News & Highlights

Are Virtual Conferences Here to Stay?

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Driven by concerns about the carbon footprint of air travel, time taken away from family and work duties, and ever-tightening budgets, many science and engineering organizations in the past few years had begun to explore the potential for virtual scientific exchange, using digital tools to enhance the in-person experience and allow for greater participation online, both live and after-the-fact. Now, the social distancing constraints imposed by the coronavirus disease 2019 (COVID-19) pandemic have pushed the vast majority of these organizations to jump entirely into the virtual realm. Luckily, in a convergence of widely available hardware, bandwidth, and innovative software, the technology now exists to transform many aspects of in-person conferences into virtual ones.

The largest components of most engineering conferences are invited presentations, panel discussions, and poster sessions (Fig. 1). These also happen to be the most straightforward aspects to convert to virtual experiences. Options for hosting talks and panels include videoconferencing software such as Avaya Spaces, Cisco Webex, Google Meet, Intrado, Jitsi, Microsoft Teams, Skype, and Zoom. While all these tools can handle real-time video streaming, many conference organizers have been asking presenters to film their talks ahead of time. Attendees then watch the talks before the meeting. "It is definitely more work for presenters,

especially those that normally prepare their talk on the plane on the way to the meeting," said Lauren Parr, vice president of meetings at the American Geophysical Union (AGU) in Washington, DC, USA. "We had to completely throw that out the window and start prepping our presenters much earlier."

Despite the challenges, this film-ahead approach provides multiple advantages. First, it avoids issues arising from poor internet connections for both the speakers and attendees. Jay Brodsky, chief digital officer at AGU, said a major challenge in hosting AGU's fall meeting was finding a firm to host nearly 7000 presenter videos. "We needed someone who could then play it back around the world," he said, "whether you have a low-bandwidth connection on the continent of Africa or you are in downtown San Francisco." Second, when attendees can watch presentations beforehand, they can do so at their convenience and focus in on what interests them most. And third, viewing talks pre-meeting frees up more time for live discussions. "We feel like it is more exciting when the speakers talk to each other rather than just talk to an audience," Parr said.

To boost interaction and discussion among attendees viewing talks, question and answer (Q&A) sessions, and panel discussions, organizers can add on tools, such as Microsoft Teams, Flock, and Slack, that enable fast and dynamic communication. Other tools,

(a)   (b)
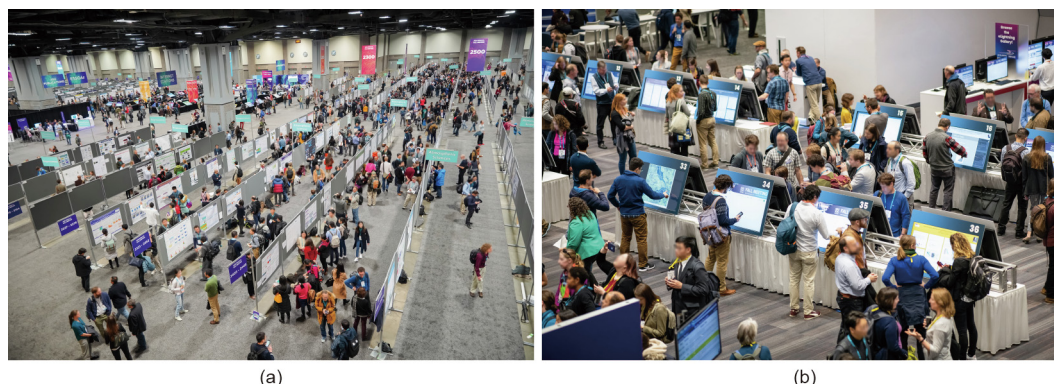
Fig. 1. (a) Pre-pandemic, the poster hall at the 2018 American Geophysical Union (AGU) fall meeting teemed with conference attendees. The poster sessions at the entirely virtual 2020 meeting featured roughly the same number of posters (also similar to the number presented in 2019), hosted on a platform that included iPosters, a software format that allows presenters to include text with embedded hyperlinks, audio narration, zoomable images, videos, and animations. (b) AGU began piloting the use of iPosters at its 2017 meeting, with 100 presenters using the technology. In 2019, nearly 1000 presenters—including the large handful shown here—used the tool to share research advances. Credit: AGU, with permission.

including Crowdcast, Mentimeter, and Slido, give attendees the opportunity to vote on questions posed by audience members. This approach can improve the quality of questions speakers are asked, engage shy students and early-career scientists, and prevent Q&A sessions from being dominated by established professors.

As far as poster sessions go, the bare-bones solution is uploading a portable document format (PDF) file. A slightly more advanced solution is creating a powerpoint presentation with 3–5 slides that can be shared as a short graphics interchange format (GIF) file. The advanced option is iPosters, which can include text with embedded hyperlinks, audio narration, zoomable images, videos, and animations. In addition, the platform includes a chat feature that enables real-time conversations with the author. "iPosters are so much more dynamic than paper posters," Parr said.

Integrating several such disparate apps can be challenging. "The hardest thing about putting our meeting online was there is no singular solution for what we were trying to do, so we had nine different platforms that we weaved together to serve the content," said Brodsky. "Getting all of those pieces to work well together to keep the data flowing smoothly was not easy."

Not all organizers choose the do-it-yourself route. Plenty of firms, such as Accelevents, Attendify, and On24, will work with organizers to select the features they want and then do all the backend work to seamlessly merge them. In London, the United Kingdom's Royal Academy of Engineering (RAEng), for example, worked together with the production company Worldspan to create a bespoke platform of connected apps for its most recent Frontiers Symposium, which brings together 65 of the best early- to mid-career researchers, practitioners, and innovators to tackle international development challenges. "It operated almost like a social media network, in that you can see a list of all the meeting delegates and invite them to impromptu meetings, send private messages, and collaborate on Miro, an online digital whiteboard to exchange ideas and form plans for projects," said Amy Stratton, events manager at RAEng.

One feature of in-person conferences that is particularly challenging to replicate online is the social aspect: serendipitous encounters during coffee breaks, social events, and banquets. "It is in this realm where the most creativity is needed," said Nathan Kahl, managing director of communications and society advancement at the American Society of Engineering Education in Washington, DC, USA. "Interactive lunches, yoga breaks, or even knitting circles can add a personal touch to your program."

To better replicate an in-person meeting and give participants something to do rather than sitting on a Zoom call watching one talk after another, Sococo allows conference organizers to create online buildings with separate virtual rooms for watching talks, viewing posters, socializing, networking, mentoring, and visiting exhibitor booths. Participants, represented as colored dots, enter rooms by clicking on them and connect with one another using a feature that invites colleagues for a video chat within the Sococo platform.

Another way that conference organizers are trying to boost social interactions among far-flung participants is through matchmaking apps such as Braindate and Brella. The apps match attendee profiles and suggest private video conferences to discuss shared interests. For a series of Neuromatch meetings he helped organize in 2020, Konrad Kording, a professor of neuroscience at the University of Pennsylvania in Philadelphia, PA, USA, developed an algorithm to match participants based on their research abstracts [1].

While praise can be given to organizers for making the jump online under short notice, the question remains whether this will be the way meetings are held once the pandemic winds down.

Among the advantages for conference goers is that those with caregiving responsibilities, disabilities, travel restrictions, scheduling conflicts, or limited funds are more likely to be able to attend meetings online. So far, it appears as if virtual conferences are attracting bigger crowds than their in-person predecessors. A small survey of ten US-based conferences across many disciplines showed that most saw higher attendance than in previous years, some as much as 3–4 times more [2]. And since virtual conferences scale much better than in-person ones, it has been relatively easy to accommodate extra attendees at little additional cost to organizers. Registration fees have dropped accordingly, with more than half of the conferences in the small survey mentioned above eliminating entry fees or reducing them by at least half. International participation appears to have increased, too. The number of countries represented at the virtual meeting of the American Physical Society (APS) in April 2020, for example, increased from 28 at the 2019 in-person meeting to 79 at the virtual meeting [2].

Advantages for organizers include no locations to arrange, no rooms to book, and no projectors, caterers, entertainment, travel, or hotel reservations to manage. In addition, high-profile researchers are more likely to accept invitations to speak at virtual conferences because of the reduced time commitment. Another benefit of going online is data analytics. "At in-person events, it is hard to check in with how people are actually engaging with the content," Stratton said. "For online events, though, all that data is at your fingertips. You can see when and how every individual is connecting with the platform, who they are in touch with, and how certain groups are interacting during the event. And you can tailor activities as the event is going along to support individuals who may be less engaged."

Another beneficiary of the online migration of conferences is the environment. A recent survey of 270 past in-person conferences across scientific disciplines found that nearly 860 000 people spent more than 1.288 billion USD and generated upwards of two million metric tons of carbon dioxide (CO_2) attending these conferences between 2016 and 2020 [3].

With so many obvious advantages of going virtual, it seems inevitable that some conferences will remain online in the future. More than 80% of 485 APS attendees indicated that some meetings should continue to be held virtually, even after the COVID-19 pandemic ends [4]. However, Parr said a more realistic way forward will be hybrid meetings, with some people attending in-person and others remotely. In addition to offering increased opportunities for scientific exchange, such hybrid meetings could potentially charge reduced registration fees, likely leading to expanded participation overall.

"In 2015, our board asked, 'How do we create the scientific meeting of the future?'" Parr said. "I do not know that we are there yet, but this year has given us so much opportunity to experiment."

References

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