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Enterprise Collaboration Platform Configurations: an Empirical Study

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Abstract. Collaboration and communication technologies are essential for the support of cooperative work in organisations. Unlike the situation with ERP Systems, there is no single integrated Enterprise Collaboration System that provides systematic and comprehensive support for all the different forms of collaborative activities. As a consequence, organisations must combine multiple tools, applications and systems to build their Enterprise Collaboration Platform. In this paper, we present the findings of a focused empirical study that examines the complex collaborative technology landscape in user organisations in order to characterise and understand the evolving portfolios of collaboration software that have been implemented. Based on a literature review combined with an analysis of existing commercial software products, we developed a classification scheme for Areas of Collaborative Work (ArCoW), which is then used to structure an online questionnaire. The analysis of data from 23 responding user companies revealed three typical "configurations" of Enterprise Collaboration Platforms: *concentration,* where the platform is highly focused on a core ECS/suite with only a few additional collaboration software tools, *diversity* that also builds around a core ECS/suite but extends this with a wide range of additional tools and *dual core* characterised by two ECS/Suites with few additions.

Motivation

The use of collaboration technologies to support and coordinate distributed collaborative work is increasing in both scale and scope. This has been especially noticeable in the past two years as organisations have responded to the short-term challenges presented by the work from home mandates triggered by the COVID-19 pandemic (McKinsey Global Institute, 2021; World Economic Forum, 2020) as well as the longer-term trend for organisations to offer employees more flexible work options to support hybrid work (Gratton, 2021). This is resulting in a wider range of working arrangements and an increased requirement to provide collaboration technologies to support distributed work teams.

As a response to this increase in the scale of distributed collaborative working there has been a concomitant increase in the scope and functionality of technologies to support collaborative work (Gartner, 2021). As the degree of hybrid working increases, the complexity of supporting collaborative work has also increased, requiring IT departments to place greater attention on the selection and provision of "collaboration software" to provide a stable technology environment to support a wider range of collaborative work situations.

However, collaboration software designed to support *ad hoc collaborative work activities* is inherently different from software such as Enterprise Resource Planning (ERP) systems that, by design, support *repetitive and highly structured business processes.* Whilst the majority of today's ERP Systems have evolved into highly integrated systems with functional modules that store data in a central database, the commercial solutions for collaboration software are highly specialised, focusing on supporting selected areas of joint work. Only a small number of collaboration software products (e.g. HCL Connections, Atlassian Confluence, Jive) contain multiple functional modules and would qualify as *integrated* Enterprise Collaboration Systems.

The fact that collaboration software is highly specialised means that organisations often need to combine many different software products to support the diverse requirements for joint work. This has led to a (somewhat uncontrolled) growth of available products in use in organisations (Schubert & Williams, 2022) and as a consequence, many companies have implemented a heterogeneous range of tools (from different vendors) with overlapping (redundant) functionality. These portfolios of collaboration software include lightweight tools for specific tasks such as file sharing or simple message exchange to more complex Enterprise Collaboration Systems (ECS). Taken together the tools provide an "Enterprise Collaboration *Platform*" (ECP) that comprises the full range of collaboration software tools and applications available to the registered users of an organisation. Frequently, the selection of these products arises bottom-up in a piecemeal fashion as different tools are requested by single departments and is not conduct-

ed top-down, centrally coordinated by the IT department (Riemer et al., 2012). Examining the portfolio of software products across the entire organisation reveals a diverse range of tools in use, provided by multiple vendors and supporting differing and often redundant functionality. The aim of our research is to examine whether typical "configurations" for Enterprise Collaboration Platforms are emerging to support distributed collaborative work. That is, our goal is to identify whether there are frequently occurring combinations of collaboration software products that, in their combination, provide identifiable collaboration platform types.

In this research note, we report on the findings of an empirical study of existing Enterprise Collaboration Platforms in 23 medium- to large-sized organisations. In order to investigate the design of Enterprise Collaboration Platforms, we develop a generic template for the **Ar**eas of **Co**llaborative **W**ork (ArCoW) and use this to examine similarities in existing collaboration tool portfolios reported by the participating user organisations and to identify *typical* configurations. The study builds on and extends our previous work on the use of social software in organisations (Schubert & Williams, 2022; Williams & Schubert, 2018) and is part of IndustryConnect, a long-term university-industry research programme exploring collaboration technologies and the design of the digital workplace in 35 leading organisations in the DACH area (Williams & Schubert, 2017). The research programme has been following the emergence and shaping of the digital workplace in these organisations since 2013 through the development of longitudinal case studies, research workshops, interviews and trace ethnographies of work and work practices.

The paper is organised as follows. In the next section, we introduce the research design and explain the development of the survey instrument and the collection of research data. We then present our analysis, and emerging platform configurations are identified. Finally, we conclude with a discussion of our findings and present imperatives for future research.

Research Design and Survey Instrument

This section describes the research design and the development of the survey instrument. As described above, our aim is to examine the emergence of enterprise collaboration platform types by identifying and analysing the portfolios of collaboration tools in use in organisations.

A mixed method research approach using an exploratory-sequential design was applied (Creswell & Plano Clark, 2018), which combines literature and software analysis with empirical methods for the collection and analysis of survey data. The *survey instrument* was developed based on a literature review followed by a thorough examination of the functionality of existing standard software solutions

(Schubert & Williams, 2022). The *survey data* was collected from user organisations through an online questionnaire.

Figure 1 shows the research steps and the outcomes of each step. In the *first step*, the findings from an analysis of *dimensions of collaborative work* in the CSCW research literature and the examination of *functionality of existing collaboration software* were merged to develop a classification of **Ar**eas of **Co**llaborative **W**ork (ArCoW). In the *second step*, the ArCoW structure was used to design the online questionnaire and in the *third step*, the questionnaire was implemented using LimeSurvey (an open source online statistical survey Web application) and used for data collection.

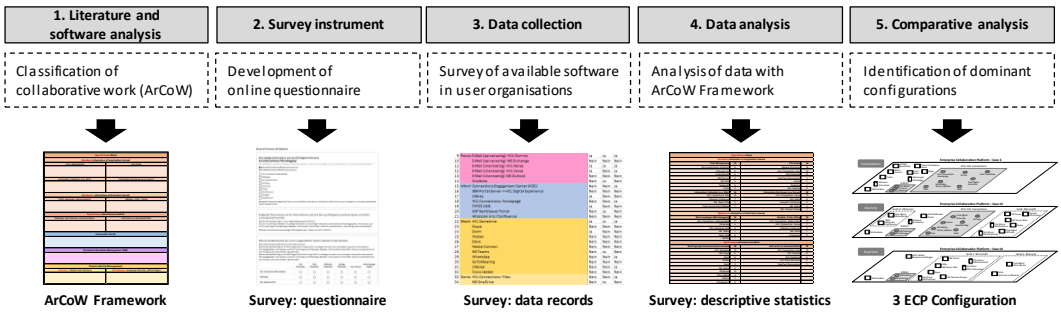

Figure 1. Research steps and results

The collected data records containing the portfolio of software in use in the responding user organisations were transferred into an Excel file for analysis. In the *fourth step*, the ArCoW Framework was used to derive descriptive statistics about the type and number of tools in use in the responding organisations. The *fifth and final step* was a comparative analysis of the data records which reveals similarities in the data that could be described as *typical configurations* of an Enterprise Collaboration Platform.

The following sections describe the research carried out in each of the steps in more detail.

Literature and Software Analysis: Areas of Collaborative Work

Investigating the infrastructure for *all areas* of collaborative work is a complex task and requires a classification scheme that is consistent with analytical frameworks developed in the academic literature as well as with "the language of practice". Moreover, the classification must be applicable to examining the functionality bundles of contemporary commercial collaboration software. For this, we purposefully combined findings from a literature review with a functional examination of existing software products.

Literature review

For the development of our classification scheme, we examined existing approaches in the literature. We were particularly interested in meta classification schemes that provide a comprehensive classification of the entire field of collaborative work. Examples are the study of *categories of tools* by Bafoutsou and Mentzas (2002), Riemer's *catalogue of classification criteria* (Riemer, 2007), the *8C Framework* by Williams (Williams, 2010) and Schubert's *classification of software components* (Schubert, 2018). All of the identified classification approaches contain similar dimensions, the most prominent being *synchronicity* (synchronous/asynchronous) and *place* (Ellis et al., 1991), *permanency* of the information (ephemeral/long-term) (Schubert, 2018), type of *group process* (communication, cooperation, coordination) (Williams, 2010), *content type* (text, image, video, audio) and number of *communication partners* (1/many) (Ellis et al., 1991). The type of activity is often grouped into three (or four) "Cs": Communication, Cooperation, Coordination (and Content). In addition, studies have shown that collaboration software can be classified into categories, which are dependent on the *type of work* which they support. Riemer (2007) suggested the five categories *Integrated Systems*, *Everyday Systems*, *Meeting Systems*, *Coordination Systems* and *Specialised Tools* as a result of a cluster analysis on a sample of 94 collaboration software products using some of the attributes listed above. Bafoutsou and Mentzas (2002) found similar categories in their functional review of collaborative systems. Their main groups are *real-time conferencing*, *non-real time conferencing*, *file and document sharing*, *electronic workspace* and *electronic meetings systems*.

Software analysis

We used the *Collaborative Technologies Evaluation Tool* by Schubert and Williams (2011) for our analysis of leading commercial software products. The evaluation tool is based on the 8C Model (Williams, 2010) and contains a list of 42 functional criteria which are grouped by the four inner Cs (see Annex).

The preceding analysis of the literature showed that there is no accepted "standard" classification scheme for all areas of collaborative activity. The following analysis of the software identified that there is no *single integrated* Enterprise Collaboration System that covers all aspects of collaboration. Instead, the market for collaboration software is heterogeneous, comprising a multitude of commercial collaboration tools with both overlapping and disjoint functionality.

Based on this analysis, we developed and used a classification scheme that is relatively straightforward in its reflection of daily work practices and allows organisations to clearly define requirements according to user activity. To map the software functionality to this scheme, we decomposed software products on a modular level, assigning (some of) them to multiple areas. This turned out to be a feasible approach and it also helped to clearly identify overlapping and redundant

functionality. The resulting classification contains *8 functional categories* (Figure 2) which represent the areas of collaborative work (ArCoW).

On the highest level, we distinguish between synchronous and asynchronous activity. *Synchronous* activity is further sub-divided into communication-oriented *meetings* and cooperation-oriented work on *documents/files*. *Asynchronous* activity has two additional sub-areas according to the *permanency* of the information: ephemeral (of short-term interest) and persistent (of long-term interest). The *ephemeral* section contains communication-oriented short messages (microblogging) as well as the coordinative features *ideation, polls and voting*, content which is normally only relevant for a short amount of time. The *persistent* section has four sub-areas: the coordination-oriented *task management* and the three content-oriented *file sharing*, *information collection* (documentation) and *information exchange* (question-response).

Asynchronous Work	
Persistent information of longitudinal interest	
Task Management	File Sharing
Information Collection	Information Exchange
Ephemeral information of short-term interest	
Short messages (Microblogging)	Ideation, Polls, Voting
Synchronous (simultaneous) Work	
Meetings	Joint work on documents/files

Figure 2. ArCoW Framework (Areas of Collaborative Work)

All dimensions that were identified in the literature review are contained in this classification but they are not all equally important/visible. Our main dimensions are *synchronicity* and *permanency* of the information. The sub-areas reflect different types of *group processes* (communication, cooperation, coordination, content creation). *Content type* (text, image, video, audio) and number of *communication partners* are implicitly embedded in the functionality provided by the software. We excluded the dimension of *place* (Ellis et al., 1991) in our preliminary analysis of distributed remote and hybrid work, where nothing is (solely) co-located. This is not to say that place is not important, however, for the purposes of this preliminary study where the objective is to analyse the constellations of software tools in use and emerging technology platforms being formed, the analysis of the place where someone is working from is less important than the mode of working, i.e. synchronous/asynchronous and the requirements (or not) for persistence of information. Place (and physical distribution of actors), as well as other dimensions such as those identified by Lee and Paine (2015) such as scale, scope and nature of work play an important part in our subsequent analysis of the collaborative work and work practices.

Introducing the platform view

The aim of our study was to investigate how organisations build their Enterprise Collaboration Platform – the collective portfolio of collaboration software to provide the technology environment to support enterprise-wide collaborative work. As demonstrated in our software analysis, commercial collaboration software can be assigned to specific areas of collaborative work (discussed above). When examining the infrastructure of a whole organisation (*the platform level*), we need to also consider the *basic technology stack* that is used to form the foundation of the platform. The foundation includes the *user management*, *personal information management* as well as the *organisational "homepage"* (usually a *portal or intranet*) that provides a structured and uniform access to the information resources of the organisation.

The *technical* aspect of the *Central User Directory* is covered by solutions for identity and access management (IAM) that comprise services for authentication, authorisation, user management as well as a central user repository. IAM provides the possibility for single sign-on for multiple software applications from desktops as well as mobile devices (Gartner, 2022b). The *informational employee directory* addresses the need to know the background of a person (area of expertise) in order to identify experts or appraise their contributions (name of person, room, contact info, expertise, role, …). In recent years, this functionality has been added in the form of "Enterprise Social Networks" (ESN) (Wehner et al., 2016) or "Social Intranets" (Williams & Schubert, 2018). These terms were coined when "Enterprise Social Software" was introduced into organisations as a direct result of the success of the public Social Media (Leonardi et al., 2013). These two software types have similar functionality but differ in their primary objective. Both provide "social features" (social profile, link, follow, like, tag, post, comment, …) where the *ESN* has a focus on people with the aim of establishing links between them to build an organisational network structure and the *Social Intranet* has a focus on content to share and increase awareness about information.

Personal Information Management (PIM) is the term used for the realm of information creation and organisation of each employee. PIM software enables individuals to create digital content (texts, slides, worksheets, graphics, databases, charts, videos, music, …). The majority of documents are first created within individual desktop environments and only later "become social" when they are uploaded or copied into collaboration software. Content that is natively created in a collaboration software is "born social" (Hausmann & Williams, 2016).

Information Portals are typically implemented by means of *Digital eXperience Platforms (DXP)* (Gartner, 2022a) or *Content Service Platforms (CSP)* (Gartner, 2022c).

These basic platform components are the necessary foundation for the building of an Enterprise Collaboration Platform. Collaboration software for the different areas of collaborative work (ArCoW) is then added to the ECP according to the

requirements of the user organisation. Figure 3 shows an example of an ECP with its portfolio of software products. As mentioned earlier, software products containing multiple functional components can appear in multiple areas. For example, NextCloud is a tool for (asynchronous) *file sharing* but also allows users to *synchronously work on files*. HCL Connections is an integrated Enterprise Collaboration System with multiple functional modules (wiki, blog, forum, etc.) that supports almost all areas of asynchronous work. For our analysis, we decomposed such systems and suites into their separate modules. This explains why the same symbol can occur multiple times with different labels.

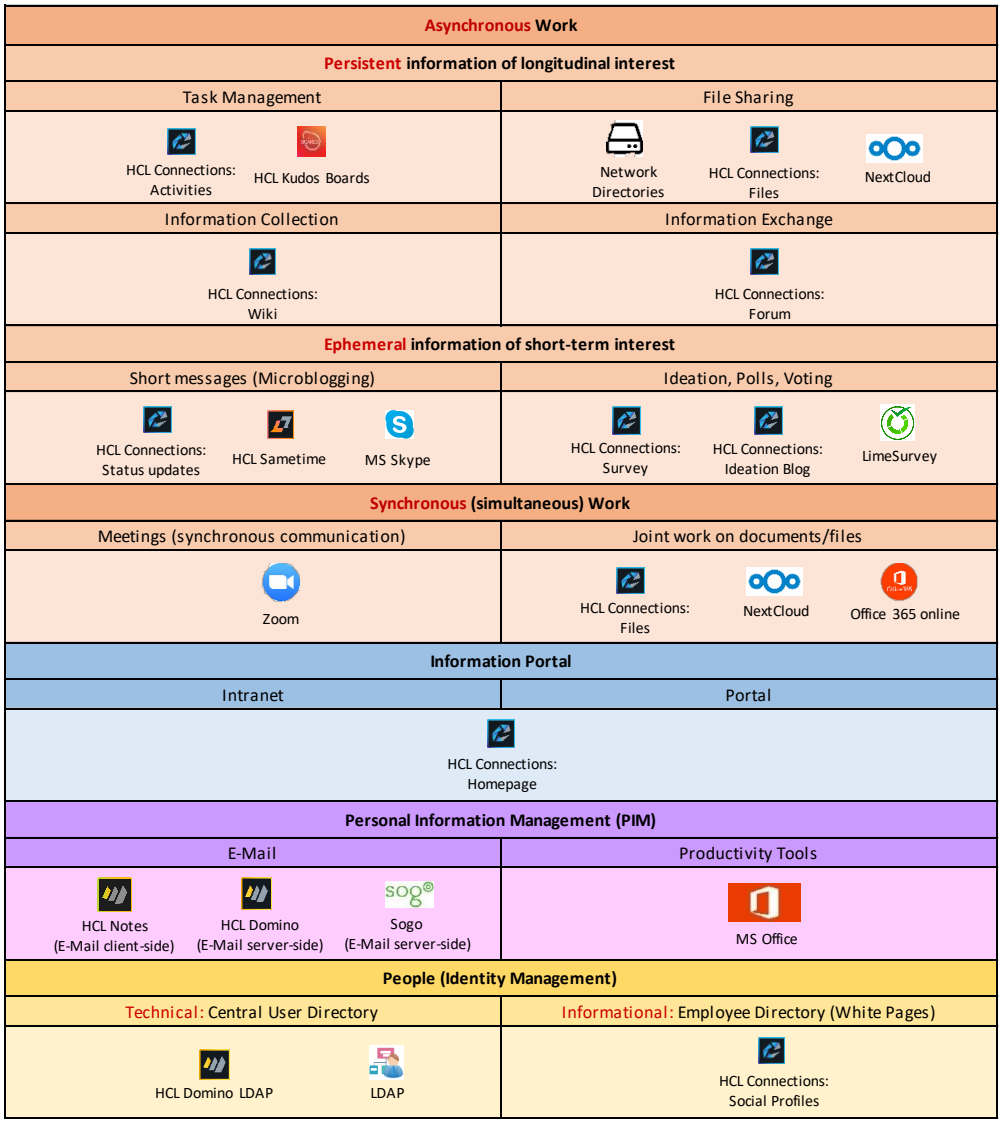

Figure 3. Case example for a platform configuration (ArCoW and basic platform components)

Data Collection and Analysis

In the survey, we investigated the current portfolios of collaboration software that user companies have implemented to build their ECP. Data was gathered from a sample based on responses from 23 user companies that, taken together, have a total of more than 730,000 employees. The user organisations are all members of the research initiative IndustryConnect (Williams & Schubert, 2017) and are interested in supporting collaboration research and the design of the Digital Workplace. They are mostly large organisations located in the DACH area, and they represent different industry sectors (e.g. manufacturing, engineering, services).

Asynchronous Work			
Persistent information of longitudinal interest			
Task Management	**44**	**File Sharing**	**52**
HCL Connections: Activities	12	Network directories	19
Jira	12	HCL Connections: Files	15
MS Planner	7	MS Sharepoint	10
Kudos Boards	5	MS OneDrive	5
MS Todo	4	OwnCloud/Nextcloud	1
Trello	2	OpenText Documentum	1
Taskworld	2	nScale	1
Information Collection	**31**	**Information Exchange**	**29**
HCL Connections: Wiki	16	HCL Connections: Forum	15
Atlassian Confluence	10	HCL Notes	6
MS Teams Wiki	4	MS Teams	4
Open Source Wiki-Software	1	Atlassian Confluence	3
		MS Yammer Groups	1
Ephemeral information of short-term interest			
Short messages (Microblogging)	**38**	**Ideation, Polls, Voting**	**28**
HCL Connections: Statusupdates	13	HCL Connections: Ideation Blog	12
MS Teams	10	HCL Connections: Survey	11
HCL Sametime Chat	6	MS Forms	3
WhatsApp	5	LimeSurvey	2
Zoom Chat	2		
Kaizala	2		
Synchronous (simultaneous) Work			
Meetings (synchronous communication)	**64**	**Joint work on documents/files**	**33**
MS Teams	14	HCL Connections: Files	12
HCL Sametime	10	MS OneDrive	10
Skype	7	SharePoint	6
Zoom	7	Office 365 online	4
Webex	7	OpenText Documentum	1
WhatsApp	5		
GoToMeeting	5		
Slack	4		
Lifesize	3		
Cisco Jabber	2		

Figure 4. Software products in use by the surveyed user organisations (n=23)

The questionnaire respondents are the people in these organisations who are responsible for identifying and supporting the user requirements regarding collaboration software. In the questionnaire the respondents were asked to identify the products that are contained in their organisation's portfolio from a list of software products for the different areas of Enterprise Collaboration. It was also possible

for respondents to add further software tools in a free text field if these were not included on the original list.

The data from all the respondents was consolidated and an inventory of all the tools reported by organisations was created and then analysed. Figure 4 contains an overview of the functional modules that were selected (or added) by the respondents. The numbers in Figure 4 show that the organisations involved in the study have implemented a substantial number of *different* commercial software products to build their Enterprise Collaboration Platform (ECP). 319 different software modules (for ArCoW) were identified in the sample of 23 organisations, which represents an *average of 14 functional modules per organisation*. The numbers reveal the high degree of redundancy in the available functionality. For example, the 23 organisations have implemented an average of 2,78 applications per organisation for synchronous meeting support (64 in total).

Technology Landscape of an Enterprise Collaboration Platform (ECP)

For the visualisation of the Enterprise Collaboration Platforms of the study participants, we developed a template for visualising a "platform image" that shows the areas of the classification. We then used this template for the visualisation of the 23 company data sets. Figure 5 shows an example platform visualisation for one of the cases. As explained earlier, the software used to provide the platform foundation is displayed on the bottom of the graphic. Most of the respondents use Microsoft Active Directory or some form of LDAP for their technical user directory and the majority have implemented an informational user directory, either in the form of an ESN or Social Intranet.

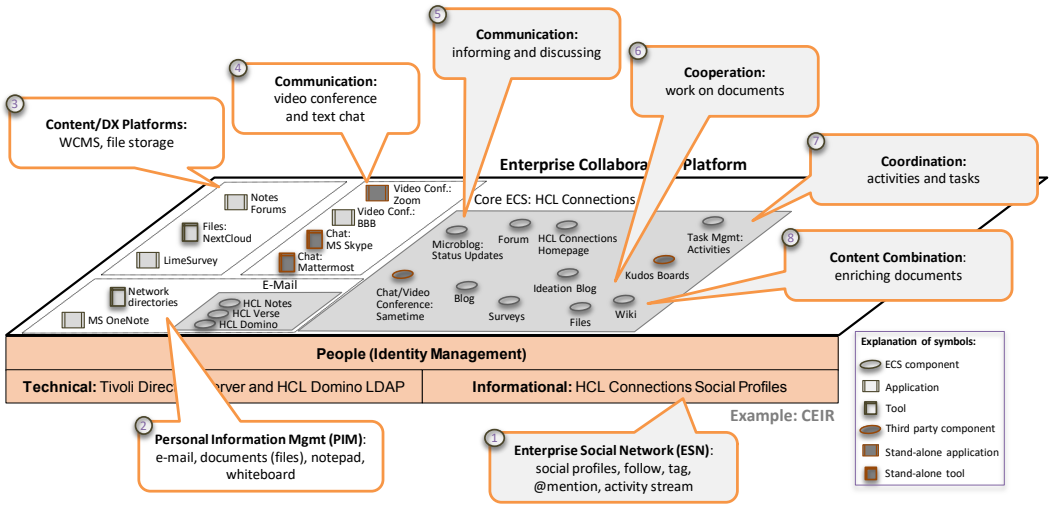

Figure 5. Case example of an Enterprise Collaboration Platform: modules grouped by ArCoW

The software modules are clustered in groups according to their category. The symbols indicate if the software is a tool, an application or a component of a sys-

tem or suite (see legend). The dark colour indicates that the software is "standalone" and uses its own technical user directory (no single sign-on). The tools for Personal Information Management are shown on the bottom left. We only included selected tools such as E-Mail and personal notebooks that have collaborative functionality. Tools for portals and intranets are placed on the top left. As already mentioned, the study showed that the area of (near) synchronous communication contains a wide variety of specialised solutions for video conferencing and text chat which is why we allocated it to a specific section.

The rest of the platform contains the modules that support the *core ArCoW modules* and this was our candidate section for the identification of typical configurations.

The software products used to build the ArCoW core differ in the *range of functionality* and the *degree of integration* between the modules. The following four types could be identified: *Enterprise Collaboration System/ECS (1)* are a purposefully developed selection of applications/tools that are fully integrated and provided to the user in a workspace under a uniform interface (e.g. HCL Connections). A *Collaboration Suite (2)* is a bundle of applications/tools (often under a joint license) that can be used independently. They provide a certain degree of technical integration because they have been designed to work together (e.g. the collaboration suites by Google, Atlassian and Microsoft). An *application (3)* is a standalone software product with multiple collaboration features (e.g. TeamViewer with screen sharing, video conferencing and file transfer). A *tool (4)* is a lightweight desktop or mobile software/plug-in/functionality with a central focus on one/few features (e.g. chat in WhatsApp).

The analysis of the survey data revealed three dominant ECP configurations, defined as *Concentration*, *Diversity* and *Dual Core*. A small number of companies were still in the early stages of defining their collaboration portfolio and were classified into a group named "*Forming*".

Dominant Platform Configurations

The ECP framework was used to synthesise the survey data about the types and the range of collaboration technology in use in the responding organisations (the "cases") and the collaboration technology landscape for each case was visualised. The results were then examined to gain insights into different collaboration platform configurations.

The three dominant configurations are:

(1) **Concentration** (core ECS/suite with a **few** additions)
(2) **Diversity** (core ECS/suite with a **broad range** of additions)
(3) **Dual Core** (**two** ECS/Suites with a few additions)

Figure 6 shows a visual comparison of the assemblages of tools comprising the emerging enterprise collaboration platforms for three selected case companies.

The visualisations show the different enterprise collaboration platform design strategies that the organisations are following.

Case Company 3 is following the ***Concentration approach***. The company is using all functional modules of the integrated ECS. Only where functionality is missing or insufficiently provided, are they making use of complementary tools (e.g. in this case the company is doing this to support synchronous communication through video conferencing and specialised task management through Trello).

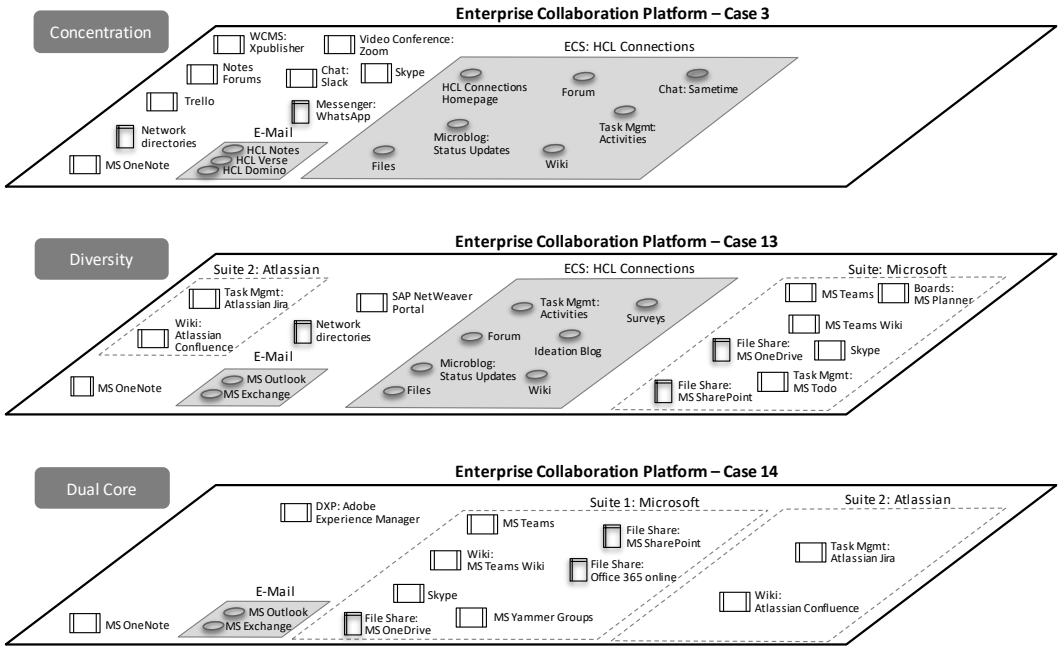

Figure 6. Three dominant ECP configurations: Concentration, Diversity and Dual Core

Case Company 13 is following the ***Diversity approach***. The company is only using selected modules in the core ECS and is complementing the functionality of the platform with applications from two other collaboration suites. Whilst this configuration provides the users with a broad range of options for collaboration support it also creates the problem of redundancy (e.g. in this case there are three different software products supporting wikis).

Case Company 14 is following the ***Dual Core approach***. The company is using two suites (Microsoft and Atlassian) to provide the necessary ArCoW functionality.

There are many commonalities in our sample in the first three areas (1-3) of Figure 5, which means that these tools had no influence on the identification of the platform configurations. All companies provide (1) PIM software in the form of E-Mail, network directories and shared notebooks. The software category of (2) Intranets (DXP/CSP) mostly contains complementary stand-alone tools. All companies have multiple (independent and redundant) (3) communication tools

such as chat and video conferencing. Looking back at Figure 2 (Areas of Collaborative Work), it is noticeable that the commonalities on the left side of the figure are for 1:n activities such as "top-down informing" and "content provision and preservation".

The differences in the configurations, however, can be identified mostly in the core areas (5-8) of multilateral joint work, the *(5) communication* among employees, the *(6) cooperative work* on documents, the *(7) coordination* of work and the joint *(8) combination and enriching of documents*.

Table 1 contains an analysis of the locations of the functional modules in the three case companies. Numbers larger than 1 indicate redundant functionality. Characteristically for the *Concentration Approach*, the case company has built its ECP almost entirely on the core ECS. They provide their employees with only a few additional software components specialised on communication and task management. In the example of the *Diversity Approach*, identical functionality is provided by all 3 systems/suites (files, tasks and wikis). The case company in the example for the *Dual Core Approach* provides two suites with some overlapping functionality and some functional areas that are not supported (surveys and forums).

Table 1. Location of functional modules in the ECPs of the three case companies

Module	*Concentration*	*Diversity*	*Dual Core*
Files	(2) ECS (files), network directories	(4) all 3 ECS/suites, network directories	(3) Suite 1 (OneDrive, SharePoint, Office 365)
Microblogs/ Chat	(5) ECS (status update), Slack, Skype, Whatsapp, Sametime	(3) ECS (status update), Suite 1 (Teams, Skype)	(3) Suite 1 (Yammer, Skype, Teams)
Video Conf.	(2) Zoom, Skype	(2) Suite 1 (Teams, Skype)	(2) Suite 1 (Teams, Skype)
Surveys	(0) -	(1) ECS (Surveys)	(0) -
Tasks	(2) ECS (activities), Trello	(4) ECS (activities), Suite 1 (Planner, Todo) Suite 2 (Jira)	(1) Suite 2 (Jira)
Wiki	(1) ECS (wiki)	(3) all 3 collections	(2) Suite 1 (Teams wiki), Suite 2 (Confluence)
Forum	(2) ECS (forum), Notes Forums	(1) ECS (forum)	(0) -
ESN	(1) ECS	(1) ECS	(1) MS Suite (Yammer)

The findings reveal that there are multiple emerging platform strategies and designs. The three case examples presented above show distinct approaches, one of more strict control over the number of tools in use by focusing on the functionality of the core ECS *(Concentration)*, a second more open, offering multiple tools to support the same functionality and thus giving the employees more flexibility but also the burden of choice *(Diversity)*. The third approach *(Dual Core)* combines two collections for the necessary range of tools to create the Enterprise Collaboration platform which also creates some redundancy.

In summary, our research identified that Enterprise Collaboration Platforms are built around one or multiple *core* products that are complemented by multiple additional tools and applications to provide the desired comprehensive support for collaborative work.

Conclusions and Outlook

In this research note attention is focused on the large-scale provision of collaboration software in organisation to provide a stable technology environment to support a wide range of collaborative work situations. To date, limited work has examined the enterprise level provision of software tools. Existing studies are frequently focused at the micro-level largely limited to studies of a single type of social software (e.g. blogs, wikis) (Holtzblatt et al., 2010; Richter & Riemer, 2013) or to a specific type of collaborative activity (e.g. knowledge sharing, expert search) (Hacker et al., 2017; Mäntymäki & Riemer, 2016) and lack the scale and scope to address the wider, meso/organisational and platform level transformations to the organisation-wide support of collaborative work.

In this study we intentionally focus on the enterprise-wide provision of collaboration tools in order to examine the types of collaboration platform currently being assembled. Our findings confirm that currently, no single collaboration system provides all the functionality needed to support distributed collaborative work, thus requiring organisations to assemble their collaboration platform by selecting and combining additional tools and systems. The study examines these portfolios of tools and provides a classification of areas of collaboration support (ArCoW) and a catalogue of software with functionality in these areas. Using these insights, a survey to examine the portfolios of tools in 23 organisations was conducted. The data for each organisation was then analysed and visualised and used to identify the three dominant collaboration platform configurations described above. The visual representation of collaboration platform structures reveals the diversity and complexity of the collaboration technologies supported and will enable us to further examine enterprise-level collaboration support and to consider the design requirements for a more integrated platform for collaborative working.

The current study provides insights into which technologies are in use; the questions of how these platforms are planned and designed remain open. Based on this, the next phases of our work are focused on investigating the platform design processes to understand how these enterprise collaboration platforms are being designed (for example through intentional centralised planning, the situated requirements of individual work groups or both) and how they are evolving over time. For example, is functional redundancy removed (or does it increase), do the portfolios of tools continually change or do they stabilise?

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Annex

Collaborative Technologies - Evaluation Tool

based on the 8C Model for Enterprise Information Management

Scale:

0 - function not supported

1 - function supported

		TOOLS				
		Req.	Tool 1	Tool 2	Tool ...	
	EVALUATION CRITERIA	**0**	**0**	**0**	**0**	**Example functionality/typical functionality of:**
	COMMUNICATION (TOTAL)	**0**	**0**	**0**	**0**	
1	Chat (text message)	0	0	0	0	e.g. SMS, WhatsApp
2	Microblogging	0	0	0	0	e.g. Twitter tweet, Yammer
3	Blogs	0	0	0	0	e.g. diaries, 1 to many
4	Voice message synchronous	0	0	0	0	e.g. Skype, VOIP
5	Voice message asynchronous	0	0	0	0	e.g. voice box ("answering machine")
6	Asynchronous sent (rich) text message	0	0	0	0	e.g. e-mail
7	Discussion forums	0	0	0	0	e.g. forum, newsgroups (hierarchical message structure: post and r
8	Notice boards	0	0	0	0	e.g. boards/pinboards (broadcast, posts, no responses)
9	Comments, annotations	0	0	0	0	e.g. comments on files
10	Video conferencing	0	0	0	0	e.g. Skype, Zoom
11	Unified Communication	0	0	0	0	e.g. information integration on different devices, e.g. same
12	Broadcast	0	0	0	0	e.g. webcast, podcast
13	### (other - please add any other criteria not already liste	0	0	0	0	
	COOPERATION (TOTAL)	**0**	**0**	**0**	**0**	
1	Shared authoring	0	0	0	0	e.g. text editors, Wikis, whiteboard
2	Markup of changes (in a text)	0	0	0	0	e.g. revision marks
3	Screen sharing/shared desktop	0	0	0	0	e.g. with Teamviewer
4	Shared workspaces	0	0	0	0	e.g. a group space, team room, community
5	Workspace awareness	0	0	0	0	e.g. information on what is happening in the past, presence and
6	User profiles / social profiles	0	0	0	0	e.g. to show demographics, personal attributes, discovery of
7	Ratings, rankings	0	0	0	0	e.g. "useful", "not useful", "most frequently viewed" (shows first (
8	### (other - please add any other criteria not already liste	0	0	0	0	
	CONTENT COMBINATION (TOTAL)	**0**	**0**	**0**	**0**	
1	Document management (document storage, archiving)	0	0	0	0	e.g. EDRMS type functionality (e.g. contracts, manuals)
2	Content management	0	0	0	0	e.g. CMS type functionality (e.g. web pages, images, descriptions)
3	Data aggregation (display what a user needs on start page	0	0	0	0	e.g. portals, corporate entry pages
4	Data integration	0	0	0	0	e.g. mashups, dashboards, widgets
5	Content collection	0	0	0	0	e.g. Wikis, glossary
6	Linking (e.g. hyperlinks)	0	0	0	0	e.g. hyperlink in posting
7	Pointers or references to content	0	0	0	0	e.g. bookmarks
8	Tagging, Folksonomies	0	0	0	0	e.g. classifying label (tag) on content items (e.g. posts)
9	Visualisation of tag usage	0	0	0	0	e.g. tag cloud or tag list
10	Collecting feedback	0	0	0	0	e.g. with surveys, ratings
11	Search	0	0	0	0	e.g. search in posts and documents
12	Content subscription	0	0	0	0	e.g. RSS feeds
13	### (other - please add any other criteria not already liste	0	0	0	0	
	COORDINATION (TOTAL)	**0**	**0**	**0**	**0**	
1	User directories	0	0	0	0	e.g. LDAP, groups, distribution list, shared address book
2	Roles	0	0	0	0	e.g. organisational roles (e.g. manager, assistant) and access rights
3	Group calendar, deadline planning	0	0	0	0	e.g. joint view of appointments of multiple people
4	Resource planning	0	0	0	0	e.g. reservation of resources (rooms, projector, people)
5	Shared tasks	0	0	0	0	e.g. todo lists involving multiple people
6	Reminders, triggers, alerts	0	0	0	0	e.g. notification when response has been written or threshold rea
7	Workflow support	0	0	0	0	e.g. predefined flow of documents including authorisation (signed
8	Graphical flow	0	0	0	0	e.g. visualisation of a document flow and attached rules
9	Polls and voting	0	0	0	0	e.g. to find a decision in a team
10	Document and version control	0	0	0	0	e.g. automated versioning
11	Presence awareness	0	0	0	0	e.g. status icon in Skype
12	### (other - please add any other criteria not already liste	0	0	0	0	