Making Serendipity Stick

Translating short, live online interactions into meaningful relationships

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Submitted to the Program in Media Arts and Sciences,
School of Architecture and Planning,
in partial fulfillment of the requirements for the degree of

Master of Science in Media Arts and Sciences
at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2015

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Abstract

Deep personal connections foster rich learning. Making such connections is one of the most valuable benefits of attending face-to-face conferences. Online technologies offer the opportunity to meet with more people at a fraction of the cost. However, it is more challenging to experience the immediacy of face-to-face meetings in online gatherings and virtual conversations. Forming strong ties with people at conferences is much easier offline, than online, where it is easy to get distracted and harder to reach out and connect. This thesis extends Unhangout, a platform for online unconferences, and investigates how we can help people translate short, live online interactions into lasting relationships. I mimicked some of the successful features of the offline unconferences into an online experience on Unhangout. I designed and implemented a series of interventions around three distinct phases of an online event, "Who to connect with?", "How to connect with others?" and "How to stay connected?" and explored their impact on people's behaviors and ability to form relationships with each other. Throughout this study, the purpose is to help users of an online event make deeper and longer-lasting connections with other participants.

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Acknowledgments

To Mitchel Resnick, for the opportunity to live my childhood dream of working in a creative, hands-on learning environment. Thank you for your advice, feedback, and encouragement.

To Philipp Schmidt, for being a wonderful mentor and giving me the opportunity to have one of the most memorable learning experiences of my life. Thank you for introducing me to the world of peer-to-peer learning.

To June Ahn, for serving as a reader for this thesis and giving me constructive feedback.

To Charlie DeTar, for being so patient while reviewing my code, and merging my pull requests. To Drew Harry, for getting me started with the Unhangout development.

To my colleagues and best buddies, Juliana Nazaré, Katherine McConachie, and Grif Peterson, for their immense support, peer feedback and making my time here a magical experience.

To Lifelong Kindergarten (LLK), for offering a welcoming environment, helping me learn from my mistakes and making me a more humble person. To each and every member of LLK for motivating me, helping me grow, and boosting my self-confidence. A special thanks to Abdulrahman Y. Idlbi and Champika Fernando for being my loving and caring seniors.

To my friend Dhairya Dand, for his lessons on life and work, and in helping me shed my introversion and introducing me to members of the Media Lab community.

To friendships developed at the Media Lab with Cindy Hsin-Liu Kao, Krishna Rastogi, Prashant Patil, Harshit Agrawal, Amna Carreiro, Deepak Jagdish, Analisha Jewelz, Chelsea Barabas, Chang Long Zhu Jin, Roger Boldù, Xavi Benavides, Sang-won Leigh, Tal Achituv, Alisha Panjwani, Artem Dementyev, Tarana Gupta, Nathan Matias, David Moinina Sengeh. To Paras Kuhad, Vivek Anand, Kunal Gupta, Priyanka Chaudhary and Aditya Patawari, friends outside of the Cambridge area, for being my inspiration.

To mom and dad, for believing in me, and happily sending me overseas to pursue my dreams. To my sister Aastha and brother Spandan for cheering me up over Skype.

Contents

1

Introduction

Deep personal connections can be a rich source of learning experiences. They allow us to develop diverse friendships and learn with each other about the changes happening all around, fostering meaningful connections that not only provide opportunities for professional development but also enrich us personally. Making such connections is one of the most valuable benefits of attending face-to-face conferences.

When we meet others in face-to-face meetings, engaging in conversations and forming connections are more fruitful than attending top-down lecture-style presentations. For many of us, networking at events has greatly impacted our lives. In my personal experience, the majority of my learning during my undergraduate schooling, happened by making connections with people outside of my campus and attending physical conferences. My experience is not unique; I believe we all have stories from our experiences of going to workshops, conferences, or informal meetups. After participating in a well-designed event, and being surrounded by like-minded individuals, we walk away motivated and feel inspired to create change in the world.

Rachel Sanders, the founder of the PyLadies group in San Francisco, writes in a blog post, "I've organized tech meetups for a couple years now. I've watched people show up, make friends, get jobs and build a network and community for themselves. I've met people I would never have met otherwise, gotten opportunities I wouldn't have gotten otherwise. It's one of the best things I've ever done, and I love it." (Rachel Sanders - Medium)

Many new formats for face-to-face meetings, like meetups [1], barcamps [2], and edcamps [3], are designed to provide new means for people to learn. Studying them can help us better understand how people learn and what they want to learn. Additionally, in all of these meetings, networking and developing connections with people to support each others' learning holds a great significance.

Although these offline meetings provide ample opportunities to socialize, and the liveliness of the space creates an environment well-suited to make connections, the face-to-face format also has challenges. If we meet with a stranger and have no common background or interests, it can be hard to find a conversation starter. Specially, introverts are found either hanging out with people who they already know or hiding behind the screens of their mobile devices, or on the fringes of the room. Thus, socializing with others can be an intimidating experience for some in the in-person meetups. There is also a typical pattern observed in these events where attendees tend to reach out to presenters in the hope that they will help them excel in their career. Presenters, who are being approached by a lot of people, might not be able to catch up with everyone. If their conversation with an attendee was not exciting enough, they might not followup on the conversation. Even though people exchange contact information, after the conference they are busy with their professional lives and may forget to contact someone they did not communicate with in depth at the event.

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[1] Meetups http://www.meetup.com/

[2] Barcamps http://barcamp.org/

[3] Edcamps http://edcamp.org/

Besides the networking hurdles described above, in this fast-paced world it is challenging to host or attend frequent face-to-face meetups. They require a lot of prior planning: reserving the event venue in advance, finding appropriate resources for funding, paying for equipment set up, flying speakers to the venue, calling for proposal submissions, and so on.

This process is tedious and time-consuming. There is an opportunity for online models that could cater to the needs of a wider audience and touch people in different time zones. Online tools bring not only learning communities together, but also allow people to be part of them from the comfort of their homes.

Although online technologies offer the opportunity to meet with more people at a fraction of the cost, it is more challenging to experience the immediacy of face-to-face meetings in online gatherings and virtual conversations. In an offline setting, it is easier to construct the identity of individuals and predict their interests and behavior. People's voices, attire, personalities, and gestures create memorable appearances. You also get a number of opportunities to know people better. You shake hands with them, converse, make eye contact while listening to them, socialize over drinks, and exchange business cards at the end of the event. It makes it easier to approach someone who you might want to connect with after the event. It is hard to give online gatherings the same liveliness of the physical world. Making connections with people at conferences is much easier offline than online, where it is easy to get distracted and harder to reach out and connect. Online, it takes quite a while to get submerged in a new virtual experience; you need time to understand a new model, become familiar with the technology, and gain a sense of belonging.

Despite the pitfalls of making connections online, there are important benefits as well. Online technologies allow people to talk to strangers with less hesitation, as it gives them control over how they would like to represent themselves in front of others. They can prefer to turn off their video and control their profile settings such as name, gender, avatar, description, etc. Thus, an online space provides a platform where people can worry less about their personal identity, body language and others watching them, therefore permitting them to be more relaxed in their interactions.

For this thesis, I have combined the best aspects of face-to-face and online meetups to translate short, live online interactions into meaningful relationships.

1.1 Making Serendipity Stick

Translating short, live online interactions into meaningful relationships

Serendipity is "finding out things without being searching for them" (Austin, 2003), or "a pleasant surprise" (Tolson, 2004). The notion of serendipity in this thesis is defined as the happenstance by which you meet with a pool of like-minded individuals from all over the world through live online interactions. This thesis introduces a series of design interventions created to help participants of online events deepen these serendipitous encounters and extend them into learning exchanges. One of the objectives of my work is to make it easier for the members of an online event to connect with each other.

For the purpose of this study, the Unhangout [1] platform has been utilized as the experimental setup for the integration of design features. Each of these features targets a distinct phase of an Unhangout event (before, during, and after) and addresses a specific research question.

The features developed and the research questions approached are as follows:
1) Participant Proposed Sessions - “Who to connect with?”
2) Conversation Networks - “How to connect with others?”
3) Followup Emails - “How to stay connected?”

I have followed a design-based research methodology to design, implement, and evaluate these features. I co-hosted online events for the deployment of each of these features and evaluated them by conducting surveys. I conclude this thesis by reflecting on the implementations and survey analysis to recommend ways in which we can help people to translate short, live interactions into lasting relationships.

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[1] Unhangout http://unhangout.media.mit.edu

1.2 Thesis Overview

In Chapter 2, I describe the background and prior work related to this thesis. I elaborate the Unconference model of physical settings, the Unhangout platform, observations from past Unhangout events, and related projects.

In Chapter 3, I outline relevant background research, and introduce three concepts (learner agency, social presence, and strength of weak ties) that informed my research. This chapter also describes the design-based research methodology I used.

In Chapter 4, I describe the features I designed to address three research questions: "Who to connect with", "How to connect with others", and "How to stay connected?". The implementation of each of these features is described in detail.

In Chapter 5, I explain the deployment of each feature, describe how the features were used in different online events, and share survey data that informs my findings and reflections.

In Chapter 6, I conclude this thesis by reflecting on my findings and suggesting directions for future work in this research area.

Appendix A contains an overview of the Unhangout application and technical implementation details of the three features I developed.

Appendix B contains survey forms I used after Unhangout events designed to aid in the evaluation of features.

2

Background & Prior Work

I start the chapter by outlining the Unconference model. I then describe the Unhangout platform, its use cases and the observations I made while running a variety of different events on the platform. I then compile how these observations led to the framing of this thesis. The last section of this chapter contains related projects that inspired me during the initial design phases of my research.

2.1 The Unconference Model

In a physical setting, an unconference promotes participant-driven conversations and impromptu discussions in small breakout groups, thereby nurturing informal learning. A typical unconference does not have a pre-determined agenda and builds on the belief that "a group of people, given a purpose and freedom, have the ability to self-govern, self-organize, and produce results" (Boule, M. 2011). In these informational gatherings with a pool of diverse participants, learning occurs through social interactions with peers.

In this model, the event usually begins with a kick-off gathering where a group of people with similar interests gets together at a specific time. The host welcomes everyone present in the room and talks about the overall goal of the event. Members of the group can propose sessions that they are interested in facilitating. Organizers judge interest in each session and allocate rooms to sessions depending on interest level and/or other resource constraints. Thus, the conference schedule is developed in collaboration with community members. Participants then choose a breakout discussion to participate in, but are also encouraged to move from session to session. Often a final wrap-up ceremony brings people together again to share what they learned with others [Figure 1].

1. Kick-off gathering

2. Participants propose sessions

3. Breakouts

4. Wrap-up ceremony

Figure 1: Different stages of a physical Unconference

The Unconference model uses variations on the Open Space Technology [1] format developed by Harrison Owen in 1980's, and the term "unconference" first appeared during the XML developer conference in 1998 [2]. Since early 2000, a lot of conferences (Foo Camp [3], Barcamp, BloggerCon [4]) have been organized based on this format.

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[1] Open Space Technology http://en.wikipedia.org/wiki/Open_Space_Technology

[2] XML Developers' Conference http://xml.coverpages.org/bosakXMLDayAnn9808.html

[3] Foo Camp http://en.wikipedia.org/wiki/Foo_Camp

[4] BloggerCon http://en.wikipedia.org/wiki/BloggerCon

2.2 Brief History of the Unhangout Platform

In the spring of 2013, Media Lab researchers Mitchel Resnick, Natalie Rusk and Philipp Schmidt collaborated to offer "Learning Creative Learning (LCL) [1]" an online version of a Media Lab course "Technologies for Creative Learning". During that year, the MOOC (massive open and online courses) movement was gaining popularity, and some universities were experimenting with integrating their offline courses into online platforms by offering video recordings of their lectures. But the researchers at the Media Lab were keen in engaging participants of their course more directly and decided to live stream rather than pre-record weekly seminars.

MIT Media Lab alumnus Drew Harry who had written his thesis dissertation on designing complementary communication systems (Harry, D. 2012) started collaborating with the LCL team to develop a backchannel chat interface [Figure 2] that remote class participants could use to chat with each other, and share ideas during LCL's weekly panel discussions. The original system was based on an open-source chat framework called Candy [2].

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[1] Learning Creative Learning http://learn.media.mit.edu/lcl/

[2] Candy http://candy-chat.github.io/candy/

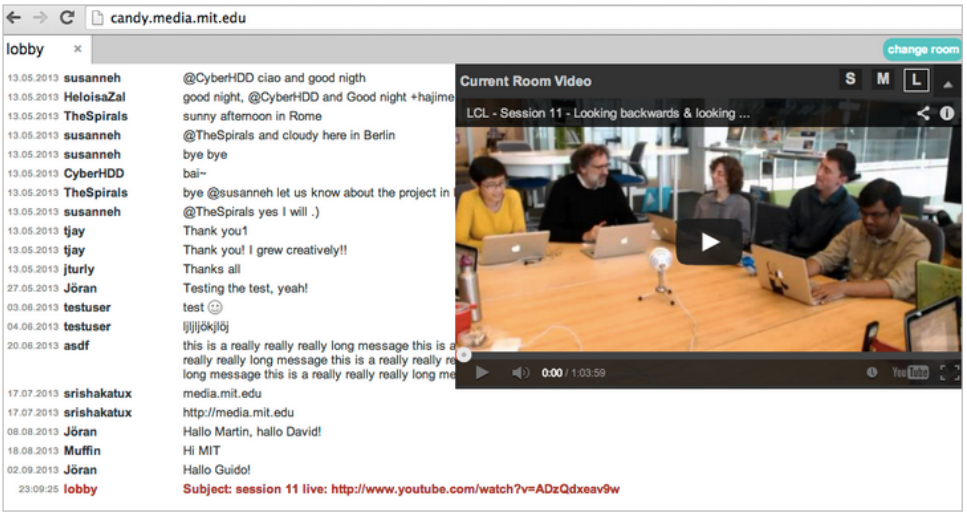

Figure 2: Candy-based chat room

Taking inspiration from their success using Candy to engage participants in more meaningful and small group discussions online, Philipp Schmidt and Drew Harry designed and developed the first prototype of the Unhangout platform.

The Unhangout Platform

Unhangout is designed to run unconference style events online. It fosters impromptu discussions. It offers a platform for hundreds of participants to take part in a virtual event while helping retain the intimacy of small group discussion. At its core, Unhangout is a virtual lobby [Figure 3] that offers three ways of interacting. Participants can jointly watch embedded video (including live presentations), chat with each other, and enter breakout groups.

The platform supports open learning communities of different sizes and interests and is designed to create opportunities for participants to play an active role through

dialogue, critique, presentation, ideation, etc. Unhangout encourages community-based learning and supports in-depth conversations.

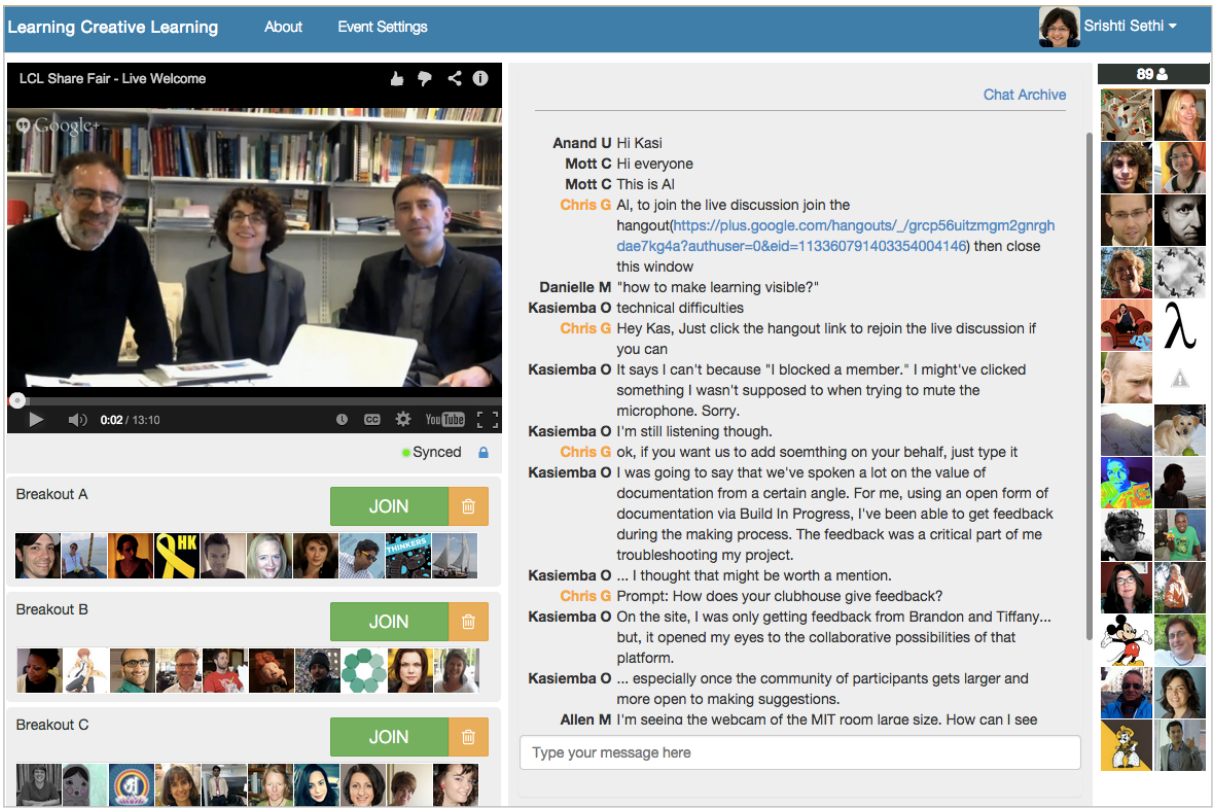

Figure 3 The Unhangout platform's lobby

2.3 Observations, Issues, Opportunities

In this section, I describe observations from Unhangout events that led to the framing of this thesis topic, "Making Serendipity Stick." Over the course of a year and a half, along with Philipp Schmidt, Charlie DeTar and other researchers at the Media Lab, I contributed to the Unhangout platform in varied ways (design, development and research). It allowed me to better understand the various learning styles, expectations,

and needs of online learners of different backgrounds. For my research, I developed a set of features that extended version 1.0 of the Unhangout platform to support the development of lasting relationships.

In addition to design and development of the platform, I co-organized a variety of online seminars on the Unhangout platform [Figure 4], geared at different audiences and serving different goals. In a span of a year and a half, Unhangout had over 10,000 users, more than 100 events were created, including 20 events that Media Lab co-hosted.

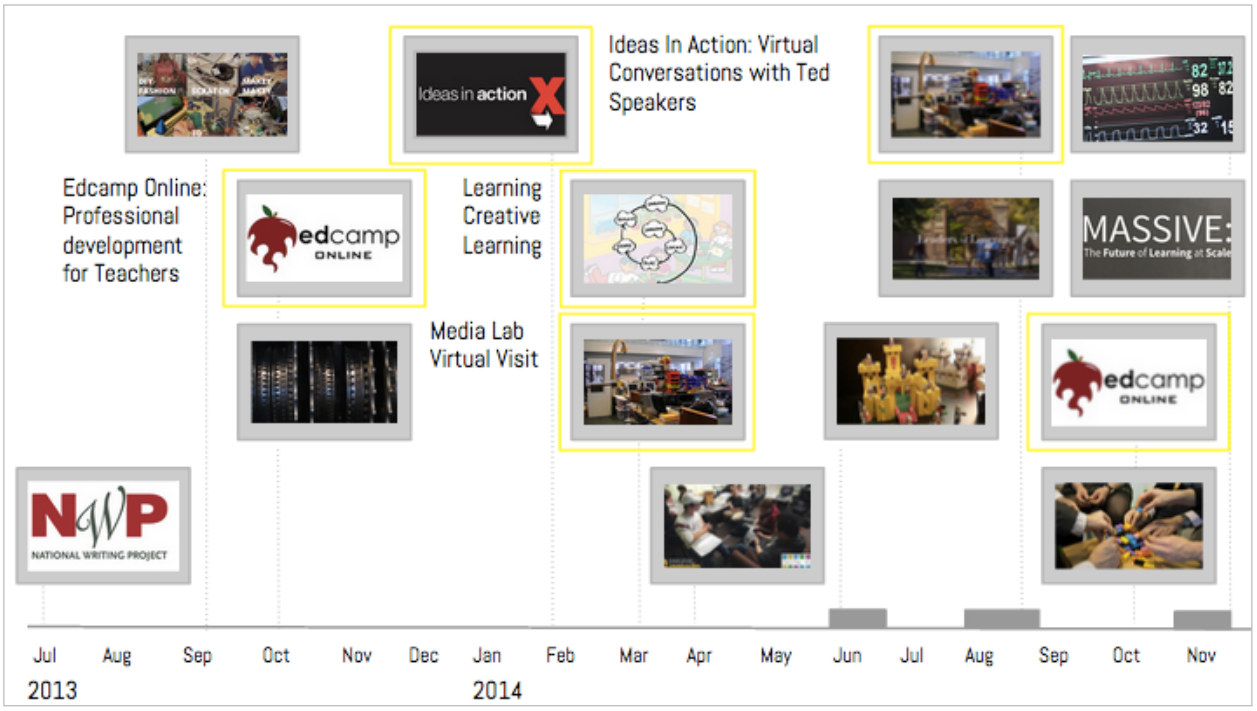

Figure 4 Online seminars run on the Unhangout

Some of these events were part of Learning Creative Learning 2014, the Media Lab's online course. I also organized two Media Lab Virtual Visits connecting Media Lab researchers and students from all over the world, hosted virtual conversations with

speakers from TEDx Beacon Street, and collaborated with Edcamp to organize two online unconferences for professional development for educators. With each iteration of the prototype and event design, I better understood the challenges participants encountered and thought of new opportunities to deepen their engagement. The topic of this thesis is inspired by the successful experiences, as well as the challenges, I observed in events we hosted on the Unhangout platform.

The platform was designed to foster active engagement and a spirit of peer learning among participants. For the Unhangout events that we were involved in hosting, we conducted surveys with participants. Collective results from survey analysis of seven Unhangout events (each of a different style) indicated that 50% [N = 167] agreed they were not just listening but also speaking in a breakout room, and 57% [N = 167] enjoyed participating in small breakouts more than listening to speakers in the lobby. These results motivated us, because we were hoping to exactly this kind of engagement among learners. 95% said they would recommend a similar style event to a friend or a colleague.

Survey responses conveyed that people enjoy conversations with people from different time zones and diverse backgrounds, who they happen to meet through these events. They liked being able to participate online with a wide array of perspectives from multiple settings. Participants wanted to take advantage of this opportunity to identify individuals with similar interests so that they could form relationships and continue learning after the event.

Intrigued by this feedback, I conducted a few user interviews to learn more about the ways that users were connecting with each other. One of the participants mentioned that he had the opportunity to listen to someone's work in the breakout room that

aligned with his current research. He further said, “I wish I could remember just the name of that girl in my breakout room so that it would have been easier to follow up with her.”

I learned that some of the other participants also wanted to get in touch with another participant after the event in order to continue their conversations. But there was no easy way for people to establish connections after these short, live online interactions.

During one Unhangout event, Amos Blanton (a Media Lab staff member who was participating in the event), made a comment on Twitter [Figure 5]. His tweets are a good example of how difficult it is to connect people manually after an Unhangout event. I knew Amos already and tried to connect him with Daniel (who Amos wanted to follow up with) before the event was over.

Figure 5 Tweets received from an event

There are many more stories like this. I also noticed that after Unhangout events, people were following up with facilitators through emails. This was possible, since it is easier to find the facilitators contact information online. They are either experts (so there is information available about them online) or, for some events, we displayed their description on the event page to let people know more about their work prior to the event. Still, there were few interactions between learners after events.

We had not designed the platform to facilitate conversations to continue after an event. But, as a result of an event that I organized for undergraduate students in India, one of the participants connected with a facilitator and he got an internship offer. I received a thank-you email from the student later [Figure 6].

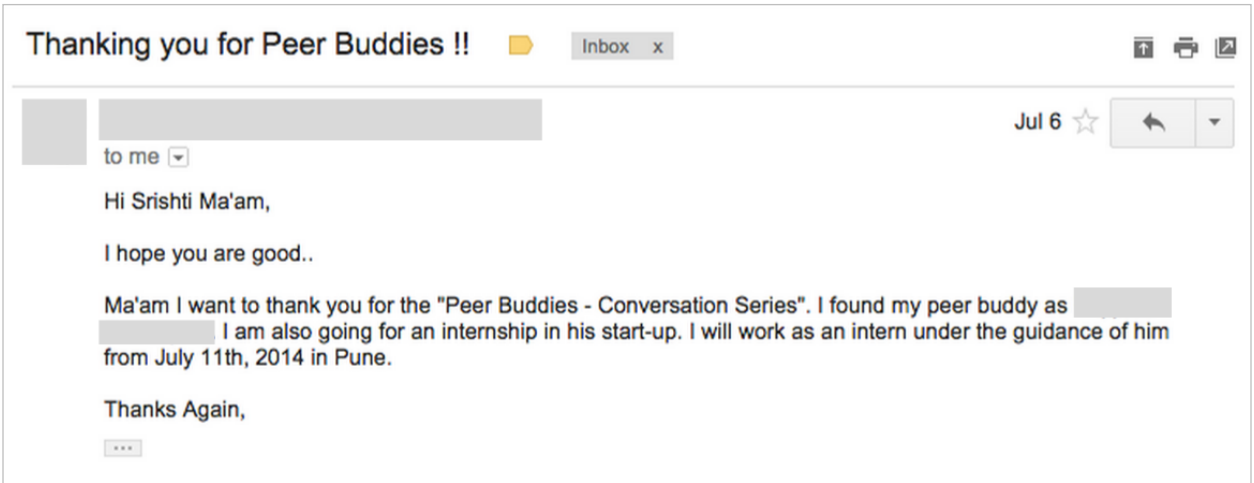

Figure 6 Thank-you email received from the student post Unhangout

After this successful story, I started to think about ways we could foster more opportunities for people to deepen their connections through Unhangout events and decided to explore this challenge in my thesis.

2.4 Related Projects

There are a dozen platforms like join.me, GoToMeeting, and UberConference to host virtual conferences. These platforms are mostly used by corporate organizations to host webinars with a goal to scale viewership. Using technologies like AdobeConnect and WebEx, some educational institutions are extending the learning beyond the classroom. They are being integrated with a few learning management systems as well. With these technologies, the focus is on distance learning and, in some cases, to enable remote collaboration. There are a few educational applications like Minerva and ZOEN (Zenph Online Education Network), designed to support teaching in small, discussion-based seminars. Still, these platforms put more emphasis on teaching rather than learning.

There are also several projects that incorporate synchronous components like real-time chats and video discussions and could be used to facilitate collaboration in small groups online. Open-source projects like WebRTC, Licode, and TogetherJS make access to open and real-time communications technologies easier.

Contrary to the platforms described above, Unhangout is designed to replicate the unconference model, empowering learners as active participants. It promotes community-driven learning by promoting peer interactions among people with similar interests and/or backgrounds.

I also took inspiration from Proximate [Figure 7], a tool that aims to bring participants from an offline event together. It provides an online gallery of participants (who

attended or are planning to attend an offline event) and includes a short personal description, the ability to search, and social network visualization.

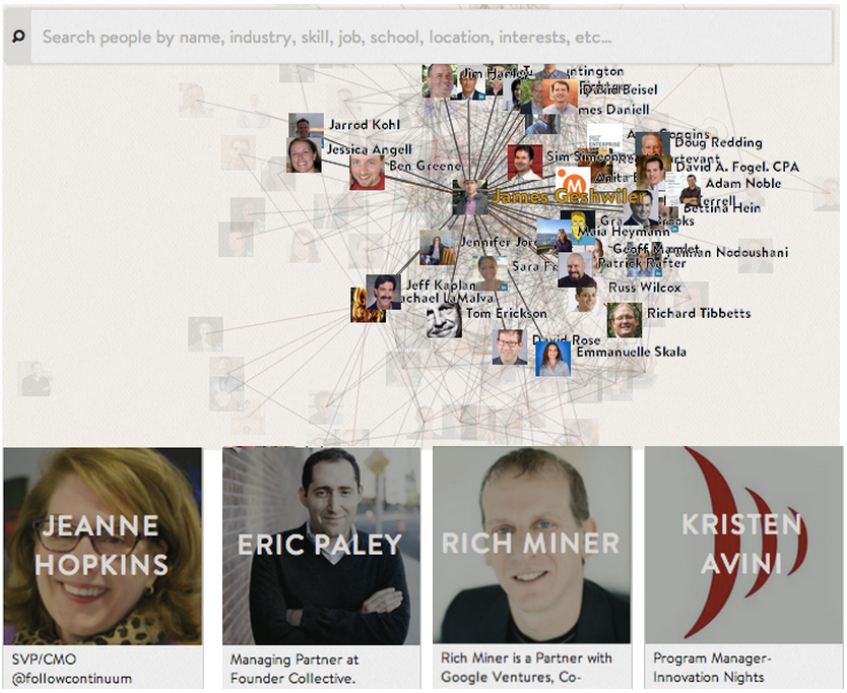

Figure 7 Proximate tool

3

Background Literature & Research Methodology

3.1 Background Literature

I will briefly highlight two learning concepts that are often referenced in the context of learning webs.

The first is Ivan Illich's concept of learning webs, described in his book Deschooling Society (1971). In this work, Illich contended instead of searching for new educational approaches that only scale the old model to more students, we should focus on "the design of educational webs which heighten the opportunity for students to transform each moment of their living into one of learning, sharing, and caring" (Illich, I. 1971).

The second concept is connectivism, as developed by George Siemens (2005). "Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning, which is defined by Connectivists as actionable knowledge can reside outside of ourselves (within an organization or a database) and is focused on connecting specialized information sets. Furthermore, the connections that enable us to learn more are more important in connectivism than the current state of one's own knowing" (Siemens, G. 2005).

Illich's vision of deschooling society developed before learning was impacted by digital technology whereas connectivism is a learning theory born of the digital world. However, both concepts have shaped the work of many contemporary educators.

Learning webs can be seen in practice through platforms like Meetup, P2PU [1], Stackoverflow [2], and NovoEd [3] each of which emphasize educational networks over more traditional educational models. A connectivism approach to viewing learning as the process of creating connections can be observed in platforms like Stanford Online and Personal Learning Environments Networks and Knowledge (PLENK).

Both deschooling society and connectivism argue that a great deal of learning takes place in informal spaces when people collaborate with their peers and work on projects or tasks they care about. In current society, needs of learners are changing in part due to the transformation of workplaces. Learners switch careers over the course of their lifetime, which makes learning a continual process. Thus, the value of informal learning, and personal learning networks continues to grow.

Digtial technology has begun to reshape the design of our learning environments. With the advent of Web 2.0 technologies, it has become easier to develop a sense of presence within the online world. Furthermore, some of these technologies enable new pedagogical models and constructivist approaches of teaching and learning online. Educators can use these tools not only to implement a traditional classroom model online, but also to transform their role from sage-on-the-stage to guide-on-the-side.

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[1] P2PU https://p2pu.org/en/
[2] stackoverflow http://stackoverflow.com/
[3] NovoEd https://novoed.com/
[4] Stanford Online http://venture-lab.org/education
[5] PLENK http://connect.downes.ca/

Not only educators but students are interested in the more participatory learning models. New learning tools hold great potential to provide an unstructured collaboration space to learners where they could learn from a wider peer group and each other's discipline and backgrounds.

Downes (2009) claims (cited in Kop, 2011), that people can advance their learning by using personal learning networks and making connections with resourceful people with similar interests. Downes' study also draws challenges associated with this approach to connectivist learning in open online networks. Two challenges mentioned by Kop (2011) relevant to this study are: 'self-directed learning' and 'presence'. These challenges were assembled from observations on a MOOC course PLENK (Personal Learning Environments, Networks, and Knowledge). In the MOOC, the process of developing connections worked well only if people had the ability to direct their own learning. Additionally, having a sense of who the facilitators and the participants were increased engagement and sense of belonging in connectivist learning environments. This work suggests that we should not only research virtual learning spaces in terms of technologies and tools, but as environments that can lead to meaningful relationships between peers.

Taking inspiration from this literature, I review three approaches and how they might contribute to sustaining online learning communities, and boosting meaningful connections, and therefore inform the design of new Unhangout features:

3.1.1 Learner Agency

Learner agency is defined as "the capability of individual human beings to make choices and act on these choices in a way that makes a difference in their lives" (Barker,

2005, p.448). William Glasser's choice theory lists freedom or autonomy as one of the needs for a healthy educational setting (Glasser, 1998). Thus, relating to Glasser's approach to identifying freedom, choosing what and how to learn, and how we want to live our lives addresses learner agency. Learner agency plays a crucial role in creating transformative learning experiences (Lindgren & McDaniel, 2012). Furthermore, learning communities are sustained by common goals and by the value they place on the contribution of an individual (Ryman, Burrell, Hardham, Richardson & Ross, 2009).

An unconference model is a perfect example of enabling learners with agency and freedom. As mentioned earlier, unconferences follow the "Law of Two Feet" which entails that "if at any time during our time together you find yourself in any situation where you are neither learning nor contributing, use your two feet, go someplace else" (Owen, 2001). Learner agency offered in such environments brings active engagement, thereby creating possibilities for extended conversations and interpersonal relationships. A participant-driven learning culture not only helps people to learn from one another, but also helps them connect with like-minded individuals. Present-day tools are experimenting on tying the pedagogical models with technological tools, but still it's challenging to design an experience that gives learners a more active role in their learning in a large online setting.

3.1.2 Social Presence

Social presence has been defined "as the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (Short, Williams & Christie, 1976, p. 65). It is considered a necessary design factor to sustain learning communities (Ryman, Burrell, Hardham, Richardson & Ross, 2009). Therefore, enhancing social presence makes it easier for learners to become familiar with each

other, and understand the contributions that each can bring into the community. Social presence in an online environment can be understood as the ability of members “to project their personal characteristics into the community, thereby presenting themselves to other participants as ‘real people’" (Garrison, Anderson, Archer, 2000, p. 89).

Version 1.0 of the Unhangout platform supported the development of a basic sense of presence among participants. The platform's lobby display avatars of whoever is present in the room. At the beginning of events we co-organized, we encouraged participants to introduce themselves by saying a sentence about who they are, and what they do. This activity is intended to help people familiarize with each other and give a better sense of their background to others present in the room. Other learning communities are experimenting with other tools to bring social presence into their courses. Some of them use Twitter chat as a means of discussion to enhance social presence (Dunlap, Lowenthal, 2009).

However, it is often difficult to maintain social presence with large numbers of participants in a synchronous environment where conversations take place for a very short duration of time. There, it’s hard to construct the identity of online participants. It’s also a two-way process. Both facilitator and participants need to involve fully to share common goals or purpose. When members of an online community don't feel a sense of presence, they don't tend to engage actively.

3.1.3 The Strength of Weak Ties

The literature on the strength of networking ties provides a concrete framework for thinking about the roles of strong and weak ties in social networking interactions.

Granovetter (1973) defines strong ties as your friends and weak ties as your acquaintances. Research indicates that weak ties relationships are more valuable for some information exchanges as they provide access to opportunities and resources outside of our close-knit networks of friends. This information can play an important role in shaping our professional lives. Weak ties range from brief to irregular exchanges occurring with a unique purpose. Strong ties are important too, but as they take quite a while to prosper, it would be harder to identify such interactions and measure their impact in this thesis. I will focus on the effect of new features on people's ability to establish weak-tie relationships with other participants, and if they result in continued information exchanges.

3.2 Research Methodology

I followed a design-based research approach, which is most commonly used in the learning sciences. Design-based research is a methodology applied in natural settings where interventions are implemented in an iterative manner in order to produce new theories, design principles, and guidelines on teaching and learning (Barab, S., (2006). I applied design-research methodology in the following way:

- Designed experiments to test hypothesis that were derived from past observations
- Developed, implemented, and revised design interventions
- Evaluated the impact of interventions
- Followed an iterative design process

I used both qualitative and quantitative observations from earlier iterations of the Unhangout platform to frame three design interventions (and develop new features) for my thesis. I tested the hypothesis behind each intervention by hosting specific

Unhangout events for them and recording qualitative and quantitative data from participants. I used the results from these events to iterate on the design, implementation, and deployment of the features.

I considered results from each deployment for the design of next iterations and feature development. I reflected on "what worked well?", "what didn't work well?", and "what changes can be made to a feature to get closer to solving the bigger research question?" I conducted online surveys to understand people's use of the feature and perceptions of its value and considered how actively each feature was used. I discuss the evaluation of each feature in detail in Chapter 5. The results from surveys shed light on the impact of the features on people's behavior and their ability connect with each other online.

4

Design & Implementation

I drew inspiration from the literature described in Chapter 3. The literature helped informed design decisions I made to address my overall research question "How can we help people translate short, live interactions into meaningful relationships?". Thus, I designed a set of features in the Unhangout platform that augment social presence, support learner agency, and nurture weak tie relationships. These features are intended to empower learners, create a shared sense of curiosity and purpose in an Unhangout, and make it easier for them to network with like-minded individuals to form meaningful relationships. My design interventions address the following three sub-questions:

- Who to connect with?
- How to connect with others?
- How to stay connected?

I used the Unhangout platform as my research setting, designed three features “Participant Proposed Sessions”, “Conversation Networks”, and “Followup Emails” and integrated them with the platform.

4.1 Who to connect with?

In a physical unconference, schedule building takes place just before the event kicks off. Participants have the agency to pitch ideas for discussion topics they are interested in facilitating or hearing about [Figure 8]. Allowing people to create sessions makes it easier to find others who they might want to connect with. When anyone can express their interest, it increases likelihood of finding others to connect with in two ways:

- It gives participants a platform to announce their personal areas of interest (so that others can find them).

- It creates fast feedback on which topics are most likely to attract participants with shared interest (increasing the chances that they end up in conversations with others they might enjoy connecting with).

Figure 8 Participants pitching ideas for topics in a physical unconference

This approach works well in physical unconferences. But version 1.0 of the Unhangout platform (described in section 2.2) only allowed event organizers (with event administrator status) to create sessions. Taking inspiration from the schedule building phase of an unconference, I designed a feature "Participant Proposed Sessions". With this feature, I examined how giving more agency to learners can help them identify others who they might want to connect with during the event.

4.1.1 Participant Proposed Sessions

Feature for research question: "Who to connect with?"

Prototype

As a preliminary prototype to address the research question: "Who to connect with?", I used a separate schedule creator tool called the "Question Tool Instance Chooser" [1] in one event. This tool allowed participants to propose sessions and vote on them (the results of which are illustrated in Figure 9). The sessions that attracted most interest were then created as Unhangout breakout rooms by the organizer. 55% [N = 41] of the respondents of this event said they either proposed or voted on a sessions and 35% [N = 41] indicated that they wanted to followup with an individual post Unhangout event.

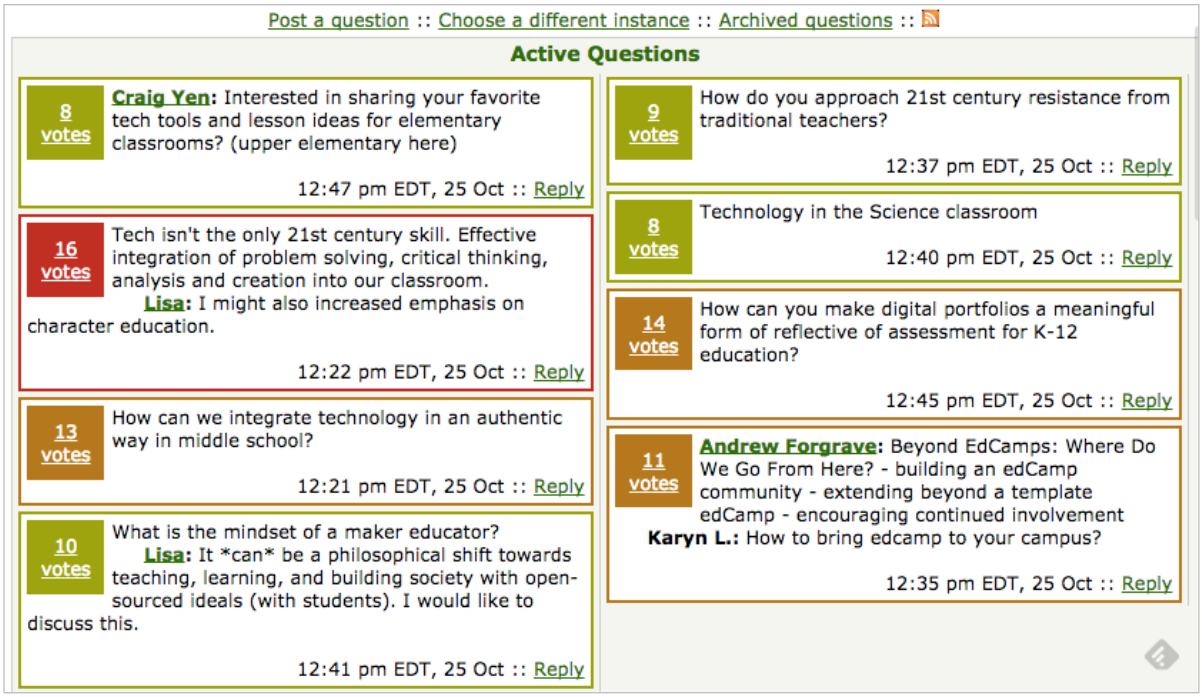

Figure 9 Question Tool Instance Chooser

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[1] Question Tool Instance Chooser http://cyber.law.harvard.edu/questions/chooser.php

These results indicated the potential usefulness of this tool and led to the decision to integrate this functionality with the Unhangout platform.

Feature description

I developed the participant proposed sessions feature, keeping in mind the key learning from the prototype testing. The goal of this feature is to give participants the agency to propose their breakout room discussion sessions in an online event and announce what sessions they aspire to lead or hear about. The design of this feature replicates the agenda building of a physical unconference and incorporates visual elements to represent different activities involved in the process of schedule building in an Unhangout.

With this feature, any participant present in the Unhangout lobby can propose an idea for a session. Proposed sessions appear visually different from approved and active sessions. The design of a proposed session block acknowledges the significance of using personal profiles to prototype in an online environment and consists of avatars and names of the person who submitted it. Everyone can vote on the proposed sessions, and each session displays the number of votes received in real time. Administrators moderate these sessions and can approve or unapprove them during the event. Once approved, a session will appear as LOCKED until the breakout rooms are opened, ensuring that people join rooms together.

Interaction flow for participants

1) Organizers of the event "Enable Participant Proposed Sessions" from the "Event Settings" panel [Figure 10].

2) With the breakout rooms still locked, participants and organizers propose new sessions by clicking the "PROPOSE A SESSION" and entering their session title in a popup dialog box. Each session displays the name and avatar of the participant who proposed it [Figure 11]

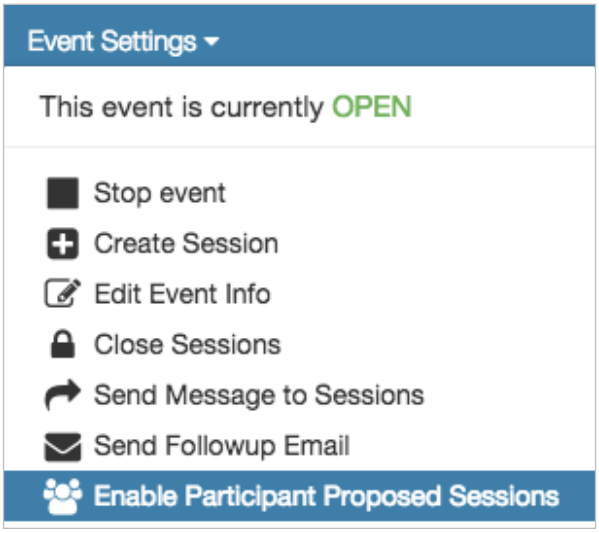

Figure 10 Event settings "Enable Participant Proposed Sessions"

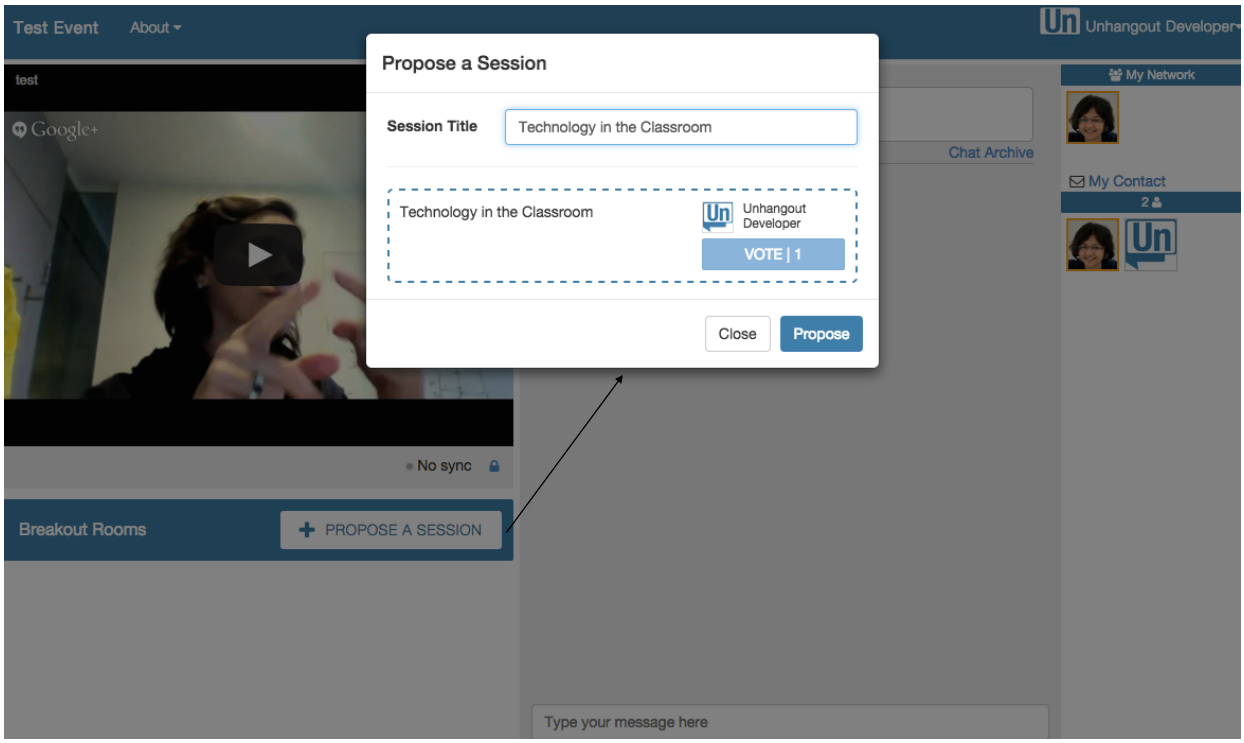

Figure 11 Propose a session dialog box

3) Sessions proposed by participants appear on the left in the Unhangout Lobby [Figure 12]

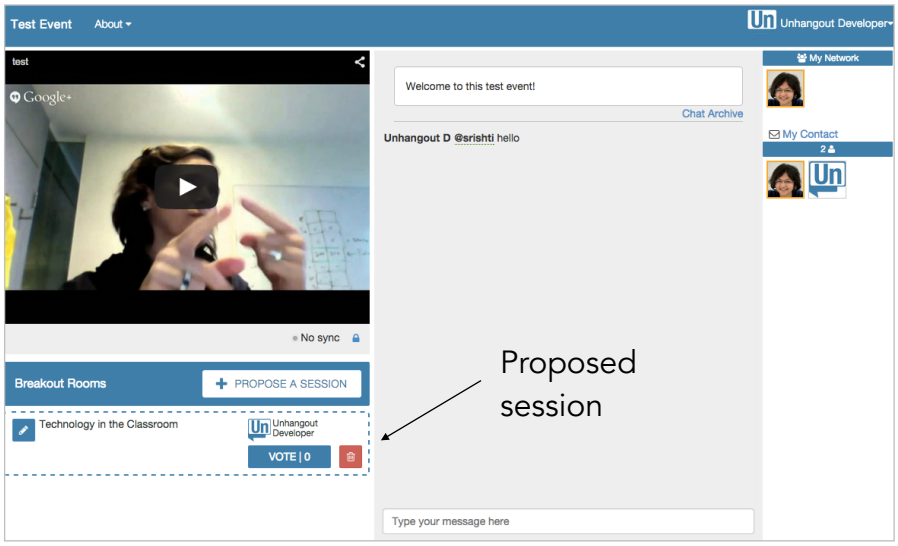

Figure 12 Proposed sessions appear on the left in the lobby

Participants can also vote on the sessions proposed by other users, and the number of votes received are displayed in real time. Session proposers can only edit or delete their own proposed sessions, whereas organizers of the event can modify, approve and delete all the sessions at any time [Figure 13].

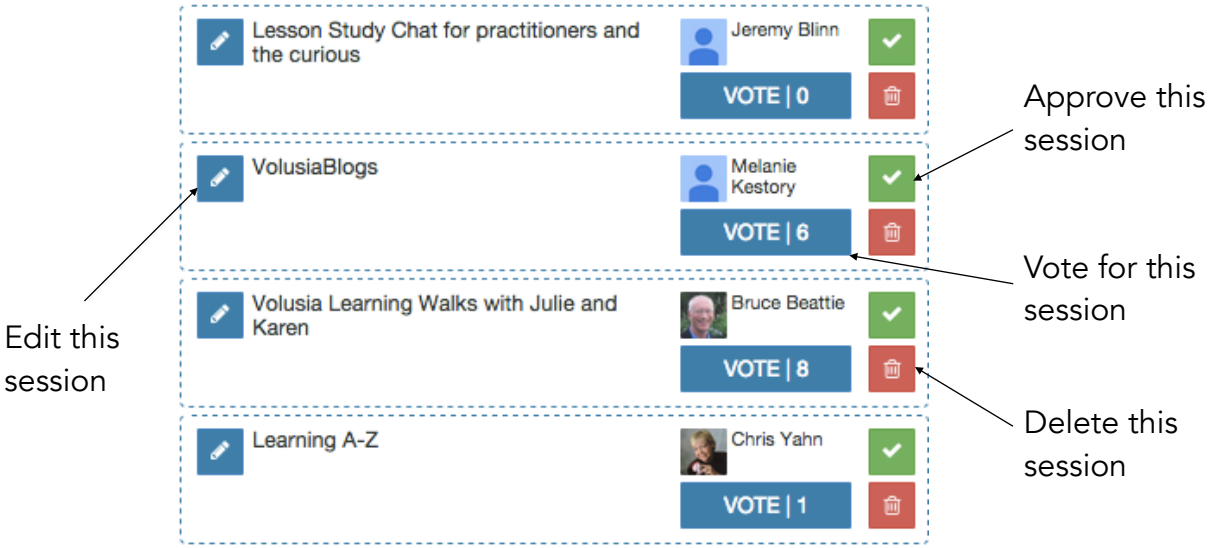

Figure 13 Proposed sessions

4) Organizers can approve these sessions taking into account the number of votes each one received. When organizers approve these sessions, they appear as "LOCKED" sessions and display ten empty spots indicating that each session can accommodate ten people. Organizers can unapprove them back to the proposed mode [Figure 14].

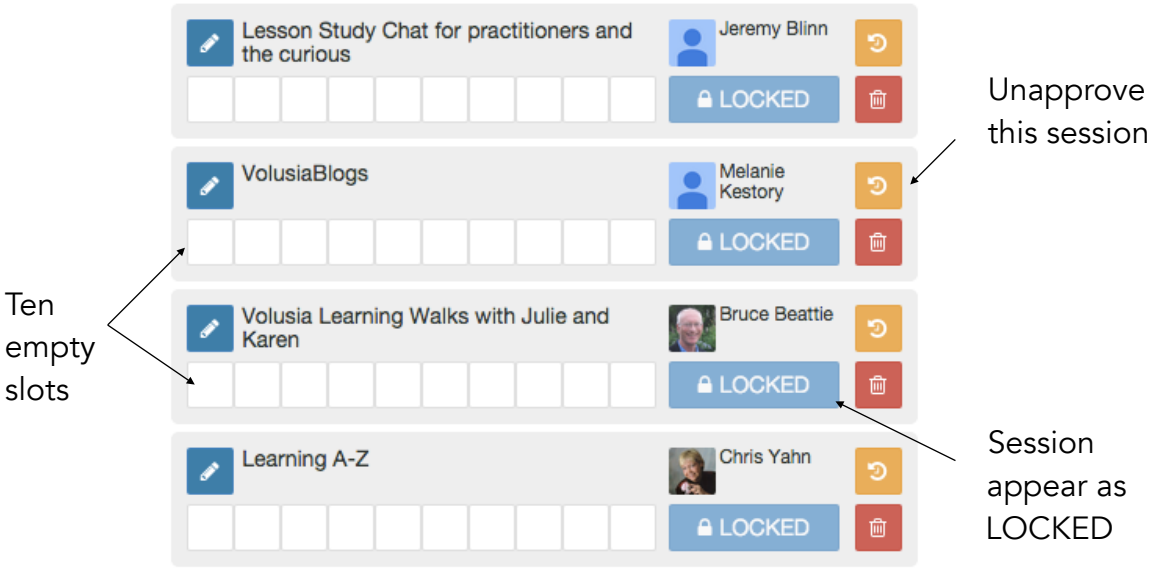

Figure 14 Approved sessions

5) After voting is completed, organizers can open all the approved sessions. Once the breakout rooms are open, participants are now able to select and join a room, which will open in a separate Google Hangout window [Figure 15].

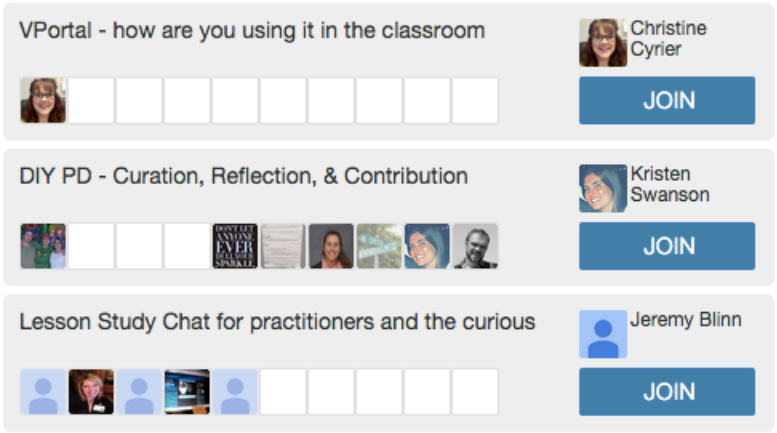

Figure 15 Active sessions

4.2 How to connect with others?

With more than 100 people in an online gathering, it's difficult to keep track of the conversation and remember who said what. Moreover, initiating a conversation or typing in the public chat window can be hard in an online setting where you are not familiar with that many people.

Currently, the Unhangout platform's lobby represents participants by their mini avatars [Figure 16]. From my past experiences of running events on the platform, I have observed that people tend to connect with or identify individuals who they already know before the event.

This observation made me reflect how I could represent an individual's conversation network and keep track of interactions with people during the event with whom they might want to connect with at a later stage. I designed a feature "Conversation Networks" and studied how it can lower the barriers to establishing connections; thereby helping people initiating the first step in forming relationships with their peers.

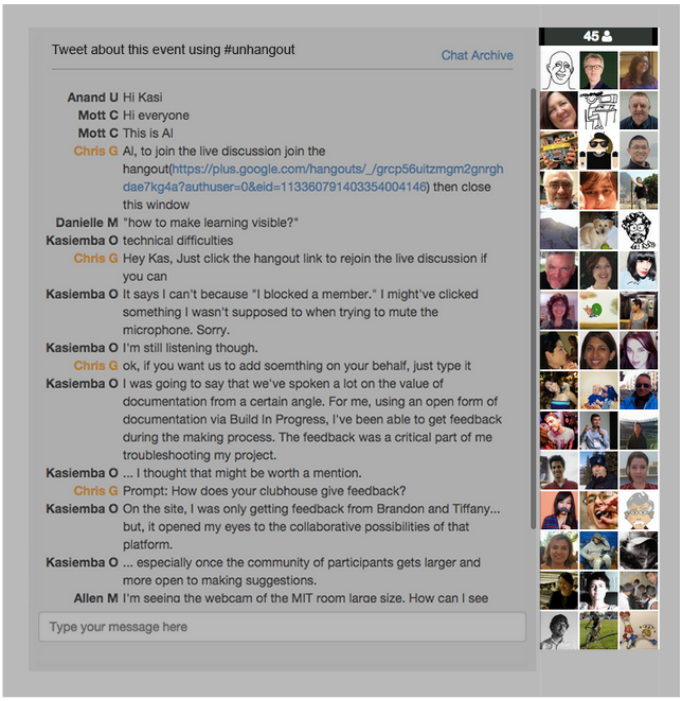

Figure 16 Unhangout lobby: avatars on the right represent who is in the room

4.2.1 Conversation Networks

Feature for research question: "How to connect with others?"

Feature description

"Conversation Networks" feature addresses the question "How to connect with others?" The goal is to give participants a better sense of who they are talking with (their conversation network); eliminate the barriers of making a connection with others; and instigate participants to make the first step in initiating a conversation with others.

This feature keeps track of the conversation exchanges taking place between participants in the Unhangout Lobby and encourages them to chat with others using the "@" symbol and their first name. Any participant they address directly by adding @ to their name (e.g. @srishti) is added to their personal conversation network. The feature also let's participants add others to their conversation network manually by clicking on their names from the chat window.

Interaction flow for participants

1) During the event, if a participant communicates with another using the "@" symbol and their first name in the chat window, the other person's avatar will appear in the participant's conversation network [Figure 17].

Figure 17 Chat with a user by @ing them to see them in your network

2) Participants can also manually add or remove others from their conversation network by clicking on their "@" names from the chat window [Figure 18].

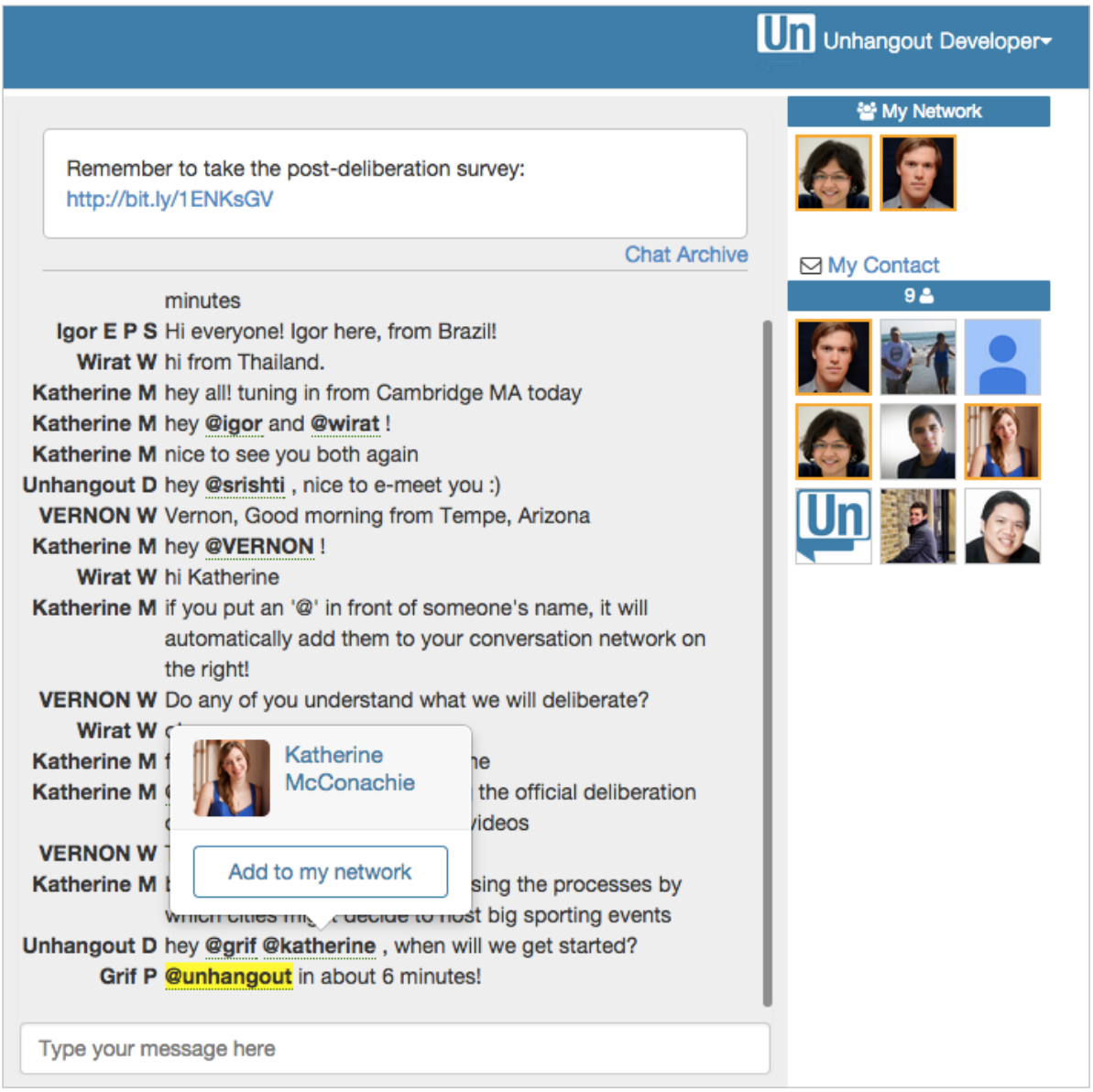

Figure 19 Manually add a user to your network by clicking on their "@" names

4.3 How to stay connected?

Let's assume that you have attended an online event. Now the question is "How can you stay connected?" and maximize your experience by following up with fascinating people you just met. Even though people exchange business cards or socialize over dinner at in-person events, these might not provide enough of a trigger to remind them of who they met and why would they want to follow up with them. This is even more complex in the context of online events where conversations are short, transient and it's easier to get overwhelmed with the experience and let everything slide away once it is over. To explore how the follow-up could be made more natural after an online event, I designed a feature "Followup Emails". The feature encourages participants to get in touch with the ones who they chatted with in the lobby or who they talked to in a breakout group on their favored method of contact.

4.3.1 Followup Emails

Feature for research question: "How to stay connected?"

Feature description

The "Follow-up Emails" feature addresses the question "How to stay connected?" This feature is designed to cultivate weak-tie relationships that may have formed among participants from an online Unhangout. After an event is over, the feature sends an email to participants reminding them of who they talked to in a breakout room. At the beginning of each event, participants are able to specify their preferred method of contact (email, twitter, linkedIn) or opt-out of the feature. The contact information will be included in the email. The email encourages participants to follow up and continue

interacting with others after an Unhangout. Most of the implementation for this feature works behind-the-scenes and records the history of a user's presence in a breakout-out during an event. It stores the amount of time each participant spent at the event, and in break-out sessions. After the event, superusers can send out automatically generated follow-up emails with contact information tailored to each participant. We use the Mandrill API (technical details are in Appendix A) to send emails and keep track of the email delivery.

Interaction flow for participants

1) When participants come to an event, they are shown a contact information form [Figure 20]. They can specify different contact information(email, twitter, linkedIn) or decide not share their information with others.

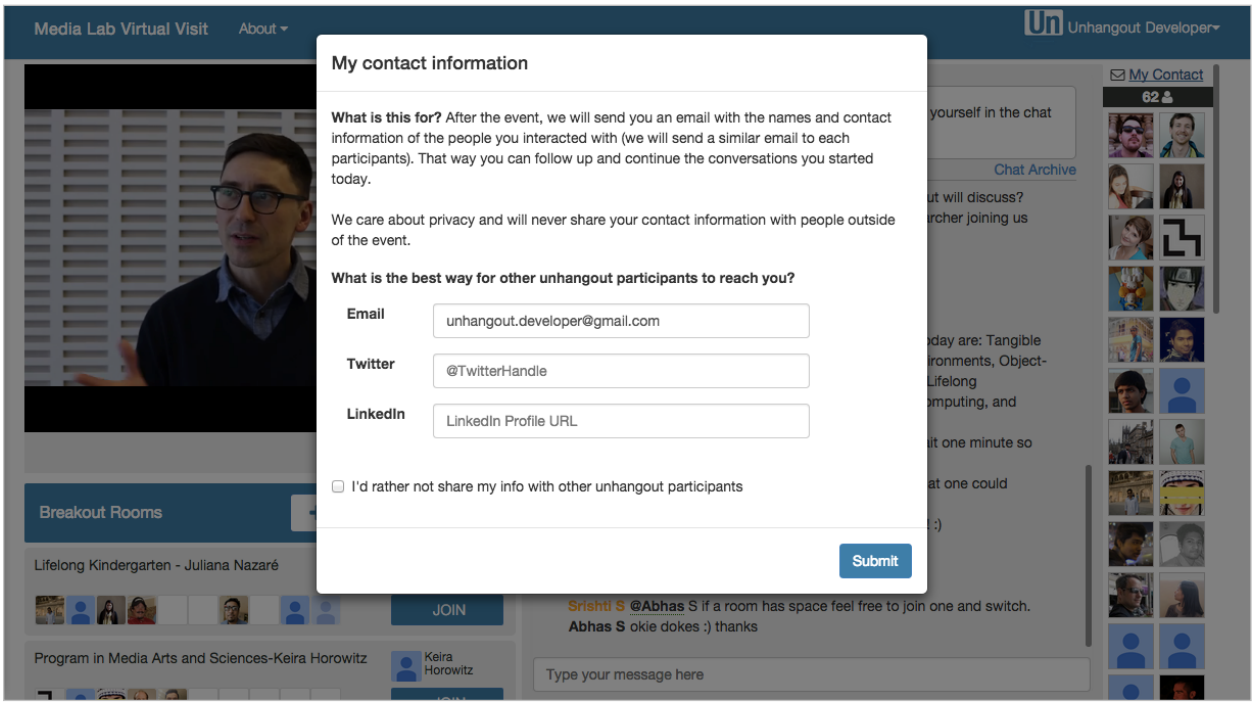

Figure 20 Contact information form

2) After the event ended, organizers select "Send Followup Email" from the "Event Settings" panel [Figure 21].

3) Organizers can then enter a preview mode where they can browse through the emails of all the participants of the event. This feature allows organizers to verify the format and content of emails (and is useful for developers trying to debug) before hitting "Send Email to All".

4) Participants receive an email with contact information (names, avatars, preferred method of contacts such as a link to twitter, linkedIn profile, and email address) of participants who they met in the breakout. [Figure 22].

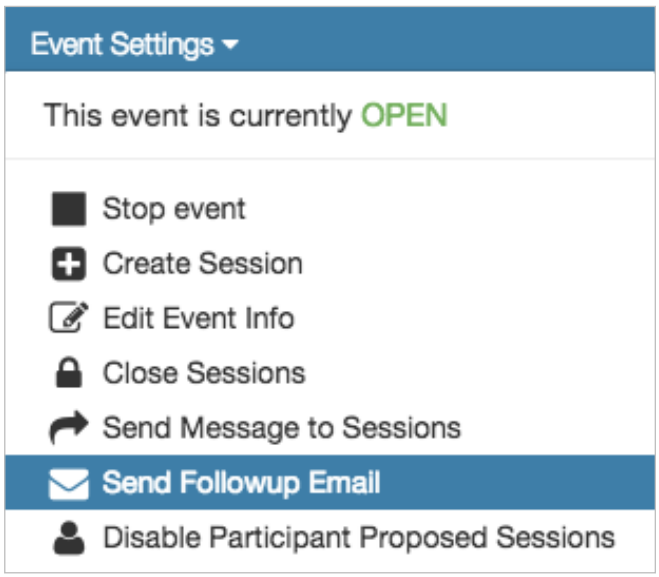

Figure 21 Event settings "Send Followup Email"

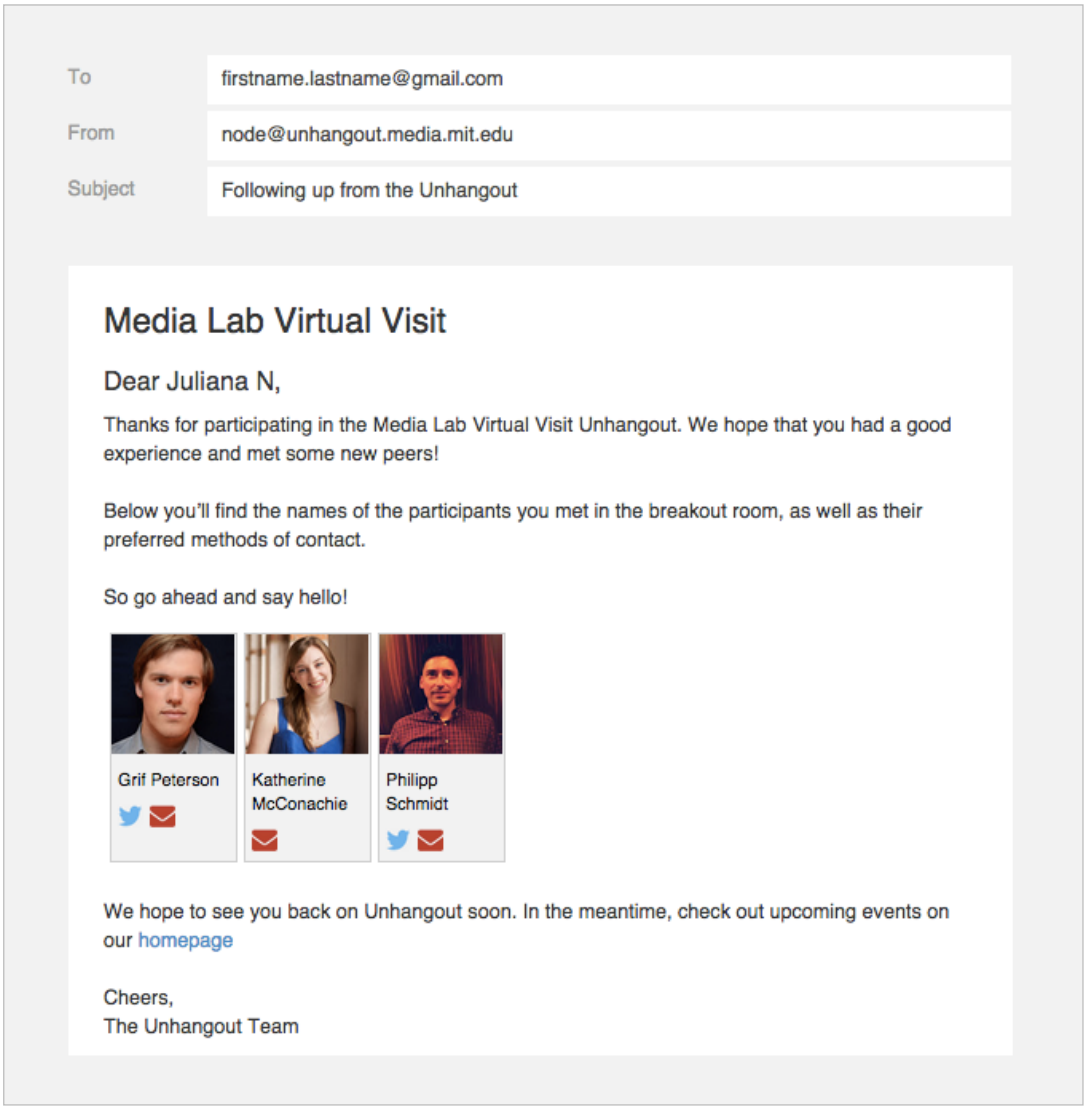

Figure 22 Followup email

5

Deployment & Evaluation

I followed a rapid prototyping approach to develop the design features and deployed them in a series of events to test their effect. For each of the design features (participant-proposed-sessions, conversation networks, and follow-up emails), I conducted a post-event participant survey. In this section, I describe the deployment results for each feature, and share my findings, and reflections.

5.1 Participant Proposed Sessions

Feature Deployment

Along with Kristen Swanson (founder of the Edcamp Foundation) and Meg Rao (an administrator from Volusia County Schools), I then organized an in-district virtual Edcamp to test the feature. More than 40 people including teachers, district professional development specialists, and parents joined us live for the event.

The event [Figure 23] began with a kick-off webinar led by Meg and Kristen. Both conveyed the message that, this event is about what people want to learn, talk about, and share with others and that they should drive their own learning experience during this event. Meg gave a short tour of the new feature to participants, after which they contributed in building the event agenda. As sessions were being proposed, others were voting on them. The ones that received a significant number of votes were approved by administrators, allowing people to join them. Although this event was supposed to be an hour long, participants seemed deeply engaged in their breakout conversations, and they didn't want to leave. Thus, the event went over by half an hour. Here are some observations drawn from the survey:

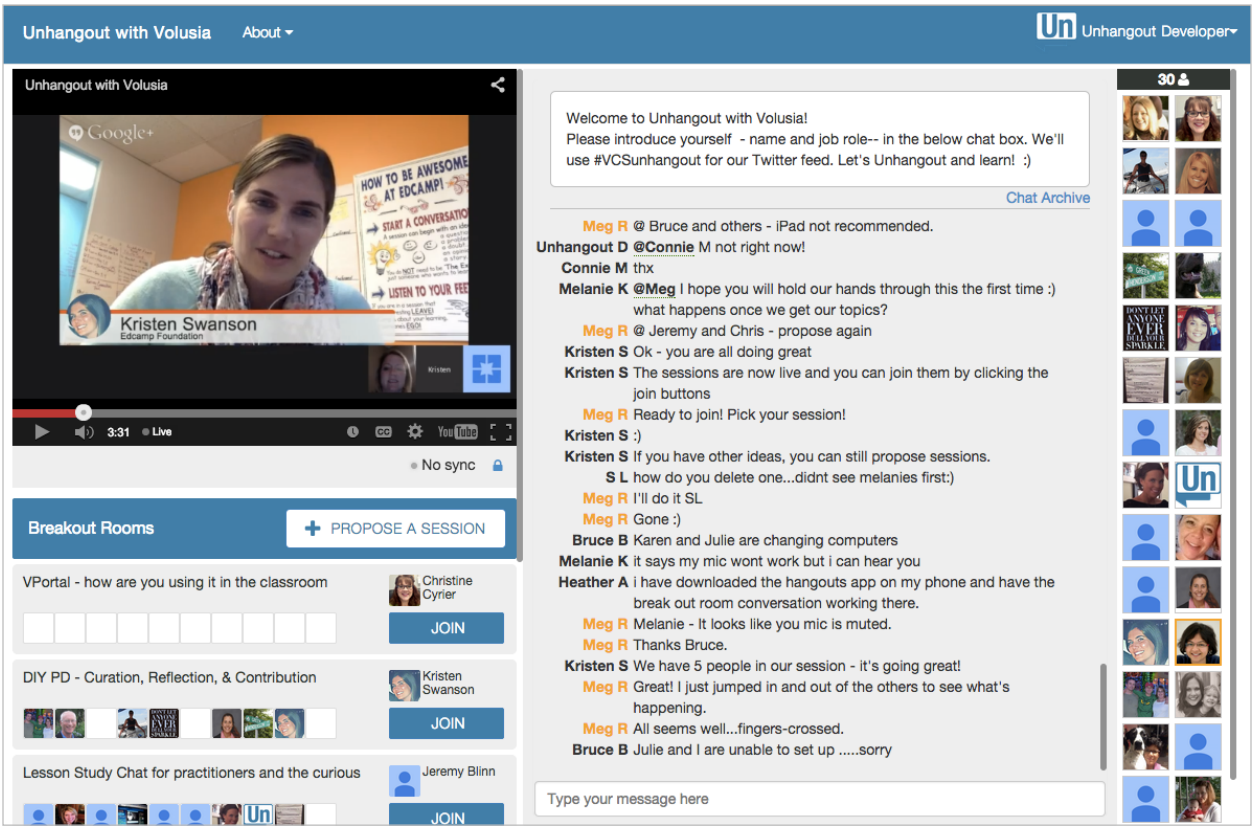

Figure 23 Edcamp Online Unhangout

5.1.1 Integrating the feature into the platform increased its use and appeal

Although this event was the first Edcamp for 85.7% (N = 28) of the respondents in the room, it was encouraging that 28.6% of the respondents proposed a session, and 71.4% of the respondents participated in the voting. This constitutes a significant increase from the last edcamp event (in the earlier iteration, 14% proposed a session, and 19.8% voted), where we used the Question tool outside the platform for proposing sessions. Comments ranging from "Choosing the session was easy. I chose the one I proposed :) " to "Since I'd never done it, it took a minute, but it became visually clear" conveyed that the feature was easier to use than the Question tool.

5.1.2 Learners took ownership of the event

A great example for the way that this feature changes the dynamics of a conference, was a breakout room entitled "Volusia Blogs". One of the participants proposed the this session, drew a few others participants into her breakout discussion, and came up with an action plan which they wanted to execute right after the event. In the end, the event organizer asked for more information about the plan, catching up with the participants who had already taken things into their own hands [Figure 24]. That is exactly the kind of agency we were hoping to see from participants.

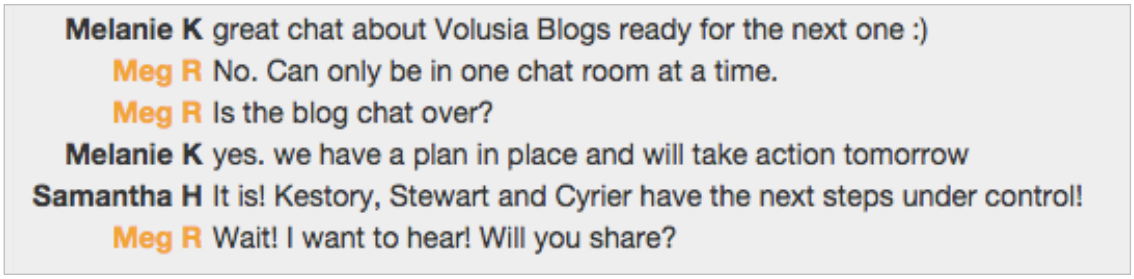

Figure 24 Conversation about 'Volusia Blogs' in the Unhangout Lobby

5.1.3 Relevant discussion topics increased participation

The feature enabled participants to play a more active role in shaping the event, than a traditional conference would allow. Giving people the autonomy to pitch topics relevant to their learning not only kept them actively engaged but also motivated them throughout the event to suggest topics of their interest. A learner wrote: "I saw people were interested in discussing Lesson Study but the other session was filled; therefore I proposed it for the second breakout room on that topic." Other participants reported:

"I loved that the participants drove the PD. Everyone was there to learn something that was relevant to them, which is so important!"

"I liked the ability for participants to propose and choose their own topics as it makes the learning relevant for the individual. The feature where participants typed in their topic was AWESOME! They didn't have to leave platform to propose and admins didn't have to do all of the typing."

These responses conveyed that participants liked the feature. Learners contributed to the event by proposing sessions and learned about the topics that were relevant to their interests. Therefore, they drove their learning experience.

5.1.4 Participants found others with similar interests

One of the main objectives of this feature is to give participants a better sense of who they might want to connect with and help them find others with similar interests. 46% (N = 28) said that in the process of proposing or voting they identified other participants who had similar interests as them. One of the event participants wrote: "I could tell by the pictures of folks I knew and it impacted my choices of sessions if I had a good working knowledge of their work already, I chose another session". However, these results would have been higher if we did not encounter the following:

a) 50% already knew each other before coming to the event
b) The schedule-building process took place for a very short duration (about 5 minutes), and there was not sufficient time for everyone to participate in this process.
c) Quite a few were using IPads, and Unhangout is not fully functional on tablet devices. Due to this, they faced a lot of technical challenges. Participants using tablets did not have access to chat, proposing sessions or joining a breakout room.

Besides these results, 78.6% people said that they were planning to follow up with participants after the event. There has been an increase in these results since the last Edcamp: in the earlier iteration 29.8% said they were planning to follow up with others. With the introduction of this feature, the hypothesis was that it will not only help participants of an online event to announce their personal areas of interest, but also identify others to connect with. The ability of this design feature to actively engage participants in session proposing phase, helping them find others with similar interests and sparking interesting conversations that people want to continue after the event, conveys its value. A week after the event, we received an email from Kristen sharing the great news that the Department of Instruction in Wisconsin wants to do the virtual Edcamp across the entire district.

5.2 Conversation Networks

This section describes the results from the deployment of the conversation networks feature. I tested the first iteration of the feature during JuryX [1], an Unhangout that was part of a HarvardX course and co-facilitated by my colleagues Katherine and Grif. JuryX intends to support live, online deliberations about pressing issues of our time.

After JuryX, I began to explore other events in which the conversation networks feature could be leveraged. I recalled my experience from participating in the Learning Creating Learning (LCL) Unhangout, where the videos from course professors were the key to engaging discussions.

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[1] JuryX https://www.edx.org/course/juryx-deliberations-social-change-harvardx-hls3x

Taking inspiration from the LCL format, I designed an Unhangout entitled Virtual Conversations: Ted Talks on Education [Figure 25] designed to co-watch a number of Ted talks on education. I invited undergraduate students from India who I had met at previous face-to-face workshop. Some of participants had worked together during the workshop and knew each other well.

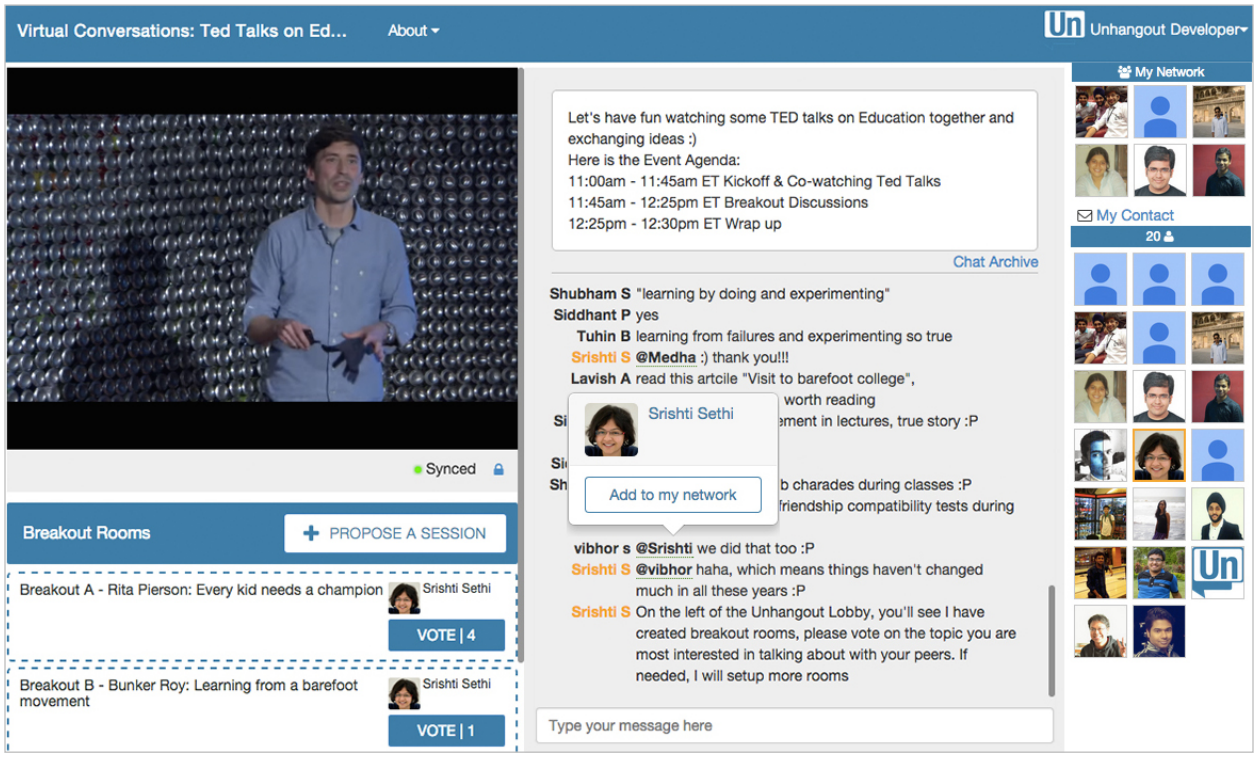

Figure 25 Virtual Conversations Unhangout

The learning from the previous iteration was that, in order to let conversation exchanges or thought-provoking discussions taking place in the Lobby, there needs to be an introduction to a core learning focus or some interesting content. Thus while designing the second iterations, I kept in mind the goal for the research question associated with the feature and the learnings from the previous iterations. I designed the event with an aim to foster the ideas that strike us while watching the TED and

TEDx talks and use online spaces as a means to carry forward those conversations with others.

In the beginning of the event, I encouraged participants to use the chat window to say a sentence about who they are and where they are from. I then played a series of TEDx and TED talk videos on education and asked participants to write their comments in the chat window and use the "@" feature to reply to others comments. Here are some observations recollected from the event:

From the use of a lot of exclamation marks in the chat conversations, I got the sense that people liked the event format. Although a very few students were typing while listening to the video, there were mostly quotes from the talk or comments appreciating the work of the TED or TEDx speaker. This could have been because students from developing countries are not use to the model of flipped classrooms. They take time to get used to the system of thinking more deeply about the content, being active listeners and asking questions. I could observe this comparison, as I participated in the Learning Creative Learning course, where the level of engagement in discussions among participants was much higher. People were not hesitant to take part in group discussions.

In both the iterations for evaluation, the “@ing” feature was used by the participants to greet others who they already knew from the workshop, rather than to reply to others comments. One of the organizers mentioned, “It was nice to see participants [sic] avatars pop up on the right while chatting with them”. As there were not enough discussions or comments in the chat window at the first place, it was tough to measure the success of this feature through this event. But, it is likely that the feature would be more useful for certain kinds of Unhangout events and different groups of people.

5.3 Followup Emails

This section describes the results from the deployment of the Followup Emails feature. I deployed the feature for the Media Lab Virtual Visit Unhangout on April 6th, 2015. More than 70 people from all over the world participated, including students, professionals, and Media Lab researchers. The event [Figure 26] began with a series of introduction videos from Lab researchers highlighting the philosophy and research work of their respective groups. It was an hour-long event where people spent about 40 minutes in breakout discussion groups; where participants listened to researchers talking about their projects and also got the chance to ask them questions.

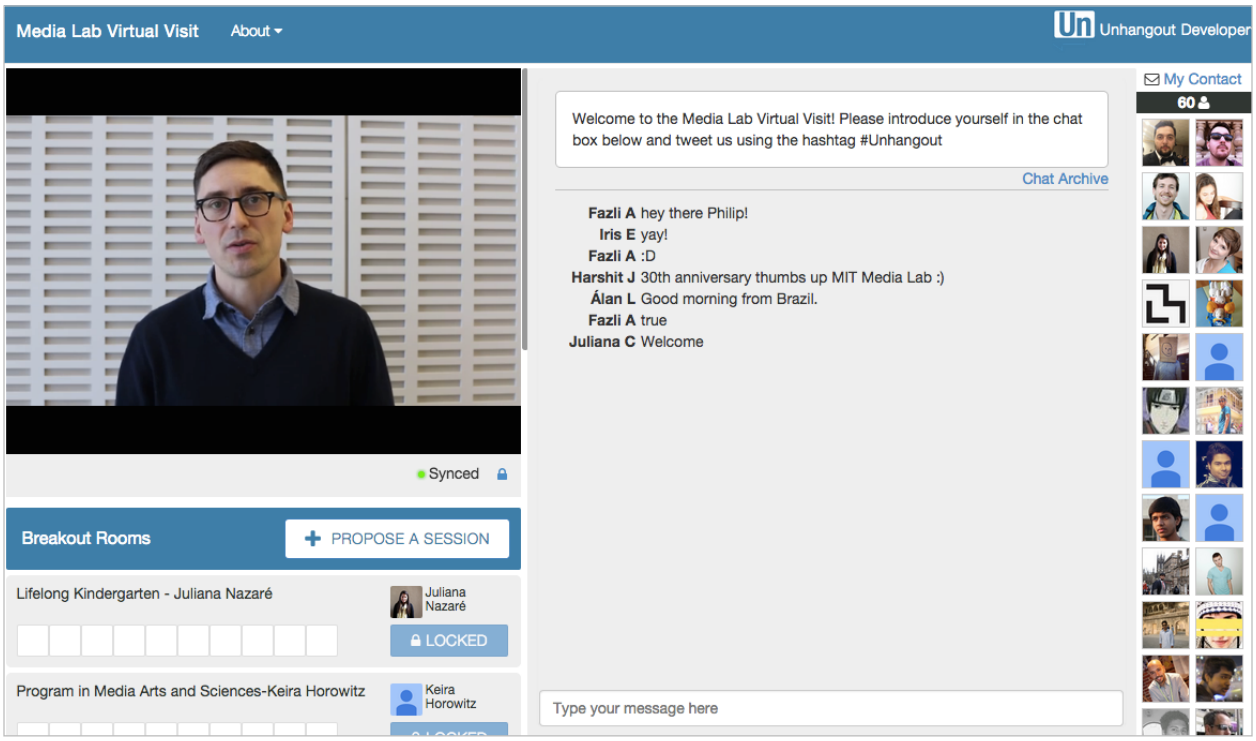

Figure 26 Media Lab Virtual Visit Unhangout

As part of the follow-up feature, when the event commenced, participants were shown a contact form which allowed them to fill out their preferred method of contact. One day after the event, the email sending functionality was used to preview and send emails to all participants.

Two days later after sending emails, the outbound activity of the emails (via Mandrill) showed that 95 emails had been successfully sent and delivered to participants from the event. The open rate of the emails (71.6% - 68/95 people) and the average click rate (17.9% - 17/94 people) were significantly higher than the average email campaign stats of Mailchimp for the education industry (open rate - 22.82%, click rate - 3.05%). The outbound activity of the emails helped me frame the questions for the survey and made me think through how I should go about asking for participation from people who opened the email versus those who did not open the email.

Email content for 67% (N = 95) of participants contained the information of other members who they met in the breakout group. For the remaining members, the contact information was empty. This might be explained in two ways: (1) the participant did not join a breakout room discussion or (2) all of the participants who they met in their breakout room opted out of sharing their contact information with others.

I shared a short survey with participants after observing the results provided by the Mandrill tracking system. Out of 95, 16 people responded to the survey. 87.5% (N = 16) of the respondents said they received an email. Two people reported not getting an email. There could be two reasons for why they did not receive an email: (1) the emails sent via the Mandrill API went to the promotion tab of their inbox and thus were ignored by the respondent, or (2) because of a delivery failure from the Unhangout

application. There is no way to guarantee that an email was delivered or that someone opened the email. Some observations made from the survey results are as follows:

5.3.1 Participants found emails useful to identify others

I will start with a brief explanation of a short story from the virtual visit. Post-event, I had a conversation with one of the event facilitators. She expressed that one of the participants from her breakout group had worked before with her group supervisor. She laughed and said, “That is why I was a little bit nervous while talking." Upon asking if she remembered the name of the person, she said, "Unfortunately, I did not.” This story highlights that it is tough to collect even basic contact information of individuals from fleeting conversations in online events.

Of the 14 respondents who received an email, all except one reported opening the email. All (N = 13) the people who opened the email said, they recognized people in the email from the Unhangout event. The fact that all the respondents who opened the email, said they recognized people in the email, shows the further potential of this feature.

92.3% (N = 13) of respondents who opened the email said that they found it to be useful. The answer was on the 5-point Likert scale where 1 denoted ‘not useful at all’ and 5 denoted ‘incredibly useful’. 41.7% answered 3, 8.3 % answered 4 and 25% answered 5. The distribution of the responses are shown in Figure 27. The distribution showed two peaks, one for scale-3 and another for scale-5. It may be interpreted from these results: a) the majority of responses were neutral, b) some group of people found the email more useful than the average participant.

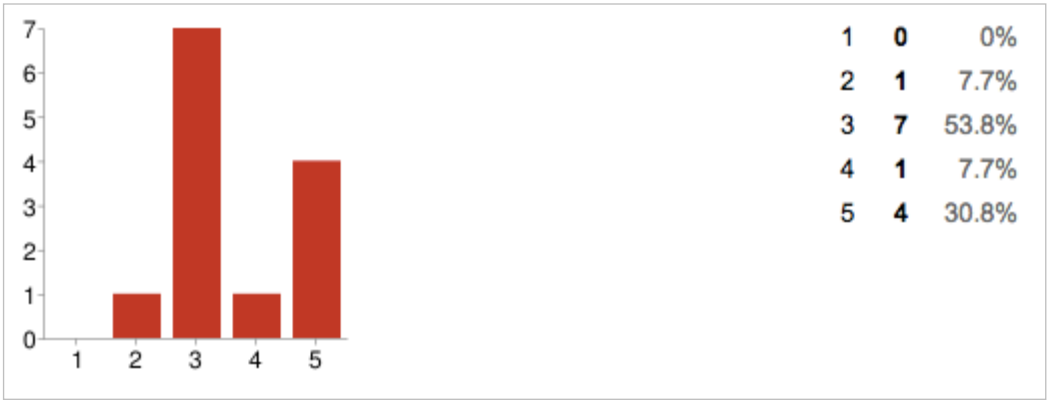

Figure 27 Distribution of responses for the usefulness of email

All respondents who opened the email agreed that the email contained information that would allow them to follow-up or to connect with someone who they wouldn't have otherwise. One of the participants mentioned: "I have saved the email and marked it as important for future references" and another said: "It was very useful as it helped me to connect with people i would rather couldn't [sic] find on the social media easily."

5.3.2 People followed up with other event participants

The ultimate test for the value of the feature is if participants actually used the email to connect with each other after the event. 61.5% (N = 13) of respondents who opened the email reported that they followed up with people using the information contained in the email (23% through Twitter, 38.4% through email). One participant mentioned that: "I connected with all the participants who I met in the breakout room through emails as most of them preferred that way. I learnt [sic] about the work they are doing, projects they've built, and discovered similar interests among us."

The sample size is too small to draw broad conclusions but it would be a great success to consistently see half of the participants stay connected after an online event spanning only 1 hour.

Limitations

The Media Lab visit in itself is a unique use case of Unhangouts where the facilitators leading the breakout rooms are people who participants look forward to staying in touch with later, as they are researchers at a prestigious institution. With these kind of events, the jumping around between breakout groups happens frequently, as people want to learn about multiple projects that are happening at the Lab. Because of the unique characteristics of this event, I received a lot of suggestions for improving the email mechanism related to including information about research groups, facilitator descriptions, and papers discussed in the rooms.

For example, one of the participants wrote:
"I first I thought the folks in that mail were this [sic] who offered a breakout room in the hangout. At the second sight, I realized that it was the people together with me in breakout room. My fault, I didn't read carefully".

This comment conveyed that participants' expectations for the email were that it would contain information about the facilitators from the event, not about other attendees. It is interesting that in a type of a event such as this, that participants are less interested in learning about their peers, and rather are more interested in staying connected with the presenters. For events following this form, the follow-up email feature might not be as directly relevant to participants as it would be in an event that is structured to support peer-to-peer learning. Thus, to design future iterations of this feature, I am

interested in using it for events where we allow learners to talk with each other and explore how they would benefit.

Currently, there is also a challenge to represent individuals who prefer to not use avatars. It might be worth investigating why people do not prefer to use profile pictures, how that could be encouraged, and if this would make any difference to overall feelings of connection amongst participants. It is also tough to observe how successful this feature as an intervention actually is beyond how participants use and view the email that we are sending to them. It would be desirable, for future research, to be able to track the ways in which participants are actually following-up with one another, without having to rely on them self-reporting this information into a survey. It could be interesting to look at twitter follower status, and linkedIn connections made within a timeframe that seems reasonable to attribute it to the fact that follow-up email were sent.

6

Conclusion

In this section, I conclude the findings of this thesis with my reflections and suggest new promising directions for future work in this research area.

6.1 Findings

I designed three interventions: “Participant Proposed Sessions”, “Conversation Networks”, and “Followup Emails”, to examine three research questions: “Who to connect with?”, “How to connect with others?” and “How to stay connected?” These interventions were designed to achieve the following goals: supporting learner agency, augmenting social presence, and nurturing weak-tie relationships. The hypothesis was that meeting these objectives would help participants of an online event in establishing meaningful connections with others. I evaluated these interventions through different iterations of the Unhangout events.

By deploying these interventions, and analyzing the participants’ responses collected from surveys, I gained insights on what worked and what needs further thinking or improvement. Some of the insights in this chapter might contribute to the ongoing research on sustaining meaningful connections in other online settings. My reflections are most applicable to online learning environments that provide spaces for synchronous discussions and to facilitate peer-to-peer learning.

One thing that struck me was how much the roles and behaviors of participants during an Unhangout varied with the way a particular event was structured. Thus, the use and results of my design interventions were different at different kinds of Unhangout events, and for different groups of participants. It was interesting that the features I thought

were less significant during the initial design phases of this study, generated more fruitful results and vice-versa. Some features were more useful for a particular type of event, but not for others.

6.1.1 Reflecting on supporting learner agency

The design feature, "Participant Proposed Sessions" allowed participants to propose sessions relevant to their learning. The results from the evaluation of this feature showed that it gave participants the freedom to express themselves and announce their personal areas of interests. The participants not only became active contributors of the event, but also managed to connect with others sharing similar interests. The fact that a large majority (78.6%) of participants wanted to follow up with others was evidence that learner agency increases the likelihood of people to establish meaningful connections.

6.1.2 Reflecting on augmenting social presence

The design feature "Conversation Networks" aimed at augmenting social presence by giving participants a better sense of others present in an online gathering. The feature allowed people to add others to their personal network from the Unhangout Lobby, who they might want to follow up with later. From the multiple iterations of the evaluations studies, I realized there were not enough discussions or comments posted in the chat window. This may have happened because: a) time spent in the Lobby was not enough to grow discussions, b) content was not interesting or thought-provoking, or c) participants were not used to contributing actively to the discussions. Thus, there were not sufficient factors to measure the outcomes of this feature. It might be

interesting to explore as part of the future efforts of this research if the feature would be useful for certain kinds of online events and groups of people.

6.1.3 Reflecting on nurturing weak-tie relationships

The design feature "Followup Emails" reminded participants of people who they met in the breakout and encouraged them to follow up with the ones with whom they might have formed weak-ties during an Unhangout event. 100% of the event participants reported that they found the email useful to identify others and 61.5% mentioned that they used the email to connect with other participants via Twitter and email. These results indicated that a follow-up mechanism could lead to supporting ongoing conversations among peers, which otherwise is a challenge.

6.2 Limitations

These design interventions were designed, implemented, and deployed to small-scale events in a short span of time. As it was challenging to collect survey responses from the participants and evaluate them, the outcomes of this thesis are drawn from a small sample size. Due to time constraints, I could not assess the combined impact of all the design interventions. To some degree, technical challenges affected the results too. In a few events, people did not have full access to the Unhangout features. This may have been due to two reasons: 1) participants did not have a reliable internet connection, and 2) participants were using iPads or a browser that does not support the full functionality of the Unhangout platform.

In a few events, some people knew each other before coming to the event, which influenced their decisions about joining breakout groups or exchanging conversations in the Lobby. While in some events people preferred to choose a breakout room to talk with people whose work they were not familiar with, in others they decided to communicate with people who they already knew. The design interventions were not valuable for events that were not structured around peer-to-peer learning. In those events, people were conversing more with facilitators or organizers, but there were not that many exchanges among learners. Most participants who join the online events for educational purpose, use their organizational id's and prefer to not use avatars. Some of them do not prefer to share their contact information while others don't participate in the breakout rooms, and silently lurk in the Lobby. It's hard to construct the identity of such participants.

6.3 Future Directions

Reflecting on the evaluation studies of design interventions, I discuss future directions for this research and ways to improving the design.

I found that interesting content is the key to engaging discussions in an online event. Thus, future studies could focus on content and integrating design activities in the Unhangout Lobby for the before and after stages of an Unhangout event, as well as during the breakouts. For the before phase, the activities could focus on letting participants become familiar with each other, before joining breakout groups with random people. This might make them feel more comfortable to initiate conversations in the breakout rooms. For the after phase, the Lobby could incorporate activities that

make it easier for participants to share what they learned during the break-out discussion. During the breakouts we could design tools or conversation protocols to make it easier for a group of users who don't know each other to form relationships.

Currently, it is tough to investigate how people are following up with others. One of the most useful strategies while concluding online discussions involves the use of weaving comments and synthesizing them in a way that leaves the door open for further exploration (Albion & Ertmer, 2004). Future efforts can explore ways to redirect people to online spaces for ongoing exchanges and extending collaborations post Unhangout events. It could be not only a useful way for tracking meaningful exchanges, but also examining the kinds of interactions people are interested in post online events. This could be an approach to help sustain connections among all participants who are interested in particular ideas.

It might be interesting to identify the relationship between these interventions and types of online learning events. I can't wait to see the combined impact of these design interventions on the different kinds of audience and use cases of the Unhangout platform and their contribution in making serendipity stick in online learning communities.

Appendix A

Technical Implementations

A.1 Application Overview

Unhangout implements a model-view architecture. Some of the major tools the application depends on are as follows:

1. Express

The Node.js based framework Express.js is used for server handling. Express supports the HTTP request methods like (get, post, etc.) that allows defining of flexible and powerful routes. We are using the route handlers to send the HTTP response and pass on the request to perform processes such as login, authentication, and load application pages.

2. SockJS

Javascript library SockJS supports a reliable and fast channel for communication between the browser and web server. It provides websocket-like objects. The application uses this library to manage communication on the event pages. For instance for dealing with administrative functionalities (e.g. embedding videos, creating live broadcasts, creating sessions), chat messages, keeping track of participants joining or leaving the event.

3. Redis

The application uses an in-memory, open source, data structure server called Redis. Redis allows data to be stored in a key-value pair format and supports not only strings but also abstract data types (e.g. for lists of strings, sets of strings, and hash tables). Redis stores the data in the memory and loads the entire data model when the

application is initialized. Thus, all the interactions with the models (such as get and set fields, call methods or save data fields) take place in the memory.

4. Backbone

The application uses the open source javascript framework Backbone.js for data structures (models and collections) and the user interface (views and URLs). For data representation of models both on the client and on the server, the application uses Backbone.js model objects.

5. Marionette

The views for all the major pieces of the client-facing interface for event pages are written in Backbone. Marionette which provides extra layers on top of the basic Backbone view objects. Each model in the system (e.g. events, sessions, users, and chat messages) has a corresponding view. Each view has a matching template that contains its markup. A view defines various events and user interface elements. When the model properties change or the application state alters, the view re-renders to respond to the changes accordingly.

6. Mocha

Tests for the core functionalities of the application are written in Mocha, which is a javascript test framework running on Node.js. These test cases run serially and map uncaught exceptions to the correct test cases. A selenium web-driver is used for integration tests and live testing with the Firefox browser.

7. Google Hangout API

To create small breakout rooms inside Unhangout, we rely on the Google Hangout API. For generating Google Hangout links and routing over one hundred people to more than ten hangouts quickly and reliably, there are two possible solutions available. One is using Google Calendar events as a backdoor to getting Google Hangout URLs or building a simple Hangout app location to phone home with a newly-created Hangout URL. We use the former strategy as the primary approach, and if it does not work, we fall back to the latter.

A.2 Technical details of features

A.2.1 Participant Proposed Sessions

When the organizers set the event mode to "Enable Participant Proposed Sessions", participants can propose a session from the Unhangout lobby. When a session is proposed, a send function (of a custom library called *Transport*) is called from the client-side. This send function takes arguments in the JSON format: message type (as create-session), and parameters such as session title (as string), roomId (as string) and approved (as boolean) [Figure 28].

```
this.options.transport.send("create-session", {
    title: title,
    roomId: this.options.event.getRoomId(),
    approved: false,
});
```

Figure 28 Send function takes message type as "create-session"

The approved field signifies whether a topic is approved or not by an administrator, and thus by default, it is set as 'false'. The *transport* library acts as an intermediate channel of communication between the client and server using sockets. In the *transport* library, we establish a connection with the SockJS server [Figure 29].

```
this.sock = new SockJS(
    document.location.protocol + "//" +
    document.location.hostname +
    (document.location.port ? ":" + document.location.port : "") +
    "/sock");
```

Figure 29 Establish a connection with SockJS server

To send messages, the send function defined in the *transport* module calls the send method on a SockJS object. The message is in JSON format and contains the type of message and session arguments [Figure 30].

```
send: function(type, args) {
    this.sock.send(JSON.stringify({type: type, args: args}));
}
```

Figure 30 Call send function on a SockJS object to send a message in the JSON format

As part of the socket setup, we define a module called "Room Manager" to handle connection, disconnection and authentication of sockets. Room manager [Figure 31] is used to trigger sockets messages with type and their incoming arguments.

```
var mgr = new RoomManager(sockjs, this.db.users);
```

Figure 31 Initialize an object of the "Room Manager" module

The event "create-session" is triggered on the "Room Manager" object. When the event is triggered, we create a new session using the parameters received. We then save the session and acknowledge the change by calling "writeAck" method, that writes a message to the socket [Figure 32].

```
mgr.on("create-session", _.bind(function(socket, args) {

    var event = this.getEvent(args.roomId);

    var newSession = new models.ServerSession({
        title: args.title,
        proposedBy: socket.user.toClientJSON(),
        approved: args.approved,
    });

    newSession.save({}, {
        success: function() {
            event.get("sessions").add(newSession);
            mgr.writeAck(socket, "create-session");
        },

        error: function(err) {
            logger.error("Error creating session", err);
            mgr.writeErr(socket, "create-session");
        }
    });

}, this));
```

Figure 32 Event "create-session" is triggered on the "Room Manager" object

For other features supported on a session, we follow the same procedure. We call the send function of transport module and pass the message type and necessary arguments. Using sockets, we listen to an event and make corresponding changes to the session model. For example, to update the vote count of a session, we call the send function of the transport module from the client [Figure 33].

```
vote: function() {
    this.options.transport.send("vote-session", {
        id: this.model.id, roomId: this.options.event.getRoomId()
    });
},
```

Figure 33 Send function takes "vote-session" as message type

Using sockets, we listen to "vote-session" event. We then grab the previous votes of the session and, after ensuring if it is not already voted by the same user, we update the session vote count [Figure 34].

```
mgr.on("vote-session", _.bind(function(socket, args) {

    var event = this.getEvent(args.roomId);

    if (event && socket.user) {

        var session = event.get("sessions").get(args.id);

        if (session) {
            prevVotes = session.get("votedBy");

            if (prevVotes.indexOf(socket.user) > -1) {
                    return;
            } else {
                prevVotes.push(socket.user);
                session.save({votes: args.vote, votedBy: prevVotes});
                mgr.writeAck(socket, "vote-session");
                return;
            }
        }
    }

    mgr.writeErr(socket, "vote-session");
}, this));
```

Figure 34 Event "vote-session" is triggered on the "Room Manager" object

Each time a model is updated, we listen for the change in the backbone view and re-render the controls accordingly [Figure 35].

```
this.listenTo(this.model, 'change:votes', this.render, this);
```

Figure 35 Listen to the change in model in backbone view

A.2.2 Conversation Networks

When a participant sends a message in the chat window, the chat function defined inside the Unhangout sockets is being called. The chat function searches for the "@" symbols in the chat message. If there are any symbols found, a custom module "atname" obtains a name followed by an "@" symbol to search for it in the connected event users list. If there is a match, it returns the identification number of the mentioned user. We then call a user model function "changeNetworkList" to modify the network list of a user [Figure 36].

```
atname.mapAtNames(msg.get('text'), event.get("connectedUsers"),
    function(part, mentioned) {
  if (mentioned && mentioned.id !== socket.user.id) {
      socket.user.changeNetworkList(event.id, mentioned.id, false);
  }
});
```

Figure 36 Atname module searches for a name followed by an @symbol in the chat message in the list of connected event users

The "changeNetworkList" function [Figure 37] is called twice in the application: 1) inside the chat function when someone replies to a user 2) if someone manually add or remove users from their network by clicking their names in the chat window.

```
changeNetworkList: function(eventId, atNameUserId, toggle) {
  var clone = deepCopy(this.get("networkList") || {});
  if (!clone[eventId]) {
    clone[eventId] = [];
  }
  if (_.contains(clone[eventId], atNameUserId)) {
    if (toggle) {
      logger.debug("REMOVE FROM NETWORK", atNameUserId);
      clone[eventId] = _.without(clone[eventId], atNameUserId);
      this.save({networkList: clone});
    }
  } else {
    clone[eventId].push(atNameUserId);
    logger.debug("ADD TO NETWORK", atNameUserId);
    this.save({networkList: clone});
  }
}
```

Figure 37 "changeNetworkList" function modifies the "networkList" of a user

The "changeNetworkList" function saves the network list (event id and corresponding user id) to the user object in the format indicated in Figure 38.

```
networkList: {
  "1": ["xxx111","xxx123"],  //where "1" is the event id and
  "2": ["yyy111", "yyy123"], //item contained in the square
  "3": ["zzz111", "zzz123"]  //bracket are user ids
}
```

Figure 38 Network List format

In the view end, we create a "networkListView" which is using the composite view of the Backbone.Marionette framework for rendering a user's network list. The initialize function of this view listens to any change in the "networkList" of user model and re-renders the view accordingly [Figure 39].

```
views.NetworkListView = Backbone.Marionette.CompositeView.extend({
    template: '#network-list-template',
    itemView: views.UserView,
    itemViewContainer: "#network-list-container",
    id: "network-list",

    initialize: function(options) {
        this.listenTo(options.event.get("connectedUsers"), 'change add remove',
            function(model, coll, ops) {
            if (!this.registered && ops.add && model.id === auth.USER_ID) {
              this.listenTo(model, "change:networkList", this.render, this);
              this.registered = true;
              this.update();
            }
            var users = _.map(this.getMyNetworkList(), function(id) {
              var user = this.options.event.get("connectedUsers").get(id);
              return user ? user : null;
            }.bind(this));
            users = _.without(users, null);
            this.collection.reset(users);
        }.bind(this));
    }

    ...
}
```

Figure 39 Backbone based NetworkListView

A.2.3 Follow-up Emails

When participants login to an Unhangout event, the application gathers their preferred methods of contact (email, Twitter, LinkedIn). Users can either fill out their contact information or choose to not share it out with others. We store the preferred contact of a user in the following format [Figure 40].

```
  preferredContact {
      emailInfo: "srishakatux@gmail.com",
      twitterHandle: "Srish_Aka_Tux",
      linkedinURL: "https://www.linkedin.com/pub/srishti-sethi/54/368/560",
      noShare: false,
  }
```

Figure 40 Preferred contact format

During an event, the application runs in the background and keeps track of which breakout rooms people join. We store the history of event and session participation (the amount of time a user has been in an event or session) as an object of the form (indicated in Figure 41).

```
history: {
    events: {
        <userId>: { total: <time in ms>, start: <timestamp> }
    },
    sessions: {
        <sessionId>: {
            <userId>: { total: <time in ms>, start: <timestamp> }
        }
    }
}
```

Figure 41 History of event and session participation

After the event, "superusers" (Unhangout developers) can browse through the preview of emails for all the participants and ensure that the email would appear in a user's inbox well. They can then fire off automatically populated emails to all the participants containing the contact information of people who they met in a breakout room. For the email sending functionality, we are using the node-mandrill API. Mandrill API client is installed using the npm (node package manager). We require the mandrill-api module and instantiate the mandrill class to make use of the API and gain access to it's functions [Figure 42].

```
var mandrill = require("mandrill-api");
var mandrill_client = new mandrill.Mandrill(options.MANDRILL_API_KEY);
```

Figure 42 Instantiate Mandrill class

The message body for each email contains fields such as text, from_name, from_email, and subject which are used to populate the email body [Figure 43]. By setting the value

of fields, track_opens and track_clicks as true, we can keep track of the average open and click rate of emails through the Mandrill's account dashboard.

```
var message = {
    "html": html,
    "text": "Example text content", // XXX FIXME
    "subject": "Following up from the Unhangout",
    "from_email": options.UNHANGOUT_SERVER_EMAIL_ADDRESS,
    "from_name": "Unhangout Team",
    "to": [{
        "email": user.get("emails")[0].value,
        "name": user.getShortDisplayName()
    }],
    "headers": {"Reply-To": options.UNHANGOUT_SERVER_EMAIL_ADDRESS},
    "important": false,
    "track_opens": true,
    "track_clicks": true,
    "auto_text": true
};
```

Figure 43 Message body of the email

Each recipient contains their own user object along with a list of other user objects who they met in the breakout. We store the information for each recipient as an object of the form indicated in Figure 44.

```
history: {
    events: {
        <userId>: { total: <time in ms>, start: <timestamp> }
    },
    sessions: {
        <sessionId>: {
            <userId>: { total: <time in ms>, start: <timestamp> }
        }
    }
}
```

Figure 44 History of event and session participation

The implementation uses the promise library to send emails asynchronously. A promise call takes resolve and reject as its arguments. Rejection callback will be called if

something is not defined, resulting in an error being thrown. In that case, the error is caught by the promise and turned into a rejection. Otherwise, the iteration continues without any interruption [Figure 45].

```
followup.sendEmails = function(htmlAndUsers) {
  var emailsSent = 0;

  return Promise.map(htmlAndUsers, function(htmlAndUser) {
    var html = htmlAndUser.html;
    var user = htmlAndUser.user;

    return new Promise(function(resolve, reject) {
      mandrill_client.messages.send({"message": message}, function(result)
        if (result[0].status == 'sent') {
          emailsSent += 1;
        }
        resolve();
      }, function(err) {
        reject(err);
      })
    });
  }).then(function() {
    return {
      sent: emailsSent,
      total: htmlAndUsers.length
    };
  });
};

return followup;
};
```

Figure 45 Send emails function

For authoring of the emails, the logic uses EJS templates, a javascript templating library that builds HTML strings from JSON data.

Appendix B

Survey Questions

B.1 Participant Proposed Sessions

Proposing sessions and building the agenda together

1. Did you propose a session?
a. Yes
b. No

2. Did you vote on a session?
a. Yes
b. No

3. Was it easy to understand how you could propose a session (or vote on a session someone else proposed)? (answer was on scale 1 to 5)
1: It was very intuitive
5: It was extremely confusing and hard to use

4. In the process of proposing or voting, did you identify other participants who had similar interests as you?
a. Yes
b. No

5. If you answered “yes”, please provide a little more detail.

6. How easy was it for you to choose a session?
a. difficult
b. easy
c. moderate

7. For your response to the above question, could say a little bit more detail on why it was either difficult or easy or moderate to choose a session?

8. Are you planning to followup with any of the other participants after the event?
a. Yes
b. No

The Edcamp Experience

1. Would you consider Edcamp as an alternative for in-school professional development? (answer was on 1-5 scale)
1: Not at all
5: Absolutely

2. How likely were you to organize a local Edcamp event before attending Edcamp online? (answer was on 1-5 scale)
1: Very unlikely
5: Very likely

3. How likely are you to organize a local Edcamp event after attending Edcamp online? (answer was on 1-5 scale)
1: Very unlikely
5: Very likely

B.2 Followup Emails

1. In which city are you based?

2. Did you receive an email with the subject line “Following up from the Unhangout”?
a. Yes
b. No

3. Did you open the followup email?
a. Yes
b. No

4. How useful was the followup email to you? (answer was on 1-5 scale)
1: Not at all useful
5: Incredibly useful

5. Could you give us a short narrative on how you used the email?

6. Is there anything you were expecting to find in the email, but didn’t?

7. Do you think that the email contained information that would allow you to followup or to connect with someone you wouldn’t have otherwise?
a. Yes
b. No

8. Do you recognize anyone in the email from the Unhangout event?
a. Yes
b. No

9. Do you followup with anyone using the information in the email?

a. Yes

b. No

10. If your answer to the above question is “YES”, how did you followup with them?

a. Twitter

b. Email

c. LinkedIn

10. With how many people did you followup?

a. 1 or 2

b. Less than 5

c. More than 5

11. Any additional feedback you would like to give us to improve our followup mechanism for Unhangout events?

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