Leveraging communication data to support workers' learning in collaborative complex work

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As work in modern workplaces becomes more complex and interconnected, we notice a missed opportunity to leverage the rich communication data (e.g., information captured from meetings and community discussions) to support follow-up collaborative activities. However, it's unclear how to design the right information artifacts to harness this potential and effectively support workers in complex work. In this workshop paper, we draw on our ongoing work and prior literature to explore designs of innovative information artifacts in two specific scenarios: scholarly collaboration and collaborative podcast creation. Our exploration highlights the potential of transforming communication data into interactive information artifacts to enhance workers' learning in complex collaborative work. We hope to share our explorations and learn from workshop participants who have extensive experience researching complex work. We hope the discussion could further our understanding of the potential of these information artifacts in supporting workers' learning in complex tasks.

CCS Concepts: • **Human-centered computing → Collaborative interaction**.

Additional Key Words and Phrases: keywords

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1 INTRODUCTION

Effective communication between stakeholders and collaborators is crucial for successful collaboration in today's complex, distributed, and interconnected work environment. Responding to the increasing need for communication, workers now spend more time in online meetings and messaging since the 2020 onset of the pandemic [8], and the change persisted even with the more recent shift to hybrid work [1]. These synchronous and asynchronous communication can often be characterized as part of the "articulation work," defined as the necessary work that unites distributed yet interdependent work elements [10–12]. In complex collaborative work, articulation work can take many forms such as "ensuring the flow of resources," "making arrangements about the division of labor," or "linking or meshing otherwise divided tasks" [7, 10, 11].

While articulation work plays an important role in supporting team planning, coordination, and decision-making in solving complex tasks [9], it is often considered as the extra work required to enable primary work that has "specific agendas and goals of the work situation" [4]. Indeed, the significant communication data in the form of chat logs, meeting recordings, emails, and comments that people now produce as part of their collaboration on complex tasks is oftentimes treated

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as throwaway. For instance, our ongoing research finds that workers who record their remote meetings rarely go back to them, let alone use them in follow-on activities with others, despite wanting to do so.

We see a missed opportunity and argue that these repositories of communication data, rather than the detritus of old conversations, could be a rich resource for teams and beyond. Not only could they be useful for workers to catch up, but they could be leveraged by new members, peripheral team members, and other members within the community of practice. The rich repository of communication data, which embeds teams' collective wisdom, decisions, and social dynamics, could enable continuous learning of tacit or explicit knowledge about collaboration, building the common ground necessary for successful collaboration [6]. Distributed teams or teams with high turnover rates, such as scholarly collaboration teams, recreational podcast production teams, and open-source project collaborations, could especially benefit from the newly enabled learning opportunities.

In the following sections, we first reflect on how current technologies fail to leverage communication data to their full potential. We focus on one specific type of data: information captured from remote meetings. As a first attempt to address the missed opportunity, we proposed five design dimensions for information artifacts that could support follow-on activities beyond the communication session itself. Moving beyond the context of remote meetings, we then explore design ideas on how to leverage communication data to support learning in two specific scenarios inspired by our ongoing work: scholarly collaboration and podcast creation. We also consider how emerging technology, such as large language models (LLM), could augment learning opportunities.

2 CHALLENGES AND OPPORTUNITIES TO LEVERAGE REMOTE MEETING DATA FOR POST-MEETING ACTIVITIES

Video meetings became an increasingly important venue for workers in complex work to communicate and exchange information with each other in complex work. While recordings and notes capture significant communication data from video meetings, this information is not being leveraged to its full potential to support the collaboration. In our ongoing empirical work, we asked people how they use information captured from video meetings and their challenges in using such information. We found that information captured from meetings has the potential to support a wide range of post-meeting activities, including serving as an archive, a task reminder, to support onboarding and group inclusion, to support additional sensemaking, and to serve as a starting point for follow-on collaboration. However, people also commonly have challenges in conveniently capturing information from meetings, effectively consuming information after meetings, and flexibly sharing information with others. These challenges indicate that the current design of the common information artifacts, such as video recordings or notes, could not effectively support workers in post-meeting activities in ongoing collaboration.

We then conducted a series of co-design studies to understand further the gap between current and ideal information artifacts for supporting their ongoing engagement with meeting information. We synthesized five design dimensions for ideal information artifacts, including **DD #1:** Incorporation of multiple linked data types and rich media; **DD #2:** Structure(s) to help users explore information; **DD #3:** Ability to view and share custom artifact presentations for varied contexts and audiences; **DD #4:** Connection to contextual information outside the meeting; **DD #5:** Ability to evolve after the meeting. Mapping existing meeting information artifacts into the five dimensions, we found that while users expect to continue to engage with information even after the meeting ends, current artifacts, such as recordings and notes, focus on preserving and presenting information from meetings but rarely support workers in transforming and molding such information to support post-meeting needs.

3 DESIGN OPPORTUNITIES TO SUPPORT COLLABORATIVE COMPLEX WORK IN SCHOLARLY COLLABORATION AND PODCAST CREATION

In this section, we explore how to leverage the rich communication data in complex collaborative work to support workers' learning in two scenarios where we have ongoing research.

3.1 Scenario 1: Scholarly Collaboration

Collaboration among scholars can be complex, especially when working on projects that involve multiple geographically dispersed institutions. During such collaborations, scholars often need to quickly familiarize themselves with each other's interests and expertise, continuously improving their understanding of research topics and methodologies throughout the project lifecycle. Communication platforms such as Slack play a crucial role in facilitating information exchange and building a common understanding among team members. While these conversations are often rich with insights, arguments, and references that are useful for individuals and teams to learn and build on top of, there is often a lack of structured tools or support to leverage these learning opportunities fully.

We attempt to leverage these rich social signals in past communication data in a literature recommendation system within Slack, where researchers often have rich conversations about ongoing research projects. Specifically, we found via a series of formative interviews with researchers that information such as papers that researchers previously shared in the conversation, the discussion around a particular paper, and people's reactions to previously shared papers can be valuable social signals for scholars to make judgments on future paper recommendations. Scholars leverage these social signals to determine what paper they would like to recommend to the group, how they explain the relevance of the recommended paper, and how they evaluate the relevance of papers shared by other people.

We took inspiration from these empirical observations when designing AI-powered features in our system so that it can leverage the social signals in past conversations and help scholars learn about the discussion topic and group norm. Specifically, we collected three groups of social signals from past conversations: (1) academic papers that people have shared; (2) users' engagements around papers, such as their reactions and replies to message threads containing paper recommendations; and (3) users' general discussion around a paper.

Once these social signals are collected, they are used to facilitate scholars' learning in two ways: (1) support information seeking and deeper understanding by providing AI-based recommendations of relevant papers. The system curates a list of papers that are relevant to the ongoing discussion topic based on previously shared papers and users' engagements around them; (2) Contextualize the recommendations by connecting them to the conversation context. The system provides a variety of explanations, including how the new recommendation connects to previously shared papers, discussions, or specific users, surfacing implicit connections in the conversation.

Scholarly collaborations often evolve quickly and are rich with references, which requires scholars to continuously learn and refresh their understanding of the discussion topic and the social dynamic. The AI-powered features can serve as a translator to resurface useful information from past conversations and transform them into useful forms for researchers' continuous learning (e.g., a summary of previous discussions as explanations to new recommendations).

3.2 Scenario 2: Collaborative podcast creation

Podcasting has emerged as a way of content creation in recent years. As with any complex work, our ongoing empirical work of the podcaster community shows that producing a podcast requires tightly coupled collaborative work that involves diverse stakeholders - including hosts, guests,

engineers, and audiences. Each episode is a culmination of diverse perspectives molded by negotiations and collaborative efforts. As a result, it often requires creators to learn complex technology configurations (e.g., how to record remotely with guests, how to get feedback from guests on editing) to produce an episode successfully.

In response to the complex technical and collaboration skills required as part of the podcast creation process, we observed that the production of podcasts is deeply rooted in communities of podcast creators, such as podcast networks or online forums. Rich conversations that could support creators in acquiring new skills or getting familiar with the community norm could happen within the community in the form of online gatherings or forum discussions. Prior work also showed that workers of complex tasks can often benefit from continual learning from their peers [2, 3, 5], especially from those who have relatable experiences [5]. However, due to the abundance of unorganized discussion, podcast creators commonly face challenges in leveraging these resources in actual practices, hindering the transfer of complex skills within the community. For example, some participants mentioned that when they have specific questions about audio editing, it can be hard to locate such information in the Slack channel of their podcast network when the main reason for joining the network was to gain access to those resources in the first place.

We explore the design of a repository of skill-sharing conversations that can more effectively support podcast creators in acquiring the needed skills.

- **Incorporate multi-media demonstration of skills** Demonstration of complex skills often involves conversations with multiple back and forth. Capturing the nuances of podcasting requires more than just text. The repository of skill-sharing conversations could support integrating each conversation with screen recordings, illustrative video clips, and supplementary resources. Combining multiple linked data types could give podcasters a more comprehensive learning experience and allow them to acquire the skills more effectively.
- **Provide structure and summaries to help users explore** To help users extract relevant information when needed, the repository could encourage users to attach relevant tags to tutorials or tips. The repository could also leverage LLMs to generate TLDRs for long-form unstructured content. These structures could help learners sift through and access the rich content repository more effectively.
- **Embed the information in editing interface** To better contextualize the learning materials from the community of practice, the repository could be integrated into common editing tools. For example, editing tools could use AI-powered features to surface relevant tips and tutorials from the community during users' editing process, creating an experience of asynchronous shadowing. This would allow users to follow expert demonstrations in real-time, bridging the gap between learning and application.

In conclusion, leveraging the rich communication data within the community of practice could be a promising learning resource for podcasters. AI-based features such as summaries or in-context content recommendations could serve as a curator of past unstructured information to support users in accessing such information more conveniently.

4 CONCLUSION & DISCUSSION QUESTIONS

As communication becomes an increasingly important component of the modern workplace that involves complex and interconnected tasks, one promising opportunity is the effective utilization of communication data generated during collaborative tasks. Our ongoing research explores the opportunity to transform these remnants of old conversations into valuable assets that support workers' learning of skills, new knowledge, and social dynamics in collaborative complex tasks. We explored several concrete design ideas in two concrete scenarios: scholarly collaboration and

collaborative podcast creation. In both scenarios, we show that novel AI technologies such as LLM could be promising in augmenting our ability to transform and curate unstructured past communication data into useful formats.

While our exploration points to promising opportunities, it motivates more nuanced discussion. Specifically, we are interested in discussing the following questions with other participants:

- What specific learning objectives do workers have in various scenarios? What other scenarios of collaborative, complex work can workers benefit from summaries and curation of past communication?
- How can these information artifacts be designed to suit workers' current workflow?
- How else can the capabilities of large language models (LLMs) be leveraged to support the curation and transformation of past communication data?

We look forward to sharing our insights and exploring these unresolved questions with participants in the workshop.

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