Format Matters: Comparing the Inclusiveness and Effectiveness of Hybrid and Remote Meetings

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The surge in remote and hybrid work has provided many benefits in terms of flexibility and autonomy, but it also presents challenges when it comes to team collaboration and meetings. Using a mixed-methods field study, we compare hybrid and remote meeting configurations to better understand how to improve the inclusiveness and effectiveness of these different meeting modalities. Our findings indicate that overall, fully-remote meetings are the most inclusive and effective. Fully-remote meetings are perceived as more inclusive of remote attendees despite their lower chat usage compared to hybrid meetings. We also find that people's preferred format varies depending on the purpose or type of meeting and the skill set of the meeting moderator. We provide recommendations for improving meeting inclusion and effectiveness in both hybrid and remote meetings, such as training moderators and integrating chats with the main meeting.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**.

Additional Key Words and Phrases: remote meetings, hybrid meetings, meeting inclusion, meeting effectiveness

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1 Introduction

The COVID-19 pandemic has transformed the way organizations and employees view traditional work structures, resulting in the widespread adoption of remote and hybrid work. One survey found that as of May 2023, 12 percent of full-time employees were fully remote, and 29% of employees were hybrid, working from the office some days and from home on other days [4]. As technology continues to advance and connectivity improves, remote and hybrid work models will likely become even more efficient and therefore more prevalent.

There are many benefits to hybrid and remote work, both to firms and individuals, such as the ability to recruit and retain top talent, to promote healthier work-life balance, and create greater autonomy for employees [19, 35, 36]. However, the distributed nature of remote and hybrid work can make communication and collaboration more challenging. As such, virtual and hybrid employees frequently communicate and collaborate through technology-mediated meetings. Recent data suggests that time spent in meetings per week increased roughly 150 percent [14], likely due to the advancement of meeting technology and the ability to meet from any location. Unfortunately,

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even before the pandemic, research finds that only 35 percent of employees report feeling able to contribute during meetings, even when they have something to add to the conversation [8]. In addition, computer-mediated communication tools (i.e., video-conferencing systems) introduce unique challenges for remote meeting participants, such as distortions in video and audio [38], disruptions in turn-taking [23], and lack of opportunities for informal interactions [33], ultimately leading to severe difficulties in overall comfort [3] and establishing trust [50].

As offices have reopened following the pandemic, people have settled into a mix of in-person, remote, and hybrid work arrangements. As a result, there has been an increase in hybrid meetings — meetings where at least two participants are in a room together and at least one is attending virtually from a different location. One could plausibly hypothesize that now, after the all-virtual period of the pandemic, the inclusion of remote attendees in hybrid meetings could have either improved or declined. On the one hand, when the pandemic first caused wide-spread remote work, employees who had previously been remote from their collaborators reported that all remote meetings were an improvement over hybrid meetings because everyone was now on an equal playing field [49]. Having now experienced the remote side of work, it could be in-office attendees who will be aware of the challenges of remoteness, and work towards including remote attendees moving forward. On the other hand, hybrid meetings could simply revert back to the way they were prior to the pandemic, resulting in similar inclusiveness problems as pre-pandemic. These differing possibilities motivate our study, where we look to compare the *inclusiveness*, which we define as fostering an environment of involvement and participation, and *effectiveness* that refers to achieving the meeting's goals. Further, we explore two hybrid meeting formats that many organizations have adopted to try to improve hybrid meetings for the remote attendees: (a) having all in-person meeting attendees bring their own devices and (b) assigning an in-person moderator to facilitate remote attendees' participation. The choice of these assignments was motivated in part by meeting guides circulating at the company we study that suggested both of these approaches (moderator/facilitator and devices) to improve hybrid meetings.

This study investigates the following research questions:

- **RQ1**: How does meeting format impact perception of inclusiveness?
- **RQ2**: How does meeting format impact perception of effectiveness?
- **RQ3**: How does meeting format influence engagement with video conferencing tools?
- **RQ4**: How does the meeting purpose and size affect preference over format?

More specifically, we recruited employees from a large technology corporation (N=332) to participate in an 8-week long field study, in which we collected and analyzed three types of quantitative and qualitative data sources: telemetry meeting data, Likert-scale and open-ended survey responses, and semi-structured interviews. This multi-method approach enabled triangulation, which improved quality, credibility, and comprehensiveness of our results. Our findings suggest that the participants perceived fully remote meetings to be most effective and inclusive, nevertheless the participants preferred to have co-creation type meetings (e.g., Brainstorming and Planning) via hybrid modalities. We also highlight the unique challenges of moderated hybrid meetings, and report that the limited skill set and experience of the meeting moderators can hinder the effectiveness of hybrid meetings. Given the growing role of hybrid meetings in a post-pandemic era, this paper concludes by applying a socio-technical lens to list recommendations on how to improve both remote and hybrid meeting configurations moving forward, such as training meeting moderators and advancing virtual co-creation technology.

2 Related Work

Our work is related to existing research on meeting effectiveness and inclusiveness, different configurations of remote and hybrid meetings, and technological tools and features used to engage participants in distributed meetings. Below, we review findings in each domain which inform and guide our research.

2.1 Work Meetings: Perceived Effectiveness and Inclusiveness

Work meetings are defined as purposeful, work-related interactions occurring between at least two individuals that have more structure than simple chat, but less than a lecture [39]. Meetings provide a space for sharing information, brainstorming, solving problems, and deciding what actions to take moving forward [25, 30, 40]. Beyond their task focus, meetings are key sites where organizational roles and relations are manifested [12, 47]. In some cases, workplace meetings are one of the few opportunities that employees may have to voice their thoughts, present ideas to organizational leaders, and develop relationships with peers [1].

Meetings vary in their effectiveness. Prior research shows that people can perceive meeting effectiveness differently, and factors such as open communication, task-oriented focus, and agenda can influence this perception [32]. Effective meetings not only enable achieving goals and moving the agenda forward in a timely manner, but also they can foster feelings of open communication, bolster positive job attitudes and employee well-being, promote employee engagement and organizational commitment, while reducing turnover [1, 26, 39]. Conversely, ineffective meetings relate to increased fatigue, greater subjective workload, and negative feelings about the day [27, 39]. Perception of meeting effectiveness — measured mainly via self-reported survey studies [15, 25] — is a critical component of meeting success, as individuals' views on effectiveness can impact attendance, general behaviour, and longer-term retention [5, 41].

Meeting participants can also perceive inclusiveness differently. Inclusiveness refers to harnessing diverse resources by creating an environment of involvement, respect, and connection [20], and in the context of meetings refers to when all participants get the opportunity to contribute, and all voices are heard. Davidson [10] examines prior collaboration studies in distributed teams and highlights the key role of trust and inclusion in team members for fostering effective collaboration. More recently, Cutler et al. [9] explored the link between meeting effectiveness and meeting inclusiveness in a remote context, finding meeting participation, meeting inclusiveness, and feeling comfortable to contribute in the meeting are all related to meeting effectiveness.

In our study, we build on and extend prior works to gain greater insight into meeting inclusion and effectiveness. While previous research in this space has primarily focused on fully remote meetings, we investigate various remote *and* hybrid meeting configurations. Thus, we are able to compare feelings of meeting inclusion and effectiveness in different meeting modalities (i.e., fully-remote meetings, hybrid meetings where in-person attendees have their devices, and hybrid meetings with an assigned moderator). Additionally, we incorporate a qualitative research methodology via inductive interviews to better understand the relationship between meeting inclusion and effectiveness. Leveraging a qualitative design, we are able to capture the *why* behind quantitative research findings that link meeting inclusiveness and effectiveness.

2.2 Remote and Hybrid Meeting Configurations

Many prior Human-Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW) research has explored the dynamics and configurations of remote meetings, especially at large companies with many distributed teams and varying objectives. Drawing on empirical data from the meeting organizers at a large technological company, Standaert et al. [48] found that

while exchanging voice and sharing screens are critical components for successful remote meetings, viewing other participants' videos was deemed less essential. With a focus on sociality in remote meetings, findings from a large global study revealed that employees struggled to balance social and work aspects of meetings, further advocating for flexible meeting technologies that provide agency to teams for selecting features [6].

Hybrid meetings have recently surged as a common format to engage both remote and co-located participants. These meetings involve video- and audio-based media that facilitate both in-person and remote participation [44]. A fieldwork study of hybrid meetings in two large software companies found that a shared laptop in the physical room was the main format for conducting video-based hybrid meetings. However, this approach posed challenges for remote participants to view all co-located team members [44]. The physical infrastructure, as well as social factors (e.g., accent barriers and cultural behaviours) further exacerbated the *socio-technical asymmetry* that leads to the isolation of remote members and domination of co-located participants [44]. In addition, analysis of brainstorming meetings at a U.K. global software company — set up as a panoramic camera in the middle of the table with attendees all bringing their own laptop devices — revealed that meeting disruptions (e.g., video turning off due to network connectivity and outside noise) exacerbated the lack of inclusion among the remote attendees. The authors propose that setting up expected behaviors and workarounds ahead of time can help alleviate this problem [43].

Especially in a post-pandemic era when many employees have returned to in-person work, engaging in both remote and hybrid meeting is a new norm. Distributed teams continuously make decisions on the types of meetings to organize remotely or in a hybrid format, taking into account meeting characteristics such as size and purpose. As such, it is crucial to investigate different remote and hybrid configurations and compare effectiveness and inclusiveness of these meetings. Unlike the prior works that focused on either remote or hybrid meetings in isolation, this paper compares remote meetings and two hybrid meeting modalities.

2.3 Distributed Meeting Tools and Communication Channels

HCI and CSCW literature has extensively explored remote and hybrid meetings, using off-the-shelf commercial software and system prototypes to empirically examine meeting and participant characteristics.

The main commercial tools of investigation are Skype [2, 24, 37], Microsoft NetMeeting [21, 28], and Google Hangout [22], and more recently post the COVID-19 pandemic, Zoom [13, 29] and Microsoft Teams [6, 45]. Many of these studies aimed to investigate particular meeting and attendee characteristics, as well as behaviours using video conferencing tools, in empirical and ethnographic studies. For instance, Awori et al. [2] explored sharing indigenous knowledge with Kenyan communities and discovered remote manipulation of videos can mitigate the challenges of managing a video conferencing session. Other HCI and CSCW works designed and developed video conferencing prototypes that showcased novel techniques to improve formal and informal interactions in remote meetings. For example, HERMES (Harmonious Environment by Round Meeting Space) [18] is a pioneer work in the space of hybrid meetings that aimed to lessen fixation of attention on the main monitor by spatially placing in–person and remote participants in a round table. In addition, Roussel [42] introduced the "Well" which aimed to complement the existing video conferencing solutions and designed a relaxed and joyful atmosphere to facilitate informal communications.

Besides the audio and visual modalities as the main communication channels in hybrid meeting tools, many platforms also offer parallel chats that enable participants to exchange text and image-based content [46]. Using the integrated chat feature provides a complementary mechanism for attendees to share resources, maintain engagement, and form bonds with other participants [46, 51].

However, chat usage can contribute to increased cognitive load and distraction [16]. This paper compares chat usage in remote and hybrid meeting configurations to better understand how written communication is leveraged in meetings in hybrid and remote contexts.

3 Method

Between mid-April and early-August 2022, we conducted a large scale study of employees' experiences in remote and hybrid meetings at a large technology company. This company uses Microsoft Teams for meetings. For hybrid meetings, onsite attendees go to a conference room with a projector, video camera, microphones, speakers, and a meeting-room device that connects directly to the meeting. Onsite attendees can also join the meeting on a laptop (without audio) to have direct video and chat access. To provide a rich picture of the employees' perceptions on various hybrid and remote meeting configurations, we collected telemetry, survey and interview data. We ran an 8-week study of hybrid and virtual meetings with full-time employees that encouraged participants to try different meeting formats, sent them surveys about their experience, and gathered telemetry data from their meetings. We then conducted follow-up interviews with a sample of employees that participated in the experiment to learn more about their experiences in the various meeting formats. To alleviate concerns about disrupting work, we made clear that participants were only being asked to use the selected format "whenever possible" and they had the discretion to ignore the request if it was not appropriate for a given meeting. We made it clear that we would only access the metadata from the meetings (e.g. number of participants, number of chat messages, etc), not the content of any messages, audio or video. The study and data use was approved by an IRB and the company's privacy team.[1] The IRB protocol further discouraged collecting large-scale demographic data on the participants.

3.1 Hybrid Meeting Experiment

Participants were recruited via internal mailing lists between February and March, 2022. They were asked to partake in an 8-week experiment exploring different hybrid and remote meeting configurations, with the goal of understanding how meeting configuration and technology can influence perceptions of meeting effectiveness and inclusiveness. Upon consent, participants were assigned to one of three conditions at random. For the first two weeks, in the first condition, they were instructed to, whenever possible, have their meetings "hybrid with devices"—those attending in person bring their own device or personal laptop to the meeting and connect in to the meeting—for a duration of two weeks. In the second condition, the participants were instructed to have their meetings "hybrid with moderator": those attending in-person do not log in on their own devices, but there is a meeting moderator present who connects to the Teams call on their own device in the conference room to facilitate remote attendees' participation. The moderators were broadly instructed to monitor meeting activities (such as 'hand raises') and solicit participation from remote attendees. These light instructions aimed to sustain authentic meeting behavior. In the third condition, participants were instructed to, whenever possible, organize their hybrid meetings as fully-remote (virtual) meetings, where all attendees connect in to the meeting from their own devices in separate locations. We sent each participant a (non-blocking) calendar invite for the two week period to help them remember. The instructions sent to participants for each meeting format are in Appendix A.

A total of 332 participants signed up for the study. Following a within-subject study design, all participants experienced the three conditions at random, each condition lasting two weeks, with a week in between each condition – amounting to a course of 8 weeks. Randomization happened at

[1]Name of the IRB and approval number is redacted for anonymity.

the individual level, not the group or meeting level and only applied to meetings that the participant organized (not all meetings they attended). The random assignment caused these participants to be more likely to experience the different meeting types than other employees, but was not strong enough to support an instrumental variable analysis. For that reason we focus on the survey results and differences in meeting configurations as defined by the telemetry rather than defined by the treatment assignments.

3.1.1 Survey data. There were intermediate surveys at the end of each condition (e.g., every two weeks) asking for participant insights on each configuration. There was also a final survey at the end of the study to gain a holistic evaluation of the participants' experiences with different meeting formats. At least one intermediate survey was completed by 153 participants and a total of 190 participants completed the final survey at the conclusion of the experiment. The survey questions are in the Appendix. The survey responses were then grouped and aggregated to inform the distribution of categories (e.g., Least Inclusive, Somewhat Inclusive, and Most Inclusive) in each meeting format.

3.1.2 Telemetry data. We supplement our survey data with telemetry data automatically generated by Microsoft Teams. For each participant in the study, we pull data on all the meetings they joined during the study period. For each meeting attendee, we see when they join and leave a meeting and the type of device they use. We also have the first 8 bits of an attendee's IP address to categorize each attendee as "onsite" or "remote" for each meeting.[2] We also observe when conference rooms join the meeting, which combined with whether participants were onsite, allows us to categorize the format of each meeting.[3]

Refining the dataset to meetings that contained between 3 and 50 attendee, and duration in which the median user session length is at least 2 minutes yielded 20,006 unique meetings for further analysis. Meeting size was lower-bounded by 3 to reflect the smallest possible hybrid meeting, and upper-bounded by 50 to exclude very large meetings, such as company-wide all-hands sessions, which are qualitatively different types of meetings . The minimum user session length of 2 minutes aimed to filter out accidental join-ins or meetings that had been cancelled, but some attendees accidentally joined. Based on the telemetry, the distribution of meeting types is, out of 20,006 meetings, 18,415 (92.0%) meetings were conducted remotely, while 1,213 (6.1%) and 378 (1.9%) were in hybrid+devices and hybrid+moderator conditions, respectively.

We also have chat actions (e.g., instances of writing and reading messages, replying, reacting, and scrolling), though not the contents of any chats. We match chats to meetings based on time and user IDs. In total, we have 4,475,615 chat actions mapped to a meeting included in the study.

3.2 Qualitative interviews

To supplement the quantitative survey and telemetry data, we conducted semi-structured interviews with a sample of employees who participated in the experiment. Our goal was to further explore and unpack employee perceptions of meeting effectiveness and inclusiveness in the remote and hybrid meeting configurations they experienced throughout the duration of the experiment.

For recruitment, we reached out via Email to 320 experiment participants asking if they would be willing to partake in a follow-up interview to learn more about their experiences with and perceptions of the various meeting configurations and experimental conditions. A total of forty-five

[2]Referencing an existing list of the company's private networks, we categorize IPs as onsite or remote. We do not observe IP address for each meeting, but every few hours. We call an employee 'onsite' for a given meeting if they use an onsite IP on that day (local time).

[3]If no conference room device joined the meeting, it was categorized as "all-remote." Among hybrid meetings we categorize those with only 1 user joining onsite as "with moderator" and those with multiple onsite users joining as "with devices."

employees agreed to partake in an interview. Interviews began following the completion of the experiment in early June 2022 (6/9/2022) and concluded mid July 2022 (7/25/2022). One member of our author team, who was removed from the experimental data and analyses (i.e., 'blind' to the experiment and survey data) conducted the 1:1 interviewees with each of the forty-five employees. The interview was designed to further understand individual experiences with hybrid and remote meetings, and explore factors leading to the success or lack thereof of their various configurations. All interviews took place virtually over Microsoft Teams and were both recorded and transcribed in Teams. The average interview length was 23 minutes long. Roughly two-thirds of interview participants were male (67%), and a majority had been with the company between 1-3 years (40%) followed by longer than three years (36%). Participants had a range of job roles, including software engineers, product managers, product marketers, and business planners. A majority of the sample reported commuting into the office 2-3 days a week (37.8%) followed by once a week (22.2%). Last, nearly two-thirds of participants indicated they have hybrid meetings "multiple times a week" (64.4%) and nearly half of the participants attend some of these meetings in person (51.1%).

Interview questions asked participants to reflect on the three experimental treatment conditions – the fully remote, the hybrid with devices, and the hybrid with the assigned moderator. Participants were then asked which meeting format they preferred, and if it differed depending on meeting characteristics such as meeting purpose or size. Interview questions also asked participants to discuss some of the challenges and benefits of both fully remote and hybrid meetings. We asked which meeting configuration they found to be most inclusive, and which format or configuration was most effective. Two of the forty-five interview participants were unclear of what we meant by meeting inclusiveness. We defined this term for the interviewees: meeting inclusiveness was described as if the participant felt they had a chance to contribute and participate in the meeting, and they felt all voices were heard [9]. Further, we asked how the meeting technology, particularly the chat, was utilized in both hybrid and remote meetings. Last, we asked participants to provide suggestions on ways to improve hybrid and remote meetings in the future. We concluded the interviews asking participants to reflect on lessons they learned throughout the experiment, and if they would do anything different in the future when leading or attending remote and hybrid meetings.

3.2.1 Data Analysis. We analyzed our data in line with best practices for conducting thematic analysis proposed by Braun and Clarke [7]. Braun and Clarke's (2006) thematic analysis is a widely used method for identifying, analyzing, and reporting patterns (themes) within qualitative data. Thematic analysis is flexible and can be applied to various types of qualitative data, making it a popular approach in social science research. Throughout this process, researchers must maintain reflexivity, acknowledging their own influence on the analysis. This approach allowed for both a systematic and flexible exploration of the data, ensuring that the themes identified were grounded in the participants' experiences. Braun and Clarke emphasize that thematic analysis is not a linear process, and researchers may move back and forth between the different phases as they refine their understanding of the data.

Leveraging this approach, we began the analysis by reading through the interview transcripts, familiarizing ourselves with the data, and noting initial themes and insights emerging from the text. Our primary focus was on meeting preferences, more specifically, which meeting configuration had the greatest reported perceptions of meeting inclusiveness and effectiveness. Thus, our work is focused (e.g., on preferred meeting configurations), yet inductive within this focus (e.g., not built from existing theory). We then systematically coded interesting features of the data in a way that captured key concepts. These codes were often short, descriptive labels assigned to portions of the data that were relevant to our overarching research questions. Next, we organized the initial codes

into potential themes, identifying patterns, connections, and relationships within the coded data. In this phase, we used the qualitative coding software Atlas.ti to categorize participant statements into themes that represented overlapping content. For example, we had one theme focused on key challenges with hybrid meetings labeled *lack of inclusiveness*. Within this theme, coded statements describing issues around fostering an *even playing field* in a hybrid environment, interruptions in hybrid settings that hindered remote audience engagement, and *feeling left out* of meeting discussions were grouped together to represent this overarching theme. Themes were further developed by defining what each one encompassed and assigning a clear and descriptive name. This step involved creating a coherent and meaningful narrative around each theme to compliment the experiment, survey and telemetry findings.

4 Results

Below, we present results from both our quantitative surveys and qualitative interviews. Further, we report telemetry findings specific to how chat is used in remote and hybrid meetings. We note that while there was significant consensus and agreement in the results from our survey and interview data, there were also slight differences. These differences are likely due in part to the fact that we only interviewed a subset of the employees that participated in the experiment and completed the surveys. Moreover, the goals of our qualitative interviews differed from the goals of our experiment and survey. The goal of our inductive interviews was to unpack and explain the survey results and better understand the nuance of meeting inclusiveness and effectiveness. Therefore, in the interviews we asked questions specific to what makes hybrid and remote meetings successful – and what are the greatest challenges with each meeting format.

4.1 RQ1: In general, fully remote meetings are more inclusive than hybrid meetings

Study participants reported remote meetings to be the most inclusive type of meeting, with a slight majority of respondents saying it was the most inclusive of the three types (55.1%) and few saying it was less inclusive than both types of hybrid meetings (18.4%), as shown in Figure 1, Hybrid and devices was perceived as the least inclusive meeting format (47.4 % of Least Inclusive ranking).

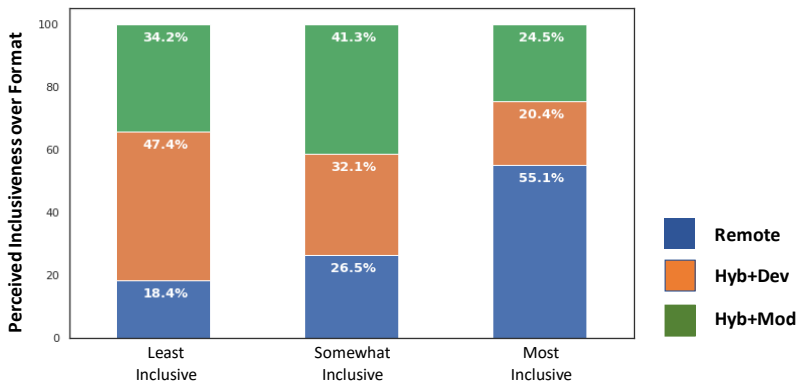


Fig. 1. **Meeting inclusiveness rankings.** Responses to the question, "In general, how do you rank the inclusiveness of these meeting formats for meetings where some people are in the same building and others are not?", where respondents dragged options into their preferred order. N=196.

The theme of remote meetings being more inclusive was also evident in the qualitative interview data. A majority of employees reported all remote meetings are the most inclusive experience

(34/45 participants). Participants indicated all remote context provides an equal experience for meeting attendees, compared to a hybrid format where some attendees are in-person and others are joining remotely. For example, one participant noted,

> "I think from an inclusion perspective, it's probably all remote. Everyone being in their respective offices joining because then they have the equal opportunity to have those side conversations and hallway conversations."

This employee felt there is an unfair advantage for in-person meeting attendees given they have increased opportunity for pre/post meeting conversations and informal interactions outside of the meeting context. A second respondent reported, *"I think it is best to have all folks in that remote environment because then it's not like a one person is being left out of the conversation."* This employee also expressed the disadvantage associated with being a remote attendee in a hyrbid meeting. A third respondent suggested, *"I think [inclusion] is where it can be challenging with hybrid, so my initial thought is, in some ways, either all remote or all in-person just lend themselves to be more inclusive. It feels equal."*

If there is a hybrid configuration, most interviewees recommended in-person attendees bring their devices to the meeting to help even the playing field (32/45 participants). That way, those attending in person can then have access to the remote meeting features (e.g., chat, hand raising, reactions) and can engage with the remote audience through the meeting technology. For example, an interviewee reported,

> "Fully remote is most inclusive because it puts everyone on a level playing field, but then the next [most inclusive] would be hybrid, but where everyone calls in from their devices and can access the chat."

This employee expressed the importance of all attendees having access to the technology and the tools associated with the meeting software. Another participant noted, *"I would say that the most inclusive experience for a hybrid meeting is when people that are in-person are actually logging into their devices as well."* Collectively, the general theme from the data (for the participants in our sample of interviewees) is remote meetings are the most inclusive experience.

However, according to the interview data, a hybrid meeting where in-person attendees log in on their individual devices is the second most inclusive experience. This differed from the survey findings where respondents reported they were slightly more positive on meetings with moderators compared to hybrid meetings with devices. The discrepancy could be due to differences between the participants who agreed to partake in interviews compared to those who were in the larger experiment (e.g., those that self selected to participate in follow-up interviews could have different perceptions of or investment in their meetings). Alternatively, this difference could be attributed to the interviews having an alternative focus (e.g. comparing moderators to meetings where attendees were asked to bring devices - and many may not have - versus meetings where they actually did).

4.2 RQ2: In general, fully remote meetings are more effective than hybrid meetings

Hybrid meetings did only slightly better on effectiveness than they did on inclusiveness, as shown in Figure 2. Half (50%) of respondents thought remote meetings were more effective than either of the hybrid formats, a quarter (25%) ranked remote in between the two hybrid formats and a quarter (25%) ranked it worse than either hybrid format. The two hybrid formats were pretty similar, with hybrid with devices being slightly preferred to hybrid with moderator (30.6% vs 19.4% most effective and 36.2% vs 38.8% least effective).

These findings was supported in the qualitative interview data. Participants indicated fully remote meetings were the most effective (37/45 participants). Further, a majority of interviewees reported hybrid meetings with a moderator (and no personal devices for in-person attendees)

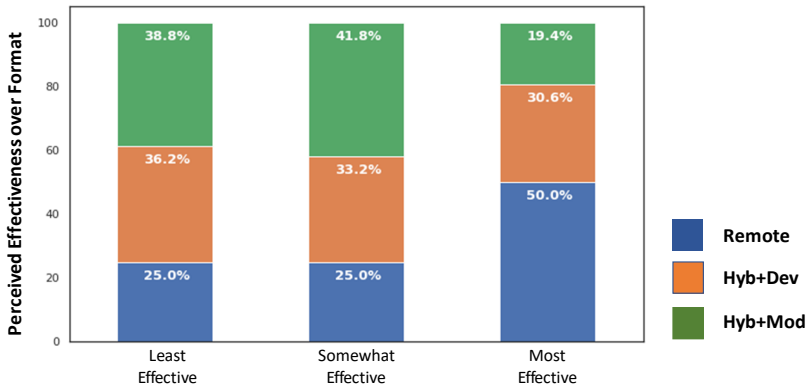


Fig. 2. **Perceived effectiveness rankings.** Responses to the question, "In general, how do you rank the effectiveness of these meeting formats for meetings where some people are in the same building and others are not?", where respondents dragged options into their preferred order. N=196.

resulted in the least effective meetings (30/45 participants). Interviewees reported meetings where in-person attendees did not have access to their devices were least effective because the in-person attendees had difficulty communicating with the remote attendees. For example, when in-person attendees did not have devices in the meetings, they could not read or respond to the chat or have more personal, up-close views of the remote attendees. Because of this barrier in communication due to lack of access to meeting technologies, the meetings were not as effective compared to hybrid meetings where all attendees have access to a device and equal access to the associated technology. For example, one interviewee reported,

> "I would say having your own device is most effective in a hybrid meeting... Having the capability to see and respond directly through the technology."

This finding provides support for the relationship between meeting inclusiveness and meeting effectiveness. If remote attendees and in-person attendees have difficulty communicating when in-person attendees are device-less, this creates challenges for participation and meeting inclusion. One interviewee spoke directly to this point, acknowledging,

> "In hybrid meetings, there are participants who remain silent for the entire meeting. That inclusiveness is something that, unless one consciously makes a call that I need to get everybody involved in a meeting, I haven't seen to be very effective in hybrid meetings. What happens in hybrid meetings is the core set of team members who are present in a room are the ones who are most participative, and they have a different wavelength and can share ideas and move faster between themselves when compared to the larger [remote] audience."

This employee noted the communication challenges associated with hybrid meetings in general, particularly hybrid meetings when the in-person audience is without devices. This interviewee is alluding to the apparent divide that can occur in hybrid settings when the in-person audience favor one another, forgetting about the remote audience. Because of the suggested link between meeting inclusiveness and meeting effectiveness, it is not surprising that a majority of interview participants felt fully remote meetings were the most effective *and* inclusive of all meeting modalities. Meeting effectiveness in hybrid formats (with no devices and an assigned moderator) is largely dependent on the skill set of the moderator. When a hybrid meeting is lacking a competent moderator, the effectiveness of the meeting is significantly compromised.

4.3 RQ1&2: Challenges with Meeting Moderators

Half of interview participants specifically reported and identified challenges with having an assigned meeting moderator instead of in-person attendees bringing their own devices to hybrid meetings (28/45 participants). This may explain why the hybrid, moderated condition was rated as least effective and interviewees said they were less inclusive. Interviewees discussed the lack of awareness and training of meeting moderators and facilitators. This suggests the hybrid meeting with moderator format could work better with more experienced moderators. For example, one participant noted,

> "It is easier for people to pay attention to people in the room if they are [also] in the room. It takes a very, very good moderator to watch chat... You know, addressing that fairly well. I think that's probably the biggest challenge. People don't know how to moderate."

This interviewee is expressing the additional challenges that hybrid meetings elicit –above and beyond fully remote meetings – noting the fundamental role of the moderator in mitigating these challenges. A second interviewee suggested formal training as a potential solution to the moderation challenges, stating

> "I think it's both advancing the technology, having the available office spaces for people to take the hybrid meetings and also training for both the attendees and for the moderator to make sure that it's more inclusive and it's actually, you know as effective as doing a [fully] in person meeting."

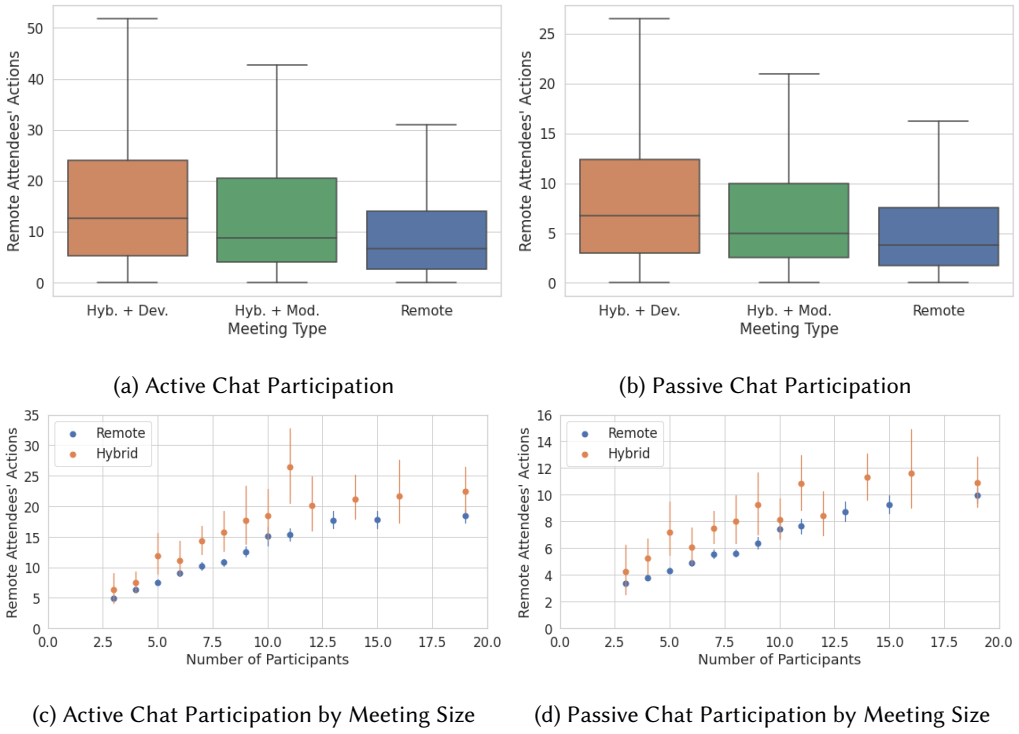
Here, both participants are acknowledging the importance of the meeting moderator in hybrid meetings where in person attendees do not have their meeting devices, and are relying on the moderator to facilitate the discussion between the remote audience and the in-person attendees. This finding suggests the moderator can play a critical role regarding encouraging meeting inclusion, acting as the connector between the remote and in-person attendants.

4.4 RQ3: People use the technology differently in remote and hybrid meetings

To better understand the differences we see between remote and hybrid meetings, we look to the telemetry data to investigate whether people chat differently in remote meetings and different types of hybrid meetings. We focused on chat behavior in our telemetry data because it gave the clearest picture of meeting participation, compared to audio- and video-based communication. For in-room participants, we have no measure of how much the participants speak, but we could still look at whether they participated in meeting chat. For remote participants, unfortunately the telemetry data could not inform when the participants turned their mic or video on or off, as there was no information for their status at the very start of the meeting. So, people who were muted the whole time look the same as people who were unmuted the whole time (and similarly for video). Overall, we find that remote attendees use chat features more during hybrid meetings (whether with a moderator or with devices) than during remote ones.

We break the chat actions we observe into active and passive. We define active chat actions as any action that contributes content to the chat such as writing a new message, reacting to a previous message, and composing a new message. We define passive chat actions as any action that only consumes content that others posted to the chat such as reading messages, scrolling the chat, and navigating around the chat. We then look at the average number of such actions for remote attendees by meeting type. Since we do not know how many in-person attendees do not log into the meeting, we cannot accurately measure their average participation, so we focus on remote attendees for all meeting formats. As shown in Figure 6a for active chats, remote meetings yielded the lowest activity while hybrid meetings with devices led to the highest usage, with median values

of 6.8 and 12.6, respectively. Similarly, participants passively used the chat in remote meetings the least (median: 3.80), and the most in the hybrid and devices condition (median: 6.75), as displayed in Figure 6b.[4]



(a) Active Chat Participation

(b) Passive Chat Participation

(c) Active Chat Participation by Meeting Size

(d) Passive Chat Participation by Meeting Size

Fig. 3. **Average levels of active and passive chat participation for remote attendees by meeting type.** Each meeting during the study period is categorized as 'hybrid' if a conference room joins the meeting. Hybrid meetings are categorized as with a moderator if there is only one onsite attendee that joins the meeting and with devices otherwise. N=20,006. For (a) and (b) the Mann-Whitney U tests are all significant with p<.01.

To confirm that these differences are not just driven by differences in meeting sizes, Figures 6c-6d, show a binscatter of the average number of actions by meeting size for remote and hybrid meetings. Note we did not have enough of the different types of meetings to distinguish between the moderator and devices hybrid conditions when looking at different meeting sizes. While we find that chat engagement does increase with meeting size, hybrid meetings have more engagement than remote ones across all meeting sizes. These results suggest that remote attendees may try to overcome the difficulty they feel in participating in hybrid meetings by using the written chat more in these contexts. However, our earlier results suggest using chat is not sufficient in fostering inclusion, considering they still feel those meetings are less inclusive and less effective. If in-person

[4]The ordering of the three formats is the same if instead of the average number of actions we look at the share of attendees doing active or passive engagement, though in that case the difference between hybrid with devices and hybrid with moderator is not statistically significant (graphs in the Appendix).

attendees do not follow the chat, it is not surprising that remote attendees feel their chat activity is insufficient participation.[5]

The qualitative results supported the above findings pertaining to both the frequency of and challenges with chat use in hybrid and fully remote meetings. A majority of interview participants acknowledged the more frequent use of chat in hybrid meetings with devices (31/45 participants). Participants leverage the chat to communicate in these contexts, especially when they are the remote audience in the hybrid meeting For example, one interview participant explained:

> "I rely on chat more so in hybrid meetings, especially when I am remote because this is how I can get my two cents in without awkwardly interrupting those in the conference room. Chat is my way of saying *hey, listen to me and my ideas*."

This employee is describing how the chat can be leveraged in hybrid meetings to increase feelings of inclusion and voice. However, this is likely dependent on who is paying attention to and/or moderating the chat during hybrid meetings.

As a second interviewee describes, it is critical for the in-person meeting attendees to engage with and respond to the chat:

> "I think there's the element of [the moderator] being effective at managing people in a room as well as virtual attendees... I've got a couple folks that just completely ignore chat. I was like *well actually so and so said this in the chat.* If you're in the room, it is important to try to be that advocate to say *this person said this in chat, can you respond to that or can you elaborate on that?*

This particular employee feels it is the responsibility of the meeting moderator as well as in-person attendees to be attentive to the chat in order for the remote audience to feel heard and included in the hybrid meeting setting.

Taken together, these findings suggest both active and passive meeting chat is used more frequently in hybrid meetings – regardless of the size of the meeting. However, we can not conclude that the increase in chat relates to increased feelings of meeting inclusion or effectiveness in hybrid meetings. Rather, our interviews suggest the success of chat in fostering feelings of inclusion is largely dependent upon the awareness, skills and actions of the meeting moderator.

4.5 RQ4: Different modalities work better depending on meeting purpose and size

In the final survey, we asked about participants' preferred choice of meeting format for facilitating different types of meetings. As displayed in Figure 4, when asked *"going forward which type of meeting do you plan to use for meetings you organize?"*, the participants favored hybrid meetings for brainstorming and planning meetings, while they indicated that presentation and stand-up meetings can be better facilitated via fully remote meetings. It seems that for meetings requiring co-creation and collaboration activities, the benefits of having some people in the room outweighed the challenges of the hybrid format. On the other hand for meetings focused on relaying information, the benefits of in-person interaction did not seem to outweigh the challenges of remote.

When asked about preferred meeting formats given size, remote meetings were selected by a plurality of participants across all sizes, as displayed in Figure 5. However, one of the two hybrid formats was selected by a majority of respondents (62.5%) for medium-sized meetings (6-15 people) and a slight majority of respondents (55.1%)for large meetings (>15 people). Hybrid with devices were preferred over hybrid with moderator for small and medium-sized meetings, but for large meetings the moderator was considered more valuable. The differences in the distributions

[5]We can look at chat activity of onsite attendees who join the meeting, but have no way of knowing what number of onsite attendees do so. If most onsite attendees do not join the meeting, it is not particularly helpful to remote attendees to have onsite attendees who do join be active in chat.

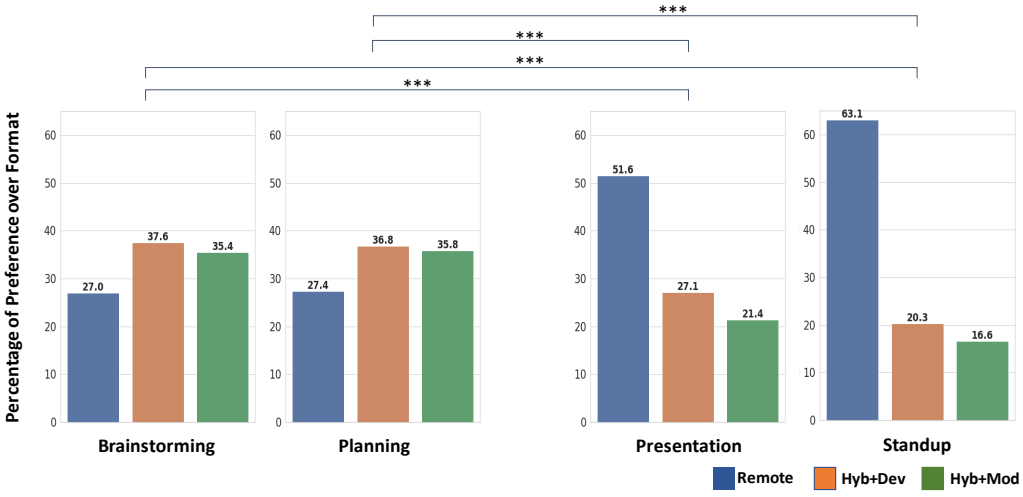


Fig. 4. **Participants' preferred meeting configuration given meeting purpose.** Responses to the question "For each of these types of meetings, which meeting format would you choose for a meeting where some people are in the same building and others are not?" Sample sizes from left to right are 189, 190, 192, 187, with variation due to a small number of people responding "N/A (didn't have this meeting type or don't know)". Stars above the charts indicate the significance of X^2 tests, *p<0.1; **p<0.05; ***p<0.01.

are marginally significant between small and medium meetings, but the other differences were significant.

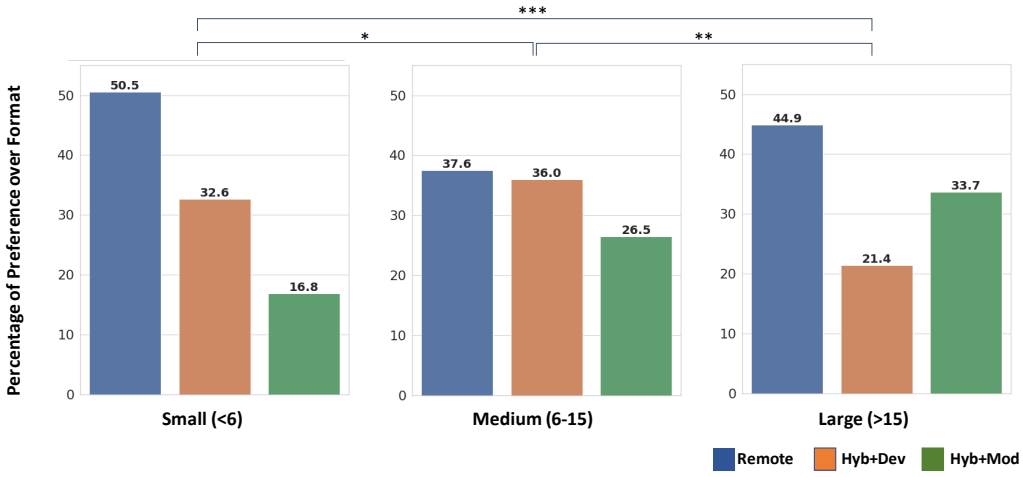


Fig. 5. **Participants' preferred meeting configuration for meetings of different sizes.** Responses to the question "For meetings of different sizes, which meeting format would you choose for a meeting where some people are in the same building and others are not?" Sample sizes from left to right are 189, 190, 187, with variation due to a small number of people responding "N/A (didn't have this meeting type or don't know)". Stars above the charts indicate the significance of X^2 tests, *p<0.1; **p<0.05; ***p<0.01.

This finding was supported in the interview data. When interviewees were asked if their preferred meeting configuration differed depending on the purpose or type of meeting, forty out of the forty-five participants felt all remote meetings were ideal for large, 100+ size meetings – such as All Hands or Town Hall meetings.[6] However, most participants (37/45) contended more intimate meetings that warrant brainstorming or idea generation should involve in-person attendance. For example, one participant noted,

> "So if it's gonna be a 100 person meeting, well, it seems like it makes more sense to just make that remote instead of dealing with the logistics of setting up a room to make a hybrid, All Hands... the benefits just might not be there with with that type of meeting."

This participant felt that very large meetings are easier to organize and execute in an all remote environment. Another noted, *"I think Town Halls and All Hands are perfect remote. Because there's one speaker and a lot of participants... But with many presenters or brainstorming, it's harder when there are more people remote. Because people will talk over each other and sound systems are not good enough to pick up people who are talking in parallel."* This participant acknowledged that remote lends itself to a presentation-style meeting where there is generally one speaker relaying information to a large audience. However, when there is brainstorming and attendee participation involved, an in-person or hybrid option is preferred. Similarly, a respondent reported,

> "If there is some kind of brainstorming discussion, ideation phases and design discussions that we do, I prefer to be in person to have white boarding sessions and it makes a lot of difference to have people in person."

This participant valued the in-person white board experience for brainstorming and ideation. Another participant also expressed the importance of having a physical white board during brainstorming meetings, *"There is a considerable difference when when you are at a table and when you are actually brainstorming on on the wall. There is a considerable element of feeling like you are putting your hands on the problem and you are contributing. That feeling, if you are remote, doesn't exist."*

The general findings from both the survey data and the qualitative interviews suggest presentation style meetings (such as Town Halls, Standups and All Hands) should be conducted fully remote. However, meetings that involve brainstorming, white boards, active participation, and idea generation are more effective when attendees are in-person.

5 Discussion

The study findings answer the four research questions laid out in Introduction. We report that fully-remote conditions can facilitate improved meetings in terms of both inclusiveness (**RQ1**) and effectiveness (**RQ2**), yet hybrid meetings where everyone brings their devices can provide in-person attendees access to meeting features available to remote participants (e.g., chat). This is evident using the telemetry data given that attendees in hybrid and devices condition more frequently engaged in active chat participation (**RQ3**). Lastly, meetings that require co-creation and collaboration (i.e., brainstorming and planning) might be better suited for hybrid meeting formats, and large-sized meetings can benefit from the presence of a moderator (**RQ4**).

Given Findings 4.1 and 4.2 that remote meetings are more inclusive and somewhat more effective than hybrid meetings overall, it might be tempting to conclude that even when some people are in the office together, when meeting with remote colleagues they should have an all-remote meeting. In addition to the fact that this may be impractical in open office spaces, our Finding 4.5

[6]In the survey, participants were less positive on all-remote for large meetings relative to smaller meetings. However, in the survey, a large meeting was defined as more than 15 participants. Respondents may have been focused on 15-30 person meetings rather than larger All Hands or Town Hall meetings.

on preferences for different meeting purposes suggests that, at least for certain types of meetings, there is substantial value to having some people in the room together.

In a hybrid work environment, improved coordination of in-office time could allow some hybrid meetings to be all in-person instead, but at many companies fully-remote employees and geo-disperse teams mean that remote or hybrid meetings are unavoidable. For meetings that are focused on conveying information, like Standups and Presentations, all-remote meetings may be the right solution. In-office time should be prioritized for creative or collaborative activities like Planning and Brainstorming, but some of those meetings will likely still be hybrid. Our research suggests several cultural and technical avenues for trying to improve those hybrid meetings, as discussed in the following subsections.

These findings contribute to an existing body of literature that aims to improve competence of different meeting stakeholders. For example, Cutler et al. [9]'s guidance on leveraging affordances of computer-mediated communications systems is to improve the role of meeting attendees by nudging remote participants to more frequently engage via videos, and further recommends meeting organizers to include agenda with their invitations. The implications of our study point towards moderator training, the tools used in hybrid meetings, and the role of parallel chats.

5.1 Moderator training

In light of the above insights, a recommendation moving forward is to provide training and guidance to meeting moderators and leaders on how to efficiently and effectively facilitate the discussion to reduce the barriers in communication that inherently arise in hybrid meetings.

There are various strategies organizations and teams can implement to help train moderators in this context. First, it is important to familiarize meeting moderators with hybrid meeting technology. Moderators should have a thorough understanding of the technology being used for the hybrid meetings, such as how to use the video and audio conferencing in the room. Training should review how to manage screen sharing, breakout rooms and chat in a hybrid setting. Second, organizations can train moderators on techniques to engage both in-person and remote attendees effectively. For example, encourage meeting moderators to use visual aids, polls, and interactive activities to maintain engagement during hybrid meetings. Encourage moderators to actively involve remote participants by addressing them directly, monitoring the chat, asking for their input, and ensuring all voices are heard. Third, have meeting moderators gather feedback from meeting participants, both in-person and remote, to understand their experiences and identify areas for improvement. This feedback can help refine facilitation techniques and adapt to the evolving needs of hybrid meetings.

5.2 Improved technology for remote or hybrid whiteboarding

A reccurring suggestion from interviewees on how to improve hybrid and remote meetings involved improved technology for remote whiteboarding and collaboration. This is likely why participants in our sample preferred to be in-person for brainstorming meetings. Meetings that include an ideation element benefit from having a white board to share ideas, draw figures/diagrams, and work through problems. The current 'virtual' whiteboard in the meeting platform is insufficient in replicating the in-person white board experience, creating frustration in these meeting types. An updated and improved remote and hybrid whiteboard experience would advance the effectiveness of brainstorming meetings, and ensure the remote audience feel included and able to contribute in the idea generation discussion.

5.3 Bridging parallel chats and the main meeting

Our findings show that despite the higher use of chats by remote attendees of hybrid meetings, they still felt less included than participants in all-remote meetings, which points to the need for more awareness from the co-located attendees. Some interviewees further expected the meeting moderator to continuously monitor the chats and bring up these points within the in-person attendees. While this could potentially improve the inclusion of remote participants, it can introduce additional burden and cognitive load for the moderators. The question then is: *how can parallel chats be more integrated with the main meeting to enhance awareness and presence of remote attendees, while minimizing cognitive load for additional moderating?*

Aggregation and summarization of chat messages can enable bridging interactions in the chat and the main meeting seamlessly. Many prior CSCW and Computer-Mediated Communication works have explored integrating multi-modal channels of communication, but these methods have been less explored in work meetings. Especially in large meetings where the number of chats can be overwhelming, aggregation and summarization techniques [11, 31, 52] can benefit the moderators who are not only trying to monitor remote and in-person activities, but also participate in meetings as attendees. In addition, the recent advances of large language models — given the high accuracy rates in summarizing texts — provide opportunities for automating parts of the process, so that attendees can more easily see the main points being made in chat.

5.4 Limitations and future work

Our study was focused on the hybrid and remote meeting formats for actual work meetings (instead of meetings created just for the purpose of the study), which created challenges with participants' compliance with assigned meeting formats. We asked participants to use the assigned meeting format when possible. While we do believe this increased their use of assigned meeting formats, participants generally did not adhere to the assigned conditions evident by the number of meetings recorded from the telemetry data; a large majority of meetings were still all-remote (almost 12 times more than the combined hybrid conditions), which is why we were not able to use experimental variation in meeting format. Future studies wanting to do field experiments could focus on people who organize more meetings and therefore have more control over the format or focus on certain recurring meetings where they might get the group to agree to experiment with the format. In some contexts, it could also work to incentivize people to stick to the assigned experimental condition.

Another limitation was that for hybrid meetings we were unable to measure how many people were in the physical room. We could see the number of onsite users using devices, but if someone in the room did not join with a device, they were not observed. Even our observation of those with devices was imperfect because if someone was onsite, we were unable to know for sure whether they were joining the meeting from the conference room or separately from their own office. Future studies could try to solicit feedback on specific meeting to both get objective measures like the number of onsite attendees and solicit meeting-specific ratings of effectiveness and inclusiveness.[7]

Despite the clear trends presented in this paper, it is important to note that user perception around meeting effectiveness and inclusiveness — which was measured solely via subjective assessments — can depend on other factors that fall outside the scope this work, such as meeting topic and logistics, meeting composition and the level of familiarity among attendees (which can lead to changes in emotional states [34]) and technology affordances. Given that meetings generally comprise a subsection of a longer term collaboration, inclusiveness and effectiveness can also be influenced by prior events, which are not captured in this study. In addition, the landscape of hybrid meetings is far from static, but an ever-changing set of conditions with unevenly distributed digital equipment

[7]We tried to capture this with a daily survey, but were unable to link many of the responses to specific meetings.

and competence, in which attendees' use and perception of hybrid meetings continuously evolve. Aligned with Hollan and Stornetta [17]'s "Beyond Being There" vision, remote meeting technologies need to go beyond simply mimicking real life, hence opening new collaboration and interaction paradigms. As remote and hybrid meeting tools evolve, user perception around effectiveness and inclusiveness can also change. While this paper — which has an application-oriented focus compared to examining foundational levels of communication — sets a precedence for comparing remote and hybrid configurations in practice, future work can further explore optimal meeting formats for different meeting types.

6 Conclusion

In a large-scale and mixed-method study of meetings, we find that remote meetings are considered more effective and inclusive than hybrid meetings. However, hybrid meetings are still preferred for meetings that involve co-creation such as brainstorming or planning meetings. The findings suggest a variety of opportunities for improving hybrid meetings in the future - from training meeting moderators to improving co-located attendees' awareness of meeting chat.

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A Participant Instructions

In the first condition, whenever possible please organize your meetings as **conference room + devices**. This means

(1) Reserve a conference room for in-office attendees
(2) Ask **all attendees** to bring a laptop or phone to the conference room and join the meeting using the in-room / no-audio mode. This will allow them to view the chat & online hand-raises as well as provide a direct video of themselves to remote attendees.

In the second condition, whenever possible please organize your meetings as **conference room + moderator**. This means

(1) Reserve a conference room for in-office attendees
(2) Ask one of the in-person attendees to be the moderator/facilitator. They should have a phone or laptop to access the online chat. They should monitor 'hand raises' in Teams and solicit participation from remote attendees as appropriate.

In the third condition, whenever possible please organize your meetings as **all-remote** meetings. This means

(1) Don't reserve a conference room for the meeting
(2) Ask people to join the Teams meetings from their own devices in their own space (whether they are at home or at work)

B Survey Questions

B.1 Intermediate Surveys

- Over the past couple weeks, what share of the meetings you ORGANIZED with a combination of on-site and off-site participants were <assigned meeting type> meetings?
  - Most (75-100%), Many (50-75%), Some (25-50%), Few (< 25%), N/A I didn't organize any meetings with a combination of on-site and off-site participants
- Over the past couple weeks, what share of the meetings you ATTENDED with a combination of on-site and off-site participants were <assigned meeting type> meetings?
  - Most (75-100%), Many (50-75%), Some (25-50%), Few (< 25%), N/A I didn't organize any meetings with a combination of on-site and off-site participants
- On average, how effective were your <assigned meeting type> meetings?
  If you didn't have any <assigned meeting type> meetings, just tell us about your meetings overall.
  - Very effective, Somewhat effective, Somewhat ineffective, Very ineffective
- On average, how inclusive were your <assigned meeting type> meetings?
  If you didn't have any <assigned meeting type> meetings, just tell us about your meetings overall.
  - Very inclusive, Somewhat inclusive, Somewhat uninclusive, Very uninclusive
- [For the all-remote group] Did you feel you were able to fully participate in the <assigned meeting format> meetings you attended? If you didn't have any all-remote meetings, just tell us about your meetings overall.
  - Yes, fully; Somewhat; No
- [For the hybrid groups] Did you feel you were able to fully participate in the meetings with a <conference room + moderator / conference room + devices> that you attended REMOTELY?
  - Yes, fully; Somewhat; No
- [For the hybrid groups] Did you feel you were able to fully participate in the meetings with a <conference room + moderator / conference room + devices> that you attended IN PERSON?
  - Yes, fully; Somewhat; No
- How did the all-remote format work for these different types of meetings?

  - Options: Very well, Kind of well, Kind of poorly, Very poorly, N/A
  - Meeting types: Stand up/ Status, Planning / Strategic, Tactical / Problem Solving, Brainstorming / Ideation, Social / Team Building, Presentation
- Is there anything else you would like to share about your meeting experience over the past two weeks?

B.2 Final Survey

Repeat intermediate survey questions for the final assigned meeting type, followed by:

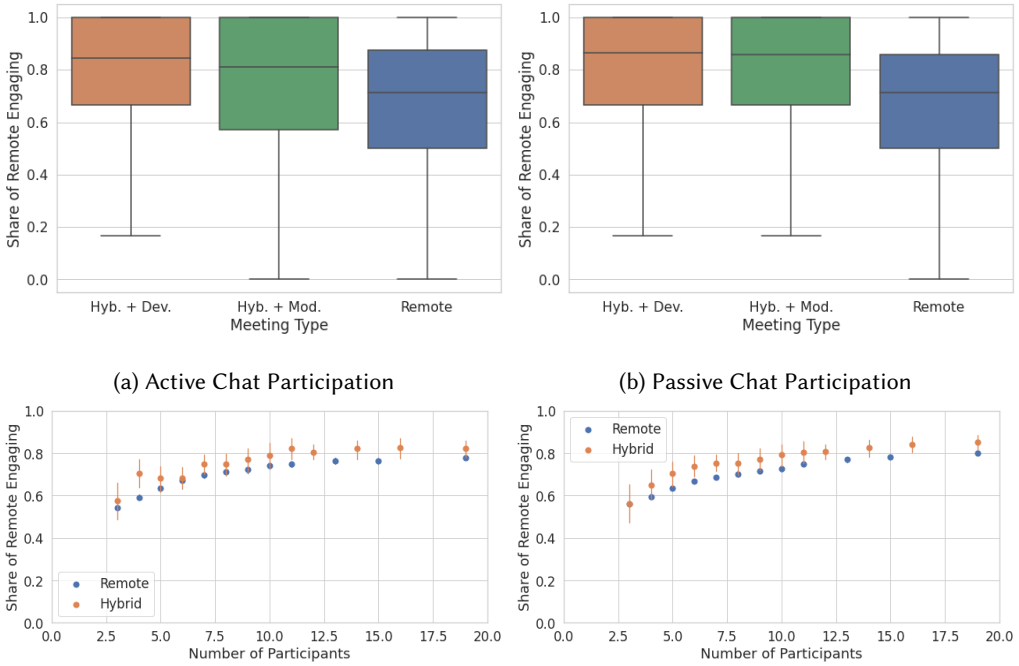
Over the past couple months, you have been asked to try all-remote meetings, meetings in a conference room with a moderator facilitating remote attendees' participation, and meetings in a conference room with each person bringing their own device to join the Teams meeting.

This section asks you to compare your experiences with the different meeting formats for meetings where some people are in the same building and others are not. All open-response questions are optional

- In general, how do you rank your preferences of these meeting formats for meetings where some people are in the same building and others are not? (Top is most preferred, you can drag options up and down or use the arrows that appear when you hover over them)
  - All-remote meetings, Hybrid meetings + moderator, Hybrid meetings + devices
- Explain your preference ranking:
- In general, how do you rank the EFFECTIVENESS of these meeting formats for meetings where some people are in the same building and others are not?
  - All-remote meetings, Hybrid meetings + moderator, Hybrid meetings + devices
- Explain your preference ranking:
- In general, how do you rank the INCLUSIVENESS of these meeting formats for meetings where some people are in the same building and others are not?
  - All-remote meetings, Hybrid meetings + moderator, Hybrid meetings + devices
- Explain your preference ranking:
- For each of these types of meetings, which meeting format would you choose for a meeting where some people are in the same building and others are not?
  - Options: All-remote meetings, Hybrid meetings + moderator, Hybrid meetings + devices
  - Meeting types: Stand up/ Status, Planning / Strategic, Tactical / Problem Solving, Brainstorming / Ideation, Social / Team Building, Presentation
- Explain why formats work best for different types of meetings:
- For meetings of different sizes and cadences, which meeting format would you choose for a meeting where some people are in the same building and others are not?
  - Options: All-remote meetings, Hybrid meetings + moderator, Hybrid meetings + devices
  - Meeting types: Small meetings (<6 attendees), Medium meetings (6-15) attendees, Large meetings (16+ attendees), Weekly recurring meetings, Bi-weekly, monthly, or quarterly meetings, Non-recurring or "one off" meetings
- Explain why formats works best for different meeting sizes and cadences:
- Anything else you would like to share about your experiences with hybrid meetings? Are there other meeting characteristics that you think affect which format is best?
- Would you like to be contacted with the results of this study?
  - Yes, No

C Additional graphs

Here are additional figures generated from the telemetry data.



(a) Active Chat Participation

(b) Passive Chat Participation

(c) Active Chat Participation by Meeting Size

(d) Passive Chat Participation by Meeting Size

Fig. 6. **Average share of remote attendees participating in chat.** Each meeting during the study period is categorized as 'hybrid' if a conference room joins the meeting. Hybrid meetings are categorized as with a moderator if there is only one onsite attendee that joins the meeting and with devices otherwise. N=20,006. For (a) and (b) the Mann-Whitney U between remote and either hybrid condition are significant with p<.01, the difference between the two hybrid conditions is not significant.

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