

Getting to grips with online conferences

Online conferences are increasingly popular within scientific communities due to the travel restrictions faced by many countries. Although a relatively new phenomenon for many of us, lessons from recent meetings provide useful reflections on the format's opportunities and challenges compared to conventional in-person meetings.

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Coronavirus disease 2019 (COVID-19) is impacting research in many ways. One of the major disruptions has been to the usual conference circuit — the backbone of many scientific communities. Most of the conferences planned for 2020 have been either cancelled or postponed. As such, many researchers can no longer meet in person to exchange views, network and socialize. Without some kind of replacement, this could stifle the long-term development of new ideas and projects.

Online conferences have been discussed for some time, particularly in light of their inclusivity and low environmental impact. Nonetheless, most meetings have continued to be in-person. Now, forced by the current health emergency, many online conferences are mushrooming to keep scientists connected while they stay safe at home^{1,2}.

In the face of the cancellation of the 2020 *Materials Research Society* Spring Meeting, the perovskite photovoltaics community met online in a one-day 'Virtual Perovskite Conference 2020', in short ViPerCon2020 (<https://salibalab.wordpress.com/virtual-perovskite-conference>). This experiment attracted over 680 participants, many more than initially anticipated, thus fostering the 'community spirit' that many of us know from offline conferences. An online meeting, however, necessarily differs from an offline meeting in many aspects. One of the main questions is how to organize and run an online conference to bring the scientific community together. Following the experience of ViPerCon2020, this author offers some reflections on the organization of a virtual meeting and the lessons learnt from it.

Organizing online conferences

Organizing a (successful) traditional offline conference comes with time-consuming requirements. While these requirements can vary from case to case, they typically include renting an appropriate venue a long time in advance, providing public transport schedules and maps for directions, organizing a catering service and an evening programme, applying for funds, relying



Fig. 1 | The face of a virtual meeting. An illustration of the online interface at the ViPerCon2020 conference. One of the speakers shares their screen to present their work. The video cameras of the chair and organizers are visible during the session while those of the participants are turned off. Only the speakers were visible to the audience. Participants are allowed to interact with the chairs and speakers via chat box. Credit: Weiwei Zuo

on a relatively large team for technical assistance during the talks and extensive communication with the participants.

On the other hand, the organization of online conferences is much less complex: no venue needs to be rented, there is no complication from travelling, technical assistance is externalized mainly to the software, which is relatively inexpensive and thus relaxes the requirement for fundraising significantly. Therefore, the organization of an online conference is within reach for a relatively small team and can be planned on a shorter time scale. In our case, ViPerCon2020 was organized with only a four-week time horizon and advertised exclusively on social media. Yet, more than 710 researchers registered for the meeting and over 680 unique viewers were recorded. However, several aspects need to be considered.

Choose a platform that can accommodate your conference. There are commercial and non-profit software solutions to organize an online conference, such as Zoom, WebEx,

Microsoft Teams, Blue Jeans, OpenMeetings or Jitsi, catering for various needs such as cost, reliability, the required number of attendees, recording functions or side rooms³. Also, the familiarity of the audience with a particular system may influence the choice of the online platform. Figure 1 illustrates what the ViPerCon2020 meeting room looked like to the online audience.

Address technical requirements before the conference starts. For example, the speakers must have a stable, high-speed internet connection to ensure good audio and video quality, which also rely on adequate equipment such as a headset and webcam. While the conference organizers cannot influence this directly, they should inform the participants well in advance about such essential provisions.

Plan a clear structure to engage your audience. A way to allow participants to ask questions to the conference speakers is important, especially for larger meetings with hundreds of people where it is hard for everyone to get heard. One solution is to

permit written questions, for example in an online chat, that can then be pooled, curated and relayed by a moderator. Unanswered questions can remain open and still be answered later, in writing, by the speakers. Non-verbal cues can be represented with pictograms or emojis communicating, for example, applause for the speaker, approval or interest in follow-up questions.

The conference organizers need to anticipate technical failure. Multiple moderators should be present in all sessions in case something goes wrong. Speakers may also have the same problem and thus it is a sensible precaution to permit for short-term shifts in the schedule. Moreover, the organizers should be available for all speakers before the conference to provide technical assistance in using the conference software.

The conference timing and session length are important. ViPerCon2020 was divided into four time slots over one day. Slots were typically 90 minutes long; they included a 15 minute break and featured three invited speakers. The reason for the frequent breaks is that long sessions are particularly tiresome when staring at a computer screen. In fact, there are initial indications that the lack of non-verbal cues, small delay times due to slow internet connections, the use of the same online tool for spare time and work, and the constant view of yourself and others on screen tend to tire participants out more quickly as greater attention to speakers and self-presentational efforts are required — a phenomenon dubbed video call fatigue^{4,5}. Thus, frequent breaks are essential to refocus and refresh the participants.

Disadvantages of going online

Conferences are more than just talks; they glue scientific communities together. Much of the personal interaction occurs at coffee or lunch breaks, dinners or other social settings. Here, informal discussions become possible where new collaborations and trust can be built, especially among participants that have not met yet. Poster sessions are important moments especially for young researchers to gain exposure and to communicate their research. Conferences not only facilitate the exchange of ideas and encourage networking, but they also increase researchers' visibility and enable contact between researchers and future employers, journal editors or industrial partners. Conferences in this sense are the 'living room' of the science communities.

Some of these aspects are hard to replace at online conferences but this can be mitigated somewhat. For example, coffee breaks can be held virtually using smaller side rooms with only two to five

participants, either assigned randomly or by a wish-list. Poster sessions may require a more innovative approach to permit a dynamic interaction between the audience and the poster presenter and allow participants to hop from one poster to another. One possibility could be the creation of a virtual reality environment drawing inspiration from massively multiplayer online role-playing games. Freely and publicly available virtual world platforms such as *Second Life* had been used to organize collaborative meetings in the healthcare field⁶. This option, however, may require a specialized headset.

Moreover, online fatigue can be tackled by introducing ample breaks to provide temporary relaxation. In general, it is good to remember healthy practices when sitting in front of a screen for an extended period of time. This includes a good choice of an ergonomic chair, occasional physical movement and stretching, and to listen to some parts of the seminar while standing. The conference organizers may also consider assigning short time slots in the schedule where the participants are prompted to undergo a collective group exercise of short duration.

Advantages of going online

New formats bring new possibilities and unique advantages. To attend in-person conferences, especially in the case of large international meetings, scientists often need to undertake expensive intercontinental flights. Online conferences, instead, do not require such flights and have consequently a reduced carbon footprint. The energy community is particularly sensitive to this aspect, although climate change considerations are becoming increasingly important to society at large; as shown for example by the Scientists for Future movement. Moreover, online conferences come with health benefits because no arduous long journeys need to be undertaken and the often-feared jetlag can be avoided.

An online conference can be orders of magnitude less expensive than a traditional one saving resources for research groups. Often the budget for attending conferences is limited and thus inexpensive online conferences provide the possibility of attending significantly more (online) conferences, which may benefit the participant in terms of exposure to the latest research developments, networking and idea exchange. In addition, online conferences are more accessible for researchers in developing countries who frequently struggle with obtaining visa permits and cannot dole out easily the

funds for flights, conference fees, hotel costs and sustenance.

As a result, online conferences may encourage more inclusivity, which can strengthen the scientific community. In addition to increasing participation by lowering financial or geographic barriers, online conferences can reduce the access barrier for researchers with family obligations, such as those with children or other types of care responsibility — an issue that disproportionately affects women. Online meetings also facilitate the participation of people with disabilities or health concerns. Overall, online conferences can allow for a larger pool of potential speakers and participants, which leads to an improved conference quality.

It is also noteworthy that online formats are often more dynamic and fluid than traditional formats. They can be adapted more easily to the speaker's needs, such as being available for only a short amount of time due to other commitments, but can also bring in the audience more easily. For example, during a panel session, an audience member can be promoted by the organizers to a panellist with just a few clicks allowing them to make a more active contribution to the discussion where relevant. This would be much more cumbersome in an offline format.

Lastly, at ViPerCon2020, this author observed an exceptional quantity and quality of questions and comments to the speakers. It may be that having questions in writing contributed to the increased quality. Also, it seemed that especially younger students felt empowered to have their voices heard. Here, the relative anonymity on the internet really could have helped to reduce barriers and to counteract the (often involuntary) tendency of mainly established scientists, frequently sitting in the front row, to get the lion's share of the attention at offline conferences.

Future directions

ViPerCon2020 had a large number of young and early career scientists, for example from India, China, Europe and Latin America, some of whom would have struggled to afford the high expenses of a traditional conference. Being online allowed the conference to reach and engage with a much wider global audience who will form the next generation of researchers.

Studies show that new habits form after about two months on average⁷. With the on-going travel restrictions, people have quickly developed new habits and digital skills. There is now more awareness of and readiness to adopt online meetings as part of the new conference circuit. This author is therefore confident that there will be a

place for online conferences beyond the present emergency.

At the same time, this change need not be restricted to conferences. Many organizations, for the first time in their history, have held their meetings online, for example, companies' annual shareholder meetings⁸, or the relatively recent platforms for young scientists such as Germany's Die Junge Akademie, the Young Academy of Europe or the Global Young Academy.

We are already seeing the adoption of virtual thesis committees, virtual talks at research seminars, remote job interviews or even remote house hunting. There is no reason why these online activities cannot

become a more regular hallmark of a more carbon-friendly interaction with the world.

Following the positive response to ViPerCon2020, we are already looking ahead to the ViPerCon2021. While there is still more to learn about virtual meetings, we hope our experience encourages more of you in the wider energy community to consider organizing and participating in online conferences.

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