways of working, or promoting changes in the corporate culture.

Table 5. Motivation examples

Quote	*Motivation code*
"The opportunity to fundamentally make the daily work of 70.000 employees easier." (Senior Manager, HR, Logistics Services 02)	M: bus: digital workplace: make work easier
"I want to help shape change." (Senior Manager, Social Collaboration, Automotive Parts Manufacturer 02)	M: bus: culture: promote change/ change in corporate culture
"Future Work is my mission." (Manager Digital Transformation and Change, Automotive Parts Manufacturer 05)	M: bus: digital workplace: workplace of the future

The personal motivations in ECS projects are mainly in the business categories *culture* and *digital workplace*. The frequencies of the motivation codes and categories revealed the individual practitioners desire to be part of organisational change and the shaping and transforming of the company's culture and digital workplace. Functional motivations are seen as being of minor importance. The collaboration platform itself and its performance is of less importance; instead shaping the digital transformation is paramount. Table 5 provides examples of motivations where the active part and role of the individual participants in the ECS-enabled change projects becomes clear.

3.4 Pain Points

Five business pain point categories and one functional pain point category were identified (Table 2) where each category includes a set of pain point codes. For example, for the pain point category *culture* pain point codes of *change management* or *poor support for new mindset / ways of working* were identified. In line with the set of categories and the code frequencies, pain point categories (personal view) and barrier categories (company view) show highest similarity. As with the barrier categories, the categories *internal context* (business), *culture* (business), and *technology* (functional) are the most frequently cited categories, followed by *technology* (business). From the perspective of the key practitioners involved, the ECS project is constrained from inside the company due to missing resources and resistance from, for example, the works council as well as low level of digital competence. Culturally, acceptance and the lack of support for a new mindset and work practices is perceived as most challenging. Worth noting are the technology aspects that are being negatively perceived. This applies to both the corresponding business category, e.g. through multiple possible competing systems used by the organisation, and the corresponding functional category with issues of technology usability and system integration.

Table 6. Pain point examples

Quote	*Pain point code*
"Too many different tools and no single point of entry" (IT Manager, Collaboration/Knowledge, Technology Inspection Service)	P: bus: technology: variety of systems P: func: technology: missing single sign-on
"Binding rules on collaborative work […] regulate a particularly strong group of Confluence users." (Project Manager Intranet, Retail Grocery 01)	P: bus: implementation project: missing binding rules; P: bus: technology: competing system
"Works council." (Project Manager, Automotive Parts Manufacturer 04)	P: bus: internal context: slow movement due to the works council
"System acceptance and the competition with Microsoft products" (Internal Consultant, Air Transportation 01)	P: bus: culture: acceptance; P: bus: technology: competing system
"Deficits in IBM Metrics: Development of analytics methods without existing documentation" (Specialist, Collaboration/ Statistics, Automotive Parts Manufacturer 02)	P: func: technology: deficits in metrics capability

As with the barriers, functional technology-related pain points become visible through ECS use. For example, practitioners noticed the significance of pain points such as a missing single sign-on feature when the ECS is being used alongside multiple other business software systems. The participants' responses in Table 6 show examples of individually perceived pain points in the ECS projects that make shaping the new workplace (which was one of the key motivations) more difficult.

3.5 Interpretation of Drivers, Barriers, Motivations and Pain Points

The visualisation of the DBMP (Figure 2) and the underlying data reveal both similarities and differences in the collected drivers, barriers, motivations and pain points.

While drivers and motivations for bringing the ECS projects forward are largely business-oriented, barriers and pain points clearly deal with functional issues related to the collaboration platform itself, including deficiencies in data analytics capabilities, external access, integration or usability.

From the study findings we also see a link between the position and role of the individual participants in the ECS project and the nature (functional or business) of the perceived pain points. As can be drawn from the example pain points (Table 6) the business-oriented pain points were largely identified by project managers and internal consultants, while the functional-oriented pain points were identified by IT managers and technology specialists. Overall, however, business-oriented DBMP are most prevalent. From a company perspective, the business-oriented drivers are about

enabling and/or improving things, such as collaboration or the digital workplace, and place emphasis on ECS project outcomes. In contrast, business-oriented motivations showing the personal perspective focus on the path towards these outcomes, where having an active part in the transformation, particularly of the organisational culture and digital workplace, is key. Such obvious differences cannot be directly identified from the two quadrants on the right side of the matrix but are revealed in the coding tables. Both, business-oriented barriers and pain points specifically represent challenges from the internal context, for example through groups of people who obstruct or constrain the ECS project and the changing of culture. In addition, the business-oriented category *implementation project* has the same frequency for barriers and pain points. One reason for this is that that pain points personally perceived by the people responsible for the ECS project (e.g. project leaders and managers) are partly based on the ECS barriers prevailing inside the company, as these must be addressed by them in order to achieve ECS acceptance and satisfy their individual ECS project motivations.

Furthermore, there are some categories, e.g. *culture* or *technology* that can both be perceived as driving and constraining the ECS project. For example, while organisations and key actors in the ECS projects aim to bring about changes in the corporate culture and collaboration mindset by introducing a collaboration platform, the current cultural mindset and attitudes might also impede accepting and adopting new technologies and work practices.

4 Concluding Remarks

In this paper, we identify and analyse the drivers and barriers to the adoption of ECS. We conducted a survey with multiple ECS user organisations from different industries. Since ECS are largely being shaped by individual key practitioners in the organisations, who have different backgrounds, experiences with and expectations of collaboration systems, the *drivers* and *barriers* were studied from both a company perspective and a personal perspective. In order to differentiate between these views, we named the drivers and barriers from a personal perspective *motivations* and *pain points*. The drivers, barriers, motivations and pain points (DBMP) were collected, coded and their frequencies identified. This data is consolidated and visualized in the DBMP matrix, displaying the diverse DBMP categories and their relevance for ECS user organisations. This work extends previous work, for example [13], [16], [19] by representing multiple perspectives (company and personal) and providing a deeper and more nuanced classification of drivers and barriers.

While the current study does not yet consider the ways that DBMP change over the life of ECS projects it has delivered a clear set of DBMP anchor measures [28] that can be traced over time. The research approach and DBMP matrix provide a method for collecting and visualising DBMP and are now being used to capture DBMP from the same group of ECS using companies at regular points in time; enabling us to examine how they change (or not) over time. To achieve this requires a more animated visualisation of the DBMP matrix that incorporates the dimension of time.

From this study and further interviews and workshops with the current participants we have further identified that companies with similar drivers and motivations are designing the digital workplace differently [5] and are dealing with the same barriers and pain points in different ways. For example, the barrier and pain point of the works council being perceived as impeding the ECS project progress (by having specific requirements regarding personally identifiable information in the system or the inclusion of certain employee groups), is being addressed differently in different organisations. While some organisations involve and incorporate the works council in the ECS project, others attempt to exclude them or redirect attention away from seemingly problematic ECS functionality and procedures.

Building on this DBMP study, work is now underway to study how DBMP evolve and change over time as part of an organisation's digital transformation efforts. Our goal is to identify the organisational competencies and capabilities required to successfully achieve and manage ECS-enabled change. In particular, we are identifying key enablers and constraints to specific ECS outcomes in order to gain insights into how the ECS transformation process is being shaped. The achievement of expected and desired outcomes, e.g. faster innovation or removal of knowledge silos, requires the development of competencies and capabilities allowing for the management of ECS-enabled change and the successful embedding of ECS into the digital workplace.

Throughout the digital transformation process companies are encountering both expected and unanticipated enablers and constraints to desired ECS outcomes. For example, companies have benefitted from positive use cases that make the ECS more visible and encourage employees to be more accepting of social software. On the other hand, they are constrained by, for example, conflicting stakeholder interests and responding to new regulatory requirements. Existing research on IS capabilities has identified that capabilities are developed through action and interaction with technology and the embedding of emerging skills and competencies within the organisation [29–31]. Additionally, the emergence of capabilities requires a process of reflection and learning embedded in the specifics of the organisational context [32]. In order to successfully build a digital transformation capability, we see the need for organisations to i) reflect on and learn from the digital transformation process while identifying and developing the relevant competencies and resources, and to ii) anticipate future changes shaping the digital workplace while building the knowledge, skills and resources for enabling digital change. In this way and in contrast to prior research on the ECS introduction and adoption [15], [17–20], this research is studying ECS as evolving and sociotechnical systems and follows Dourish [33] by viewing the change context as being dynamically designed through ongoing interactions with the collaboration system.

5 Acknowledgements

Supported by the Deutsche Forschungsgemeinschaft (DFG) Research Grant No. 285717372.

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