



# How to organize an online conference

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The first online-only meeting in photonics, held on 13 January 2020, was a resounding success, with 1100 researchers participating remotely to discuss the latest advances in photonics. Here, the organizers share their tips and advice on how to organize an online conference.

The format of scientific conferences has not meaningfully changed in centuries. In fact, the essence of conferences today — with speakers presenting their results to an audience sitting before them — closely resembles that of the meetings of the Royal Society in 1660. Therefore, it is not surprising that many in the academic community are hesitant to deviate from this model, despite the emergence of many web-based alternatives.

However, with the rising impact of academic travel on the environment and on work–life balance, and the increasing availability of fast and reliable internet connections, there is now room for a paradigm shift enabled by modern teleconference solutions. To this end, several of us assembled to organise the first online-only conference focused on innovations in optics, the [Photonics Online Meetup](#) (POM). Our vision was to provide a free, globally accessible meeting in which neither the speakers nor the participants needed to travel.

The meeting was completely delocalized, with the speakers, organizers, and attendees scattered across six continents and hundreds of locations, connected via a video-conferencing tool and social media. Despite this delocalisation, the meeting retained many characteristics of a traditional conference: invited and contributed talks with follow-up questions and discussion, and a poster session. However, unlike in traditional conferences, all attendees avoided air travel, registration costs, CO<sub>2</sub> emissions and visa issues. The impact on families was minimized as well, although participants in inconvenient time zones had to wake up early or stay up late. While we were writing this piece, the APS March Meeting 2020 was cancelled due to the outbreak of the coronavirus disease 2019 (COVID-19). We believe that online meetings can be particularly beneficial during public health emergencies.

Comments on the event from the point of view of participants<sup>1,2</sup> and of some of the organisers<sup>3,4</sup> are available online. Here we summarize our tips and advice for researchers thinking of organizing an online conference in their field.

## The format

The format of POM was deliberately chosen to be very similar to that of conventional conferences. We wanted the event to be accessible in many time zones, therefore we chose a relatively short format of 3 sessions, 1.5 hours each, for a duration of 5 hours in total. We selected 13 January 2020 to avoid the winter holidays and to align with the academic calendar at most universities to ensure student participation. Complementary to the live event, we also planned a poster session, held on Twitter starting on January 9. The talks were recorded, but were made available online for two weeks only, to keep the immediacy and spirit of conventional conferences, and to provide speakers with the opportunity to present unpublished results without fear of permanent public disclosure.

## The team

Key to every event — especially for a large-scale meeting — is a motivated and organized team. Our team assembled quickly following a discussion on Twitter and comprised seven academics working in diverse areas of photonics and located on different continents. Before this event, none of us had worked together: we assembled around a common shared vision.

As it was the first event of its kind, the overall topic of the conference, photonics, emerged naturally. Orad Reshef and Andrea Armani took the reins as chairs, and we collectively worked on planning the conference, assembling the program, inviting the speakers and running the event. Due to the different time zones, a quick turnaround and enthusiastic engagement have been crucial: choose your organising team judiciously!

## The infrastructure

**Communication.** Because our team was scattered around three continents and multiple time zones, we depended on asynchronous messaging and work tools to organize the event. In particular, we chose Slack as our primary communication platform, as many of us already used it for research and other purposes. As challenging as it was to be located in such disparate time zones, it had

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some benefits, such as the ability to work around the clock — for example, our Australian co-organizer would pick up when the North Americans would end their day, and vice versa.

**Video platform.** We enlisted the help of IT support at the University of Southern California (USC) to accommodate multiple speakers from many locations and to facilitate the connection between a large number of participants while minimizing technical risks. Based on their guidance, WebEx Events was chosen as the platform to host the conference, as it can simultaneously connect hundreds of participants globally and offers additional controls, such as audience muting and delocalized presenters. We believe that Zoom, Jitsi and other similar software can be used as well. USC also provided technical support ahead of and throughout the event. In this manner, USC acted as a centralized control hub, with all speakers and participants connecting to the primary site. We believe that real-time professional technical support at a central control hub is essential to a successful online meeting.

**Website.** The last piece of basic infrastructure was a website for researchers to submit abstracts and register for the event. The website acted as a central repository for all information. It was built by Armani using WordPress, and was hosted by USC. Abstract submissions and event registrations were handled using simple survey software (Qualtrics and Google Forms). Because the event was free, secure information such as credit card numbers did not need to be transmitted. This aspect greatly simplified the registration process.

**Advertisement.** POM was organised in less than 3 months, and most of the advertisement was done through Twitter, which is the most common platform

for academic interaction. Because of the new conference format and the lack of a sponsoring professional society, engaging the scientific community was critical to the event's success. The call for abstracts for oral presentations or online posters was promoted via various social media, including Twitter, Facebook, LinkedIn and Instagram, as well as emails to colleagues. Social media acted as a seed, and word-of-mouth then helped us reach a large audience. Eventually the event had more than 1100 attendees, in 66 locations, as shown in FIG. 1, and a peak of 600 simultaneous connections.

### The program

The first step in building the program was selecting the three topics for POM. As a new event, we had a lot of flexibility, so the initial list of proposed topics ranged from fundamental optics to various applied technologies. The committee voted, and the top-ranking themes were nanoscale quantum optics, optical materials, and integrated optics.

For each of the three sessions, we formed smaller topic committees that identified potential invited speakers. Unlike conventional conferences, which often suffer from moderate invited-speaker acceptance rates, every speaker we invited accepted enthusiastically (perhaps excited by the opportunity to speak without boarding an airplane!)

By the deadline, we had received about 100 abstracts from PhD students, postdoctoral researchers and faculty members. From these applications, our subcommittees selected nine for oral presentations (three per track), and accepted the others as poster presentations.

### The hubs

We were initially concerned that the online format would result in fewer opportunities for networking, brainstorming, and other interactions. Thus, we encouraged the creation and registration of local viewing groups at various institutions, which we called 'POM-Hubs'. We anticipated that a POM-Hub would be hosted in a conference room or auditorium at an institute or university, where POM participants could gather into a sociable, in-person event.

We promoted the hubs on our website and encouraged the organizers to actively promote their hub and the conference locally. Ultimately, 66 hubs located at universities as well as other scientific institutions, such as the Optical Society (OSA), SPIE and Springer Nature, emerged on all continents (except Antarctica). In many places, the hubs were organized and supported by local OSA and SPIE student chapters. The hubs were very much like mini in-person conferences: groups of students, postdocs, and senior researchers watched the talks together, many of the hubs organized snacks and poster sessions, and there were plenty of opportunities for informal interaction. Despite the short (five hour) duration of POM, some conference culture began to emerge: a hub at UC-Davis arranged a **POM bingo game**, which then made its way to other participants via social media.

We were amazed that even in India, China, and Australia, where the meeting started in the middle of the

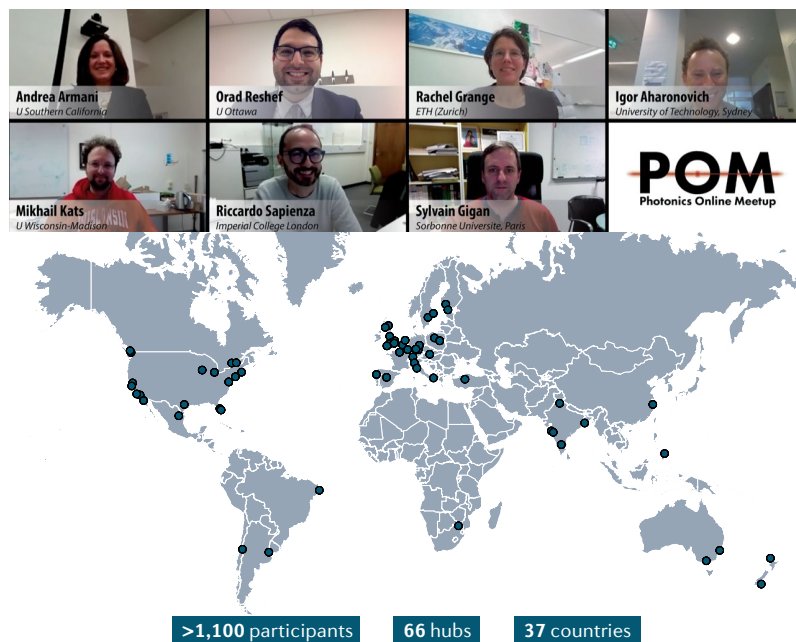


Fig. 1 | **Photonics Online Meetup.** The organizing committee of the Photonics Online Meetup (POM) and a map showing the location of the POM hubs (data courtesy of POM).

night and at 6 am, respectively, the hubs ran at full steam, and we were able to follow their progress via live-tweeted photos from participants.

### The poster session

Given the limited number of speaking slots and the high number and quality of the abstract submissions, we wanted to increase the opportunities for researchers to disseminate their findings. This demand motivated the idea of a Twitter poster session.

We provided a four-slide [poster template](#) that was optimized for display on Twitter. We asked the presenters to create a personal or group Twitter account (if they didn't already have one), post their poster, and add a short description. We also encouraged the use of the conference hashtag (#POM20) to allow researchers to easily join the poster session. For those without an account, such as researchers in locations where access to Twitter is restricted, the organizers posted the posters via the POM Twitter account and relayed the questions to the presenters. Comments and answers were publicly viewable as a thread below each poster.

Compared to conventional conferences, the posters on Twitter had a much wider reach, with some reaching 4000 views. While this was not a typical 'wine and cheese' poster viewing, the posters were viewable for days, and can still be found by looking up the hashtag. This virtual poster session also allowed researchers to create threads, directly linking relevant papers to their posters, further improving research dissemination. Finally, being situated entirely on social media, the poster session organically turned into publicity for the oral presentations the following week as participants liked and re-shared posters they were interested in to their peers.

### Before the conference

An important aspect of the preparation was to guarantee that the conference would not be derailed by technical problems. It was therefore very important to brief the presenters on the software, to check the quality of the video and sound, and to generally minimize IT issues. Each speaker performed a test run with the IT support team at USC. We also used the POM website to post test links for the software for individuals and hubs in advance and a 'helpful hints' document with detailed instructions.

### During POM

The video conference was accessible by all hubs and registered participants a few minutes before the conference started. Two staff members from USC were ready to step in for technical issues (which occurred with one speaker). The POM organizers, mostly at their own local hubs, kept in touch via Slack.

Armani had a control over the Webex software to mute or intervene, if necessary. While chairing a session, the organizers broadcasted their videos from a private office to reduce the noise from their hubs. The speakers were asked to be online and ready to present on the video-conferencing software at the start of the conference. This way, in the event of a technical glitch, we could immediately proceed to the following speaker,

which we did for a speaker who was unable to share their screen.

Questions from the audience were typed into the Webex chat, asked by the session chairs, and answered by the speakers. As will be discussed, this aspect proved to be a challenge, though we can now propose some basic solutions based on our experience.

We asked hub participants to Tweet photos from their hubs, with the conference hashtag. This activity triggered a tremendous amount of interaction online between the hubs throughout the whole conference. Depending on the time of the day, hubs had organized themselves differently (with coffee in the morning, pizza in the evening and so on), with hub attendance varying from a handful to more than 50 people. We projected the pictures of the hubs on the screen during the break, which created a feeling of community.

### Challenges

Despite the success of this initial event, which elicited an overwhelming [positive response](#) from the community<sup>1</sup>, the post-event surveys from participants revealed several challenges.

The most interesting is probably related to the different emotional engagement due to the lack of in-person interaction. It is still an open question how to provide a fuller experience with online networking. For example, the lack of applause after each talk was distinctly felt as something missing. In the future, chat rooms could be used to stimulate small-group discussions, and even virtual-reality technologies could be explored, though this would require additional equipment and expertise.

As with most online events, audio and video quality was the primary issue raised by participants. Although every speaker tested the software in advance, we learnt during the conference that several hubs had audio issues, often due to connectivity issues at the hub site or poor audio quality from the speakers' microphones. Notably, not all of the hubs reported audio issues for the same talks, indicating a variability in conference room speaker quality as well. These types of challenges can be resolved at least partially by testing the connection at all of the hubs in advance and using external microphones, which can improve the audio clarity. As suggested by Prof. Miles Padgett from the University of Glasgow, pre-prepared [subtitles](#) or leveraging built-in close-captioning may make online talks even more accessible.

The participants had mixed views on the conference size and the selection of topics. While many participants appreciated the small scale, as it allowed them to attend all of the talks, other participants wished for more presentations on a wider range of topics. Additionally, given the diverse educational level, some respondents suggested more in-depth tutorial-type presentations and extended Q&A times; this was also pointed out by David Pile, Editor at Nature Photonics, in his post-conference debrief<sup>2</sup>. One of the invited speakers, Nader Engheta from the University of Pennsylvania, suggested that it may be better to have questions come directly from the listeners via an audio/video connection, rather than via the session chairs<sup>2</sup>.

One approach to addressing some of these suggestions is to have a pair of events: one consisting of tutorial-type lectures and a second consisting of more detailed technical presentations. Another option is parallel streaming. However, having multiple virtual rooms would require the different hubs to select a single topic or have multiple physical rooms. At our inaugural POM, we decided to avoid this type of fragmentation.

In addition, in the first POM, we decided to use a single online interface for both watching the speakers and entering questions. In future events, alternative strategies may be tested and could facilitate audience engagement; for example, audience members at some hubs had no easy way to insert their questions into the computer that was livestreaming POM to that room. There are many emerging online tools designed exclusively for this purpose. For example, Slido is commonly used in large multi-site lectures and could be adapted for virtual conferences.

Finally, one of the main goals of the event was to improve access to scientific findings and to increase education equality. For this goal to be realized, everyone on the global stage must have access to the software and various web platforms used. Despite an exhaustive search, we were unable to find universally accessible web platforms that met our needs for both the poster session and the online presentations. As a result, some regions were partially excluded from the event, as the poster session on Twitter was not accessible in certain geographical regions. In the future, universal access will be a fundamental challenge facing not only the scientific community, but the global community.

### Analysis

In evaluating the event's success, we considered its global reach, particularly into communities that might not normally attend conventional conferences, as well as absolute participant numbers. We also surveyed the participants before and after the event to learn as much as possible about their experience.

Overall, we evaluate this inaugural Photonics Online Meetup to be a strong success. With 66 hub sites in 27 countries on 6 continents, the event had a large impact on an international scale. More than 600 participants watched the event at the hubs, and approximately 500 more participated as individuals. The recorded videos reached an additional 200 unique viewers. Importantly, more than half of the participants were graduate or undergraduate students. For many of these students, POM was their first conference, and attendance may not have been possible if it had not been free.

We would like to emphasize some of the innovations of POM as compared to in-person conferences and existing online events such as webinars. Our virtual poster session was held entirely on Twitter via a specially designed poster format. The posters were retweeted via the conference account, and almost 60 high-quality posters were made available to everyone online, with an average of 3,000+ impressions recorded per poster

in the first three days — far more than one would expect at an in-person conference. Our POM-Hub model successfully merged talks broadcasted over the internet with a physical presence and community building: the 66 POM-Hubs that organized organically around the world ranged from a few students in Stockholm to a massive 65-person event in Ottawa.

### Conclusions and vision

Given the clear benefits to research communities of eliminating the cost (financial and otherwise) of holding in-person events, we aspire to establish a movement of online meetups. The suite of freely (or almost free) technologies that is now available was not accessible even a decade ago, and we should take advantage of it. For some scientists around the world, particularly students, POM was a truly unique opportunity to experience an academic meeting. As novel technology is developed, online meetings will likely become even more compelling.

We believe that the innovations we developed in preparation for the inaugural POM event will be applicable not only to future POMs, but can also be readily generalized and implemented for low-cost, inclusive and delocalized conferences in all fields. Though we do not expect online meetups to displace all physical conferences, nor to replace the serendipity and networking of meeting in person, they have great potential to reduce air travel, costs of conference attendance and impact on families, and to democratize access to knowledge on a global scale.

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The authors declare no conflict of interest.

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**Photonics Online Meetup:** <https://sites.usc.edu/pom/>  
**POM bingo game:** <https://twitter.com/MarinaRadulaski/status/1216846121525399552>  
**Poster template:** <https://twitter.com/armanilab/status/1197902612365897729?s=21>  
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