

# A Hole in the Wall

## *The Potential of Persistent Video-enabled Communication Channels to Facilitate Collaboration in Dispersed Teams*

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## Introduction

Collaboration is an almost given form of working within industry and university settings (Koehne, Shih, and Olson 2012). With advances in telecommunications and information technology, these types of collaborations are no longer bound by geography (Bosch-Sijtsema and Sivunen 2013). However, as documented elsewhere, challenges stemming from geographical distance must be managed to ensure that teams work together successfully. One of the primary challenges is finding ways to facilitate communication and coordination across distance and time (G. Olson and Olson 2000). Skype, Zoom, and other internet-enabled tools provide some potential to accomplish this; however, few studies have been completed on the best ways to use these tools within a geographically dispersed collaboration with a continuously open communication channel. Those that have been undertaken focus on experiences where this channel has been deployed already. Little is known about a team's initial impressions about the channel before it is in place. This paper will contribute to this discussion by exploring the experiences of an academic lab using such a channel to connect team members located in different sites with an examination of initial impressions and then feedback after several weeks.

## Literature Review

As Olson and Olson (2000) outline, despite advances in information and telecommunications technology, distance between members still impacts a team's functioning at the task and personal levels. As they suggest and confirmed by others (Kraut, Galegher, and Egidio 1987; Kennedy, Vozdolska, and McComb 2010; Kraut et al. 1990), some amount of social presence or visible awareness of others is needed to allow for the sharing of advice, feedback, and support among team members and the team as a whole. This can be used to coordinate tasks, and generate trust, shared vocabulary, goals, and identity, all a basis for collaboration (Karis, Wildman, and Mané 2016; Venolia et al. 2010). For co-located teams, use of face-to-face formal meetings and informal interactions in common rooms and around the proverbial coffee pot is the primary way to create and reinforce social presence (Belanger and Allport 2008; Kennedy, Vozdolska, and McComb 2010; Warkentin and Beranek 1999; Karis, Wildman, and Mané 2016; Isaacs, Tang, and Morris 1996). Unfortunately, many electronic and virtual channels cannot engage in these activities since they do not fully allow for contextual cues, facial expressions, body language, gestures, and the ability to all be in the same place at the same time, all parts of media-rich channels of communication (Karis, Wildman, and Mané 2016; G. Olson and Olson 2000; Sundholm 2007; Kraut et al. 1990). In order to develop these foundations, many dispersed teams meet face-to-face first in order to create this shared identity with the use of formal and informal interactions (Karis, Wildman, and Mané 2016; Bly, Harrison, and Irwin 1993). Virtual and electronic communication can then support the team when members return to their respective offices (Pauleen and Yoong 2001; Karis, Wildman, and Mané 2016; Kennedy, Vozdolska, and McComb 2010).

Many benefits that reinforce teamwork are present for co-located teams. First, it is possible to get faster answers to significant and "insignificant queries" by creating opportunities for quick interaction that can lead to "better generation of new and novel ideas" (Sharifi and Pawar 2002, p. 663). Co-located teams create opportunities for the informal interactions, which can be work and non-work related (Sharifi and Pawar 2002). These meetings are also a way to create a shared vocabulary and shared identity that creates a foundation for accomplishing collaborative work. Known as common ground, this state is the ability for team members to have a common framework and to be aware that they do so. This can only be developed through general knowledge about a team member as well as more specific information that can be discerned through interactions with a focus on behaviour and appearance. The greater the presence of common ground means that individuals can communicate more easily with each other and then be more

productive as a team (G. Olson and Olson 2000; J. Olson and Olson 2014; Carroll et al. 2009). This shared identity becomes important for creating group effectiveness. When people see themselves as a team, they are more likely to work to support mutual goals and facilitate the distribution of work more fairly (Bos et al. 2010).

However, there are challenges with electronic and virtual communication. When not working on site with each other, those who are at a distance can become invisible and blind to each other (J. Olson and Olson 2014; G. Olson and Olson 2000), creating a case of “out of sight, out of mind” (Venolia et al. 2010; Hinds and Bailey 2003). For dispersed teams, the challenges to the creation of this awareness exist because fewer channels and personal cues in the communication can be in place. Without these, individuals are less likely to pay attention to each other. There is also limited ability to see at a “glance” if someone is available for interactions (Whittaker, Frohlich, and Daly-Jones 1994; Kraut et al. 1990; Wilbur 1997; Warkentin and Beranek 1999). All this is to say, when dispersed teams are not aware of each other in terms of presence and mental state, the development of common ground between them can be hampered (G. Olson and Olson 2000).

Some examples of ways to generate this social presence and common ground are available. Some companies have experimented with Second Life and other virtual worlds that employ avatars to represent people and text to stimulate interaction in real time. This supports the need for aspects of media-rich connections that in turn can influence knowledge management and transfer of explicit and implicit knowledge (Bosch-Sijtsema and Sivunen 2013; Kahai, Carroll, and Jestice 2007; Mueller et al. 2011; Skopp et al. 2015). Additionally, video conferencing on demand for meetings has become ubiquitous. With this channel, the participants build on earlier forms of teleconferences by adding the visual that can allow, among other things, the speaker to see if the party on the other end understands the message. The camera also allows for the use of gestures that adds to media richness, though it still does not replace the need for in-person meetings (Karis, Wildman, and Mané 2016; Venolia et al. 2010; G. Olson and Olson 2000; 2003). An early use of a video conference system was found to have facilitated informal interactions; however, its use was limited because it was located in another room where people needed to reposition themselves to use the system (Fish, Kraut, and Chalfonte 1990). This problem has been resolved with tools like Skype, Zoom, and Google Hangouts that can be deployed on everyone's desk. However, these are limited in their effectiveness because they are on demand, as needed, rather than a persistent channel that might duplicate the type of interactions that occur when team members are co-located.

Several researchers explored the potential of an open communication channel where the connection is continuous to address some of the drawbacks of on demand communication among dispersed teams. These create real time communication that helps with informal and unplanned interactions (Whittaker, Frohlich, and Daly-Jones 1994). Several prototypes were envisioned but were not tested (Kraut et al. 1990; Isaacs, Tang, and Morris 1996; Root 1988). Venolia et al. (2010) explored the potential of a persistent connection between members of a dispersed team. In this case, an embodied social proxy device focused on the at-far team member as a presence on a screen on a cart that could be wheeled among meeting rooms and offices with several cameras that could be focused both on team members as well as the larger meeting office space. This created several benefits. First, the picture focused on the dispersed team member's face and created a visual reminder of them, meaning that those at a distance could feel heard and remembered. Also, the member could more easily participate in discussions, especially those that happened quickly. Previously, the at-a-distance team members did not participate as fully in conference calls since they experienced difficulties connecting with others in conversations. Further, several of those on the video conference call left their connections open for the day that prompted others to say hello when passing by the camera and initiate conversations. At the same time, they kept the speakers open so that they could hear others and not feel as isolated. The placement of cameras allowed the at-a-distance team member to see whiteboards in the meeting space and be able to more fully participate in discussions. Finally, given that the embodied social proxy device could be placed in individual offices with a persistent connection, informal discussions could take place. This ensured that the dispersed team members felt more connected and part of a team. However, as with other studies, this type of set up did not eliminate the need for travel. The resulting face-to-face meetings were needed to create the necessary interpersonal relationships upon which the system could build to develop collaboration.

In another study, Karis et al. (2016) examined the use of a video portal with several teams at Google. In this example, the connection was kept open throughout the day with the speaker on but microphones muted. If someone wanted to talk to another team member, they merely unmuted the microphone. This method allowed distributed team members to keep in touch with and learn from each other due to the ability to ask questions and overhear what other team members were working on. It recreated the "hallway interactions" where many topics related to the formal project and more informal ones were discussed. It was also a way to know that the distributed team members were there, thus creating a sense of team and shared identity. Finally, the study found that team members could communicate more quickly than writing an email and then waiting for a reply. The researchers found that this type of interaction can be support-



ed more fully when collaborators were already familiar with each other. As a result, travel was still required so team members can develop the necessary personal relations that then in turn supported the virtual communication.

The third example was outlined by Dourish et al. (1996) where several researchers explored their use of an open audio-video link between their offices located at different locations to facilitate cooperative work over the longer term. In this case, using monitors that were separate from their workstation ones, the cameras were arranged to show the office, not just the individual face, and even at times beyond into the hallway. While the speaker was kept active at all times, a foot pedal activated a microphone when one wanted to speak to the other. In this way, this connection was used for quick questions and developing an awareness of the other and whether they were available to talk, much like “sharing an office” (pg. 45). By having the cameras focused on the office and even the larger environment, other colleagues would also say hello when they dropped by one of the offices. All this supported the development of the sense of team that underpins collaborative work.

A final example is Xerox Palo Alto Research Group’s use of a media space with persistent audio and video link in common areas and offices between Palo Alto and Portland offices. (Bly, Harrison, and Irwin 1993; Abel 1990; Harrison et al. 1997). The common rooms were replicated in each office with couches, tables, bookshelves, computers, and large whiteboards along with the video and audio connections. Offices were designed to look out over the common spaces. Given the layout, a sense of drop-in interactions was created between the two offices (Abel 1990). This system helped facilitate chance encounters in the public spaces because sound and video were always on. There was also potential for private meetings in individual offices because cameras and audio were also available there. Some issues of privacy were encountered, which were addressed by providing the ability to turn off audio and video in individual offices (Abel 1990; Harrison et al. 1997). It helped with the creation of social presence where there were reminders that there were others in the different sites. The system also facilitated with locating other people, group discussions, presentations, and social activities, which might even include “eating” lunch together (Bly, Harrison, and Irwin 1993; Abel 1990). Despite this robust design, travel was still needed to develop connections between people (Abel 1990).

While these studies are beneficial from the perspective of understanding the use of this technology to facilitate communication within a dispersed team, they have taken place after the system had been in place and operating for some time. But what were the individuals’ concerns before this system went into place? This paper addresses this question by exploring the initial impressions about ways that a persistent open communication channel could work in practice

and then provide feedback on it after it had been in place to see how these potential concerns had been addressed.

## Methodology

This project grew out of a desire of an academic lab to have more interaction with its collaborators. As one initiative, it wanted to experiment with an open audio and video communication channel between other labs. The project was initially conceived to connect three labs along with a satellite office to the main lab. Consequently, four sites would ideally be connected together by a persistently open communication channel using a series of cameras and monitors. In terms of location, the satellite office was divided from the main lab by approximately 25 feet with no direct sight lines between the two. One lab was located across campus and the other was in another city. Ultimately, just the satellite office and the main lab were connected together.

In order to understand the effectiveness of this communication channel in facilitating task and personal relationships, participating lab members were interviewed on two occasions. The first round occurred before the cameras and monitors were installed (pre-interview) with members of the three labs and satellite office. The second happened after the communication channel had been in place for several weeks between just the main lab and the satellite office (post-installation). The interview questions focused on the participants' understanding of and experiences with this type of technology to facilitate collaboration between geographically dispersed sites and their understanding and impressions of the ways it would work in this instance. The follow-up interviews focused on the lived experience with the channel in place. In both cases, these interviews allowed the researcher to explore topics more fully and deeply with probing and follow-up questions while participants reflected on their own experiences and emphasized those issues that were important to them.

A total of 15 interviews were conducted were conducted in the pre-interview round. Two were undertaken through Skype and the others were conducted in person. In terms of the post-installation interviews, the ten interviews were conducted in person.

Data analysis involved a grounded theory approach that focused on the themes that emerge from the data. This analysis was broken into several steps. First, working from audio recordings and detailed notes, the data was organized, read, and coded to determine categories, themes, and patterns. These categories were then tested for emergent and alternative understandings, both within a single interview and across all interviews. This was an iterative process, involving movement between the data, codes, and concepts, constantly comparing the data to itself and

the developing themes (Marshall and Rossman 1999; Rubin and Rubin 1995; McCracken 1988; Newell and Swan 2000).

## Findings

### Pre-interviews

For the pre-interviews, a mix of people were involved. Some knew most of the people at the three labs, whereas others were not as familiar with the others. There was a mixture of graduate research assistants (GRAs) who were part-time in the three labs and others, including postdoctoral fellows, who were working full-time in one of the labs. Finally, three faculty members who were associated with two of the three labs were interviewed. In terms of collaboration, some worked on their own projects while others directly collaborated with members of their labs. Some interviewees were members in two of the participating three labs. Even if working on independent projects, the interviewees still communicated with others in their lab by asking and answering questions, providing advice and expertise, and generally participating in the life of the lab. The postdoctoral fellows and faculty members provided some mentorship and professionalization advice to the GRAs on an informal basis.

All participants already used a variety of technology to facilitate communication and collaboration. Everyone indicated that they used email on a regular basis. Other technology included Skype, Google Hangouts, and online project management software such as Asana and Basecamp as well as GitHub, though less so. Other tools included Google Docs, Google Drive, Dropbox, listservs and Doodle Poll. More informally, social media, such as Twitter and Facebook, were used. Some interviewees even mentioned the telephone as a necessary tool. As one participant mentioned, it is hard to see how one can collaborate and communicate without these tools (P15).

For the most part, the participants did not have experience with a continuously open communication channel. There were two exceptions. One of the interviewees, a faculty member, had used a continuously open Skype connection during a “writing blitz” with their co-author. This enabled the two to quickly ask and answer questions related to aspects of the article (P7). Another had used one at a former employer. The open communication wall was placed in a social area with audio off. Once a week, the audio was turned on. They mentioned that this was a “nice way to feel connected” as it was possible to see who was in the other office or on lunch break (P13).

While all were intrigued with the experiment, they had several questions about the ways that it would work. These focused on the practical such as where would it be placed in the various labs, whether audio would be on or off, would it prove to be distracting if audio were on, and how would someone in a lab signal to another in another lab that they wanted to talk or have private conversations. There were also questions about the ways that the open communication wall might change work and communication patterns (P3). One participant also asked how outsiders might be informed about the channel so that no one would be “caught off guard when they entered the lab” (P5). Another questioned where the cameras would be positioned in order to avoid direct sight lines to computer screens (P11). Ultimately, the interviewees were interested in knowing how this would work logistically.

The interviewees had a number of initial impressions that were positive. These included “(being) intrigued and an interesting theoretical idea” (P1), “trust that this will be useful” (P3), and “excited to see what happens” (P8). The participants were interested to “see how it will play out” (P13).

The interviewees explored benefits on several different levels. One primary benefit was access to others in other locations and their expertise, skills, and knowledge. As one participant expressed, this open communication channel will provide “immediate access to others who can provide advice and expertise” (P6). Another echoed this with a hope that this channel would continue the development of an environment of advice seeking that was already in place (P11). Finally, there was also a sense that this connection would allow the ability to interrupt others and ask “how did you do that” and “did you talk to someone?” (P15).

The second primary benefit focused on the nature of collaboration and communication, and the ways that the open communication channel will facilitate. As several participants suggested, this channel had the potential to develop and strengthen relationships and “spark communication and collaboration that might not otherwise happen” (P8). Another stated that it could be useful to facilitate collaboration by providing an extension of space into another lab (P13). At a practical level, people will have the “ability to check in” instead of using email (P15). This might lead to additional communication that comes with the ability to talk with someone, rather than emailing them, thus “strengthening and developing relationships” (P8). They could see what others were working on, which might lead to casual interactions (P4).

There are some secondary benefits. The participants realized that they could understand what others are doing. There was an opportunity to “get to know one another” (P7). It was also “pretty cool” to see colleagues and work mates, which then had the potential to increase collaboration (P8). The unique working patterns of the various labs could be captured (P11).



At the same time, the participants had some hesitations about the open communication channel. The first, and primary one, related to the potential for surveillance. Some of the questions about it included: Would it be “creepy” (P3, P8)? Would it be CCTV at its worst (P6)? Would there be a “feeling of constant surveillance” to know that someone on the other side was watching (P8)? Perhaps even listening and judging (P13)?

There were some secondary hesitations. The participants were not sure what to think and realized that one “cannot know in advance how it will work” (P2). There was a realization that one would need to use the channel before deciding if it was good and whether it would create a disruption or be a distraction. While one participant was optimistic about the communication channel, they realized that others might have privacy concerns (P14). At the same time, there was some potential for interruptions and distractions that could impact productivity. Ultimately, there was some nervousness because people did not have experience with it.

Participants also identified several challenges that echoed some initial questions about the open communication channel. From a technical point of view, with Skype, calls get dropped all the time (P4).<sup>1</sup> How will this impact the communication? What would be the impact on the benefits of the channel? Another challenge related to the differences in lab culture and infrastructure. One lab was noisier due to the nature of their use of space and the equipment (P15). How would that work with the potential of sound being on? From a communication point of view, there was the potential for distractions that come with sound being on (P8). As several participants outlined, sound off may hinder the desired exchange, while the sound is on might be distracting. This leads to several practical considerations. How might people get others to be quiet so they can talk to someone at another lab (P15)? If sound is off, how might someone get the attention of another if they wanted to speak to them (P5)? And people themselves can be easily distracted with the location of the camera and monitor. Finally, one participant questioned whether seeing someone on a screen would affect or modify interactions between lab members (P3).

## Post-installation interviews

As mentioned above, the second set of interviews only focused on the one lab and its satellite office. There was already a culture of collaboration and communication between individual sites. The main lab was a converted hallway that meant there were no cubicles. Instead, it was an open space where desks were beside each other, thus creating a culture of working closely together with many spontaneous conversations and questions.

After the cameras and monitors had been in place for several weeks, the lab members expressed that they quickly became accustomed to the presence of the cameras and monitors. In fact, when asked, they had difficulty recalling the time when these were installed and the communication channel was opened. They just did not notice it any more (P16). As several noted, the cameras and monitors just melted in the background. Some found it initially off-putting, but they quickly became accustomed to being on camera (P1). Another commented that it felt a bit voyeuristic, but it became quite normal by the end of the first week (P5). A third commented that it did not feel “big brother-ish” because everyone was on camera and had already worked together (P8). Overall, some felt that it would be weird if the cameras disappeared (P16).

Participants also developed a sense of play around the cameras. They would goof around, wave at each other (P1) or put up signs saying that someone should come to the other space (P16). They would also work to catch another’s eyes or use a thumbs up motion (P12). From one perspective, it may not have been seen to be productive, but it was fun to do this (P11), in a way that helped to normalize the experience (P1). They also used the waving at each other as a sign to walk over to interact (P11) and perhaps to join for things as simple as coffee (P18).

It also extended the sense of space of the lab so it did not feel like two spaces. Rather, it reminded each other of the others’ presence (P8), thus creating a sense of belonging (P12). It was a chance to bring together people who were not physically there (P17). Some used it as a way to check to see if someone was in the other space (P16) or see if something was happening in the other part of the lab (P11). Ultimately, it extended the office space and created a “hole in the wall” to the other space (P13).

Many of the benefits echoed what was previously heard through discussions about the presence of the cameras and monitors.

The interviewees stated that there was a sense of presence that could make collaboration more tangible (P2). There was a realization that others were there (P18) and provide opportunity to interact (P5). It extended the sense of the lab beyond just two discrete sites and reminded each space of the other and created opportunity for impromptu discussions (P8). It also ensured that the lab members in the satellite space were not missing out on opportunities to socialize with other members. It provided social cues (P12) for meeting and interacting. It also created opportunity for conversations (P2). Ultimately, it created a sense of belonging without being a “creepy, police state” (P12).

The cameras and monitors also meant that each lab setting could see that the other side was working. This meant that members of the one lab could see the other and be socialized into the culture of academic work and created a work ethic (P1) and a sense of responsibility to work

(P12). As a result, certain behaviours were not engaged in (P12) due the cameras. One interviewee joked that it would not be possible to pick one's nose with the camera on them (P1). Ultimately, it created visual cues to the world that everyone inhabited (P12).

In terms of challenges, as mentioned by the interviewees, noise and sound was an issue from the outset. One called it "horrifically distracting" (P12). Another commented that it was very annoying (P17). It was an issue that all sounds—typing, pencils dropping, coughing, and other random noises—were amplified causing a distraction. In response, many of the interviewees used headphones to block the sound that inhibited the collegiality that was already present in the lab (P11). Consequently, after a week, the lab met and decided to turn off the microphones. This meant that there was little opportunity for direct communication between the two spaces.

There were also some practical concerns that remained. Who would be responsible to turn on and off the Skype connection each day (P1)? Where would the screens be put? Would there be sound? When would the cameras be on? Would there be a sense of surveillance? What type of machine was appropriate (P18)? Would people who are not part of the lab be told about the cameras when they came in (P11)?

The interviewees had several practical pieces of advice for other labs that might be thinking about implementing something similar. As highlighted in the challenges, several interviewees suggested that sound should be turned off to minimize distractions. However, they realized that some form of direct communication was needed, so they offered some possibilities like a walkie-talkie, intercom system, or messaging system would be beneficial (P8, P16). In that way, the individual who wanted to communicate with someone in the other space could alert them to this fact. There was also a suggestion that the placement of the camera be carefully thought through rather than just set up in any available space (P1) and should attempt to cover as many people as possible within the cameras' sight lines (P11) while ensuring that no one's computer screen was in a direct view of a camera (P8). Keeping with this, there were suggestions for larger monitors (P18) while keeping in mind the costs (P8). At the personal level, one interviewee suggested that lab members need to be open to working with each other in this way. It is an opportunity to remember to stay in touch with each other in order to collaborate because each is reminded of the other (P18). Overall, one participant mentioned that the open communication channel was successful and would recommended to others (P8).

## Discussion and Conclusion

Granted, this was a limited experiment on a small scale. The satellite office was relatively close to the lab, meaning that it was easy for team members to walk to the other space. The two members in the satellite office were working on independent projects so the establishment of common ground was not as necessary (Carroll et al. 2009; G. Olson and Olson 2000; J. Olson and Olson 2014). However, several discussion points and conclusions can be made.

During the pre-interviews, the participants were positive but had some hesitations due to unfamiliarity with the technology. The jury was out about whether it was a good idea. The participants expressed “yes, but” statements such as there are “benefits, but...” and “they are open to the idea, but...” One of the interviewees expressed it as “could be exciting, but there is a bit of concern” (P12). Another saw the benefits but realized that it would be hard to evaluate how this will go in advance (P14). Issues of privacy were expressed with questions. Would it feel like surveillance? Like someone is watching? This is an interesting juxtaposition because the same could be said for the lab setting where walls did not exist between members. People could already see what the other is doing (Karis, Wildman, and Mané 2016). Initially at least, there was a perception that a continuously open communication channel was different in some way from that experienced by a group of people sitting side by side. Finally, lab members realized that this portal was not a replacement for face-to-face interactions (P14), but rather a way to create and sustain personal connections when people are at a distance, even a small one. There was a person on the other side of the camera (Koehne, Shih, and Olson 2012; Venolia et al. 2010).

In terms of the interviews after installation, the participants had changed from the “yes, but” opinion to being very positive about the experience and were prepared to recommend the set up to others. Any concerns about the potential for feeling that they were being watched closely had disappeared. Instead, the lab members commented that the open communication channel had sustained already developed personal relationships. There was a sense of play and even fun associated with it that enriched the experience. In their study of the embodied social proxy device, Venolia et al. (2010) found that the members in the home base of the team joked with and about the person at the other end of the camera. They gave the individuals nicknames and also dressed them up as reference points. The same was found in a study that linked three kitchens in a work place together through cameras. The sense of play “helped humanize the system” (Jancke et al. 2001, p. 534). This was replicated in other settings (Bly, Harrison, and Irwin 1993). The cameras and monitors also allowed both sides to see when the other was busy and working hard, a task that is often easier to do when people are co-located (Belanger and Allport 2008; Chung 1995; Karis, Wildman, and Mané 2016). This meant that the lab members could know if someone was available for interruption. It facilitated the mentoring between postdoc-



toral fellows and GRAs because academic work, such as reading, writing, thinking, and discussing was being modelled. They learned what academic work looks like. And, perhaps more importantly, those in the satellite office did not miss out on coffee breaks and other socializing activities. This helped create and sustain a sense of team when integrating people who are working at a distance (Karis, Wildman, and Mané 2016). The lab felt less divided by perceived distance and minimized the “out of sight, out of mind” attitude (Venolia et al. 2010).

Of course, the positive is balanced by challenges. Unlike the study by Karis et al. (2016) where sound was kept on, but mediated by headphones so team members could listen in on conversations and interject or ask questions easily, here sound was distracting and a problem and turned off quickly. This did limit the kinds of interaction between the two sites, potentially hindering the development of collaboration. Given that the sound was off, the two sites had to develop other ways to connect with each other. This included waving to get the attention of another person. Of course, in this case, given the short distance between the labs, it was easy for a member in office to walk over and see a member in the other office.

In terms of privacy concerns, once the open communication portal was in place, privacy and the potential for surveillance were no longer issues. Instead, the camera blended into the background and was not noticed. In some senses, it replicated the feeling that comes when individuals are co-located in open or cubical-style offices where there are no walls separating people (Karis, Wildman, and Mané 2016).

It might have been too much to ask that the system could facilitate voice communication between the two sites since it was a case of many-to-many. This is in contrast to Karis et al. (2016) and Dourish et al. (1996), which were one-to-one, or Venolia et al. (2010), which was one-to-many. In these cases, the ability to communicate with the one person is simple and easily accommodated, especially if the sound and microphone are constantly on. Here, a system would need to be designed that would allow someone at their desk to talk to someone at a distance that bypassed the larger group. Further, there was a desire not to have cameras on each computer since that would have split the screen into too many smaller pictures, negating the value of having a large image of each space where individuals were located.

Given its limited scope, this research raises several questions. Would the open communication portal work as well if the lab members did not know each other already? How much work needs to be done in advance with face-to-face meetings to ensure that team members know each other? Would it assist with the development of a sense of community if the distances between sites were greater? Would this be easily scaled to other locations? Would it also work if there were walls in the labs that could already minimize a culture of collaboration?

By understanding the initial impressions and concerns about a continuously open communication channel between two sites, a system can be designed that addresses these. Initially, privacy and surveillance were concerns that then faded into the background once the channel was operational. This means that care must be taken to educate participating team members into the fact that privacy would not be an issue once the system was in place. Second, the cameras and monitors need to be positioned to ensure that as many people as possible are in line of sight of the cameras and that the monitors were visible to all. Lastly, work needs to be done to lessen the impact of sound being on while still facilitating integration and collaboration. Ultimately, the two lab sites found that the channel facilitated interactions and ensured that the satellite office was still engaged in the life of the lab as a whole<sup>2</sup>.

## Coda

This article was written before the COVID-19 lockdown, which saw an unprecedented shift to remote work. Now, students and teachers are navigating online teaching and employees are working from home. Communication platforms such as Zoom are being used to facilitate meetings. As a result, people are spending long hours online and suffering from “Zoom fatigue” as a result. It will be interesting to determine if, in the long term, companies find these platforms beneficial for all forms of communication in an office setting. Zoom can easily replicate the structure of a meeting, but more planning may need to be done to create the more casual interactions that come around the “water cooler,” interactions that can communicate important information needed for team development and a project. This situation may prompt the creation and testing of tools that replicate the strengths of co-location.

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### Notes:

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- . In fact, the two interviews conducted by Skype experienced technical difficulties. ↩
- . In fact, the lab found the system so beneficial they extended its use when one lab member was located in another city. ↩

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### Abstract:

With advances in telecommunications and information technology, collaborations and teamwork are no longer bound by geography. However, challenges stemming from distance must be managed to ensure that teams work together successfully. One of the primary challenges is finding ways to facilitate communication and coordination across distance and time. Skype, Zoom, and other internet-enabled tools provide some potential to accomplish this; however, relatively few studies have been completed on the best ways to use a continuously open communication channel to facilitate teamwork within a geographically dispersed collaboration. This study contributes to this discussion by examining the use of such a channel by a dispersed lab. While this paper suggests the potential for similar collaborations, open audio and video communication channels can create the sense of social presence by reminding members that they are part of larger efforts, even when working at a distance. It managed to do so while addressing concerns of privacy and a potential for surveillance culture. These tools also complement the other well-established online ones as well as face-to-face meetings for project coordination and decision-making.

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