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A Workspace Typology for Enterprise Collaboration Systems

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Abstract

The global COVID-19 pandemic and the need for organisations to provide digital support for work-from-anywhere has put collaboration software into the centre of attention for IT managers. In this paper we examine (self-managed) workspaces in (integrated) Enterprise Collaboration Systems (ECS) that provide the environment for asynchronous communication and exchange of information. Our aim is to better understand how employees use the ECS to support their work. Based on a structured literature review and an in-depth case study of an ECS user company we developed a generic typology of workspaces containing three main categories (community, team and non-work-related) and 5 different types of workspaces. The types are characterised by their purpose, characteristics and possible metrics for their identification. The findings contribute to our understanding of collaborative user activity in enterprise collaboration environments and provide the basis for Social Collaboration Analytics.

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Keywords: Enterprise Collaboration Systems, CSCW, Topology, Workspaces.

1. Introduction

The focus of this paper is on the electronic support of work groups, which is a central topic in the research field of Computer Supported Cooperative Work (CSCW). Enterprise Collaboration Systems (ECS) is the generic name for

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business software supporting computer-mediated collaboration and communication among employees in organisations. *Integrated ECS* provide functionality from traditional *groupware* (e-mail, group calendar, group support systems, forums) and *social media* (social profiles, wikis, blogs, with the possibility to like and follow content) [1,2].

The COVID-19 pandemic has further stimulated the need for ECS in companies and, as a consequence, the market for commercial collaboration software has grown remarkably. In the last years, Gartner coined various names for enterprise software products with collaborative capability. Examples of these software types are "Enterprise Social Network/Social Intranet", "Content Services Platform", "Employee Experience Platform", "Workstream Collaboration tools" or "Employee Communications Applications" [3].

In this paper we draw data from a *case company* that is operating an ECS on the basis of HCL Connections, a leading commercial collaboration software that provides a broad range of collaboration features (microblog, blog, wiki, forums, tasks, files) and which is a software used to build *Enterprise Social Networks*.

The aim of our study was to investigate the character of *workspaces* and to develop a *workspace typology*. Workspaces are central elements in ECS because they provide digital environments, which are used by work groups for communication, cooperation, coordination and the (joint) generation of content as suggested by the 8C Model [4]. These workspaces are the containers in which membership in the group is defined and documents are stored.

Whilst there are many reports in the academic literature on the implementation, adoption and benefits of ECS [1], little has been reported on the *details* of how employees collaborate in digital workplaces [5]. Most studies focus on the application of metrics for analysing ECS use [6] and there are only a few studies that provide insights into *how* employees collaborate. In two recent studies, *user typologies* were developed that characterise users based on their actions in an ECS [7,8]. Although workspaces (sometimes also called communities) represent the environments for collaboration in ECS, there is only little research on their use. In this paper, we are turning our attention to the actual use and characteristics of workspaces. The research objective of this paper is to identify different types of workspaces and to investigate the criteria that distinguish the different types. We are addressing the following research questions:

1. **Research Question 1:** Which types of workspaces exist in Enterprise Collaboration Systems?
2. **Research Question 2:** What are the defining characteristics/attributes of these types of workspaces?

Based on a literature review and an analysis of workspaces in a key case study (an ECS user company), different types of workspaces were identified (RQ 1). The observations from the literature review and case study about the workspace types and their characteristics were synthesised into an *ECS workspace typology* that suggests attributes and metrics which can be used for characterising workspaces and identifying workspace types based on their characteristics and actual usage in an ECS (RQ 2).

The remainder of this paper is structured as follows. The next section contains a discussion of two important terms for this research, *workspace* (environment) and *work group* (people). This is followed by a description of the research design and the three research steps (1) literature review, (2) case analysis and (3) development of the workspace typology. We conclude with a brief discussion of the findings and directions for future research.

2. Terminology: Workspace and Work Group

In the academic literature, different terms are used for referring to the digital environments in which users can communicate and collaborate. The most common terms are *community* [9–11], *enterprise online community* [12–15] and *shared workspace* [16]. Other terms used in the context of workspaces and communities are workplace [17], team and group [18,19]. For providing an understanding and distinction of the relevant terms and concepts in the context of workspaces, the use of these terms was examined in the CSCW literature.

2.1. Definition of Workspace (environment)

Gutwin and Greenberg define (shared) workspaces as an “environment for collaboration” with a “bounded space where people can see and manipulate artefacts related to their tasks” [20]. Workspaces provide a bundle of collaborative features that can be used by their members in the course of work activity or work processes as indicated in Fig. 1. Workplaces differ in their purpose and scope of functionality. Most workplaces provide a mix of

synchronous and *asynchronous* functionality. The defining element of a workplace is the *member list*, which defines the *group of users* that can access the workspace and use its functionality.

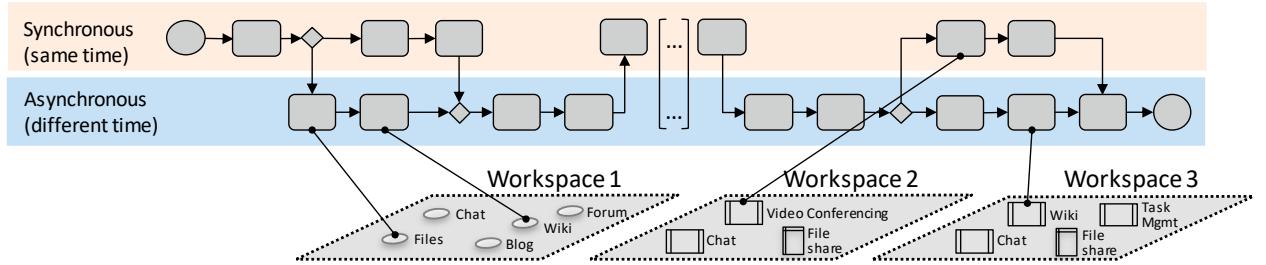


Fig. 1. Workspaces provide bundles of collaboration features to self-managed groups.

2.2. Definition of Work Group (people)

There are different terms used in the literature to describe the *group of people* that can access a workspace. The two terms that are most frequently used are *community* and *team*. Communities and teams describe the actual *people* which belong to a group that uses a workspace.

The term *community* is a broad term and is rooted in sociology. A community describes an assemblage of people that share common norms, values or identities and that have *social* interactions [21]. In the context of CSCW, there are two interesting types of communities: Communities of Interest and Communities of Practice that can both occur in workplace environments.

Communities of Practice (CoP) are groups of *active practitioners* in a specific domain, e.g. the scrum masters of different agile teams in an organisation might form a community to share their experiences with agile methods. In CoPs, practitioners exchange information and best practices with their peers to support each other. Membership in a CoP requires having a certain level of expertise. People who are non-experts are usually not allowed to be part of a CoP [22]. In comparison, *Communities of Interest (CoI)* are more open. The objective of a CoI is to provide people with a common interest with a space to exchange information and ask questions about a specific topic [22]. Members do not need to be experts in that domain.

A community is characterised by the communication or interaction around a common interest or a leisure activity [23–25] and is typically not associated with the work on a specific task. In contrast to a community, a *team* is characterised by “its unity of purpose, its identity as a social structure, and its members’ shared responsibility for outcomes” [19]. Typical *teams* are, for example, projects and organisational entities (e.g. departments). They differ in their objective and temporal length of their engagement. In contrast to projects, organisational entities usually exist as long as they are defined by the organisational chart.

3. Research Design and Research Steps

Our research was structured in three subsequent phases, as shown in Fig. 2. Our research draws from data that was gathered with a multiple methods approach [26], as outlined in the three research phases below.

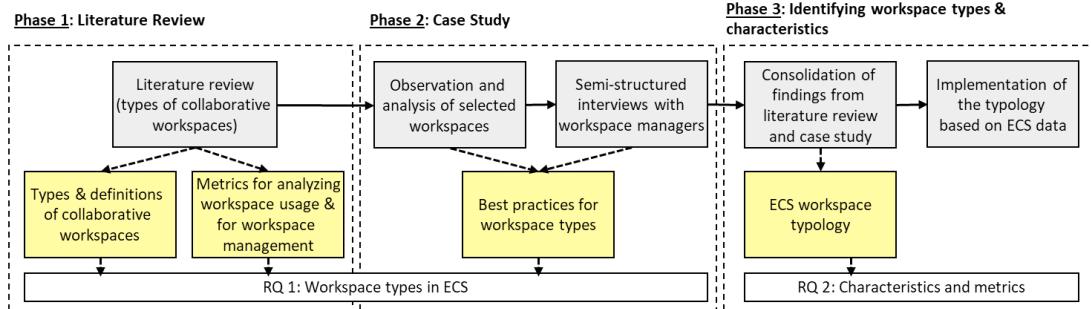


Fig. 2. Research Design

3.1. Structured Literature Review (Phase 1)

In the first phase, we conducted a structured literature review following established recommendations [27,28], for identifying existing definitions of workspace types and metrics for analysing the use of workspaces. For the search, keywords such as {workspace/community} type, {workspace/community} typology, {workspace/community} definition, {workspace/community} analysis, {workspace /community} metrics, were used in various databases including IEEEExplore, SpringerLink and Google Scholar. The titles and abstracts of the identified publications were screened and papers that contained metrics for measuring the use of workspaces or discussions of different types of workspaces were included in a detailed analysis. After the screening process, only 8 publications remained that focussed specifically on workspace types and metrics. We synthesised the commonalities from the literature as shown in Table 1.

Table 1: Workspaces identified in the literature

Workspace type	Description	Members	Persistence	Division of labour
Organisational unit	Support collaboration, communication and information exchange within organisational units	Large	No pre-defined end. Exist as long as the organisational unit exists.	Uneven
Information	Are used to gather around a specific topic and exchange information or best practices	Medium	No pre-defined end. However, the interest in a certain topic may vary over time.	Even but varies over time
Project	Support collaboration on a project with a shared goal (likely cross-departmental)	Small	Pre-defined end. Once the project is finished, the workspace is archived.	Uneven

3.2. Case Study: The use of ECS Workspaces in Practice (Phase 2)

In the second phase, we analysed the use of selected workspaces in a *key case study* [29] with an ECS user company. The case study was conducted following the eXperience case study methodology [30]. The case company is a medium-sized textile fabrics company with globally distributed branches. In 2014, the company introduced an ECS, which is based on IBM Connections, to provide a platform for company-wide communication and collaboration and for creating knowledge repositories. The main purpose of the ECS is to support the management of projects, tasks and files in globally distributed project teams. At the time of conducting the case study, 270 employees were using the ECS and there were 153 workspaces of which 143 workspaces were used productively. Our case study design consisted of two steps.

In the first step, the case company granted us access to 29 workspaces in their ECS, which allowed us to examine the use of these workspaces without the risk of potential bias because a non-participative observation role was taken [31]. In the second step, we conducted 10 semi-structured interviews [32] with workspace owners and regular members from 9 departments. The interview guideline followed the three-step principle by Helfferich [33]. The questions focussed on identifying how workspaces are used in the case company. The participants were also asked to elaborate on use cases for the workspaces that they use most frequently and to list the functional modules that are available in the workspace (e.g. blogs, files, forums, wikis, task management). Finally, the participants were asked to intuitively describe the type of the workspaces they are using. The 10 interviews provided us with essential contextual information and improved the findings of our own examination of the workspaces in the previous step.

Table 2: Characteristics of workspaces in the case study (-1: module available but not used; 0: module not available; 1 module available and used; 2: module activated and heavily used)

ID	Type	Blog	Wiki	Forum	Tasks	Files	Microblog	Bookmark	Idea
C16	Information	-1	1	0	2	1	0	0	-1

ID	Type	Blog	Wiki	Forum	Tasks	Files	Microblog	Bookmark	Idea
C43	Information	1	1	1	1	1	0	0	1
C77	Information	1	2	1	0	1	0	0	0
C91	Information	0	2	1	1	1	0	0	0
C97	Information	0	1	0	2	1	0	0	0
C101	Information	0	1	1	1	1	0	0	0
C108	Information	2	0	2	1	1	0	0	0
C109	Information	0	2	0	2	0	0	0	0
C3	Information	0	0	0	0	2	0	0	0
C6	Information	0	1	0	2	1	0	0	0
C9	Organisational unit	1	-1	2	2	1	0	-1	0
C10	Organisational unit	1	-1	2	2	1	0	0	0
C100	Organisational unit	0	0	0	2	1	0	0	0
C132	Organisational unit	0	0	0	2	1	0	0	0
C134	Organisational unit	0	1	0	2	2	0	0	0
C5	Organisational unit	1	2	1	0	1	0	0	0
C23	Project	2	2	1	2	1	-1	1	2
C31	Project	1	0	0	2	1	0	0	0
C35	Project	1	1	0	1	1	0	0	-1
C2	Project	1	2	0	2	1	0	0	0
C56	Project	1	0	2	2	1	0	0	0
C85	Project	1	1	1	1	1	0	0	0
C8	Project	1	1	1	1	2	0	0	0
C110	Project	0	2	1	2	1	0	-1	-1
C135	Project	1	1	1	1	1	0	-1	-1
C149	Project	-1	2	1	1	1	0	1	-1
C12	Project	1	0	-1	2	2	0	0	2
C4	Project	1	1	1	1	1	0	1	1
C7	Project	1	1	0	2	1	0	0	0

All 29 workspaces were independently examined and discussed with their users in the interviews. Based on this data they were assigned to the workspace types identified from the literature review. Table 2 shows the results from the investigation of the 29 workspaces at the case company. The table shows the type of each workspace and the usage intensity of the modules and features of the workspaces (-1: available but not used; 0: not available; 1 available and used; 2: activated and heavily used). 10 workspaces could be classified as *information workspaces*, 6 workspaces were identified as workspaces for *organisational units* and 13 workspaces were classified as *project workspaces*.

Information workspaces have a focus on wikis, tasks and files. In 8 of the 10 information workspaces the wiki is available and used and in 3 workspaces a high intensity of usage was observed. Additionally, files are available and used in 9 of the 10 information workspaces. The findings from the observation and interviews show that in information workspaces the focus is on building knowledge repositories in wikis because they provide the necessary features for structuring and cross-linking content. Additionally, the files module is available and used in 9 of the workspaces for sharing documents. The forum is available and used in only 5 of the information workspaces. This is an interesting

observation because the findings indicate that there might be different types of workspaces in which information is either *mutually exchanged* (in forums) or mostly *broadcasted* (from one person to the others). Moreover, there is a large overlap in workspaces (1) that have neither blogs nor forums activated and workspaces (2) that have both blogs and forums activated, which emphasises the observation regarding broadcasting and exchanging information.

In 5 of the 6 workspaces for ***organisational units***, the task module is activated and intensively used, which points to a high importance of coordination in these workspaces. Regarding the use of forums and blogs, the same pattern as in information workspaces can be observed, which indicates that organisational units can also be distinguished in *exchange* and *broadcasting*. In the majority of the information workspaces, forums and blogs are not activated which indicates that most of the information workspaces at the case company are used as repositories for sharing administrative documents (files) and for coordination purposes.

Compared to the other workspace types, ***project workspaces*** show the highest variety of available and used modules. In almost all project workspaces, all available modules of the ECS except for microblogs and bookmarks are available and actually used. In all project workspaces, the task module is available and actually used. In 7 of the 13 project workspaces, the task management feature shows a high usage intensity. This demonstrates that in project communities, tasks are essential for coordination. The wiki is available and regularly used in 10 of the 13 project workspaces. A high usage intensity could be observed in 4 workspaces, whereas only 3 project workspaces do not have the wiki activated. The findings regarding the use of wikis in project workspaces show that the wiki is essential in project workspaces. In the interviews it was stated, that the wiki is frequently used for documenting the progress of meetings and for keeping meeting minutes. Blogs and files are available and used in 11 of the 13 project workspaces but a high usage intensity can be observed in only 1 project workspace, which indicates that blogs might be used for broadcasting announcements from time to time. Compared to the availability and usage intensity of the other modules, files are available in all project workspaces but in only 2 project workspaces a high usage intensity could be observed. In the interview, the participants mentioned, that relevant documents are shared but the actual work on document takes place in other software systems, which explains the lower usage intensity of files. Forums are available and used in 8 project workspaces. Compared to the previously discussed modules this shows a lower relevance of discussion and communication in project workspaces. In general, the findings for project workspaces show that they are primarily used for assigning tasks (coordination), documenting project progress in wikis and files and for occasional announcements in blogs.

The findings from the case study confirmed the classification from the literature. We were able to assign the workspace types to the workspaces of the ECS of the case company. The rich data from the case revealed that we need to add two sub-types for information workspaces. In the next section, we show how the findings and observations from the case study were used to extend and refine the classification of workspaces that was derived from the literature.

3.3. The Enterprise Collaboration Systems Workspace Typology (Phase 3)

In the third phase of our research design, the findings from the literature review and the case study were consolidated into the ECS workspace typology. The typology defines workspace types and their characteristics as shown in Table 3.

Every research step contributed specific aspects to the ECS workspace typology and the final typology is in accordance with the findings from all phases. On the highest level, we distinguish between (1) *communities*, (2) *teams* and (3) *non-work-related* workspaces. As introduced above, community workspaces can be used for Communities of Interest and Communities of Practice. Team workspaces can be distinguished into projects and organisational units.

The typology also contains defining characteristics of the different workspace types and their metrics: number of members, persistence and division of labour. The usage intensity of specific modules (used modules) was identified from the rich data of our case study.

Table 3: ECS Workspace Typology

Type	Description	Members	Persistence	Division of labour	Used Modules
Community workspaces					
Community of Interest	Are used to gather around a particular topic and exchange information	Medium	No pre-defined end. However, the interest in a certain topic may vary over time.	Uneven	Blog: low Wiki: medium-high Forum: low Tasks: medium-high Files: medium
Community of Practice	Are used by experts to exchange specific work-related best practices	Medium	No predefined end. The interest in certain practices may vary over time.	Even but varies over time	Blog: medium Wiki: medium-high Forum: medium Tasks: medium-high Files: medium
Team workspaces					
Project	Support collaboration on a project with a shared goal (likely cross-departmental)	Small	Pre-defined end. Once the project is finished, the workspace is archived.	Uneven	Blog: high Wiki: medium-high Forum: medium Tasks: high Files: medium
Organisational unit	Support collaboration, communication and information exchange within organisational units	Large	No pre-defined end. Exist as long as the organisational unit exists.	Uneven	Blog: low-medium Wiki: low-medium Forum: low-medium Tasks: high Files: medium
Non-work-related workspace					
Recreational activities	Workspaces for planning and organising recreational activities	N/A	N/A	N/A	N/A

The first category of workspaces is called **community workspaces**. Communities are understood as a group of people that *share common norms*, values or identities and that have *social interactions* [21]. As discussed before, there are two different types of communities: Communities of Interest and Communities of Practice. Communities of interest are used to gather around a particular topic and exchange information. They usually have a medium size which means that they usually have significantly more members than a project workspace but less members than workspaces for organisational units. Communities of Interest have no pre-defined lifecycle or end but the interest in a particular topic may vary over time which might be reflected in a varying usage intensity. As reported in the literature, the division of labour is usually uneven which means that only a few users account for the majority of activities in these workspaces. This matches with the usage characteristics of the modules that we observed in the case study concerning *information workspaces* mainly used for *broadcasting*. Consequently, in communities of interest, the wiki is used at a medium to high intensity, whereas blogs and forums usually show a low usage intensity. The uneven division of labour and the low use of blogs and forums show that there is typically a rather low interaction in these workspaces which supports the assumption of broadcasting. In contrast, communities of practice are used by experts to exchange specific work-related best practices. They also have no pre-defined termination date and the interest in certain practices may vary over time, as well. In communities of practice, the participation is usually more even compared to communities of interest. In combination with a comparably higher usage intensity of blogs and forums, this underlines the supportive nature of communities of practice and thus their aspect of communication and *mutual exchange* of information.

The second category is called **team workspaces**. As discussed above, the two different types of teams are projects and organisational units. They mainly differ in their size. Project workspaces support collaboration on a project with a shared goal. Moreover, projects are likely to be cross-departmental. Project workspaces usually have the smallest number of members. In contrast to all other workspace types, project workspaces have a pre-defined end, which is the

end of the project. Once the project is finished, project workspaces usually become inactive and might be archived (if the ECS provides this feature). Compared to the other workspace types, projects have a more even division of labour but some studies also reported uneven participation, which indicates that the division of labour might not be a distinguishing criterion for determining workspace types [16]. Project workspaces are primarily characterised by a high use of task management features for coordination, a medium to high use of wikis for documentation and a medium to high use of blogs for occasional announcements. In contrast to project workspaces, workspaces for organisational units are usually larger because they contain all employees of particular units. Workspaces for organisational units support collaboration, communication and information exchange within organisational units. They have no pre-defined termination date and exist as long as the organisational unit exists. Participation in these workspaces is typically uneven, which means that few users distribute information to the majority of users. Workspaces for organisational units are characterised by a high use of tasks for coordination, and a low to medium use of blogs, wikis and forums which demonstrates a generally lower level of activity compared to the other workspace types and broadcasting nature in these workspaces. Files are typically used for sharing administrative documents or forms.

Finally, the literature review indicated a third category of workspaces: ***non-work-related workspace***. Workspaces for recreational activities are used for planning and organisation recreational activities in groups of employees. The existence of such workspaces is subject to company policy and culture of the user organisation. We could not observe such workspaces in our key case but there are reports of intentional use of this type in other case studies to support acceptance and adoption of the ECS.

4. Discussion & Outlook

In this paper, we present a typology for (self-managed) workspaces in Enterprise Collaboration Systems. It might seem surprising that our analysis of the literature and the in-depth case study only led to 5 distinctive types. We believe that these 5 types are generic types that can be found in most Enterprise Collaboration Systems. It was our intention to develop a generic framework that can be flexibly extended. This means that additional types can be added when they appear; there might be further types of workspaces for example in different industry sectors.

In the next phase we are using the typology for the analysis of forms of use in an ECS. Work is already underway to examine an operational ECS with 1500 workspaces with the help of Social Collaboration Analytics [34]. The typology contains a description of types of workspaces and their defining attributes including the necessary metrics that allow to profile the different types. It provides us with an instrument to search for patterns in the content and logfiles of the ECS. Using the workspace typology as an instrument for analysis allows ECS user companies to better understand the use of workspaces and monitor workspace use over time. Such knowledge is valuable for practitioners and decision makers because it helps them assessing and monitoring goals for ECS implementations. For example, if an ECS was introduced with the aim of mainly supporting project teams (team workspaces) and the analysis reveals a majority of workspaces being used for communities, appropriate measures (e.g. user trainings) can be taken.

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