

IBD Paper Series

Enterprise Collaboration Platforms

Part One: Understanding Collaborative Work

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Integrated Business Design (IBD) is an independent IT consulting organisation with a focus on the design of high performing digital workplaces.

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Executive Summary

In recent years office workplaces have evolved from primarily physical employer-owned premises to hybrid settings where some employees work at the *employer's premises* and others work *remotely*. The recent growth in hybrid and remote working, which intensified during and following the COVID-19 lockdowns, means that enterprise collaboration tools and systems have become even more important in organisations.

With the growth in hybrid and remote working comes an increased demand for software that supports work from anywhere with regards to communication between employees, coordination of work activities and access to the organisation's operational systems and information. Whether an organisation offers hybrid and remote working options to their employees or not, these tools are now essential for the everyday activities required to manage workgroups and for documenting and coordinating work.

The market for collaboration software is not clearly structured and the need to make collaboration tools available swiftly has resulted in heterogeneous software portfolios in organisations. As a consequence, employees are confronted with a proliferation of tools and information, that are scattered among different software systems, often with high levels of redundant functionality. The end-user is frequently required to play the role of the 'integration point' by using their own best efforts to select appropriate tools from the growing portfolio of available tools.

A well-designed enterprise collaboration platform that supports different types of collaborative work is now an essential part of an organisation's technology infrastructure.

This paper is the first in a series of papers and reports based on our research and consulting experiences, that examine the design of the digital workplace and the effective use of collaboration technologies to support collaborative work and workgroups in organisations.

The paper is published in two parts. In Part One ([Understanding Collaborative Work](#)) we provide a structure for thinking about an organisation's collaborative working and collaboration software requirements and develop insights about the provision of an enterprise collaboration platform.

In Part Two ([Designing the Technical Solution](#)) we build on these insights based on our work with organisations who are currently building their digital workplace and enterprise collaboration platforms.

Target audience

The two papers address different target audiences and are primarily designed to inform:

[Senior and Middle Managers](#), the people who lead the teams that use the technology for their joint work and who need to ensure that their team members have the necessary tools, technologies and skills for work in the digital environment. These are the important promoters of Enterprise Collaboration in their organisations.

[IT Managers](#), the people responsible for building the infrastructure that supports Enterprise Collaboration and delivering a performant enterprise-wide collaboration solution for their organisation.



Key Take-Aways

Hybrid and remote working are the new normal and organisations need to invest carefully in appropriate tools and technologies to support the accomplishment of work in a high-quality hybrid and digital workplace.

Organisations need to ensure their readiness to provide enterprise-wide collaboration software solutions that meet the needs of an increasingly large and, in many cases, diverse user base; enabling them to work effectively from anywhere and at any time.

The designers and managers of collaboration platforms need to understand the collaborative work requirements in their organisations and take a more active role in guiding users to the best tools for each type of work.

Content generated in collaboration systems provides vast repositories of organisational information and knowledge. This information must be carefully managed to ensure it is available and accessible over the long-term.

The digital workplace requires purposeful planning and an integrated design. Organisations need to expand their thinking about the provision of enterprise collaboration software, from providing loosely integrated portfolios of collaboration tools to the delivery of an enterprise-wide collaboration platform that is fit for purpose in the current world of increased hybrid, distributed and collaborative working.



The renewed imperative for hybrid and distributed working

In today's rapidly changing and increasingly distributed work environments it is essential that employees have access to appropriate tools and technologies to support collaborative working.

Hybrid and distributed working bring new dimensions of complexity

Following two years of the Work from Home initiatives triggered by the COVID-19 pandemic, the imperative to support not only workgroups located at the employer's premises, but also hybrid and distributed workgroups has become critical. In 2022, after two years of pandemic-induced remote working many organisations are rethinking their work, workplace and workforce strategies and embarking on major initiatives to provide widespread support for hybrid and distributed working; adding new dimensions of complexity to the use of technologies to support collaborative work.

New hires and existing employees expect to be offered hybrid working options

The demand for these changes is being driven by organisations and their employees, who have both identified clear benefits to be gained from flexible and hybrid modes of working. For employees, hybrid working offers greater flexibility, reduced commuting demands and, for many, improved work life balance. New hires and existing employees alike are expecting to be offered hybrid working options as part of their employment conditions. For companies, hybrid working enables them to be more flexible in the way they operate and to offer an attractive workplace to current and potential employees.

Hybrid and remote working are the new normal

In short, hybrid and remote working are the new normal, and for many organisations they are becoming a competitive necessity. If organisations are to retain current employees and attract new employees, they must offer attractive, well-designed and well-supported options for hybrid and remote working.

Not only do they need clearly defined hybrid and remote work strategies and HR policies in place, organisations also need to invest in enterprise-wide collaboration software solutions that provide a platform to support distributed collaborative working and deliver a high-quality digital workplace.

Organisations need to invest in appropriate collaboration tools and technologies

These investments will not only serve the growing needs of current employees but also, if well designed, such a platform will enable organisations to be more flexible and agile in responding to future events and to ensure business continuity. For example, to respond to changes in labour markets and to global events such as further pandemic-induced lockdowns, energy crises etc.



Increasing complexity of hybrid and remote working

Distributed collaborative work is not a new phenomenon. Work from Home (or teleworking as it was named previously) occurred before sophisticated collaboration tools existed, when the main technology was the telephone. For example, in the 1970's many organisations encouraged employees to work from home during the Oil Crisis as a measure to reduce commuting and the use of petroleum during the oil shortages. Subsequently, driven by the emergence of email and groupware systems in the early 1990's, organisations have used computer-based collaboration tools to support the joint work of employees located across multiple office buildings, geographical regions and time zones.

However, the current era of renewed interest is characterised by a massive growth in the scale of hybrid and remote working. This growth can be seen in terms of the vastly increased numbers of employees involved, the wide variety of models for hybrid and remote working being offered and the growing

functionality and complexity of the software and technologies available to support collaborative work. These three areas of growth and change raise new imperatives for organisations when planning and delivering effective, enterprise-wide, collaboration software solutions.

Significant increases in the volume of employees and variety of work areas involved in hybrid and remote working

Prior to the COVID-19 pandemic, hybrid and distributed working initiatives were often limited to specific employee groups and business areas. For example, to professionals, managers and knowledge workers in business areas such as IT, consulting, project management, product development, sales and services. However, this changed significantly in early 2020, when organisations responded to the COVID-19 lockdowns requiring as many employees as possible to work from home. *'Where jobs could be performed remotely, companies pivoted rapidly to the largest experiment in mass remote-working in history'*.¹

During this time, the numbers of employees and occupations involved in hybrid and remote working increased substantially and employee groups and work areas that were previously thought unsuited to hybrid and distributed work, were now working remotely. Going forward many of these employees and occupational areas are continuing to participate in hybrid working; meaning that the scale in terms of absolute numbers of participating employees and the variety of types of work that require collaboration tools and technologies have vastly increased.²

Imperative: The growth in the numbers of employees participating in hybrid and remote working requires organisations to provide enterprise-wide collaboration software solutions that are designed to meet the needs of an increasingly large and, in many cases, diverse user base; enabling them to work from anywhere and at any time.

Increasing diversity in hybrid working arrangements

During the COVID-19 pandemic lockdowns many employees were forced to work full-time from home, however, this is not the desired model for most employees. Whilst some employees will only work at the

employer's premises, and some will only work remotely, many employees are seeking a hybrid working model that combines some periods of time working in the employer's premises and some in a remote (usually home office) location. A wide and heterogeneous range of modes of hybrid working are emerging and many organisations are simultaneously offering multiple work models with varying degrees of flexibility in terms of location and timing of hybrid working. These include models that are flexible-by-design, where the employee works from the employer's premises as required and has the flexibility to choose which days in a week they work from home. Other models are less flexible or even fixed, hybrid working is being offered to employees, but only within highly specified time frames. For example, arrangements that specify that an employee, workgroup or entire work shift, must work at the employer's premises on specific days or for a specified time period.

These heterogeneous work models add further complexity to the planning and support of hybrid work groups, where on any given day some group members may be working remotely, whilst others are working at the employer's premises. Such arrangements require much higher levels of communication and coordination between team members, to organise the flow and completion of work. Organising, managing and participating in hybrid workgroups is a new experience for many employees and requires clear strategies and actions to ensure effective work support.

Imperative: Enterprise collaboration software solutions must be equally available, easy to access and offer the same levels of functionality to employees wherever and whenever they are working. Such solutions should also provide functionality to enable employees to easily transition between working at the employer's premises and working remotely.

Increasing investment in tools and technologies to support collaborative work

Organisations are already making significant investments in collaboration technologies. The global market revenues from collaboration software increased from around seven billion U.S. dollars in 2015, to

nearly 16 billion in 2020, and are forecast to continue to increase, reaching about 17.9 billion U.S. dollars in 2025.³

The **collaboration technology vendor landscape is also constantly evolving**. In particular, in the past 15 years, the emergence of socially-enabled collaboration software has provided a massive growth in the functionality of technologies and tools to support all aspects of collaborative work.

Such socially-enabled software (e.g. HCL Connections, Atlassian Confluence, Microsoft Teams) provides the native integration of enterprise social software (ESS) features such as wikis, blogs, social profiles, activities, recommendations, tags etc., bringing employees new possibilities for supporting collaborative work and increasing awareness of the activities of other employees. Such features and functions enable employees to share, subscribe to, or follow information and people, and to comment, tag or recommend content that has been created by other users.

New forms of collaboration software are continually being developed and offered. A recent example is the emergence of visual collaboration systems (e.g. Miro, MURAL, Lucidspark, Klaxoon etc.). These tools have significantly extended the functionality of digital whiteboards to provide environments for visual collaboration that include simultaneous, multi-user interaction around visual artefacts and are now being introduced to facilitate and support a wide range of collaborative work. They are already becoming valuable collaboration tools for delivering interactive online workshops and provide spaces to coordinate the work of design and development teams.

A challenge facing organisations in this rapidly evolving software market is the evaluation, selection and provision of appropriate tools to support different types of collaborative work. Such tools must be scalable and sustainable over the long-term, as well as ensuring that organisations' investments in enterprise collaboration software solutions deliver real business value.

Imperative: Against this background of change, organisations need to ensure their readiness to provide enterprise-wide collaboration software solutions for hybrid and remote working and be able to clearly define their collaborative work and tool/technology requirements.

Hybrid, remote and collaborative working readiness

How ready is your organisation to provide enterprise-wide collaboration software solutions to support collaborative working at scale and with high functionality?

As indicated above, a key requirement in the provision of enterprise-wide collaboration software solutions in this new era of hybrid and remote working is to ensure they provide an equivalent level of functionality, service and accessibility so that employees can work effectively from anywhere and at any time.

That is, whether an employee is working in the employer's premises or working from home, the technology environment and access to collaboration tools should be comparable and ensure that the employee can make seamless transitions between different work locations and work types.

To provide an enterprise-wide technology environment for collaborative work that supports all employees and work types and is available anywhere, anytime, on any device, requires companies to:

- analyse and **identify the types of collaborative work** that must be supported in their organisations (collaborative work requirements)
- **understand the functionality and capabilities** of collaboration tools and technologies to support these work types (collaboration tool analysis);
- **select the best tools available** to support their organisation's collaborative work requirements (collaboration software portfolio implementation).



Characteristics of collaborative work activity

To identify an organisation's collaborative work requirements and to plan and deliver effective enterprise-wide collaboration software solutions it is necessary to consider three key aspects of collaborative working: the type of work (**collaborative work activities**) that people are engaged in, the place (**location**) where they are working and the mode (**timing**) of their interactions.

Types of collaborative work activity

All collaborative work is context dependent and in the course of a single day we communicate and coordinate our work activities with different groups of people and work on different projects. Our work is constantly changing between different types of activity such as listening, speaking, reading, thinking and writing. Enterprise collaboration software solutions need to support all of these types of engagement and activity. Not all these activities are equally well-supported by a single software product and the selection

of the best tools to support different collaborative work activities is key to the assembling of a successful enterprise collaboration solution.

A useful way of thinking about types or modes of collaborative working is to use the 4C's model. Traditionally, the designers of groupware considered collaborative work in terms of three types of activity, communication, cooperation and coordination.⁴ However, an important aspect of collaborative work is missing from this traditional conceptualisation of collaborative work activity, that is, the creation, combination and organisation of digital content. Taken together, collaborative work can be seen as the combination or interplay between these four types of collaborative activity (**Figure 1**). The 4C's provide a good starting point for identifying the collaborative work requirements of different workgroups in an organisation and to guide the selection of suitable software tools. The four areas are elaborated below.

People-centric activities

The areas of communication and collaboration are largely people-centric activities, involving the direct or indirect interaction between two or more employees. For example, to meet, discuss, share information and work together on joint projects and activities.

Communication involves employees exchanging messages and information with each other and is largely concerned with the formal and informal communication that takes place between employees in

the course of their work, for example in discussions about work in progress and in joint meetings to inform, plan, make decisions and exchange information. Communication can be private person-to-person discussions or multi-person group discussions where the interaction is bi-directional, interactive and ongoing. Or it can be in the form of broadcast communication where a single message is disseminated to a large group, for example a company-wide announcement. A wide range of software tools support communication, for example messaging tools (e-mails, microblogs), tools to support ongoing discussions (e.g. forums, blogs) and tools that support team meetings (video conferences, group chats).

Cooperation refers to the mutual engagement of two or more parties in the achievement of common goals. Not simply the exchanging of messages but entering into a well-defined relationship to work together on joint or related tasks. For example, the (joint) creation of digital documents (e.g. text, slides, charts, videos), the activities involved in planning an event, designing a product etc. The focus of software to support cooperation is on the tools and functions that enable people to work together in shared workspaces and with joint authoring tools. This work can be done synchronously, for example using a joint authoring tool to write a report together, or asynchronously, for example, where each party completes their tasks independently and hands off their part to another employee to continue the work.

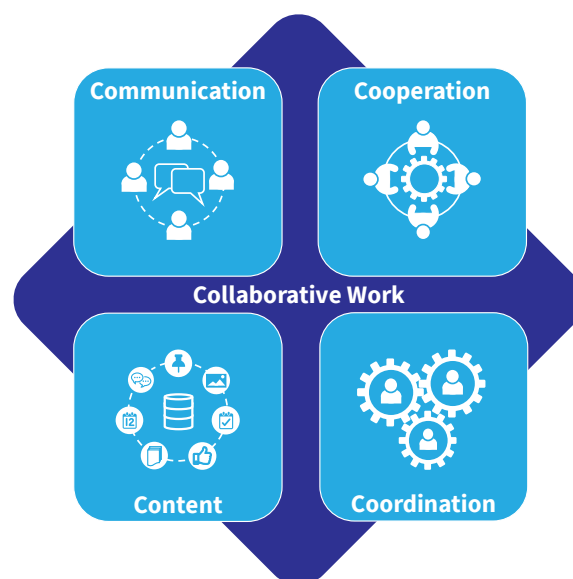


Figure 1: Areas of Enterprise Collaboration

Source: 8C Framework for Enterprise Information Management, Williams, University of Koblenz, 2010

Content-centric activities

The areas of coordination and content creation are largely content-centric activities. That is, they are focused on the inputs to, and outputs from, joint work. Coordination is focused on the work that is required to organise and orchestrate joint work for example, defining and ordering tasks, handing off work from one employee to another. Content creation focuses on work that results in the generation of digital content such as wiki pages, blog posts, messages, reminders, comments etc. that are created during the course of collaborative work.

Coordination refers to the activities that support the orchestration of work such as the defining of workflows, creation of checklists, agendas, activity boards etc. and the assigning of tasks to people and managing access to resources. Typical software tools in this category support task, workflow and project management such as the scheduling and ordering of tasks, the handoff of tasks between one employee and another and informing participants about the status of work completion etc. A large part of coordination is what is referred to as **articulation work**. This is the work that is often invisible or unnoticed, but that is important in making sure that everything is prepared and available at the correct time and in the correct order, so that the actual work can be done or the task can be completed. For example, there is an increase in the coordination work required for the preparation of online activities such as meetings or workshops; such as, setting up the online meeting rooms, sharing the meeting room credentials, ensuring all participants have access etc. As mentioned above, in hybrid and remote working the amount of formal and informal coordination work increases enormously as people need to clearly signal what they have done so that others can pick up and continue a task or activity. Good software products include built-in awareness mechanisms that allow team members to see what their colleagues are working on and which work tasks have been completed.

Content refers to the **creation and combination** of digital information and all the activities that surround the organising of that information, for example, making sure information is structured and organised so that it is findable, shareable and reusable. Every day, using collaboration technologies (e.g. wikis, blogs, forums, chats etc.) employees generate many

documents containing valuable information such as questions, solutions, news items, reports, guidelines etc. They then comment, tag and recommend these documents to other users and integrate them with other content (such as files or other wiki pages/blog posts, websites etc.) by importing or adding links to related information. Over time, collaboration tools have the potential to become large and valuable repositories of important business information and knowledge.

Location of collaborative work

The location dimension of collaborative work refers to the place where employees (and other business partners) are physically working. The work location can be **co-located** (all workgroup members are in the same physical location), **distributed** (all workgroup members are in different physical locations) or **hybrid** (some workgroup members are co-located and others are distributed).

co-located teams: workgroup members are all in the same physical location

If all employees are together in the same location, then it is possible to have physical meetings and make use of technologies in physical meeting rooms. This is a reason why many organisations offering hybrid working still require that all members of a workgroup or team should be physically working together at the employer's premises for a specified time period (e.g. one day per week, 2 days per month etc.).

hybrid teams: some workgroup members are co-located and others are distributed

The growth in hybrid working brings about a new challenge, the management of hybrid teams, where some team members are co-located in the employer's premises and some team members are working remotely. It can be argued, that as soon as one team member is working remotely then, the whole team is effectively in a form of hybrid working. Managing hybrid teams requires clear strategies for collaborative working. There is often a situation where most of the team are working in the office and could have a face-to-face meeting, however one or

more people are working remotely, from home or at a client site, conference etc.

Decisions need to be made about how the meeting is held. Do all the co-located team members meet in the same room and the remote team members are linked in using a video-conferencing tool (e.g. Zoom, Sametime, skype), or since the meeting is now partly online anyway, does everyone join the meeting from their separate offices? Further, even when employees are all in the same location, they will still use collaboration software such as microblogging tools, messaging tools and blogs or wikis to share information, document meetings, share project documents etc.

distributed teams: all workgroup members are in different physical locations

Whilst it is still important to consider the location dimension, it plays a much less significant role today than it did previously. The essential thing to consider about location is to ensure that any collaboration software solution is equally available to all employees/work partners wherever they are working from, offering the same levels of accessibility and performance.

Timing of interaction

Of much greater significance, and a key characteristic of collaborative working and for thinking about the selection of suitable collaboration software is the timing of interaction. That is, whether work is carried out **synchronously** (where all the people involved work together in real-time) or **asynchronously** (where tasks are being completed by different people at different points in time).

synchronous work: people working together in real-time, e.g. workshops or team meetings

Typically, a meeting (for example a team meeting or a meeting with a client) is carried out synchronously (face-to-face or online), whereas preparing the materials for the meeting is usually carried out asynchronously. One person creates and publishes the meeting agenda, another prepares and uploads the presentation slides, discussion documents etc. and uploads them to the digital workspace.

Although synchronous communication in the form of online meetings has gained a lot of attention, this type of interaction only represents a small part of the actual work carried out in organisations. Most work is done asynchronously, where people work independently on a task and then coordinate with other employees to discuss the outcomes, or handover the task to enable another employee to continue the work. As discussed above, it is the coordination of this asynchronous activity in particular, that is increasing the work coordination overhead in hybrid and remote work groups.

asynchronous work: people working independently on a task and then coordinate to handover the task to other employees

The importance of the content being created and stored in collaboration systems

As introduced above, content creation is an important aspect of collaborative work and the incorporation of social software functionality into collaboration tools and systems has resulted in the creation of large volumes of new information types such as conversations in chat tools, wiki entries, blog posts etc. We refer to these new content types as **social documents** or **social content**^{5,6}; they include all the digital artefacts such as blog posts, wiki pages, forum topics, files, recommendations, tags and comments that are created as people collaborate on joint work. For example, an employee creates a wiki entry providing guidelines for organising an online workshop. This content is then extended by others who edit the page (creating new versions), add subpages, attach comments, add recommendations and tags, include links to other wiki pages or to external sites and share it with other colleagues. These 'attached' elements become important components of the original wiki page and provide a history and record of how discussion and activity evolved and grew around the original topic (Figure 2).

The majority of social documents are **born-social**; that is, they are created within collaboration software with the express intention of being interactive and collaborative. When created natively in the collaboration system, a wiki entry already usually has the

functionality of version control, of commenting, recommending and collaborative tagging. In addition, some documents may **become-social** through being uploaded to the collaboration system and opened to collaborative actions.

‘Traditional’ digital documents such as pdf files or office documents do not have collaboration features as

standard; when created in their original systems (e.g. Open Office or Microsoft Office) there is no possibility to collaboratively tag or recommend the file. However, when they are uploaded into a collaboration system these collaborative features become available, the document becomes embedded in the collaboration space. The document is now a social document.

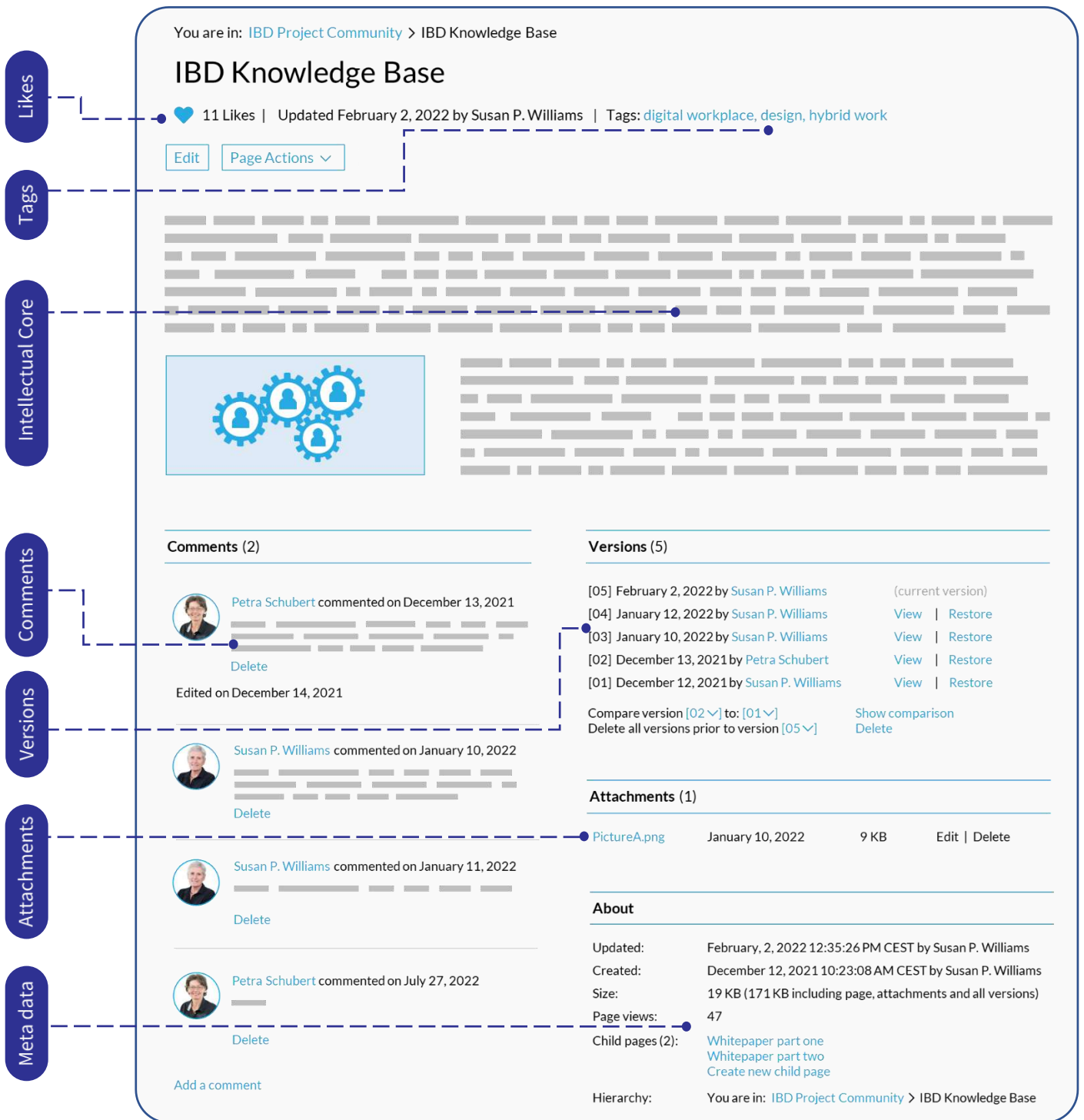


Figure 2: Structure of Social Content in Enterprise Collaboration Systems

Thus, collaboration systems contain born-social documents such as a wiki entry or a blog post and also include traditional digital documents e.g. spreadsheet, a CAD file or an image that become social documents when they are uploaded to the system.

Why is social content important? Social documents and their related content are often sources of valuable business information or form an important part of the organisational memory. One of the greatest potential **long-term benefits** of collaboration software is that over time they become vast **repositories of organisational information and knowledge**. This information must be carefully managed to ensure it is available and accessible over the long-term. Thus, when selecting collaboration software to support distributed workgroups it is important to consider the type and importance of the information that is being created.

Persistent or transient information

An additional and important characteristic of digital content that must be considered when identifying collaboration software requirements and for evaluating collaboration software is the temporal nature of information. That is, **is the information being created in collaboration tools of continuing, long-term importance, or is it information with short-lived or transient importance?** Not all collaboration tools are suited to the long-term management of information. Therefore, questions we need to ask when evaluating collaborative work and collaboration tools are, firstly whether the information being created should be persistent and accessible over the long-term, or is it transient information of short-term importance? And secondly, if required, to identify whether the software tools have the functionality and capabilities to organise and manage information over the long-term.

persistent information: important business information that is accessible over the long-term, e.g. stored in wiki pages

For example, a wiki is a perfect tool for documenting information for the long term. It has a structure; the information can be extended, and multiple people can contribute to the wiki over time. A wiki provides persistent information and is highly suited for infor-

mation that has continuous and long-term value and can easily be accessed by different people.

In our studies of organisations, wikis are one of the most widely used tools for capturing, storing and managing important information (e.g. guidelines and procedures, project meeting minutes etc.). Information in a wiki can be updated, extended and provides a repository of information and knowledge about the work of a team/workgroup.

transient information: lower value information of short-term importance, e.g. stored in microblog posts or chat channels

In contrast, a blog post whilst also providing a place to publish and share information is more suited for immediate informing, sharing news etc. Blogs and blog posts are less well-structured than wikis; blog posts and their content are typically displayed in date order. Whilst it is an excellent place to publish latest news, interesting insights etc. and it is persistently available, a blog has limited meta-structure as it is less accessible as a long-term information repository. Likewise, with communication tools, a forum is a good place to conduct discussions as the structure of the discussion is threaded and posts and their responses are linked to each other, thus it is easier to follow a discussion and to see who participated and what their responses are. The content is structured and persistent, accessible over the long-term. Chat tools also provide possibilities for conversations, but these are much more suited to short-term discussions, quick questions, updates etc. It is usually much more difficult to follow the thread of a conversation in a chat tool where the start of the conversation and the responses are less well signalled and multiple conversations become intertwined.

Summary of collaborative work requirements

In this section we have considered the different aspects and characteristics of collaborative work activity and used them to outline different capabilities that collaboration software is required to support. We began by outlining four types of collaborative work activity: **communication, cooperation, coordination and content creation**. Following this, we

identified the importance of the location of activity, whether employees are **co-located or distributed**. Today location is less important if team members have equivalent access to collaboration tools. Of greater importance is the timing of activity, whether interaction is **synchronous or asynchronous**. We then pointed to the growing importance of the content being created and stored in collaboration systems and identified the importance of **social documents as repositories of organisational knowledge and information**. When considering content creation, we also raised the question of the temporal nature and continuing importance of information, does it hold **continuous, long-term value or is it transient, ephemeral information with only short-term value**. Finally, we raised the issue of whether the collaboration software is suited for **persistent, long-term storage and access** to information, or for more **transient, short-term access and use** of information. With these different characteristics to guide the elicitation of requirements for the support of collaborative work, we now turn our attention to the provision of technology support for collaborative work.



Technology support for collaborative work

Having understood the different collaborative working requirements in their organisation, the people responsible for providing and managing the organisation's digital workplace must now assemble the best tools to support collaborative work. However, the market for commercial collaboration software is extensive and constantly evolving, making the selection and provision of appropriate collaboration tools especially challenging for organisations. Our analysis of the collaboration software currently available on the market, has identified that there is no single integrated Enterprise Collaboration System that covers all aspects of collaborative work.⁷ Instead, the market for collaboration software is heterogeneous, comprising a multitude of commercial collaboration tools with both distinct and overlapping functionality.

Type	Symbol	Description
Enterprise Collaboration Systems (ECS)		A purposefully developed selection of applications/tools that are fully integrated and are provided to the user in a workspace under a uniform interface (e.g. HCL Connections).
Collaboration Suite		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).
Application		Standalone software product with a range of collaboration features (e.g. TeamViewer with screen sharing, video conference and file transfer).
Tool		Lightweight desktop or mobile software/plug-in/functionality with a central focus on one feature (e.g. chat in WhatsApp). High focus on one/few features.

Table 1: Typology of collaboration software

The software types range from lightweight tools with highly specialised functionality through to more complex Enterprise Collaboration Systems (ECS), that are highly integrated, combining multiple components and services (e.g. forum, blog, microblog, wiki, tasks) within a unified space. **Table 1** provides a brief overview of these different types of collaboration software. To identify the tools that provide the required functionality for each area of collaborative

work, we conducted an in-depth analysis of all the major collaboration software products. We analysed and classified the different collaboration tools in terms of each of the four areas of communication, cooperation, coordination and content. **Figure 3** shows an extended version of **Figure 1** showing the generic collaboration tool types that provide functionality to support work in each collaborative work area.

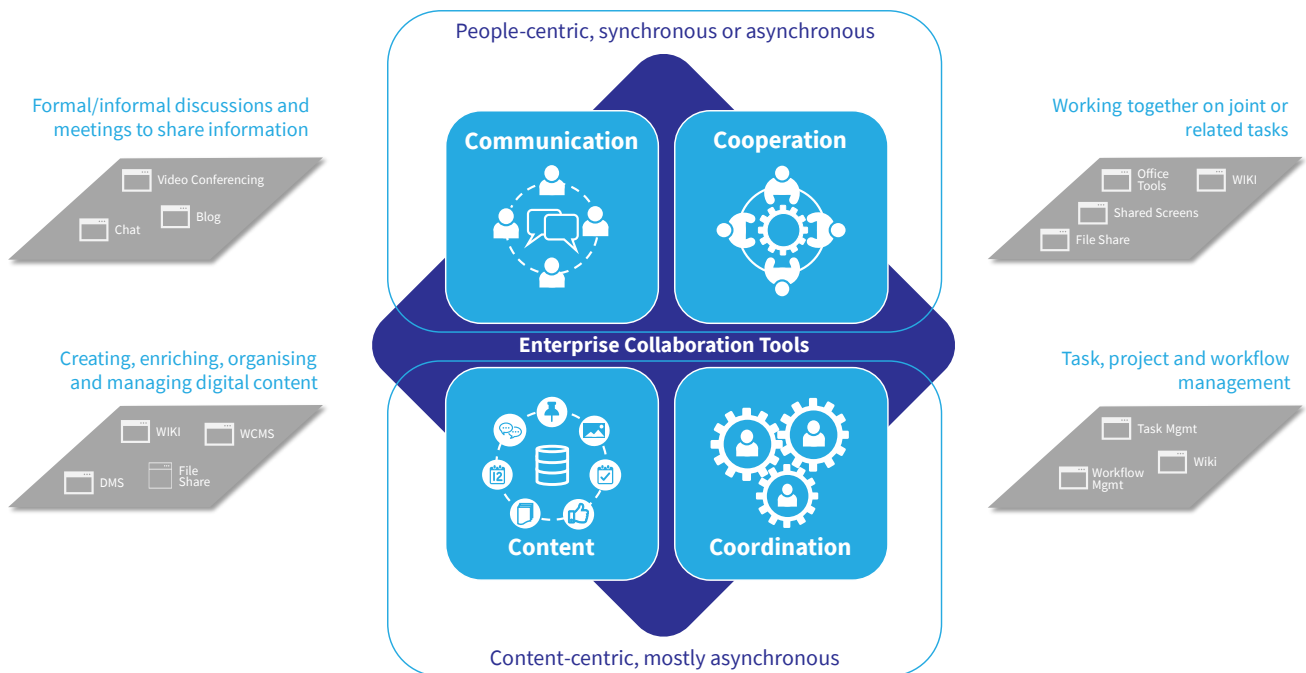


Figure 3: Enterprise collaboration tools for different types of collaborative work

Source: 8C Framework for Enterprise Information management, Williams, University of Koblenz, 2010

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

Table 2: Software support for areas of collaborative work (ArCoW)

Tools that are purposefully designed to support one type of activity very well are frequently unsuited to other types of activity. For example, tools that are excellent for synchronous communication via voice/video and near synchronous communication via text messaging (e.g. skype, Zoom, Webex etc.) are not well-suited for the long-term sharing and management of digital content. Such synchronous communication tools may provide some functionality for file sharing; however, it is not usually a good solution for the long-term management of digital content. This is much better achieved using a wiki or a file sharing application (e.g. MS OneDrive, Nextcloud or the files component in HCL Connections).

In a further round of analysis of the collaboration software products we explored how they support different work types in terms of timing of work (asynchronous/synchronous) and the requirements around the permanency of the content created (persistent long-term/transient short-term). We decomposed software products on a modular level, assigning some of them to multiple areas. This also helps to clearly identify overlapping and redundant functionality in different software products. The resulting classification (ArCoW – Areas of Collaborative Work) contains eight functional categories which represent the areas of collaborative work.⁸

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: transient (of short-term interest) and persistent (of long-term interest). The **transient** sec-

tion contains, for example 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 areas file sharing, information collection (documentation) and information exchange (question-response). The resulting classification scheme (shown in **Table 2**) is not exhaustive but reflects the typical daily work activities of collaborative workgroups. The classification is relatively straightforward and is simple to use as a starting point for identifying and defining an organisation's collaboration software requirements.

Proliferation of tools and technologies in use

As identified above there are many tools available to support different types of collaborative work and there is no fully-comprehensive integrated system for Enterprise Collaboration that provides functionality to support all the different types of collaborative work. This requires a portfolio of tools to support different types of collaborative work and modes of interaction. Organisations need to combine many different software products to support the diverse requirements for collaborative work. As a consequence, in many companies there has been a **proliferation** of collaboration systems and tools (from different vendors) **with overlapping (often redundant) functionality**.

As part of our ongoing research and development work, we have been working with a cohort of organisations who are developing their digital workplaces.

These organisations are all members of the research initiative IndustryConnect⁹ and are interested in supporting collaboration research and improving 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).

To understand this proliferation of tools, we worked with 23 of these organisations, that, taken together, represent a total of more than 730,000 employees. Through an online survey and a follow-up workshop we used the ArCoW classification described above to explore the diversity and proliferation of tools in use in these 23 organisations and to gain insights into the challenges this brings to the long-term use and management of these tool portfolios.^{7,8}

In the survey, the company 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 collaborative work. It was also possible for the 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.

Table 3 contains an overview of the functional modules that were selected (or added) by the respondents. The numbers in the table show that the organisations involved in the study have implemented a substantial number of different commercial software products to build their portfolio of collaboration tools. 319 different software modules were identified in the sample of 23 organisations, which represents an average of 14 functional modules per organisation. The numbers also reveal the high degree of redundancy in the available functionality. For example, between them the 23 organisations have implemented 64 tools for synchronous meeting support (an average of 2,78 applications per organisation). These are just the tools that were identified by the respondents, it is highly likely there are other tools being used, either formally approved by the organisation or as shadow technology selected by subgroups of users.

There has never been a time when there are so many systems and tools for collaborative work available. In general, this proliferation of tools can be seen as a positive thing and a sign of the importance of collaboration software. Users and organisations have the opportunity to choose from a wide selection of tools and to put together their collaboration tool portfolio.

However, whilst these portfolios of tools may provide the required functionality to support different forms of collaborative work, they may not provide the most stable, sustainable or user-oriented solution for the long-term.

We identified two potential challenges with this portfolio approach and argue that, given the critical importance of collaboration tools, organisations need to take a more holistic and integrated approach to the design of their digital workplace.

The first challenge relates to **tool fragmentation**. Providing a variety of software products from different software vendors to employees can introduce problems as they may be required to create different user accounts for the various tools, especially those offered by an external provider. There is also additional effort required to learn about the functionality of each tool and how to use it most effectively, as well as the additional coordination overhead for users transitioning between different tools and systems.

The second challenge relates to **content fragmentation**. As outlined above, the content being generated and stored in collaboration tools has important business value and provides a valuable source of organisational knowledge. Having a wide variety of collaboration tools can result in silos of information, each locked away in a different product; requiring additional effort to combine or connect information and make it available in a consistent and usable form.

Both of these challenges can be addressed by systematically thinking about the assembly of collaboration software and moving away from thinking about collaboration software as a loosely collected portfolio of tools to thinking about the design and deployment of a sustainable and performant enterprise collaboration platform. This topic is examined in more depth in Part Two of this paper.

Synchronous (simultaneous) Work			
Meetings	64	Simultaneous 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		

Asynchronous Work			
Persistent information of longitudinal interest			
Activity & 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
Transient information of short-term interest			
Short messages	38	Ideation, Polls, Voting	28
HCL Connections: Status updates	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		

Table 3: Software products in use by the surveyed user organisations (n=23)



Summary and next steps

This paper is the first part of a two-part report on the topic of technology support for collaborative work. In Part One, we have focused on the **imperative for a carefully planned digital workplace** and set the scene for understanding the types of collaborative work and the types of software required to support it.

In summary, the **future digital workplace for hybrid and remote working** is becoming **more complex in both scale and scope**; requiring a technology infrastructure that supports greater numbers of users, in a wider variety of work areas, who are engaging in heterogeneous models for hybrid and remote working.

To effectively support hybrid and remote working and to realise seamless transitions between physical and digital work locations as well as between the different collaboration tools being used, requires **purposeful planning and the integrated design of the digital workplace**. Our thinking needs to expand from thinking about the provision of loosely

integrated portfolios of collaboration tools to providing an **enterprise-wide collaboration platform** that is fit for purpose in the current world of increased hybrid, distributed and collaborative working.

The designers and managers of collaboration platforms need to understand the collaborative work requirements in their organisation and take a more active role in **guiding users to the best tools for each type of work** so that important activity and valuable business information are captured in a **persistent, accessible, reusable and preservable** manner. In

addition, paying attention today to the design of the enterprise collaboration platform will also provide organisations with the **flexibility and agility to respond to future changes and disruptions** such as those we have experienced over the past few years.

In Part Two of the paper, we take a deeper look at the technology requirements and focus on the design of the enterprise collaboration platform and discuss how, by taking a platform perspective, the challenges of **tool fragmentation and content fragmentation** can be addressed.

References

¹ Hadzilacos, R., Manktelow, A., Leopold, T. A., Zahidi, S., Tiew, S., Ukonu, C., Taylor, M., & Bravery, K. (2020): Resetting the future of work agenda: Disruption and renewal in a post-COVID world. World Economic Forum.

² Williams, S.P., & Grams, S. (2022): Remote Working Study 2022, CEIR Report, No. 01/2022. University of Koblenz.

³ Vailshery, L. S. (2022): Collaboration software market revenues from 2015 to 2025, statista, <https://www.statista.com/statistics/590412/worldwide-collaboration-software-market/>.

⁴ Ellis, C.A., Gibbs, S. J. & Rein, G. (1991): Groupware: some issues and experiences. Communications of ACM, 34(1), pp. 39–58.

⁵ Hausmann, V. & Williams, S. P. (2016): Issues for the long-term management of Social Business Documents, International Journal of Information Systems and Project Management 4(3), pp. 45–61.

⁶ Williams, S.P., Mosen, J. & Schubert, P. (2020): The Structure of Social Documents. 53rd Hawaii International Conference on System Sciences, pp. 2825–2834.

⁷ Schubert, P. & Williams, S.P. (2022): Enterprise Collaboration Platforms: An Empirical Study of Technology Support for Collaborative Work, Procedia Computer Science, 196, pp. 305–313.

⁸ Schubert, P. & Williams, S.P. (2022): Enterprise Collaboration Platform Configurations: an Empirical Study. 20th European Conference on Computer-Supported Cooperative Work, pp. 1–17.

⁹ Williams, S.P. & Schubert, P. (2017): Connecting Industry: Building and Sustaining a Practice-based Research Community, 50th Hawaii International Conference on System Sciences, pp. 5400–5409.

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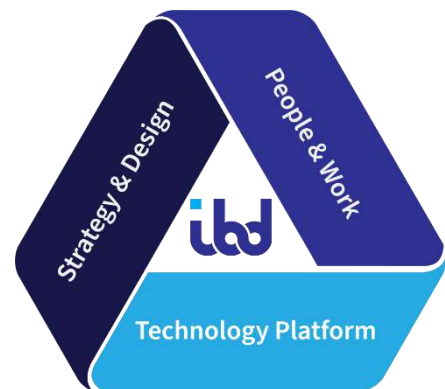
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IBD provides consulting and design services to assist organisations develop Digital Workplace strategies that are optimised for the needs of their employees and work types. IBD consultants are experts in Enterprise Collaboration Technologies and can help you design and implement the technology platform that suits your organisational requirements.

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- analyse your information landscape and identify your information needs
- evaluate your existing collaboration tool portfolio
- extend and enhance your existing portfolio to develop a secure and scalable collaboration platform

