Hybrid Meetings in the Modern Workplace: Stories of Success and Failure

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Abstract. Hybrid meetings, in which co-located and remote participants connect via video or/audio, have become ubiquitous in the globalized modern workplace. Despite, or perhaps because of this ubiquity, conducting hybrid meetings is not straightforward. In this paper, we investigate the opportunities and challenges of hybrid meetings. We conducted a multi-site study of hybrid meetings in two global software companies in Europe, using participant observation, semi-structured interviews and video-analysis. Our findings show that there is a significant diversity in formats and requirements for hybrid meetings in different working environments. Further, hybrid meeting participants perceive and handle a range of both expected and emergent problems. While some problems can be attributed to difficulties or failures of technical infrastructure, others arise out of asymmetries of interaction and social and cultural context across the co-located and remote settings. We argue that managing these asymmetries is key to a successful hybrid meeting.

Keywords: Hybrid meetings · Video conferencing · Remote collaboration

1 Introduction

Hybrid meetings are video- and audio-based meetings that include both co-located and remote participants. With the advancements of video-conferencing software and technologies, business meetings in the increasingly globalized world go beyond the physical meeting room. The hybrid meeting has become ubiquitous in modern international and multi-site workplaces, and their success (or failure) has significant economic and societal impact. Yet, most of our understanding of video- and audio-based communication is from studies conducted in laboratory or controlled settings.

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In this paper, we will take a holistic approach to better understand how hybrid meetings take place in the workplace today, and identify when they succeed and when they fail. We present a multi-site and multi-method study where we observed hybrid meetings at two global software companies in Denmark and in the United Kingdom. We raise and seek answers for the following questions: What are the main problems of people in hybrid meetings taking place in the business setting? How are hybrid meetings diversified across different working environments, departments or companies? How do certain instances emerge as problems in hybrid meetings and how are these problems constructed by different users? Our findings show that hybrid meeting experiences are diverse, and what makes a hybrid meeting a success or a failure is a complex socio-technical phenomenon shaped by the technical infrastructure and social and cultural context.

2 Related Work

Within the fields of HCI and CSCW, there has been a long history and large amount of research on video-mediated communication and video-based meetings. Researchers focused on how to improve people's experiences with hybrid/virtual meetings and virtual collaboration by studying diverse physical and social factors including but not limited to gaze awareness [15,26], audio [22,28], camera angle [12], seating position [27], social presence [3], culture [5,6,21], gesture [8,18], trust [1,24], as well as telepresence [14,16,17].

There are a number of user and case studies, which inspired us for conducting our research. Based on their naturalistic analysis of individuals collaborating on different tasks in the workplace, Heath and Luff claim that video-mediated communication causes asymmetries in interaction, which refer to changing reciprocity and manners in communication with the existence of a "technological medium" [9,10]. According to the authors, the asymmetries of interaction do not necessarily limit or prevent the video-mediated communication, but also pave the path for new forms of interaction and collaboration at work [9].

In their study, Isaacs and Tang compare video-based, audio-based and face-to-face interactions by analyzing a small teams' collaboration using a desktop video conferencing prototype [13]. They find that while using video improves both verbal and nonverbal communication compared to audio-based meetings, video-based interactions are still inefficient in terms of securing peripheral cues, floor control and side conversations, and need to be supported with other shared tools making the collaboration experience as natural as possible [13].

Based on the long-term experiences of developers, researchers and users, Dourish et al. call for departing from the presumption of comparing the experiences of video-mediated communication with face-to-face interaction and underline how complex conducts in media spaces occur in individual, interactional, communal and societal levels in the long run. [7]. Authors claim that media spaces are also part of the "real world" and interactions within media spaces are larger than person-to-person interaction [7].

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Another interesting example is a combination of the internal company and external costumer study through surveys and interviews focusing on understanding user's problems with hybrid meetings in order to prototype a more effective remote collaboration tool [30]. The authors categorize problems with hybrid meetings at conference rooms as "audio problems", "remote attendee problems" and "conference room problems" and find that remote participants feel disadvantaged as they are mostly disengaged, forgotten and ignored by the co-located participants and even moderators of those meetings [29]. The same study also underlines that co-located participants accuse remote participants for not paying attention to them, which causes them to ignore the remote participants even more and remote participants remain isolated from the meeting, which continues like a vicious circle [29].

In another study, Tan and Kondoz focus on understanding obstacles to a seamless virtual collaboration through a longitudinal and multi-method ethnographic research based on the use of a virtual collaboration desk [23]. By examining the virtual meetings of a software project group for around ten months and collecting both quantitative and qualitative data, researchers find that the success or failure of virtual collaboration is based on diverse factors ranging from the "team participation and cultural differences" to "management and policy issues" and "technology barriers" in an organization [23].

3 Methodology

We conducted a multi-site study combining three qualitative methods: participant observation, semi-structured interviews, and video-analysis.

3.1 Collection of the Empirical Materials

We conducted fieldwork in two global software companies located in Denmark and United Kingdom (Table 1). In Denmark we conducted participant observation at the Global Business Services section of a large software company (*Company A*) and observed four daily scrum meetings and one retrospective meeting. Scrum is an "iterative and incremental project management" approach especially applied in global software development projects [11]. Scrum meetings take place mostly early in the morning for fifteen minutes standing up, and once every five weeks a longer so-called retrospective meeting is held, during which they assess the implementation process of the project and teamwork. The team we observed at *Company A* consists of 27 members, 20 of which are based in Denmark and seven of which are based in India. Therefore, they have daily scrum and retrospective meetings in a hybrid meeting format. In all meetings there were scrum masters, who are also team members and intervene when there is a problem during the meetings regardless of whether the issue is technical or social.

In the United Kingdom we observed another large software company (*Company B*). At *Company B* we conducted fieldwork at diverse departments including but not limited to Sales, Marketing, Finance, Cloud Solutions and Research.

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Table 1. Overview of the observed meetings at Company A and B. Each meeting is represented with the company letter (A, B) and the number of the meeting (1–5). (Example: A3 - Third meeting at Company A)

	A1	*A2*	*A3*	*A4*	*A5*	*B1*	*B2*	*B3*	*B4*
Format[a]	VH	VH	VH	VH	VH	VH	VH	VH	AV
Duration (min)	15	15	15	5	90	90	60[b]	45	30[c]
Number of Participants[d]	**4C** 1R	**14C** 5C	**6C** 3C	**2C** 2C	**17C** 6C	**11C** 3R	**8C** N/A	**8C** 2R	104R
Type	Scrum	Scrum	Scrum	Scrum	Retrospective	Status Update, Brainstorming	Monthly Business Update	Acquaintance Meeting	Status Update
Department	Global Business Services	Global Business Services	Global Business Services	Global Business Services	Global Business Services	Sales, Finance, Marketing	Sales	Sales, Finance, Marketing	Cloud Solutions
Software	Zoom Meetings	Zoom Meetings	Zoom Meetings	Zoom Meetings	Zoom Meetings, Mural	Microsoft Teams	Microsoft Teams	Microsoft Teams	Skype for Business
Visuals	Large Screen	Large Screen	Large Screen	Large Screen	Large Screen	Large Screen, Microsoft RoundTable	Microsoft Surface Hub	Large Screen	Personal Computer
Audio[e]	Portable Mic, LS	Portable Mic, LS	Portable Mic, LS	Portable Mic, LS	Portable Mic, LS	Microsoft RoundTable, LS	Microsoft Surface Hub, LS	Microsoft RoundTable, LS	Headset
Video Analysis						x		x	

[a]VH: video-based hybrid meeting, AV: audio-based virtual meeting, [b]17 min connection issue, [c]Only observed time, [d] **Bold**: at the observed venue, C: co-located, R: remote, [e]LS: loudspeaker

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Overall we observed three video-based hybrid meetings, two of which were also recorded with a steadicam and a portable camera, and one audio-based virtual meeting. Virtual meetings are different from hybrid meetings in the sense that there are no physical rooms in those meetings, meaning that all remote participants are connected through their personal devices.

Apart from the participant observation and video recordings of meetings in both companies, we conducted semi-structured interviews with two employees from *Company A*, one from Denmark and one from the Indian team but currently employed in Denmark for one year, and with 21 employees at *Company B* from diverse departments. All of the interviews were audio-recorded except the one with a software engineer, who refused to be recorded due to being shy, but still accepted to be interviewed. Due to the time constraint of the employees, the average length of the interviews is nine minutes. Interviewees were briefly asked to tell about their department/work/position details, their experiences with hybrid meetings such as how often they have those meetings, what kind of issues/needs they have and whether any further improvements they expect from hybrid meeting tools.

3.2 Analysis

All audio-recorded interviews were transcribed in verbatim format, but in order to avoid difficulties in reading as well as to save space, intonations, interjections as well as missing text are shown as three dots closed with square brackets ([...]). All recorded videos were watched thoroughly a number of times until the saturation point in insight was reached. Relevant parts of the meetings were written down in notes. Interview transcriptions, participant observation and video recording notes were merged in the qualitative data analysis software *NVivo* and analyzed through the stages of open coding, line-by-line coding and focused coding [4].

4 Findings

We categorized our findings into two themes: technical infrastructure and social and cultural context.

4.1 Technical Infrastructure

Size and Functionality of Meeting Rooms. One of the issues *Company A* is facing is that their team is very crowded and the size of the rooms, that are specifically used for daily scrum meetings, are quite small. In these meetings also nobody takes notes on computer or notebook and it is difficult for them to locate the computer in the best position so that the other end of the meeting in India can see everyone in the room. Both employees from *Company A* we interviewed underlined the need for larger and technologically more advanced video-conferencing rooms at both ends.

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As we conducted fieldwork in two global software companies in Europe, we observed that they maximized and to a considerable extent standardized their technological resources, meaning that their employees use the same laptops, tablets or other digital devices, at the individual level. However, one of the significant problems, which is harder to normalize, is the unequal meeting infrastructure in both ends of the meeting. Both companies have hybrid or virtual meetings with partners or people located all around the world. They also have better meeting infrastructure such as faster bandwidth connection and more enhanced room functionalities compared to partners located abroad. For instance, the team working at the branch of *Company A* in India, does not have a large screen and the members use their laptop for the meetings, which makes them look down during the meetings since they are standing up all the time and makes the eye contact and social cueing harder for them. Moreover, they do not have the same connection bandwidth compared to the team in Denmark. The situation is also similar in *Company B* as one of our interviewees underlined:

> *The main issue is that is the quality [...] of the equipment. And [...] quality of line... Quite often [...] at least when we have a real hybrid meeting, when there is a team locally and another team on the other side of the of the network. [...] If we here at [Company's name] have [...] quite good equipment like RoundTables and Surface Hubs, on the other side of the network, the equipment is usually not that good and then it becomes a problem because people in the other [...] side do not hear it clearly what I was saying and it is much more difficult for them to [...] to contribute something to the discussion. Because they feel somewhat out of context of the meeting.* (P19)

Even meeting rooms in the same company varies to a considerable extent. Especially in *Company B*, where there are many meeting rooms available, employees cannot be sure about which functionalities each room has and can experience some problems in setting up the meeting and therefore lose time:

> *Yeah so problems connecting to meetings happen quite often, in my experience it stems through I think just the sheer number of the different types of [...] machines available to connect to different connection points, different ways of joining that we have here on campus, so this is a Surface Hub, there is only a couple of these on campus so we are not used to joining them regularly, we have connectivity issues in some of the meeting rooms because they all contain different technology. So when you walk into a meeting room, you are not quite sure what technology you are gonna have in there, so you may not be prepared or with the right adapters or connectors to be able to join straightaway.* (P9)

The diversity of the meeting infrastructure even in the same company causes trouble mostly during the setup process. *Meeting B2* was delayed around seventeen minutes due to problems with setting up the *Surface Hub*. Also in the *Meeting B3*, showing slides on *Surface Hub* took twenty minutes.

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According to a participant of *Meeting B2*, setting up a virtual meeting, in which everyone is connected through his/her own personal device, is easier than setting up a physical room connection to a hybrid meeting:

> *[...] The problems that we have with these technologies at the moment are more of an infrastructure problem, so for us today the network let us down or the technology in the room let us down rather than [...] actually just joining, I tend to have an easier experience when it is just myself joining from my machine [...] rather than connecting in a larger room for hybrid meeting is when we normally experience these delays.* (P9)

Another participant from *Company B* addressed as well that joining the meeting through personal devices is a must in order to create a shared, equal space for everyone in the meeting regardless of one's role or task in that particular meeting:

> *I think we need to start the default to behavior of everyone joining the meeting from a device. Irrespective of whether you are [...] the presenter or organizer of the meeting. Cause quite often [...] you are the organizer of the meeting here and you are the one that presents and joins the conference call. [...] and you have got the knowledge of and, and remembering who is on, who is also in the meeting joining remotely whereas if everyone joins from their device, then there is kind of like this common space, you got the common space, the physical space. And then also the digital life if everyone joins the same space [...] and keep people in the room [...], [be] aware of who is, who is also in the meeting. And to, to pull them in more often.* (P13)

Our observations showed us also that virtual meetings can be favored more than hybrid meetings as it is easier to setup and lead the meeting and to form a more equal platform for interaction in the workplace. In this regard *Meeting B4* was interesting in the sense that it was an audio-based virtual meeting that took place among 104 participants and the conversation among participants was very smooth and understandable. It was striking to see that even co-located team members, were all connected to the meeting with their personal devices from their desks. The turn taking among the participants was fluid and participants did not interrupt each other.

Hardware and Software. We observed that for audio-based virtual meetings, especially with participants working in an open office environment, using high quality headsets is a must for having an efficient meeting. This also applies for remote participants, who work in an open office environment. Audio quality is similarly important in hybrid meetings, which can be observed especially when there are breakdowns during those meetings. Different workplaces or teams have diverse coping strategies with audio problems or breakdowns. During the meetings we observed at *Company B*, co-located participants suggest the remote

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participant to turn off his/her video when there is a breakdown in connection. However, in *Company A*, instead of turning off the video in the call, they mute the call, keep the video on and switch to landline phone call:

> *By the time I came in 2015 [to Denmark] again, [...] I saw that we were actually more and more towards the video calls and where we stick only to Skype call as well. [...] which sometimes have this network glitch issues when you are having different countries and there was a gap and stuff like those. And then we decided to actually make a balance of this. [...] What we decided is to maintain the video-call [...] without the audio and keeping the phone call quality by this AT&T calls or DIRECT phone calls, which actually helped us understanding and looking at the people as well, and we can understand what they are working on, have the fluidity of the team if somebody is having an opinion, even during the short period of meeting, so if [...] during the fifteen minutes someone actually raised a hand and they want to share an opinion. It, it actually allowed us to, to take an opinion rather than just one person talking all the time. So it allowed more in interacting manner definitely when we have this.* (P1)

Sometimes screens are not proportionate with the size of the room, and in *Meeting B1*, a couple of times co-located participants were not able to see the screen clearly and had to stand up and get close to the screen. This happened very often especially when a document similar to a *Microsoft Excel* sheet was shown on the screen. It was not easy for participants to read them from their seats. Also there have been cases where the screens were too bright to see or especially in roundtables, people turning their backs to the screen had difficulties in seeing the remote participants, which minimized their interaction as well.

While *Company A* was relying on the laptop camera in their hybrid meetings, *Company B* was using *Microsoft RoundTable*. We observed that as the camera of a laptop makes co-located participants face the laptop most of the time, panoramic 360° cameras give the co-located participants the opportunity to sit round the table and talk without being forced to look at the screen and at the same time allow remote participants to follow the meeting smoothly. However, this also decreases their interaction with the co-located participants and isolates them from the physical room as co-located participants there can forget to interact with them.

In terms of software, *Company A* and *B* differ from each other in the sense that while *Company A* has been using a special software only for remote meetings, which is called *Zoom Meetings*, *Company B* was in a transition stage from *Skype for Business* to *Microsoft Teams*, which is more of a digital workplace platform, at which all meetings, notes, work-related chat and documents are held and stored. One of the employees we interviewed at *Company A* mentioned that they are using different tools during hybrid meetings and it would be better to rely on one single tool, which could potentially minimize the network glitches.

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4.2 Social and Cultural Context of the Meeting

Meeting Task. In *Company A*, we observed that there are more clear and defined meeting tasks, which have been repeated and implemented very often since the team has a very long history and experiences of working together from different countries. In *Company B*, even though there is a better and well established technical infrastructure, these resources are not always used efficiently. This partially stems from the fact that while the section we observed in *Company A* focuses on software development, in *Company B* we examined diverse departments, which do not always have hybrid meetings with the same people, for the same purposes and in the same meeting rooms. One of the participants of the *Meeting B2* claimed that using *Surface Hub*, which caused them around seventeen minutes delay in joining the meeting, was not necessary as it was not an interactive meeting, they were only following it:

> *Yeah so this wasn't a great use of the Hub to be honest because we in this area were more of a listening participants only. In Hub meetings are really much better in these spaces much better used when we are interacting in the Hub, which we weren't doing today. So we could have just done this in front of a normal TV and have [...] the same [...] listening experience, [...] We didn't have any input into that meeting today from this room. So [it] is more of an audience view with the people doing the hard work were [...] signed in the other room. So [...] I think in general it is better to use the Hub in this kind of environment to do interactive meetings where you are on video and you can share your desktop and use the whiteboard on the Hub so, they, they are much better use of this space.* (P9)

Language and Accent. Both team members we interviewed in *Company A* underlined the challenges of understanding the English accents of each other during meetings. Getting used to different accents takes time and requires practice, and participants can ask for help from other local person, who is in the room:

> *In the beginning I used to pretend. [laughs] [...] It takes, it takes some time. [...] Like for instance when I was [...] in another project [with] some Indian resources [...], I have difficulties understanding what they were actually saying. And sometimes we would look at each other here in the room when everybody who was present here and then we always have a landed resource and for instance at the moment we have a guy from India here and he, he gets it. So [...] we would look to him and he would sort of say it again so we would all understand it. But now as time has passed, I understand what they say.* (P2)

Cultural Behaviors. In the scrum meetings of *Company A*, participants from both sides interacted standing up and gave status updates one by one. However, while co-located people on the Danish side were talking to each other and often

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interrupting each other, participants connected from India were not interacting with each other at all, they were focusing on the conversations in the Danish side and answering only when they were directly asked any questions. We were curious about whether Indian participants were afraid or shy of interrupting the boss and asked about it to the Danish interviewee. She called this a matter of cultural behavior and differentiated Danes and Indians in social interaction:

> *I think that is very much a matter of cultural behavior. [...] The Danish people are very used to talking among each other and talking all the time and there is not, I don't know if I should say, it's the respect thing but it's just I feel that the Indian culture is more like, they wait until they are asked to speak whereas Danish people they just speak. They don't wait. If I have something I wanna say, I'll just say it. I am not waiting for my turn or waiting for somebody to ask me to speak, I'll just speak out. Whereas in India the, the culture is very different, so they will wait. [...] In our case, so this is the safe place, everybody could speak, everybody can say, you can say whatever you want. [...] That takes a lot of time for everybody to get used to that culture and be comfortable in it.* (P2)

Team Dynamics and Proximity. Most of the team members in both *Company A* and *B* know their remote participants better and meet and work with them often physically too. Therefore, during the hybrid meetings with these team members, they can recognize their voices well and do not necessarily need to see them on the screen when they are talking. However, two of the researchers we interviewed in the *Company B* mentioned that they do not meet with their remote collaborators physically and feel the need to be aware of who are in the other end of the hybrid meeting when they are talking. Thus, when there is a breakdown in connection, turning off the video is not an option for them. Awareness of others in the meeting is vital if the participants do not know each other well. Secondly, hierarchical relations among the participants shape the physical setting of the co-located participants as well as the direction of the conversation in hybrid meetings. In both companies' meetings, the bosses were sitting or standing up close to both the co-located people and the screen, where the remote participants or the other physical room can be seen. Due to their managerial role in the team, they prefer to be in the center of the conversation, since they lead and/or respond to the discussions during those meetings.

Personal Habits. During the meetings in *Company A*, we observed that the distance to the microphone and how much to increase the voice is an issue. Especially during the *Meeting A5*, participants, who were sitting far to the microphone and the screen, did not seem to care about how much the Indian team can hear them. They seemed to ignore their distance to the microphone and preferred to talk at the same voice level. In our interview, the scrum master from *Company A* mentioned the difficulty of changing people's behavior especially with the microphone:

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[...] And then there is a habit part as well. People have a tendency not to go close to the microphone. [...] For instance if I join from home, I can very clearly hear people who are also joining in from a phone, but people who are here in the room, I cannot hear them very well because they don't come close to the phone. We try [...], we have an extension microphone and everything, but still it is a matter of habit. [...] "Okay, make sure you do it! Make sure you do it! Make sure you do it!" And a lot of times [...] we would say to people "Okay, could you please get closer? Could you please remember, please remember?" (P2)

A habitual success in virtual meetings could be the *Meeting B4*, at which we observed that the turn-taking and conversation during the meeting was very smooth as participants were very literate in observing through the software who is talking and since their work is always based on remote audio meetings, they were very familiar with the manners of establishing digital dialogues such as waiting 1–2 s after the person finishes his/her talk or speaking clearly and distinctly. One of the participants of *Meeting B4* underlined the importance of following the etiquettes for every meeting case:

One thing, this term "etiquettes", that need to be the kind of the manners [...] having [...] within those kind of hybrid meetings, is well also annoying in different places, you may be in a, in a quite meeting room and maybe in an open plan area. It is to make your sound mute when you are not talking, things like that. So it is important to make sure people know what those etiquettes are and what they should do because they don't always do. (P10)

Digital Literacy. While both companies we observed are specialized in software, still the employees in different departments have diverse levels of knowledge in terms of setting up the meeting and fixing the technical problems. The case of *Company B* was interesting in the sense that for their all remote meetings, they use their own software and technical equipment, which makes them more literate and skilled of the digital tools they are using. Interestingly, when we were conducting fieldwork there, *Company B* was doing in-house testing of a new hybrid meeting software for businesses, which was not released to the market at that time but was allowing the guest users to enter the remote meeting, meaning that they could use this software not only among their team members, but also with their customers. However, the adaptation and shift of a particular department or group to the new, rapidly evolving software was diverse and it was challenging for some participants to adapt to more than ten major updates a day. One of the employees told us that he feels embarrassed when he is using the software with his customers as it is still not a mature product and can have some errors, which he cannot fix. He mentioned that during these in-house testing processes he considers himself like a guinea pig, due to having hybrid meetings with the new software based on the trial and error. Not having sufficient knowledge regarding the technology used is definitely an inconvenient situation for the employees.

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Stress. In relation to meeting task, hierarchical relations among the team members as well as the outsiders may affect the stress level of the participants, causing them not to make rational decisions when they need to fix an issue. *Meeting B3* had such a moment. A Marketing company wanted to give a presentation to the Sales team at the *Company B* in order to convince the team to work together in the future. Since the team leader and another team member were not at the office, the presentation had to be done in a hybrid meeting format. 360° panoramic camera and the new software were used. The meeting started with a 20 min delay because the presenters from the Marketing company could not manage to connect to the Wi-Fi of the company in order to share the slides through the new software. In the end, instead of uploading the presentation to another computer and sharing the slides with the remote participants through that computer, the employee from the *Company B*, who was also the facilitator of the meeting, decided to broadcast the presentation slides, which were shown on the large screen of the meeting room, through her mobile phone, causing one of the employees of the Marketing company hold her phone for around half an hour. She could not think about any other solution as the head of the team, who was connected remotely, complained that there is not enough time left and they should hurry with their presentation.

Inclusiveness of Remote Participants. According to one of our interviewees, having limited awareness of other participants in the physical room makes the interaction unequal and even unfair for remote participants:

> *[Remote participants] they have a little bit of a disadvantage of not being there. [...] Information access might not be easy or for them, to take a turn in the conversation isn't quite as easy. It's more of an active process to invite them in and then clearly stating to whom they are talking, who they are addressing, [...] through the verbalization what they would like to achieve. [...] Especially when [...] you have got many people that are remote and in different locations as well, for them figuring out who is taking turn [...] especially if there is a camera feed and [...] you have a lack of verbal and non-verbal cues as well, figuring out what's the dynamics in the group is just a little bit harder, you have to be really explicit in just saying specific people and it's harder if you wanna say something to know when it is the right time to chip in.* (P15)

In *Meeting B1*, we noticed that remote participants' interaction and participation were quite limited. During the whole meeting, they muted their microphones except while they were talking and especially when the brainstorming session started, they did not provide any input or share any idea even though that was expected from all participants in the meeting. They continued working on their own computer and did not focus on the meeting as the brainstorming was taking place on the physical whiteboard in the actual meeting room, which they cannot see properly as well. However, interestingly, in the *Meeting*

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A5, the input by the participants during the brainstorming process was provided equally on the *Mural* platform, which is an online brainstorming software. We observed that during this meeting, remote participants were more engaged and productive compared to the *Meeting B1*. Furthermore, again in *Meeting B1*, when there were breakdowns during remote participants' turn, co-located participants made fun of the situation among each other and laughed. One of the co-located participants even took the photo of the screen when the image of the remote participants was hanging to share it with the group. However, since they cannot hear the conversation in the time of a connection problem, remote participants miss even the fun part of their own "remote" participation, mostly being annoyed by the issue and trying to fix it or repeating the same sentences.

In the hybrid meetings of *Company B*, in which mostly 360° panoramic cameras used, co-located participants do not face the screen where they can see the remote participants, which cause the co-located participants to ignore them unless they make a noise. This was also mentioned by one of our interviewees:

> *[...] Why is this [...] a problem? Because quite often conversation focuses [...] in the local table. And then the other party, it is quite difficult to get into this context. It is difficult to switch the context [...] to the other side of the network. [...] [Remote participants] [...] they are just watching it's and because the, the quality of the audio is not very good, [...] and all the [...] people sitting on the table, they turn mostly back to them and the ones that turn that are faced to them are on the other side of the table so they are very small on the screen. You see [...] visually there is no [...] feeling of being part of this meeting [...] It's like you are sitting quite [...] in another room basically and you need to shout to [...] this crowd in order to get attention to yourself.* (P19)

5 Discussion

According to Oulasvirta, today's IT infrastructure, "the real ubicomp" is different from how Weiser foresaw in his famous vision of ubiquitous computing [25]: *"is a massive noncentralized agglomeration of the devices, connectivity and electricity means, applications, services, and interfaces, as well as material objects such as cables and meeting rooms and support surfaces that have emerged almost anarchistically, without a recognized set of guiding principles."* [19]. Bell and Dourish also underlined that ubicomp of today depends on the ways in which users "improvise" and "appropriate" technologies [2]. Our study shows that while a reliable technical infrastructure is a must for a successful hybrid meeting, it is still the user, who has to be knowledgeable and experienced enough to cope with the technical issues and breakdowns of hybrid and virtual meetings. In their study on individuals' handling of different devices during the face-to-face and remote collaboration in the business setting, Oulavirta and Sumari found that employees rely on their prior experiences and knowledge regarding the technologies and physical tools they are using [20]. However, the uncertainties of

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especially the mobile work and the unpredictability of resources in every situation require changes of plans and strategies, which require additional mental and/or physical efforts of the employees [20]. In our fieldwork we also observed that the unpredictability and uncertainties of remote work and collaboration still require endless mental work by the users, evolving their experiences and coping strategies over and over again. While prior planning is needed for a better meeting experience, still being flexible for last minute changes and efficient solution-making is required.

As we underline the importance of the social and cultural context, we argue that hybrid meetings create asymmetries that extend beyond the reciprocity of perspectives explored by Heath and Luff [9]. In other words, while video-mediated communication itself transforms the look, gestures and manners of bodily conduct, it also broadens the already given asymmetries stemming from the diversity of the social and cultural background of participants. With the proliferation of hybrid meeting technologies and experiences around the world, the asymmetrical inequality in opportunities of communication due to a combination of diverse technical, social and cultural factors becomes crucial to overcome.

One of the major asymmetries in hybrid meetings we observed is the diverse experiences between co-located vs. remote participants. Remote participants feel isolated from the meetings and co-located participants dominate the interaction. Differences in language and accent, cultural behaviors, personal habits, digital literacy and stress as well as technical infrastructure in different geographical locations contribute to the asymmetries of interaction and making meetings more inclusive for everyone is one of the main challenges of hybrid meetings.

It was clear from our fieldwork that all the hybrid meetings we observed were impacted by the effect of socio-technical asymmetries. The only seemingly successful meeting we observed was *Meeting B4*, which was the audio-based meeting with 104 participants. It almost seems counterintuitive that a meeting at that scale would be far better than a small meeting with a handful of co-located and remote participants, but we believe that the lack of asymmetry in the meeting was crucial to its success. Not all meetings can be fully virtual, and we believe the hybrid meeting is here to stay in the modern workplace. How can the experience and effectiveness of hybrid meetings improve? The problems we saw were socio-technical in nature, and we do not believe that the solution only lies in technological innovation. Hybrid meetings open up opportunities for companies to communicate and organize themselves in ways that was previously impossible. However, we observed that they are conducted haphazardly, and a simple recommendation would be to train modern knowledge workers in conducting meetings. Nevertheless, this also requires a more holistic articulation of the challenges that may arise, that we believe we have contributed with in this paper.

From a technological perspective, the video-conferencing software could be equipped with better tools to overcome technical and social asymmetries. We can only speculate in how such tools could be manifested, but one could imagine tools that could better indicate technical issues, for instance when the connection of a remote participant drops, or tools to visualize the activity of participants,

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which could help an organizer make sure all participants got equal time to speak. However, there is also a danger that such tools could be used for surveillance.

While through this study we do not point out specific implications for design, our findings suggest the following: Apart from improving and equalizing the technical infrastructure for all sides of the meetings, taking the meeting requirements (i.e. the meeting task and content, the number of co-located and remote participants as well as their level of experience) and socio-cultural differences of the participants into account even before setting up the meeting environment play an important role in contributing to the success of the hybrid meetings.

6 Conclusion

Through a holistic study of hybrid meetings in two global software companies in Europe, this paper shows that hybrid meetings are diversified across different working environments and both the technical infrastructure and social and cultural context of the meeting play an important role in shaping the effectiveness of the meeting. While size and functionality of meeting rooms and hardware and software used in meetings form the technical infrastructure of the meeting, meeting task, language and accent, cultural behaviors, team dynamics and proximity, personal habits, digital literacy, stress and the inclusiveness of remote participants are critical social and cultural dynamics that are part of the workplace culture and social relations around it, affecting the experiences of participants with hybrid meetings. Our research brings into light that asymmetries of interaction and social and cultural context in both co-located and remote settings can be considered as decisive factors in making hybrid meetings succeed or fail.

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