

Bu03

# Digital Traces of Collaborative Activity

**Prof. Dr. Petra Schubert**

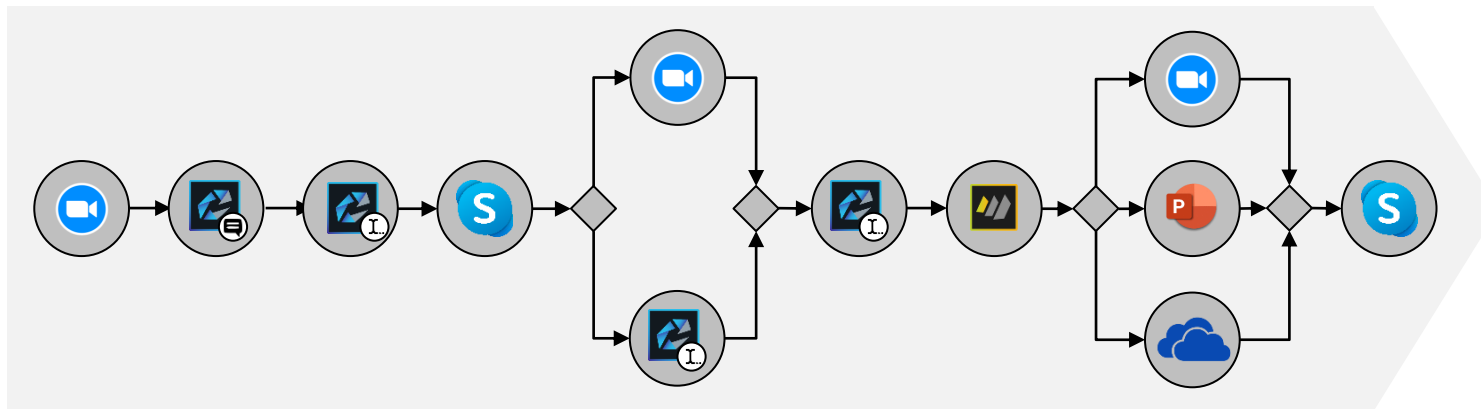
**Julian Mosen**

**Martin Just**



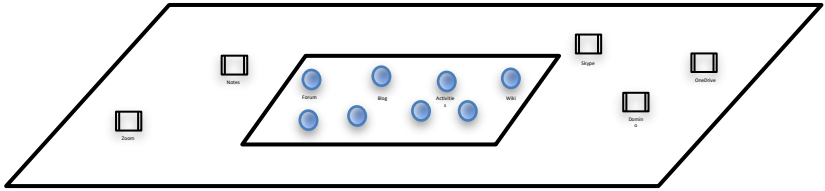
## Digital Traces of Collaborative Activity

Understanding collaborative work in Enterprise Collaboration Platforms



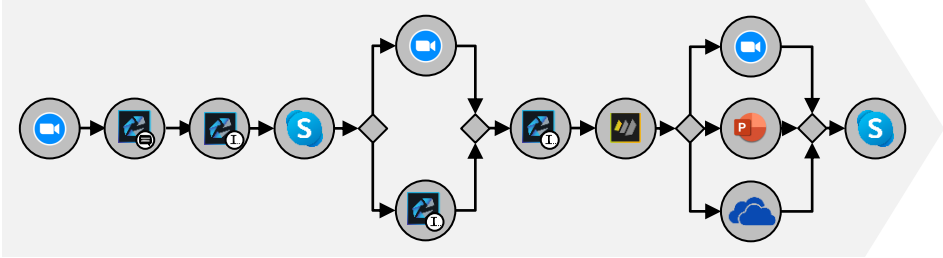
# Agenda

## Enterprise Collaboration Platforms and Digital Workspaces



Enterprise Collaboration Platform

## Collaboration across systems



## Interactive Q&A Session



# CEIR Research Team



Susan Williams  
Professor  
Director of CEIR  
Social Informatics



Petra Schubert  
Professor  
Director of CEIR  
Business Software




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Research Associate  
Cross-System Analysis



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Social Collaboration Analytics



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Manager UCT  
Benefits of ECS




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PhD Candidate  
Research Assistant  
Collaboration Platform



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PhD Candidate  
Research Assistant  
Digital Workplace




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PhD Candidate  
Research Assistant  
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PhD Candidate &  
Research Assistant  
BI/Dashboards




Simon Meier  
PhD Candidate  
Research Assistant  
Ontology-based data access



Cornelia Mc Stay  
Team Assistant



Lucas Graf  
Student Assistant  
2C-NOW



Leonardo Malzacher  
Student Assistant  
Visual Collaboration Systems

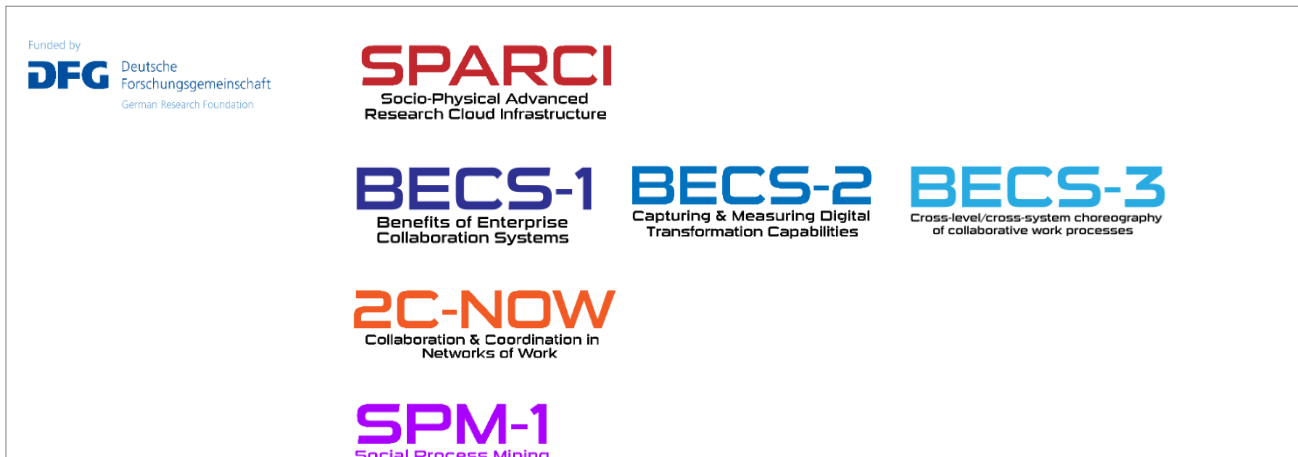
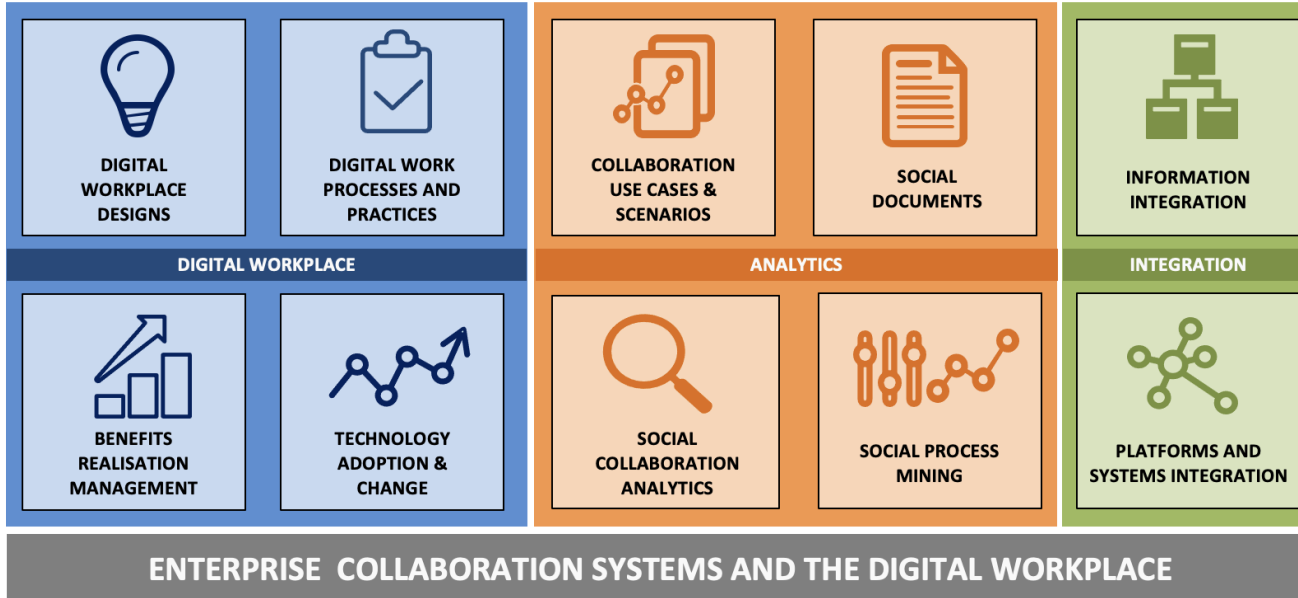


Jennifer Gerbl  
Student Assistant  
Visual Collaboration Systems

.... more student assistants

# Long-term research programme: enterprise collaboration technologies and the digital workplace

## CEIR Research Themes



Long-term research partnership with HCL  
(previously with IBM Germany)  
7<sup>th</sup> funding phase (2022-2024)



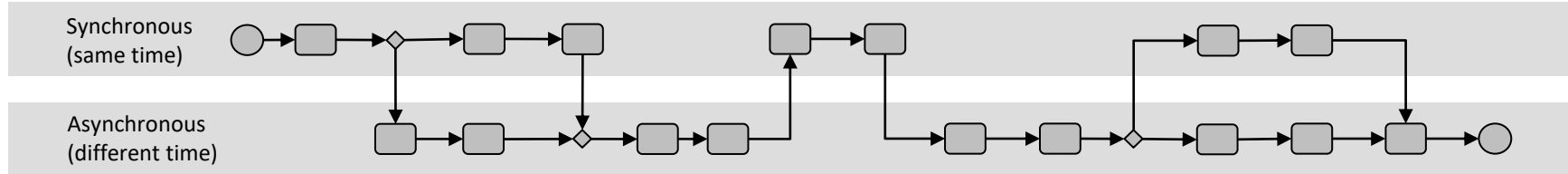
12+ years hosting UniConnect Platform and using and developing apps for HCL Connections

**INDUSTRYCONNECT**  
engaged + industry + research

University-Industry Research Collaboration  
Over 35 German and Swiss companies  
Research workshops, case studies, bilateral research initiatives

# The lack of an INTEGRATED System: ERP vs. Collaboration

Work: sequence of tasks over the day



Recurring sequence

Variable sequence

1 PROCESS-oriented work

3 AD HOC work

2 PROJECT-like work



Complement

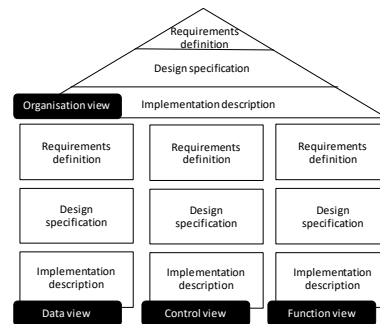
ERP System/  
Production Planning System/  
Workflow Management  
Systems

Team Communication/  
Creativity/Productivity  
Software

Project/Task/Case/Document  
Management Software

Enterprise Collaboration Platform

ARIS  
Architecture of  
Integrated  
Information  
Systems

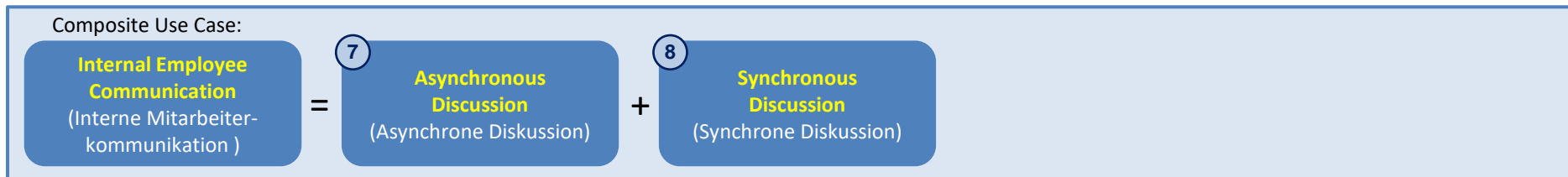
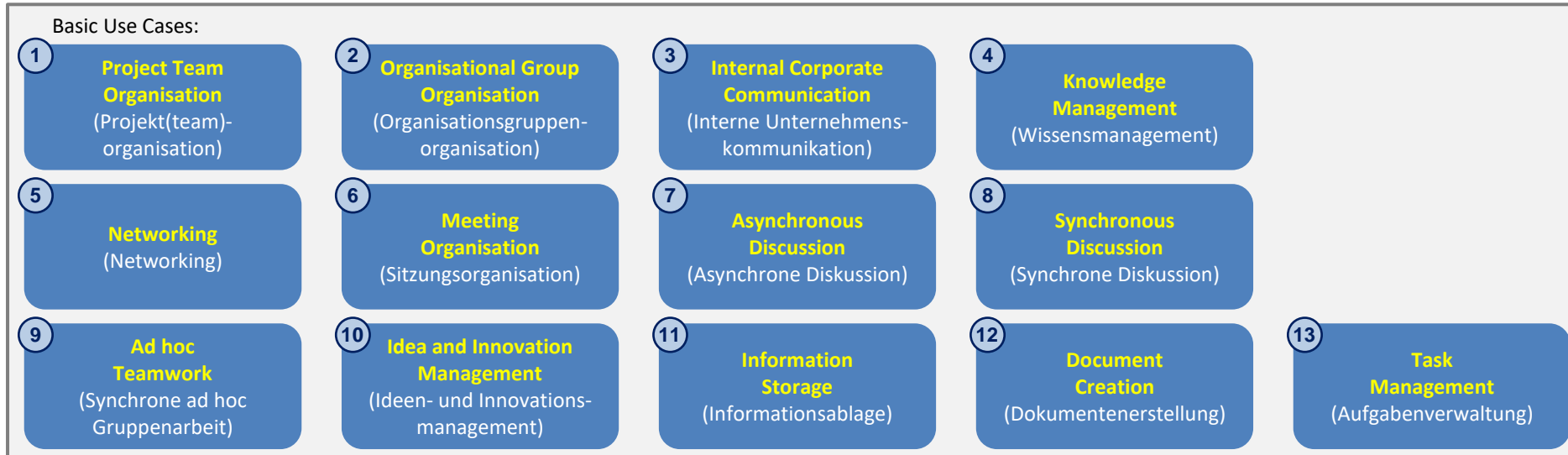


IRECS – Identification of Requirements of Enterprise Collaboration Systems			
<b>Use Cases</b>	Project Team Organisation Organisational Group Organisation Internal Corporate Communication Knowledge Management Networking	Meeting Organisation Asynchronous Discussion Synchronous Discussion Ad hoc Teamwork Idea and Innovation Management	Information Storage Document Creation Task Management ...
<b>Collaboration Scenarios</b>	Administering documents Alerting to news Assigning tasks Conducting a meeting Conducting a poll/survey	Conducting a survey Creating meeting minutes Discussing a topic Documenting Finding information	Retrieving information Search Sharing files Sharing information
<b>Content and Actions</b>	<b>Location (space &amp; container)</b> Space: system, group, user Container: wiki, weblog, microblog	<b>Content (social document)</b> Wiki/Article, Blog/post, Microblog/post, File, Task	<b>Actions (CRUDs)</b> Create, read, update, delete, label, share, notify, like, follow, etc.
<b>Collaborative Features (CF)</b>	Communication Asynchronous text message Asynchronous voice message Blog post Broadcast msg Chat msg Comment, annotation Forum post Microblog (tweet) Videoconferencing	Cooperation/Collaboration Markup of changes Rating, ranking Screen sharing/shared desktop Shared authoring Shared workspaces User profiles Workspace awareness	Content Combination Content collection Content management Content subscription Data aggregation Data integration Document management Linking Search Tagging, Folksonomies
<b>Software Support</b>	Groupspace Chat Microblog	Blog Wiki Forum	File Library Task Management E-Mail/Calendar Video Conference

IRECS  
Identification of  
Requirements of  
Enterprise  
Collaboration  
Systems

# IRESS: Use Cases

Note: All Use Cases can include external parties



## IRECS Layer 1:

Use Cases	Project Team Organisation Organisational Group Organisation Internal Corporate Communication Knowledge Management Networking	Meeting Organisation Asynchronous Discussion Synchronous Discussion Ad hoc Teamwork Idea and Innovation Management	Information Storage Document Creation Task Management ...

# IRESS: Collaboration Scenarios

- 1 **Administering documents**  
(Dokumente verwalten)
- 2 **Alerting to news**  
(Auf Neuigkeiten hinweisen)
- 3 **Assigning tasks**  
(Aufgaben zuweisen)
- 4 **Conducting a meeting**  
(Sitzung durchführen)
- 5 **Conducting a poll/vote**  
(Abstimmung durchführen)
- 6 **Conducting a survey**  
(Umfrage durchführen)
- 7 **Creating meeting minutes**  
(Sitzungsprotokoll schreiben)
- 8 **Discussing a topic**  
(Thema diskutieren)
- 9 **Documenting**  
(Dokumentieren)
- 10 **Enriching information**  
(Informationen anreichern)
- 11 **Finding an expert**  
(Experten finden)
- 12 **Joint authoring**  
(Gemeinsam Inhalte erstellen)
- 13 **Posting a short message**  
(Kurznachricht posten)
- 14 **Preparing a meeting**  
(Sitzung vorbereiten)
- 15 **Rating information**  
(Information bewerten)
- 16 **Retrieving information**  
(Informationen abrufen)
- 17 **Search**  
(Suchen)
- 18 **Sharing files**  
(Dateien teilen)
- 19 **Sharing information**  
(Informationen teilen)
- 20 **Following people and content**  
(Leuten und Content folgen)

## IRECS Layer 2:

Collaboration Scenarios	Administering documents	Conducting a survey	Finding an expert	Retrieving information
	Alerting to news	Creating meeting minutes	Joint authoring	Search
	Assigning tasks	Discussing a topic	Posting a short message	Sharing files
	Conducting a meeting	Documenting	Preparing a meeting	Sharing information
	Conducting a poll/vote	Enriching information	Rating information	...



# Typical landscape: Heterogeneous software

## MS Zoo



## HCL: Integrated Enterprise Collaboration System



## Atlassian Suite



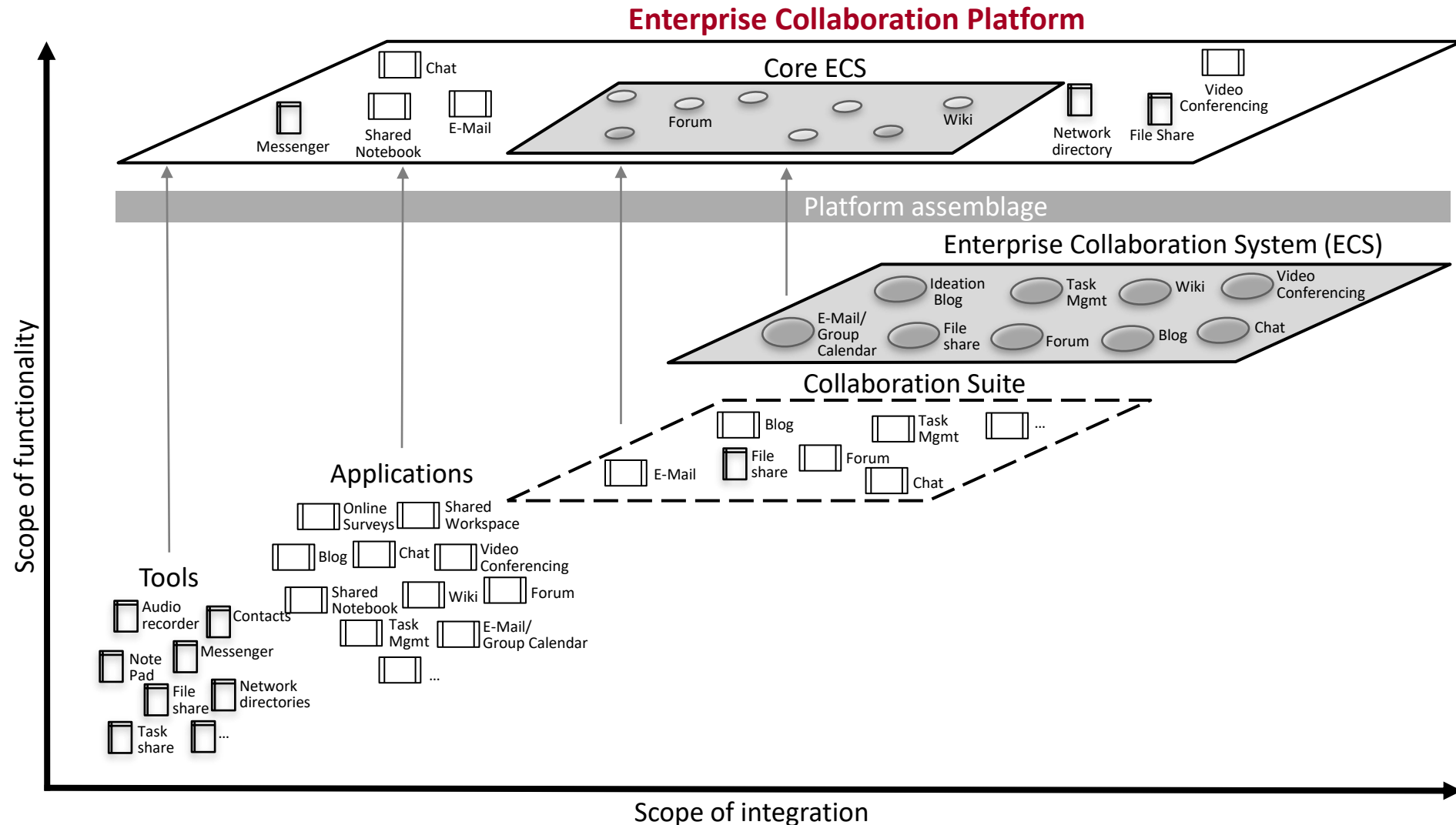
## Google Suite



And more...

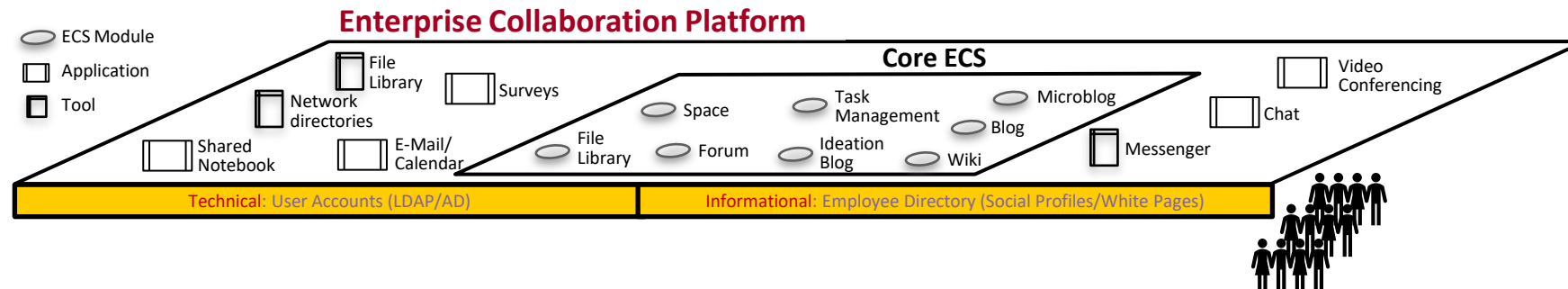


# Enterprise Collaboration Platform: portfolio of tools available for a user



# Software modules are available in the Enterprise Collaboration Platform (ECP)

**Container**  
Content store of a functional modules

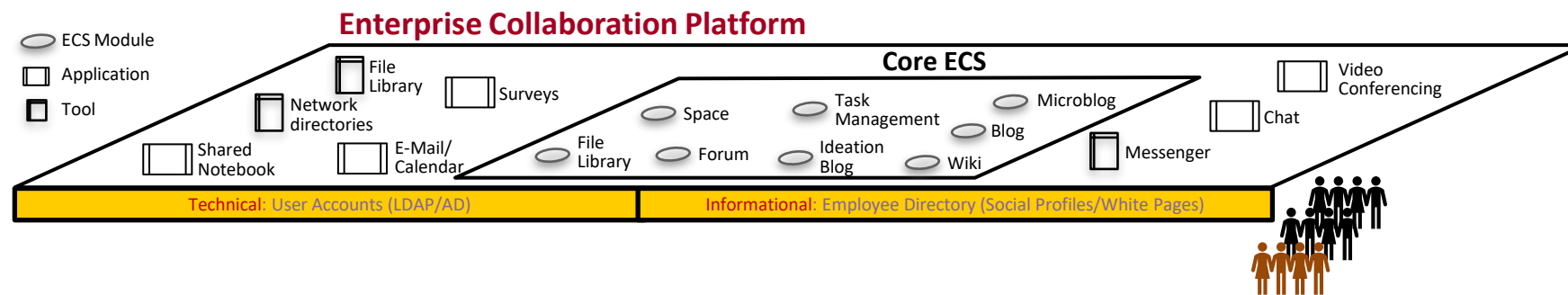
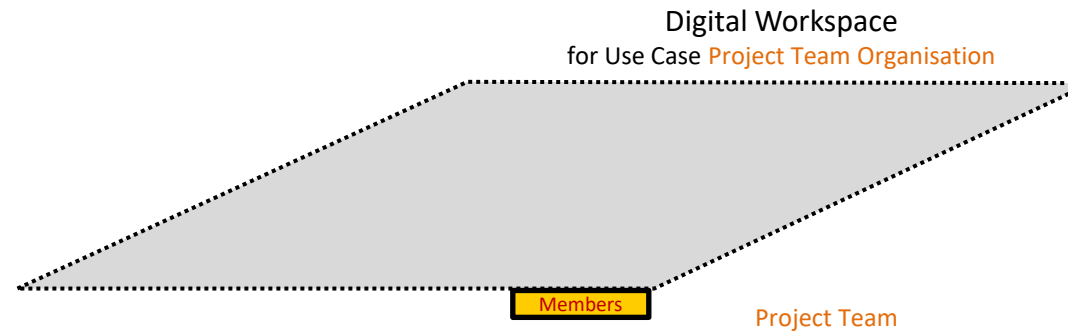


## IRECS Layer 5:

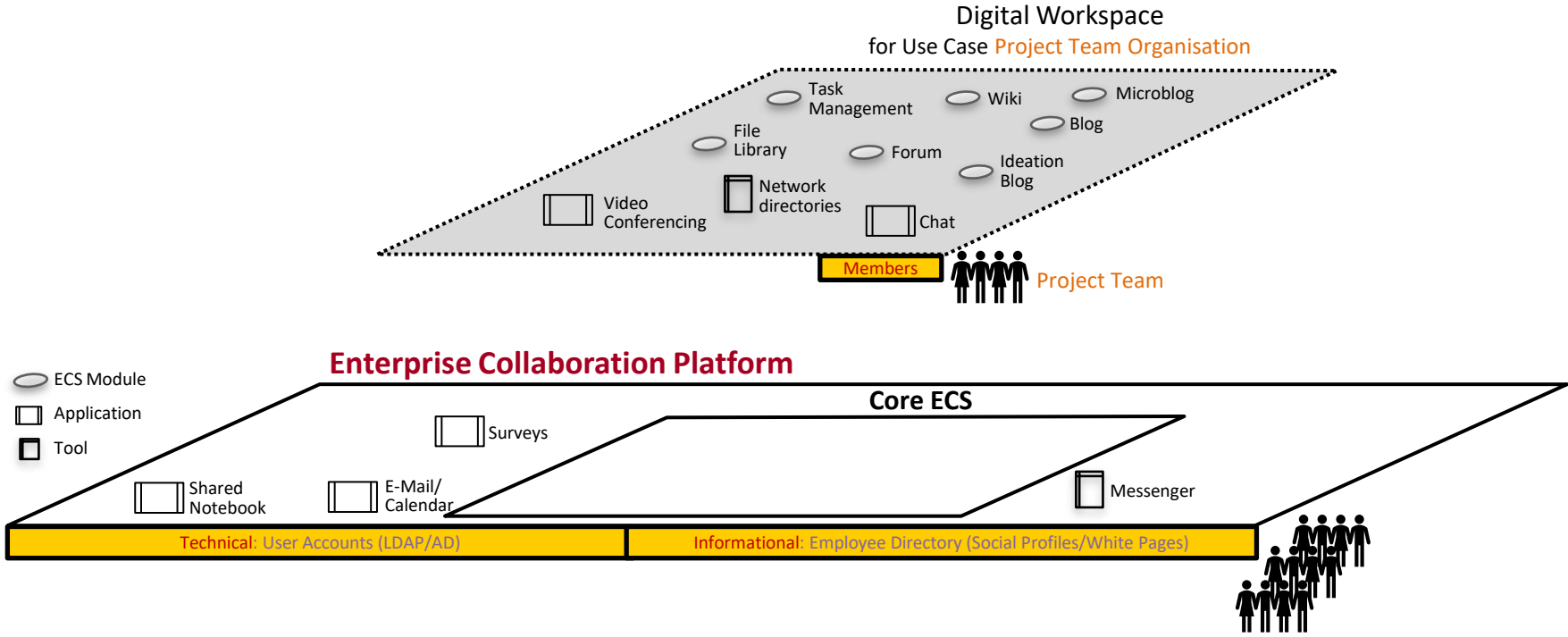
<b>Software Modules</b>	Groupspace Chat Microblog	Blog Wiki Forum	File Library Task Management E-Mail/Calendar	Video Conference ...
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# Software modules are selected to form a workspace

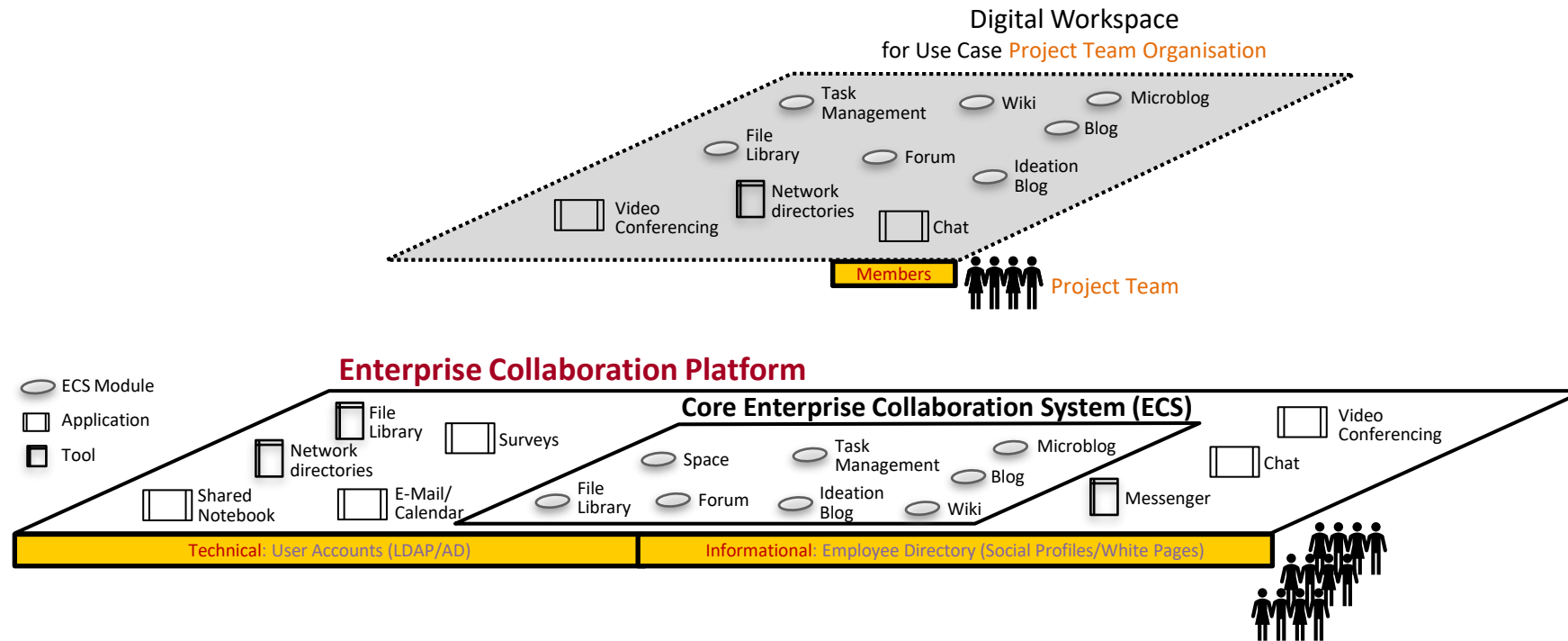
**(In-system) Space**  
Bundle of functional modules  
in a specific system  
(single-system)



# The workspace contains a combination of software modules



# Workspace for the Use Case **Project Team Organisation**



# Workspaces: software module selection (functionality)

The **platform** determines the software modules that are **available** in the workspace

The **workspace** is based on the **members** list and a **combination of software modules**

## Connections

**Add Apps** [Close]

**Add Apps** **Change Layout**

- Boards +
- Groups +
- Content Dashboard +
- eXperience Cases +
- IRESS Visualizer +
- Ideation Blog +
- Activities +
- Rich Content +
- Subcommunities +
- Bookmarks +
- Important Bookmarks +
- Feeds +

1 - 12 applications of 18      Previous Next

## MS Suite

**Registerkarte hinzufügen** [Close]

Fügen Sie Ihre Lieblings-Apps und -Dateien als Registerkarten in die Menüleiste oben im Kanal ein Weitere Apps

Suche

Letzte ▾

- OneNote
- Tasks von Planner un...
- Kanalkalende
- Word
- Wiki
- Box
- Dokumentbibliothek
- Excel
- Forms
- Lists
- PDF-Datei
- Power BI
- PowerPoint
- SharePoint
- SharePoint-Seiten
- Stream
- Visio
- Website
- Whiteboard

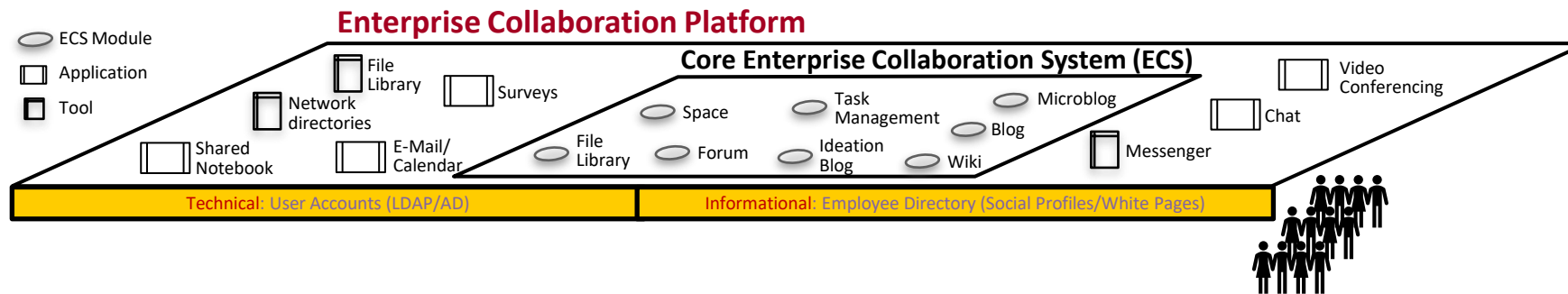
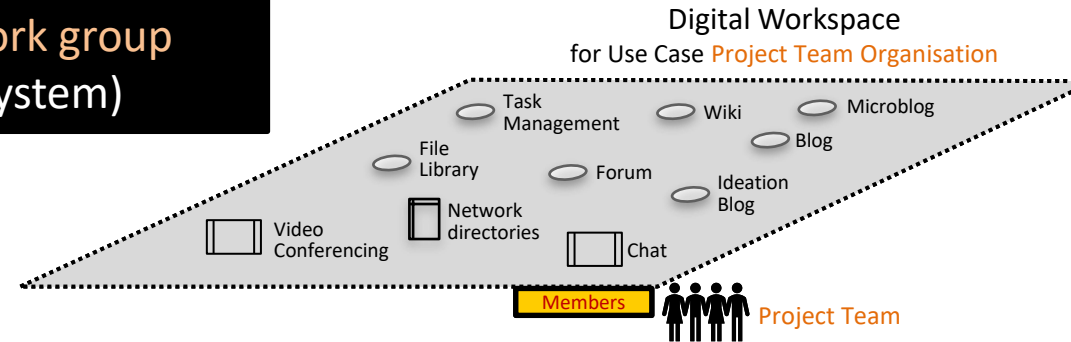
Weitere Registerkarten

- 15Five
- 365Projects
- adam.ai
- Additio
- Adobe Acrobat
- Adobe Creative...
- Adobe Sign
- Agile Task Board
- AgilePolly
- Aktivlearn Plus
- Ally
- AMION
- Amplify by Hootsuite
- Angage Live

Apps verwalten

# Workspace for the Use Case **Project Team Organisation**

**Digital Workspace (DWS)**  
 Combination of functional modules selected for a specific work group (multi-system)



- ECS Module
- Application
- ▣ Tool



# Important terms

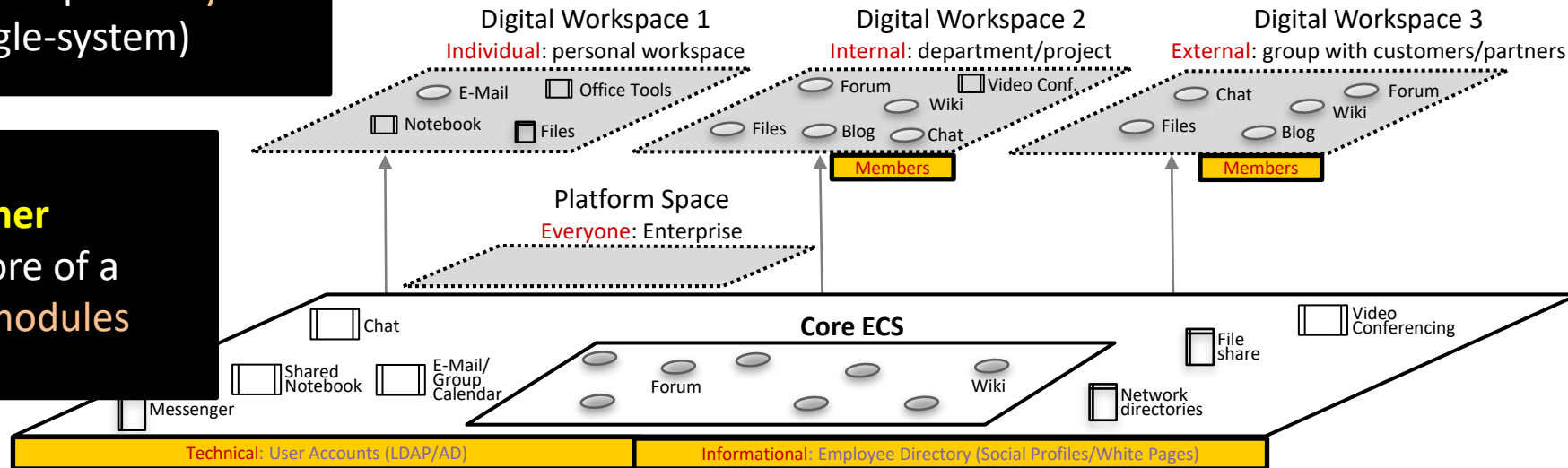
## (In-system) Space

Bundle of functional modules in a specific system (single-system)

## Digital Workspace (DWS)

Combination of functional modules selected for a specific work group (multi-system)

**Container**  
Content store of a functional modules



## System

A software product that provides functionality in functional modules

Provides spaces for groups

Comes with its own *user directory* (which needs to be linked to the central UD for SSO)

Proprietary *logging format*

Third party modules: functional modules are embedded in the system (e.g. HuddoBoards)

Wednesday, May 25 | 11:30 - 12:30 | D. Room 7-8

## Bu03. Understanding collaborative work in Enterprise Collaboration Platforms

**Connections** Other

Enterprise Collaboration Platforms are usually a collection of multiple heterogeneous software tools from different software vendors. The analysis of user activity across these different tools is a challenge because there is no harmonised format for the storing of content and the logging of user events.

In this session, we are taking a deep dive into the structure of content and the format of logfile data in HCL Connections and other collaboration software. We present an approach for cross-system analysis of user activity that makes use of an ontology (ColActDOnt) that allows us to harmonise event logs from different sources. We demonstrate the application of ColActDOnt with ontology-based data access (OBDA) in a self-developed tool that is built on Apache Hadoop, Dremio and Ontop.

The session is aimed at people who are interested in understanding and examining Enterprise Collaboration in-depth. The takeaway is an improved understanding of the traces of user activity (actions on documents) in collaboration software.

It's time to ENGAGE in understanding the collaborative activity in your organisation!



**Petra Schubert**  
University of Koblenz



**Martin Just**  
University of Koblenz

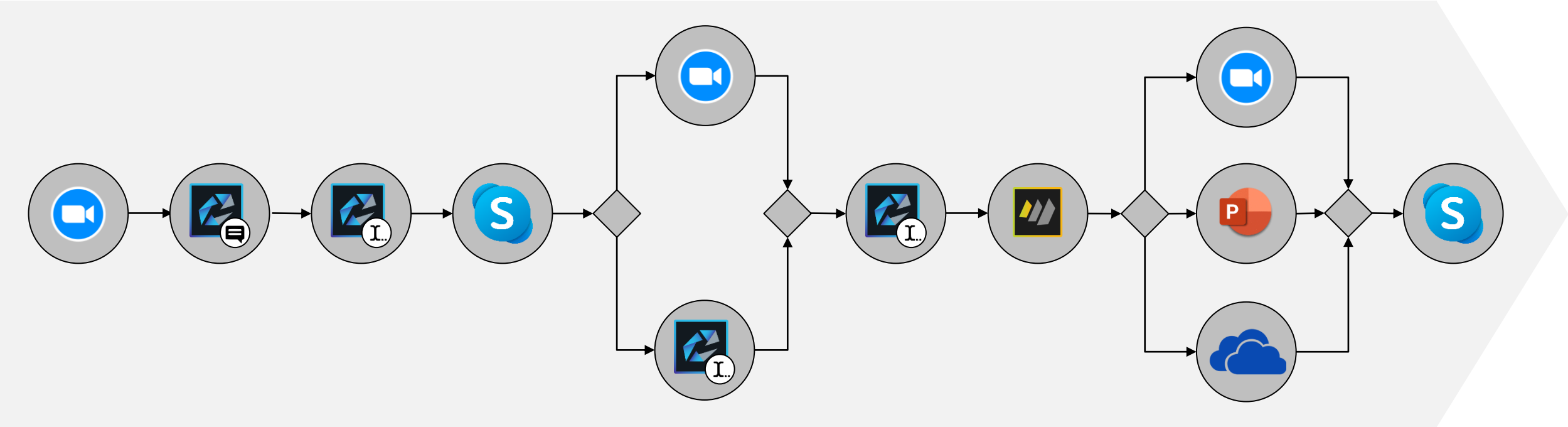


**Julian Mosen**  
University of Koblenz

## Legend

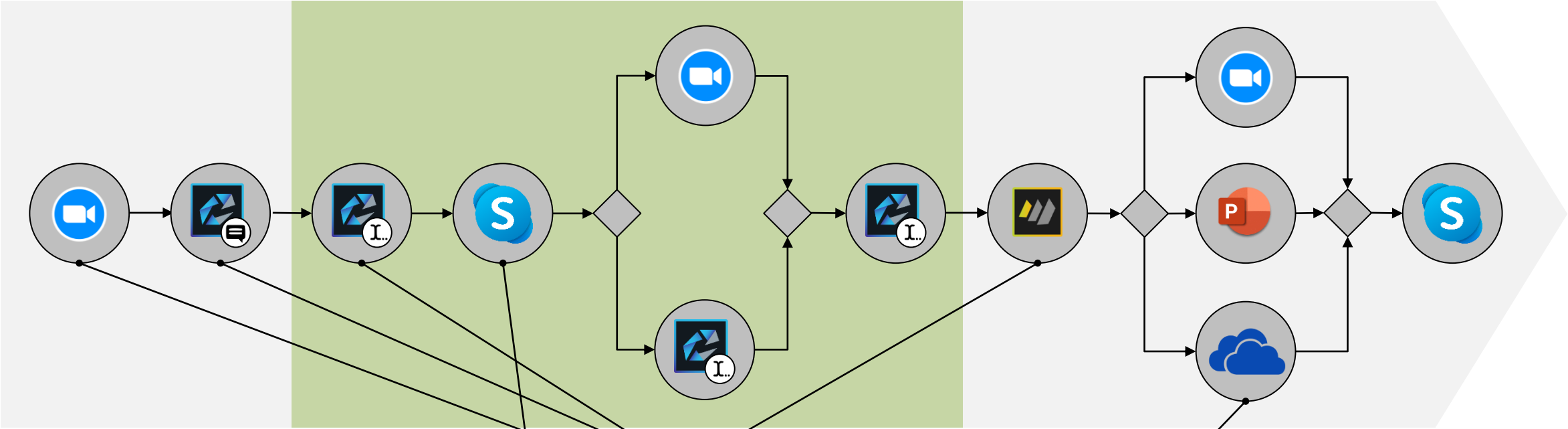


# Joint Authoring of our ENGAGE Submission

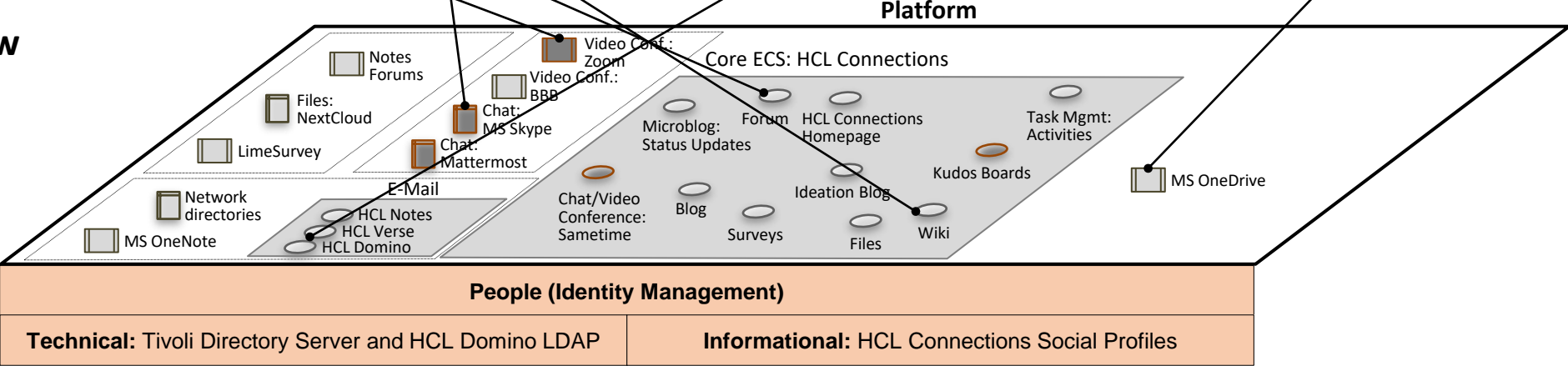


# Joint Authoring of our ENGAGE Submission

## Process View



## Application View



Example: CEIR

# Collaborative Process

User Screen

Social Document Graph

In-System Log

Collaboration Scenario

Harmonised Event Log

# Collaborative Process

**Engage 2022 - Submission Ontologies and Data Lake (Lead Martin)**

**Speaking at Engage 2022**

**Part 1: Session Details**

**Session Title**  
Digital Traces of Collaborative Activity

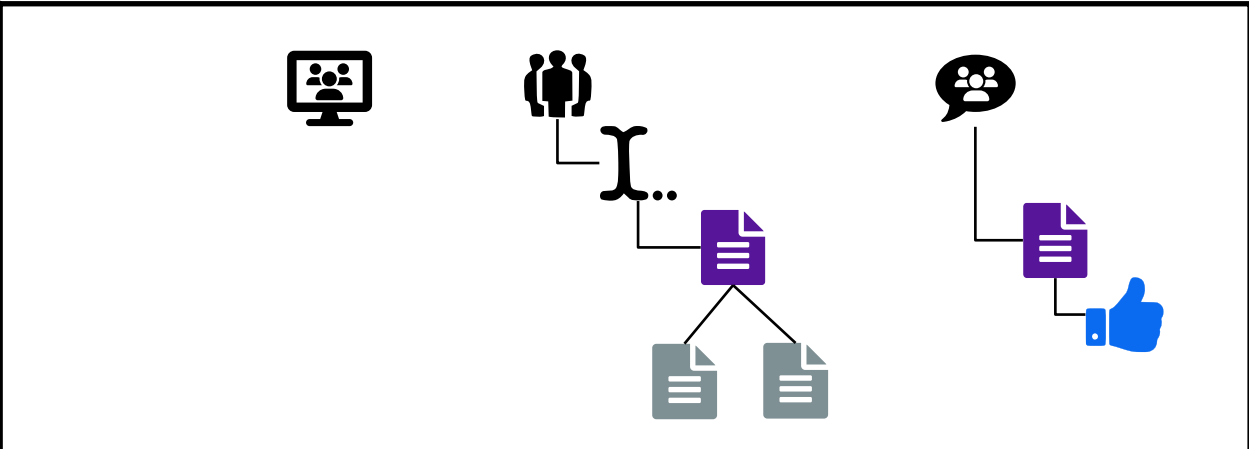
**Short Title**  
Understanding collaborative work in Enterprise Collaboration Platforms

**Session Type**  
Normal (60 or 90)

**Track**  
Business & Strategy

**OpenNMF related**  
50

**Abstract (5 to 10 lines)**



DATA_NAME	DATA_ID	COMMUNITY_NAME	COMMUNITY_ID	GROUPNAME	GROUP_ID	FILE_PATH	FILE_NAME	FILE_ID
Julian	1309	KoCo	6b73	Wiki	df2f			
Petra	1311	Skype	n.a.	ChatChannel	fd15			
Martin	1314	Skype	n.a.	ChatChannel	fd15			
Petra	1311	KoCo	6b73	Wiki	df2f			
Petra	1311	Zoom	9410	MeetingContainer	9410			
Martin	1314	KoCo	6b73	Wiki	df2f			

**ENGAGE-Team**

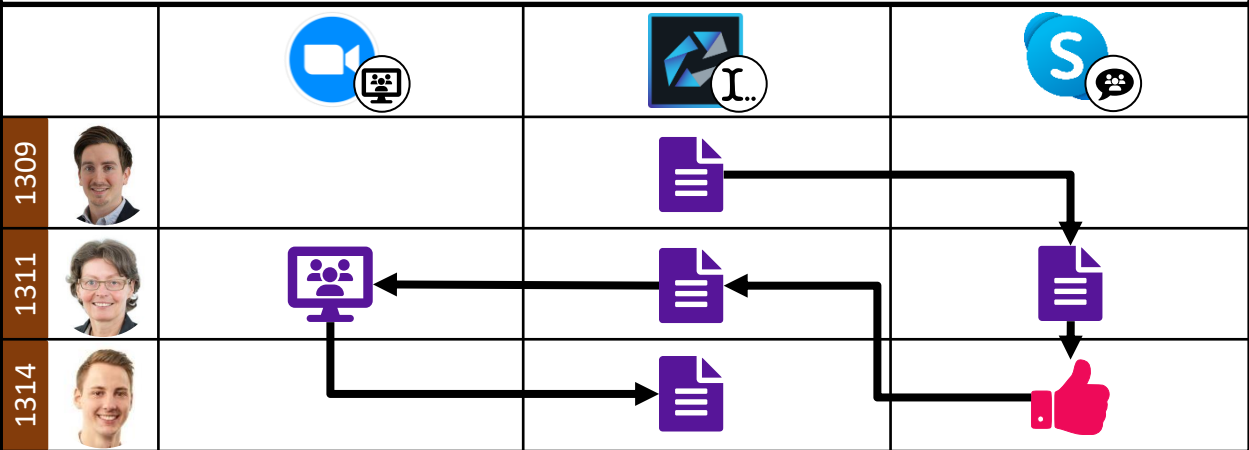
Chair: Petra Schubert  
You have accepted this meeting invitation

Online Meeting  
https://zoom.us/j/941054198

Call-in: Petra Schubert lädt Sie zu einem geplanten Zoom-Meeting ein. Thema: Persönlicher Identifikator von Petra Schubert Zoom-Meeting beitreten  
https://zoom.us/j/941054198  
Meeting ID: 941 054 198

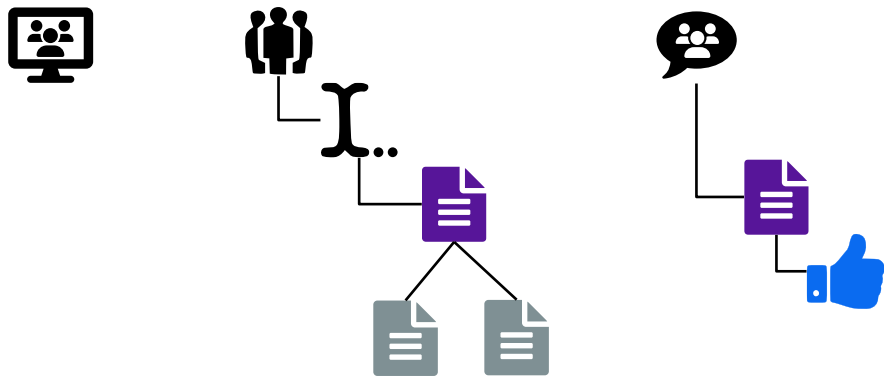
Thu, Jan 13, 2022 11:30 12:00 (0h 30m)

Kurzes Treffen des ENGAGE-2022-Teams zur finalen Abstimmung des Proposals  
Erstsch direkt im Anschluss an des CEIR-Research-Meeting

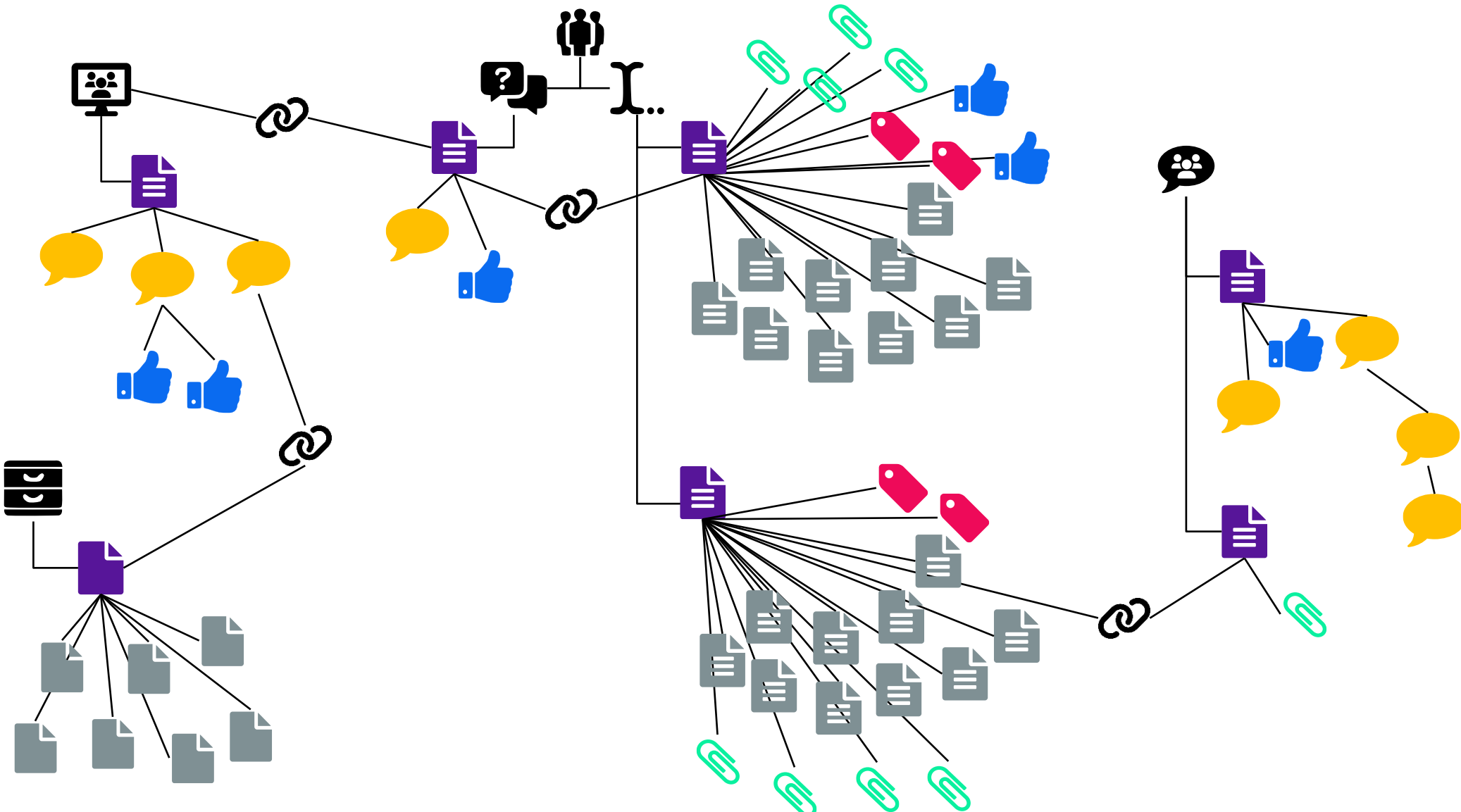


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Petra(1311)	.Skype	.GroupWorkspace(n.a.)	.ChatChannel(fd15)	.ChatMessage(1641)	.CREATED_11.01.2022-T11:00:48.960+1(n.a.)
Martin(1314)	.Skype	.GroupWorkspace(n.a.)	.ChatChannel(fd15)	.ChatMessage(1641)	.Like(n.a.)
Petra(1311)	.KoCo	.GroupWorkspace(6b73)	.Wiki(df2f)	.WikiPage(cc3e)	.UPDATED_11.01.2022-T18:49:36.130+0(2549)
Petra(1311)	.Zoom	.GroupWorkspace(9410)	.MeetingContainer(9410)	.Meeting(n.a.)	.CREATED_13.01.2022-T11:30:01.345+0(n.a.)
Martin(1314)	.KoCo	.GroupWorkspace(6b73)	.Wiki(df2f)	.WikiPage(cc3e)	.UPDATED_13.01.2022-T11:08:29.812+0(3116)

# Social Document Graph – animation

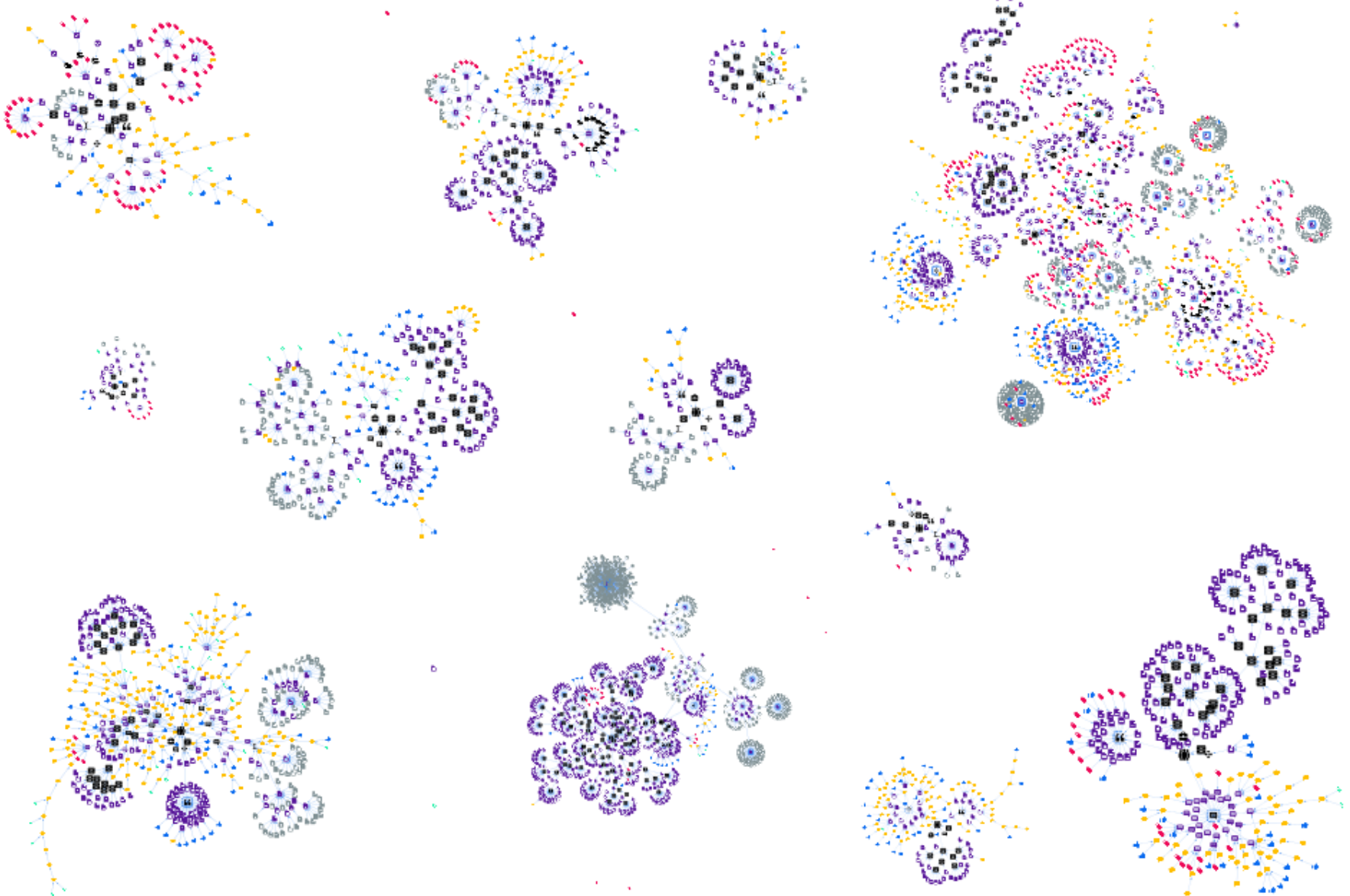


# Social Document Graph – full





# Social Document Graph – entire community



# Purpose – Why do we need a harmonised event log?

- Understand collaborative user activities across (potentially multiple) collaboration systems
- Derive this information from data of each system → event logs & content data
- Questions:

- **Who** is involved?

- *Account & Agent*

Organisational

- **On what items** are actions performed?

- *IntellectualEntities, IntellectualComponents & SimpleComponents*

Content

- **Where** are these *items* stored?

- *Container, System & DigitalWorkspace*

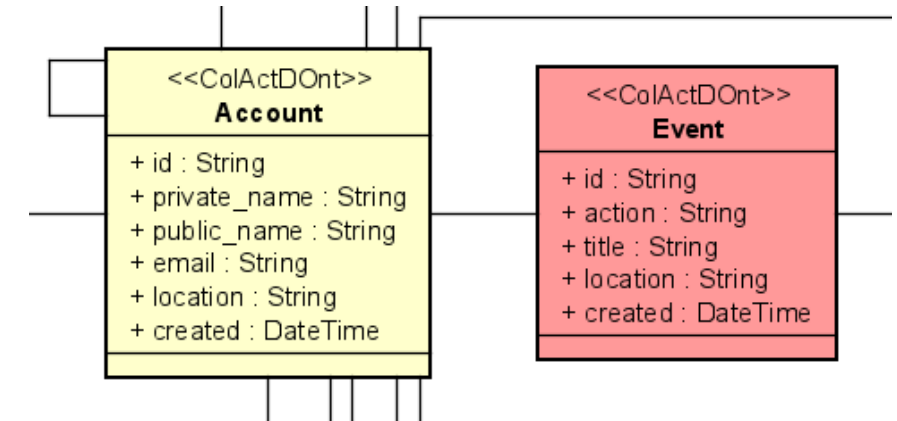
- **Which actions** are **when** performed?

- *Event*

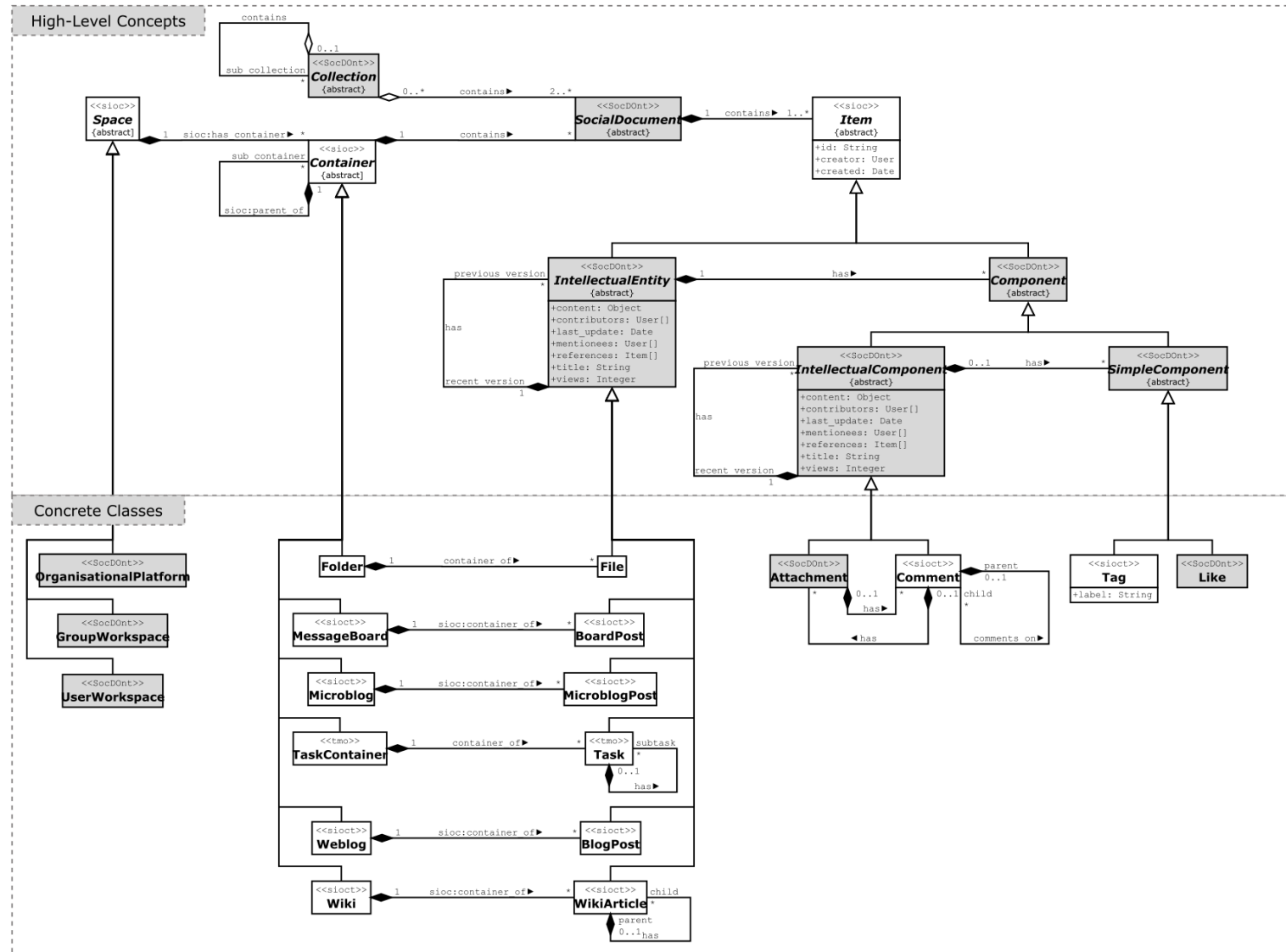
Transactional

# What is an Ontology?

- An ontology is a "**formal**, explicit **specification** of a shared **conceptualization**" (Studer et al., 1998)
- **“formal”**
  - Usually machine-readable
  - Easy application and re-use
- **“Specification”**
  - Terminology and Taxonomy as a backbone
  - includes generalisation and specialisation hierarchy
- **“Conceptualization”**
  - Abstract, simplified view of the world presented for a specific purpose



# Social Document Ontology (SocDOnt)

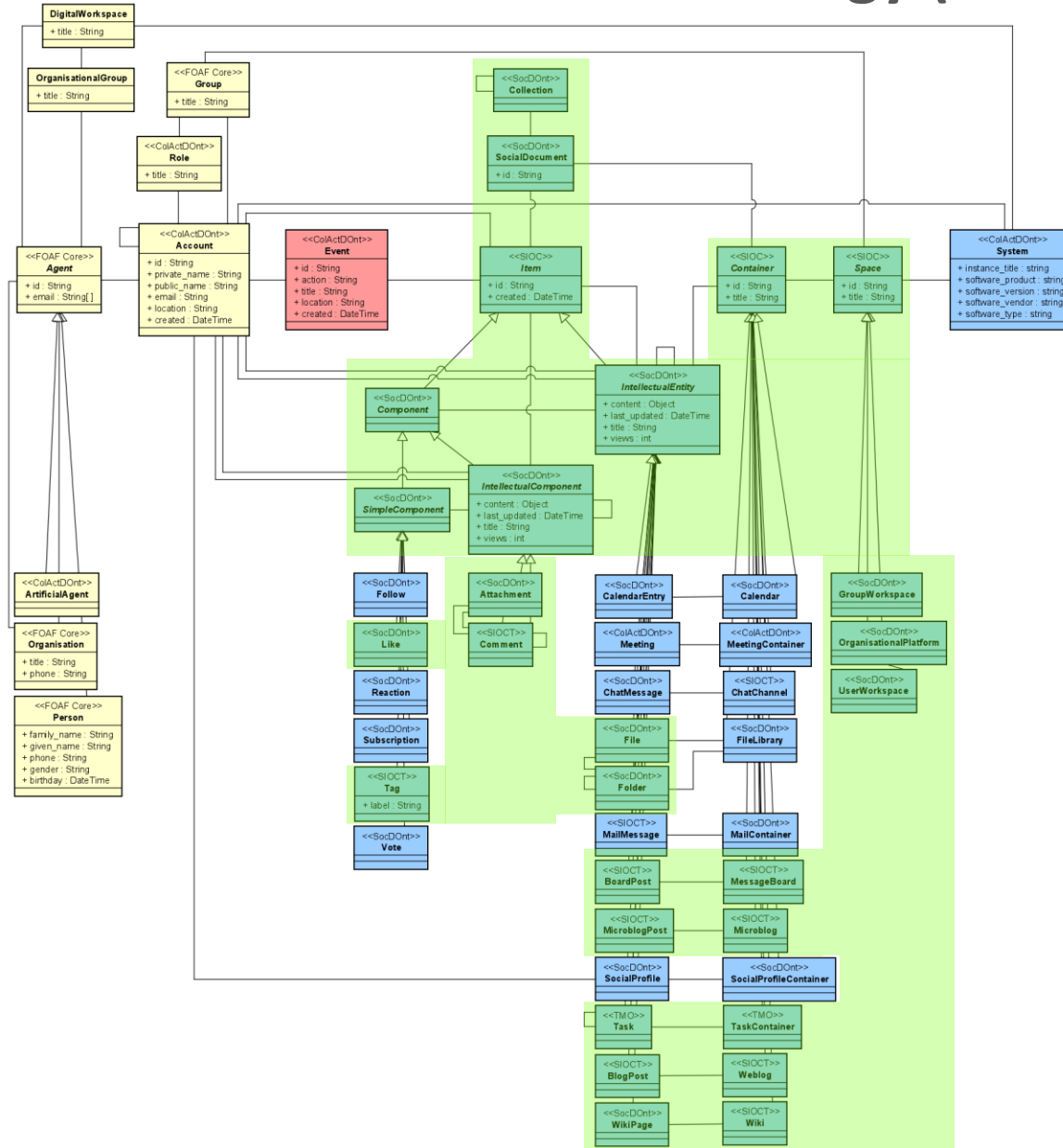


Williams, S. P., Mosen, J., & Schubert, P. (2020). The Structure of Social Documents in 53rd Hawaii International Conference on System Sciences, 2825–2834

Concepts from SocDOnt

Concepts from existing ontologies

# Collaborative Actions on Documents Ontology (ColActDOnt)

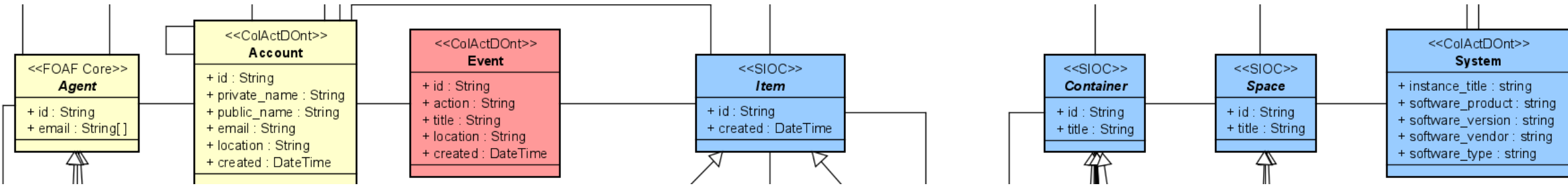


Organisational

Transactional

Content

# Collaborative Actions on Documents Ontology (ColActDOnt)



Organisational

Transactional

Content

# Formal Specification as Ontology

[w3id.org/SocDOnt](https://w3id.org/SocDOnt)



## SocDOnt - Social Document Ontology

### IRI / Latest Version:

<https://w3id.org/SocDOnt> [JSON] [OWL/XML] [TTL]

### Version IRI / This Version:

<https://w3id.org/SocDOnt/1.0> [JSON] [OWL/XML] [TTL]

### Date:

01/2020

### Current version:

1.0

### Authors:

[Susan Williams](#), [Julian Mosen](#), [Petra Schubert](#)

### Publisher:

[CEIR - Center for Enterprise Information Research](#)

### Visualisations:

[PNG](#) - [SVG](#) - [WebVowl](#)

### Publications:

[Williams, S., Mosen, J., & Schubert, P. \(2020\). The Structure of Social Documents. 53rd Hawaii International Conference on System Sciences, 2825–2834. - DOI: 10.24251/HICSS.2020.345](#)

### License:

[Attribution 4.0 International \(CC BY 4.0\)](#)

[w3id.org/ColActDOnt](https://w3id.org/ColActDOnt)



## ColActDOnt - Collaborative Actions on Documents Ontology

### IRI / Latest Version:

<https://w3id.org/ColActDOnt> [JSON] [OWL/XML] [TTL]

### Version IRI / This Version:

<https://w3id.org/ColActDOnt/1.0> [JSON] [OWL/XML] [TTL]

### Date:

XX/2022

### Current version:

1.0

### Authors:

[Petra Schubert](#), [Martin Just](#)

### Publisher:

[CEIR - Center for Enterprise Information Research](#)

### Visualisations:

[PNG](#) - [SVG](#) - [WebVowl](#)

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- - DOI: -

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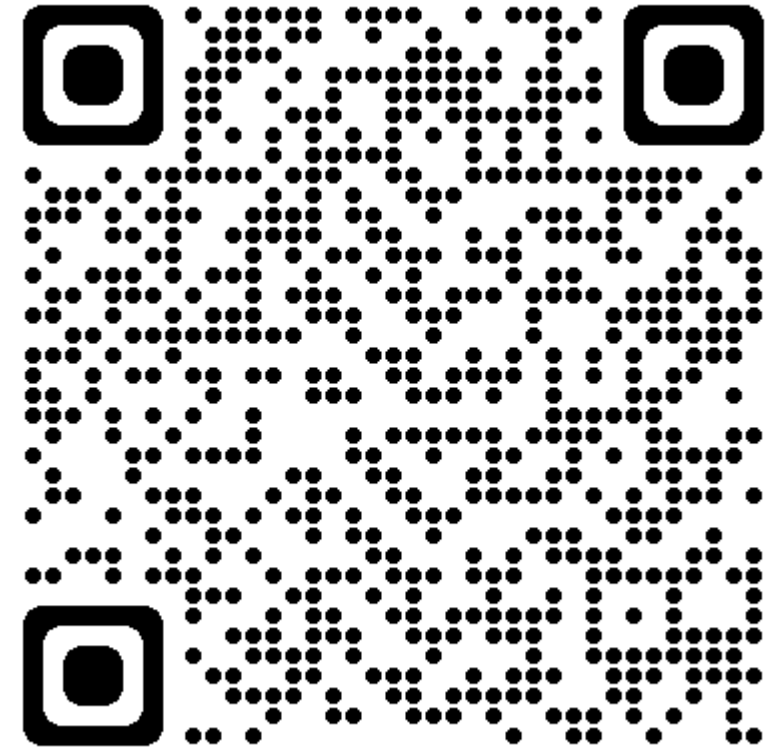
# Conclusions and Outlook

- **Collaboration “processes”** are ad hoc and rarely pre-defined (unlike ERP)
- Digital support of collaborative activity frequently spans across **multiple software products**
- **“Event”** is a useful concept for understanding user actions on documents
  - What are *people* doing?
  - What *content* is created?
- We identify the sequences (traces) of user activity to interpret digital support of joint work
  - Who did what when where with whom on what artefact?
- Ontology (ColActDont) defines concepts and their relationships → common language
- This structured way at looking at the organisation of groups and content also helps to describe the architecture of collaboration software
- Our call to action: We need a standard logging format (harmonised event log)  
→ software providers



# Interactive Audience Discussion

- The upcoming slides contain a live interactive polling
- Instructions for participating:
  1. Scan the QR code or follow the link below
  2. Enter your name and wait until the first question is displayed. It will be unlocked automatically.
  3. Submit your answers



[pollev.com/ceir](https://pollev.com/ceir)

# Do you know what the collaboration processes look like in your company?

Yes

No

# Are there any guidelines or predefined processes on how to collaborate in your company?

Yes

No

# Do you think collaboration processes can be optimised in your company?

Yes

No

I don't know

# Do you know which collaboration tools are used in your company at all?

Yes

No

# Open Q&A Session

Top

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Start the presentation to see live content. For screen share software, share the entire screen. Get help at [pollev.com/app](https://pollev.com/app)

# Thank you for your attention!



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