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Analysing and Visualising the Rhythms and Flows of Hybrid Work

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Abstract. Following the COVID-19 pandemic, there has been a growth in hybrid work arrangements in organisations. With this greater flexibility, hybrid workgroups face the challenge of increasingly complex levels of coordination, communication, and articulation work to organise the flow of work. To understand how these recent transformations shape the ways in which collaborative joint work takes place, the aim of this research is to provide more contextual analyses and rich visualisations of the rhythms and flows of joint work for hybrid workgroups. The exploratory study investigates the flow of synchronous work, the work locations and how the composition of workgroup members influences the daily work organisation. It explores the complex assemblages of people, technologies, and work contexts with a focus on the transitions between physical and digital workspaces. This requires novel methods capable of providing contextual richness over a long period. Hence, one aspect of this work is to address the methodological challenge of combining rich ethnographic data and methods with the scale of digital trace data analytics and computational methods. A longitudinal diary study will be conducted, designed to act as a bridge between both approaches, which will be enriched with digital trace data from selected collaboration systems.

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1. Motivation and Background

The constant evolution in information and communication technologies in organisations has led to transformations and changes to the working lives of employees. During the COVID-19 pandemic, many employees were forced to work remotely, which accelerated these transformations and influenced how employees communicate, collaborate, coordinate and manage information (Lund et al. 2021; Mancl and Fraser 2020; Scharf et al. 2023; Sporsem et al. 2023). Following this, many companies stated that they will continue to support work from home to a certain extent (Allianz 2020; Siemens 2020; Šmite et al. 2023), resulting in a growth of diverse hybrid work arrangements and models (fixed vs. flexible, remote-centric vs. office-centric) (Gratton 2021; Hopkins and Bardoel 2023; Smite et al. 2023). With this greater flexibility in choosing when and where to work and which systems, application and tools to use, more complex assemblages of people, artefacts, technologies, work contexts and practices arise that are driven by regular switches and transitions between the physical and digital space. Consequently, this poses the challenges of increasingly complex levels of coordination, communication, and articulation work between workgroup members that are required to organise the flow of work within hybrid joint work (cf. Babapour Chafi et al. 2022; Bullinger-Hoffmann et al. 2021; Haas 2022).

Against this background, there is a need to provide more contextual analyses and rich visualisations to understand these recent transformations to work practices. With comprehensive insights into the rhythms and flows of hybrid work researchers can further explore, for example, the impact of work interruptions, identify empirical evidence for activity-based working or investigate emerging sequences of coordination work and the complexity of work practices that are driven by these seamless transitions and handoffs in software-supported collaborative work.

These insights provide a deeper understanding of hybrid collaborative work, which are needed “to sufficiently understand collaborative technology [...] and to develop models that are in line with the variety and complexity of the systems that we are designing and using today” (Lee and Paine 2015, p. 183). Hence, this investigation will further explore this intersection between technology and work practices and sociotechnical change, drawing on insights from CSCW research (Ackerman 2000; Bullinger-Hoffmann et al. 2021; Schmidt and Bannon 2013) to identify and explore these new challenges, emerging work practices and new requirements that today’s hybrid workgroups face.

However, to achieve this requires novel research methods that are capable of providing contextual richness over extended timeframes and allow for the identification of patterns and trends. Several studies have utilised diary methods to collect rich and contextual data about different aspects of work, such as task switching, interruptions or collaboration (Czerwinski et al. 2004; Shah and Leeder 2016), but these studies have a narrow temporal focus. The captured data could also

be enriched with further data to increase the scale of the investigation, as for example shown by Cao et al. (2021). Hence, one aspect of this work is to address the methodological challenge of bridging rich ethnographic and diary study data with digital trace data.

2. Research Aim and Questions

This work seeks to understand how these recent transformations shape the ways that collaborative joint work takes place. Workgroups in which members regularly switch between different work locations, different work tasks, and synchronous and asynchronous collaborative work activities experience new challenges and require higher levels of transitions and handoffs. As a result of adaptations to different compositions of workgroup members and their work location, new or adapted work practices and patterns might emerge. Hence, the aim of this research is to provide rich contextual analyses of the rhythms and flows of joint work for hybrid workgroups.

This involves the identification, analysis, and visualisation of the flow of synchronous and asynchronous work (“When are people working together synchronously?”) and work locations (“When do individuals work in the office, when at home, and where do transitions occur?”). It explores activity-based working as well as other patterns and trends at an individual and workgroup level (“Are there work activities that typically preferred to take place in the office or at home?”). A key element of this research is to reveal the complexities and influencing factors of hybrid work by exploring and visualising the complex assemblages of people, artefacts, technologies, work contexts, practices, and processes. Special attention is paid to regular switches and transitions between physical and digital work locations, workspaces, and collaboration tools and how the composition of workgroup members influences the daily work organisation.

While this work investigates the rhythms and flows of hybrid work in general on a high-level, it continues with a specific focus on the flow and nature of (planned and spontaneous) collaborative or joint activities/meetings that take place within hybrid workgroups to inform synchronous work support.

3. Methodological Approach

With digital trace analytics researchers can follow users through traces they leave in collaboration systems and gain insights into how these systems are used, which actions they take and which artefacts people work with (cf. Lampe 2013; Mosen et al. 2020; Østerlund et al. 2020). One of the key benefits is the capability to handle the high volumes of data required to examine hybrid working holistically over a

long period of time. However, these non-reactive system data are descriptively thin (Janetzko 2017) and capture only what happens in the systems.

In contrast, workplace studies and ethnographic methods offer nuanced insights into the lived experience of hybrid workgroups and the situated improvisational and contextual factors these workgroups are operating in (Heath and Luff 2000; Suchman 2006; Szymanski and Whalen 2011). However, these methods face the challenge of handling high volumes of data, making them less scalable.

Thus, researchers face the challenge of having methods suitable for capturing and analysing large volumes of descriptively thin data as well as methods for capturing and analysing narrowly focused, low volumes of descriptively rich data and no methods for bridging between those two.

Hence, this study aims to combine the strengths of both approaches going beyond the traditional methods of ethnography and digital trace analytics by developing alternative methods that are capable of tracing work-based activity across multiple spatial and temporal frames on a larger scale.

To achieve this, a longitudinal diary study will be conducted, designed to act as a bridge between both approaches. This diary study is designed to capture in-depth contextual data across multiple spatial and temporal frames, meaning to follow different workgroup members who themselves transition between locations and work tasks over an extended timeframe. In a subsequent step the diary data will be enriched with digital trace data from selected collaboration systems and tools.

The idea is to increase the scale of research by leveraging the analytical possibilities provided by trace analytics and computational methods as well as to increase the scope and richness of the workplace study by extending and enriching trace data with more contextual and descriptively rich data gathered by the diary study and further ethnographic methods, such as interviews, that can be linked to the data captured in the diary.

The enriched and aggregated data set of sociotechnical sequences of collaborative hybrid work will then be further explored and suitable (computational) methods for analysing and visualising the rhythms and flows will be identified and developed. These visualisations and rich pictures will be the foundation for investigating the phenomenon of interest as outlined above.

In essence this work is exploratory and sociotechnical in nature and follows a pluralistic and pragmatic approach utilising a multitude of methods. For interpretation and analysis this work draws on theoretical and analytical lenses from the disciplines of Social Informatics/Science and Technology Studies, Computer-supported Cooperative Work and Workplace Studies. Furthermore, this research will draw from the emerging fields of computational ethnography and trace ethnography (Abramson et al. 2018; Beaulieu 2019; Geiger and Ribes 2011) for the development and design of the proposed novel approach that combines trace and ethnographic data and methods in the data collection, analysis and visualisation.

4. Expected Contribution

The contribution is two-fold: Firstly, it introduces a methodological advancement as it is extending ethnographic data in scale and scope by extending and enriching it effectively with digital trace data and computational methods. This includes the identification, design, and development of suitable methods and a thoughtful composition of the captured data and methods. This poses a significant methodological and data integration challenge, but when successfully solved will provide the foundations for comprehensive analyses, interpretations, and theorisations on the rhythm and flow of everyday work that can be adapted for similar research endeavours.

Secondly, the analysis and findings of this work contributes to the understanding of hybrid workgroups, the transforming and emerging work practices around coordination and collaboration within hybrid workgroups and the orchestrations and flow of hybrid work and collaborative synchronous sessions. In more detail, this work sheds lights on the lived experience of hybrid workgroups, provides empirical evidence into the sequences of (emerging) work practices involved in the conduction of hybrid work. Furthermore, it presents a comprehensive view of the complex assemblages of people, artefacts, technologies, and work contexts, shedding more light into the influencing factors of collaborative hybrid work and the transitions employees face in everyday work.

With these insights, researchers and organisations can identify and develop ways to better support hybrid and distributed workgroups and inform the design of collaborative systems and software that specifically address the challenges faced in the context of hybrid work.

5. Work/Findings to Date

The first phase of research is a longitudinal diary study in which a workgroup consisting of nine members is participating. The data collection started April 2023 and is ongoing in order to achieve a comprehensive dataset containing the data from at least one year. It contains daily data about the work times and work location on each day of work, as well as details about synchronous work activities such as meetings, e.g. start and end time, location, participants, or type of meeting (spontaneous vs. scheduled).

An app for the data collection of the diary data is currently in development. Current findings already revealed that the current method of data collection via an Excel spreadsheet is tedious and is more error-prone over the duration of the study. With the help of this data collection app, we aim to overcome some limitations and challenges diary studies face, such as participation fatigue or recall bias (Hyers 2018; Jarrahi et al. 2021), and improve the data quality and ease of use.

Besides the ongoing data collection, first ideas for rich visualisation of the rhythms and flows of hybrid work were developed. One example visualisation of the flow of meetings is shown in Figure 1. In addition to that, a first prototype of an interactive analysis and visualisation tool was developed to act as proof of concept of exploring the data and bringing the visualisation ideas to life.

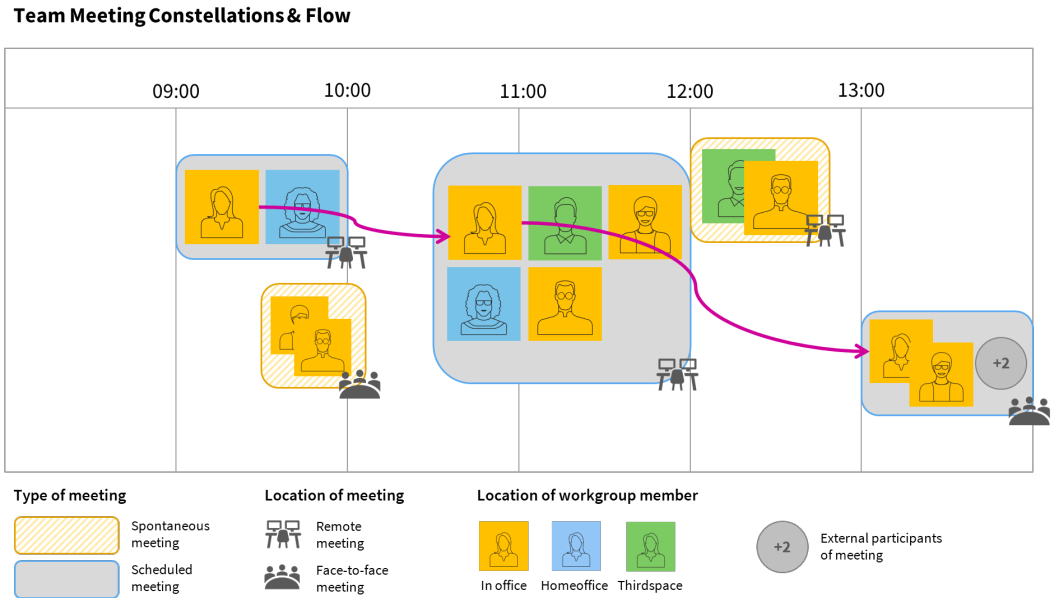


Figure 1: Example of one idea for visualising the flow of meetings.

Since the majority of the diary data is captured, next steps involve running deeper analyses of the data to explore the flow of work, initially on a high level. There are many interesting aspects to investigate further, such as identifying patterns, transitions, or frequent handoff situations (e.g. of actors, systems, documents, places). While the captured data already proved itself help- and insightful on its own, the idea behind the diary is to act as a bridge between ethnographic data and digital trace data to achieve a context-rich dataset. Hence, one major step is the enrichment of the current data with captured digital trace data from relevant systems and tools.

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