Semi-Virtual Conference Guidelines

Strategies to improve accessibility, diversity, documentation, and sustainability

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Abstract

Academic conferences produce a large proportion of greenhouse gas emissions of universities. Individual academics can reduce their carbon footprint significantly and easily by avoiding flying. Conference organizers can play an important role in this development.

Every academic conference, large and small, in every discipline and every country, can benefit from live-stream technology. As a minimum, colleagues with accepted abstracts can be offered the option of remote presentation. Remote presenters can use existing facilities and support at their local institutions. Beyond regular teaching equipment, conference rooms need wireless microphones, a sound mixer, and a webcam directed toward the audience. Two-way software such as Zoom or Skype enable talks and discussions to happen in the same stream, but audiovisual quality suffers if internet speed is low. In that case, one-way software such as YouTube live stream is preferable. Audience members with Google accounts can type questions into the YouTube comment feed and the presenter can answer them acoustically. YouTube stream links can be kept confidential ("unlisted") and provided to registered participants only. Talks can be given in YouTube and discussions in Zoom. Additional personal communication with remote presenters (Skype, Jitsi) can happen at different times in a separate quiet room.

A more ambitious option is the multi-location semi-virtual conference (realized at ICMPC15/ESCOM10). Here, all talks at all hubs are live-streamed. If hubs are about equal in size, participants are treated equally, and they are not implicitly rewarded for flying or penalized for not flying. At each hub, a local program and a virtual program run in parallel, and participants can switch back and forth between them. Per-capita emissions are reduced by 50-90% (the more hubs, the better). For colleagues from non-rich countries, the total cost of participation (registration + travel + accommodation) is drastically reduced.

Introduction

Climate ethics for academics

The warnings of climate scientists are becoming increasingly urgent.[1] The repeated failure of the global political community to respond adequately to scientific warnings in recent decades has made global warming a global emergency. Even if all nations kept the agreements made in 2015 in Paris, global temperature would probably reach 3°C higher than before industrialization by the end of the 21st century, causing widespread devastation, famine, disease, war, and forced migration. Decisive action and deep cuts will be required before about 2030 to reliably avoid runaway climate change driven by positive natural feedbacks.

It follows that everyone whose personal emissions are relatively high relative to the global average has a moral obligation to reduce those emissions and get involved in political processes to put governments and corporations under pressure. In this regard, academics are no different from non-academics. The anticipated end of global academic conference culture is trivial by comparison to the end of human civilization; we should try to prevent both. The above-average education and social/electronic networking of academics makes it easier to act for the common good, which in turn implies an increased moral obligation to do so—just as rich countries have a greater obligation than poor countries, by virtue of their greater resources.

Currently, our conference culture is putting academic colleagues under pressure to burn large amounts of fossil fuels. A typical call for papers indirectly sends the following message: *Either fly to our conference or miss out on exposure that could lead to a grant, fellowship, position, or any other benefit of informing others about your work.* The moral problem is clear. For the environmentally aware, flying to conferences has been happening against their will, although few have actually said that—perhaps believing there is no alternative.

Aims

Promising alternatives to the conventional conference format already exist. It is possible not only to reduce emissions but also to improve academic communication, collaboration, inclusion, and dissemination. Conference organizers can and should offer their fellow researchers in all countries the option of participating in global conference culture without producing the usual emissions.

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[1] http://report.ipcc.ch/sr15/pdf/sr15_headline_statements.pdf; http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

The available technology for high-quality audiovisual transmission is reliable, inexpensive, and easy to use, provided organizers are well informed in advance and can find qualified technical support (e.g. local Master's students in audio engineering). The aim of this document is to provide the necessary information.

Our recommendations are based on our successful organization of a multi-location semi-virtual conference: the 15th International Conference on Music Perception and Cognition (ICMPC15) combined with the 10th triennial conference of the European Society for the Cognitive Sciences of Music (ESCOM10). The conference happened simultaneously in four countries (Argentina, Canada, Austria, and Australia) and lasted for week in July 2018.

The research area of our conference was music cognition, but our conference format recommendations are independent of content. The semi-virtual idea could be realized in any academic discipline (economics, linguistics, chemistry, history…). In fact, any international/global conference about anything, academic or otherwise, could benefit from a semi-virtual format.

We aimed to halve per-capita emissions per participant. We achieved an even greater reduction, while at the same time making other improvements. By flexibly incorporating new communication technologies into conference organization, we were able to increase both the number of participants and their cultural diversity.

In future, total emissions from flying at semi-virtual conferences will approach zero if conference hubs are located such that hardly anyone needs to fly. Such conferences will also become more accessible for colleagues in non-rich countries. They will no longer be faced with impossibly high costs for a long flight, registration, and accommodation in a rich country.

Convincing administrators

Colleagues proposing to organize a semi-virtual conference may experience resistance from university administrators. In our experience, the problem is relatively easy to solve. Most universities are trying to promote a positive environmental image, with detailed information in the internet about their projects in the area of sustainability. Conference organizers need simply explain to relevant administrators how a low-carbon conference can visibly and effectively contribute to that larger project.

It is surprising that so few universities are currently seriously contemplating reducing the amount of flying of their academic staff. We estimate that emissions from flying typically make up between 1/3 and 1/2 of the total emissions of a university. A more exact estimate is not possible

at this time because most universities are not yet documenting their emissions from flying and comparing them with other emissions. This will change in the coming years as the climate crisis intensifies.

If administrators are still unconvinced, consider the financial aspect. Universities spend enormous amounts funding conference trips by academic staff. It might be interesting to estimate that total price tag for your home institution. When low-carbon conferences become the norm, that price tag will be significantly reduced. At the same time, international participation in local events will increase due to virtual participation. In this way, conferences will attract more attention to the research of the university and increase the chance of successful international collaboration. This is a win-win situation for administrators. The sooner they realize that, the sooner they will move to take advantage of it.

The academic, economic, and environmental potential of live streams

Since YouTube made live-streams freely available in 2013, they have become an important additional means of academic communication and documentation. Impressive examples within YouTube include “Cambridge University Press – Academic” and “Oxford Academic (Oxford University Press)”. In academic conference culture, the potential of live streams is only starting to be realized.

Every academic conference, large and small, in every discipline and in every country, can benefit from the incorporation of live streams. Live-streams enable any talk to be shared with a larger audience. That improves communicational efficiency while at the same time reducing costs, emissions, and inconvenience of travel. The information becomes more openly accessible. The geographic outreach and cultural diversity of presenters and audiences is increased. A talk can be given almost anywhere, opening up new possibilities for global academic exchange. Ultimately, every new form of academic documentation helps academic and/or general audiences to understand the content.

Contrary to popular belief, the incorporation of live streams into conferences does not spoil the conference experience. Many of us have experienced poor live streams at conferences, but that was due to solvable technical problems. The audiovisual quality of YouTube live streams is consistently and reliably high. Of course it is more fun and often more productive to communicate with people in person, face to face. But it is also true that a regular live conference can be improved by adding electronic communication with remote participants: people who could not

have flown to a central conference location anyway, because they could not have afforded it or could not easily get a visa. Moreover, it is hard to evaluate a new conference format without experiencing it and getting used to it first. Live streams open up new possibilities for conference organization that have to be implemented and tried out before passing judgment.

At a time when climate change is being recognized as an unprecedented global emergency, live streams allow us to significantly reduce academia's carbon footprint. This document aims to help academics present themselves as climate-friendly role models for others to imitate. Anyone who reduces her or his own emissions is in a better position to argue for emissions reductions in other areas.

As the 21st Century unfolds, live streams and videos will increasingly be regarded as normal and central forms of academic dissemination, alongside more traditional conference proceedings, peer-reviewed journal articles, book chapters, monographs, and popular media reports. Each kind of dissemination has its own special uses and functions. Sometimes it is easier to watch a good video than to read an academic paper. Individual colleagues can only benefit from this additional possibility, which they can either use or ignore as they see fit.

Option 1: A conventional conference with additional remote presentations

Any conventional conference can be adapted to include remote presentations, increasing the number of paying participants. The event loses its elitist jet-set character and becomes an open event that almost any researcher in the world can participate in.

This option can be added to the conference after the call for papers. When accepting submissions, inform participants that they can present remotely, give them a short technical guideline (details below), and ask for their decision by a deadline.

To guarantee the technical quality of remote talks, organizers may specify in guidelines that remote talks must be delivered (i) from a dedicated room at a university or similar institution with technical support (a person with whom your technician can communicate), and/or (ii) in the presence of a small local expert audience (e.g. some PhD students). If conference participants cannot comply with these conditions, they can negotiate with the organizers. The main thing is to guarantee technical quality and minimize the risk of technical failure.

Software and hardware for remote talks

Zoom. If both presenter and remote audience are in countries with reasonably fast internet (check Wikipedia “List of countries by internet speed” and run speedtest.net) and their specific local connections are also relatively fast (connection speeds vary considerably both within and between countries), we recommend using two-way communication software for presentations. That allows presenter and remote chair/audience to talk acoustically in both directions with almost no perceptible time delay.

Have testing various options, we recommend Zoom, which is similar to Skype. Download the free version, install it, and follow the instructions. Buy the relatively inexpensive upgrade.

To get started, send an email with a Zoom link to the presenter to organize a short rehearsal. To conduct a comfortable question session with your local audience, you will need a webcam (so the remote presenter can see your audience), some wireless microphones, and a sound mixer. If you are unable to borrow this equipment from your institution, you can buy it for few hundred dollars altogether.

During the talk, the presentation will be shown in Zoom via screen-share. The camera picture will appear in the corner automatically. On the receiving end, the voice can be electronically amplified. After the talk, questions can be asked by the audience using a wireless microphone, which is connected to the computer via a small audio interface.

- The presenter should use a headset, and a cheap one is better than none at all. A headset prevents acoustic feedback from the loop "Microphone (sending end) - PA (receiving end) - wireless microphone (receiving end) - loudspeaker (sending end)".
- Do not mute your audience microphone during the talk. The presenter should be able to see and hear the audience, which makes the situation feel more natural.
- The audience should see how they appear to the presenter in a separate window.
- The wireless microphone and the remote acoustic signal should be mixed and connected to the same amplifier. During question sessions, audience members should hear their voice through the loudspeaker. This feels natural and tells them that the presenter can hear them.
- If the presenter wants to play sound from her/his computer during the talk, test it in advance. The presenter should also send you the soundfiles separately so you can play them locally.
- Test the setup a few days before the talk. Establish contact with the presenter 15 minutes before the talk starts.

YouTube. If there is a problem with internet speed that could lead to interrupted or poor quality transmission with Zoom or Skype, we recommend YouTube live stream. YouTube is one-way (from presenter to audience but not vice-versa), but two-way communication is still possible: the audience can write comments (if they log in with a Google account), and the presenter can answer them acoustically. An advantage for both presenter and audience is that everything is documented.

If all conference participants have access to the stream link, they can watch the talk either in real time or later. That makes up for the disadvantage of remote presentation: remote and local talks get different but equivalent status. You may also decide to stream all talks in the entire conference and make all streams available to all participants.

We recommend using "unlisted" YouTube streams, which cannot be found in Google. Only registered participants should have access to these URLs and they should also sign an agreement to keep them confidential. Presenters should also agree to avoid including soundfiles or images from the internet, because YouTube can automatically find potential copyright infringements and block the stream. To our knowledge, that is the only time YouTube is likely to fail.

YouTube means more work for presenters than Zoom. To send a YouTube stream, they will have to install Open Broadcaster Software (OBS) on their laptop, and use that to stream to YouTube. OBS will mix their talking head with the Powerpoint image. A detailed guideline is in the appendix. Presenters can avoid this extra work by using the streaming facilities and support that are available at many institutions.

Personal virtual communication during the conference

For a simple semi-virtual conference at one central location with several remote presenters, presenters need to be given a feeling of participation, and local participants need the opportunity to communicate easily and informally with them. One approach is to offer a 30-minute private communication timeslot to each remote presenter. During that time, they can speak privately to interested audience members by Skype or similar; Jitsi has the advantage that you don't have to log in. This should happen in a relatively quiet room, close to the coffee area.

At ICMPC15/ESCOM10, we called this room the *global foyer*. It gives local participants the chance to communicate with anyone anywhere at any time. It can be run throughout the conference, but especially during breaks. Local conference participants can chat there with remote participants or anyone else. If remote presenters provide their contact details in their talks or

abstracts, other conference participants can contact them to arrange a meeting using their mobile phones. For the future, we recommend that conference organizers organize advisory meetings between senior and junior participants (you can assign this task to a student assistant).

Augmenting a regular conference program

A conference that includes remote presentations will typically have a regular program (schedule) that includes these talks and is printed in a small booklet. Conference participants will also need electronic links to live streams. Perhaps the easiest method is to send all conference participants an email before the conference begins, including all links along with other information about the conference. The links will have been set up in advance in YouTube, Zoom, or other software. More ambitious conference organizers can create a password-protected system in which all presenters are invited to make electronic materials (abstract, proceedings, posters, videos, sound files, discussion forum) available to all registered participants. At ICMPC15/ESCOM10, we used Moodle for this purpose.

Option 2: The multi-location semi-virtual conference

A multi-location semi-virtual conference incorporates all the above features. In addition, the conference is split across several global locations. ICMPC15/ESCOM10 took place simultaneously on four continents (Australia, South America, North America, and Europe) and the hub locations were Sydney, La Plata (Argentina), Montreal, and Graz. On the basis of our practical experience organizing this conference, we recommend the following for future semi-virtual conferences.

Review procedure

This should be carried out at one of the hubs to ensure a common academic standard. Other hub organizers will not have to bother with it. That should make it easier to recruit hub organizers. The deadline for finalizing hub locations can be after the abstract submission deadline. The hub that reviewed the abstracts should not have special status on the conference program, where all hubs are nominally equal.

Number of hubs

In principle, the number is unlimited. Consider a multi-hub conference in which each hub (i) is nominally equal, (ii) independently offers its own local program from accepted abstracts, and (iii) independently decides what talks from other hubs to include in its virtual program. In that case, there could be 10 or even 20 hubs at different global locations. The greater the number of hubs, the greater the accessibility and cultural diversity of the conference, the smaller the carbon emissions per participant, and the easier it is for individuals to organize hubs (because hubs are smaller).

A large number of smaller hubs is possible and practical if each hub works relatively independently according to a central guideline and makes its own independent programing decisions. The organizer of each hub should have a relevant PhD and take advantage of the equipment available in regular local teaching rooms.

Rooms

Each hub needs two or more presentation rooms: one or more for regular talks and one or more for virtual talks. Since many institutions are now charging large amounts of rent for lecture

theatres, organizers can save money by using regular teaching rooms instead. This option becomes more feasible if the conference is split across a larger number of smaller hubs.

Program

No matter where a hub is located in the world, it can communicate in real time with almost any other global location if the local daily program is divided into two half-days of four hours, separated by a four-hour break (siesta). In the morning at each hub, conference participants will be communicating internationally toward the East; in the afternoon or evening, toward the West. For information about changing time differences due to daylight saving (summer time) see timeanddate.com.

The following table is a sketch of one day of ICMPC15/ESCOM10. The top row (UTC or GMT) is time relative to UK time in winter (our conference was in the Northern summer). The red block in the middle represents a period of four hours during which three of the four hubs worked together. In local time, this block started in Montreal at 9 am, in La Plata at 10 am, and in Graz at 3 pm (15).

UTC (GMT)	Δ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Montreal	-4	20													9	10	11	12					17	18	19
La Plata	-3														10	11	12	13				17	18	19	20
Graz	+2							8	9	10	11				15	16	17	18							
Sydney	10	10	11	12				16	17	18	19														9

This plan varied slightly from day to day. Further details are here: https://music-psychology-conference2018.uni-graz.at/en/program/

Each hub of our conference had a regular local program that included both live and virtual talks and was printed on paper. As at a conventional conference, we delivered this document to a printer a week before the conference, which limited our ability to make last-minute changes. There was also an electronic 24-hour global program with times in UTC (GMT). The global program gave an overview of all regular talks at all hubs.

Each talk could be seen remotely at one or more other hubs (central organization was necessary to ensure that). During parallel sessions, participants could choose between local and virtual talks. We recommended that participants switch back and forth to balance local and global content and experience a varied and dynamic program. Each hub offered one keynote (prioritized on the programs of the other hubs).

For the future, we recommend that all events start on the hour or the half hour, around the clock. Every two hours there should be a globally coordinated half-hour break (which can overlap with a poster session or pre-conference activity, see below). Breaks might start at UTC 000, 200, 400 and so on. The following 90-minute blocks would then begin at UTC 030, 230, 430. The program would then comprise 1.5-hour modular "building blocks" that are constructed in standard ways, e.g.:

- 3 regular talks,
- a keynote (1 hour) followed by invited responses (30 min),
- a poster session (60 minutes) preceded by speed presentations (30 minutes),
- workshops and demonstrations in parallel, or
- an opening session followed by discussion groups.

The daily program at any location would be divided into two 3.5 hour blocks separated by a long lunch break (siesta), with one of the following two local-time plans, depending on location:

- 8 am — 12 noon and 4 pm — 8 pm
- 9 am — 1 pm and 5 pm — 9 pm

Each 3.5-hour block would be 90 minutes work + 30-minute break + 90 minutes work.

At ICMPC15/ESCOM10, we divided talks into long (30 minute slot) and short (20 minutes) based on reviewers' grades. In retrospect that made the task of creating a *thematically coherent* program too difficult. We recommend choosing a basic time unit in advance and sticking to it. Probably, 30 minutes is preferable. A 20-minute basic unit would mean breaks of only 20 minutes every two hours, which would be more stressful for participants, given widespread agreement on the importance of coffee breaks. Shorter breaks would also increase the chance of delays or technical problems (technicians have to check a list of points before the start of each session, see appendix).

Assuming a 30-minute basic program unit, there would be a 30-minute "break" before the start and after the end of each half-day. This could be used in many ways: concert, warm-up activity, demonstration, installation, discussion. After that, participants would be seated in time for the start of the next 90-minute working periods. That is important, because in a semi-virtual conference there is no room for delays (see timekeeping).

Technology

In the following, we will explain our technological solutions so colleagues in different disciplines and countries can imitate what we did at ICMPC15/ESCOM10, or adapt our approach for their purposes. We do not wish to specify an exact solution, because (i) different conference traditions have different priorities, and (ii) the technology is constantly improving, so parts of this guideline will soon become obsolete. The technology that we used was not exactly the same at each hub, depending on differences in available hardware. We will mention some of the differences in this document, but for simplicity we will focus on the similarities.

A 30-minute program slot is often divided into three parts: (1) 20 minutes for the talk itself, (2) 7 minutes for questions, and (3) 3 minutes for changing rooms. For each of these, we used different software solutions:

1. All talks were streamed as unlisted YouTube videos.
2. Discussions following talks were in Zoom and simultaneously live-streamed to YouTube. When a talk was viewed in real time at another hub, the shared discussion was live and audiovisual. When a talk was viewed at another hub after a time delay, the audience contributed comments in writing, either in YouTube or in our password-protected system (Moodle).
3. We made sure the program ran exactly on time by creating an internet page that automatically played music toward the end of each 30-minute timeslot.

Our guidelines reflect choices for a relatively low-budget conference. We spent a few hundred Euros on software and another few hundred on hardware including borrowing fees. More expensive solutions are also available (not described here).

One-way streaming: YouTube

YouTube streaming has some major advantages:

- It is free.
- It is easy to use.
- Streams are automatically saved and can easily be downloaded by the person who set up the stream.
- Both video and audio quality are excellent.

Disadvantages of YouTube:

- You need an encoder to get the data to YouTube. We used OBS.

- The high audiovisual quality comes at the cost of a buffering delay of some 20-60 seconds. So if you switch from one-way to two-way communication (as we did in our conference at the end of each talk) the presenter and audience at the sending hub have to wait for the receiving hub to catch up. This was not a problem for us because people needed a short pause anyway to process the content and formulate questions.
- Updates are released frequently and conference organizers may need to adapt to them at short notice. Usually this is no problem because updates merely offer new possibilities while retaining the old. An illustrated guideline to setting up YouTube streams is provided in the appendix. The exact procedures might have changed since the guideline was written.

YouTube offers three options:

1. Public videos, accessible to everyone and findable in Google. This is the most familiar option.
2. Unlisted videos that can be viewed only if you have the link. This is what we used.
3. Private videos that can be viewed only on invitation and after logging in with a google account. The number of people that can be invited is limited to 50 (at least in October 2018).

Many academics who present papers at conferences do not want their talk to be broadcast immediately to anyone in the world. They for example may be worried about making a mistake that cannot be corrected later. The internet never forgets! For that reason, options 2 and 3 may currently be preferable for academic conferences. Option 3 is realistic only for smaller conferences, so we focus on 2.

We provided links to live streams (URLs) to participants within a password-protected system (Moodle), with a separate page for each talk. These pages also contained abstracts and any other materials that presenters wished to upload such as proceedings, sound examples or other videos. For a smaller conference, a password-protected system is not necessary. Instead, you can set up the YouTube streams in advance (to start automatically at set times) and send the URLs to all participants by email.

Two-way streaming

The audiovisual quality of two-way software such as Skype is lower than that of YouTube. It also depends on the internet speed at the receiving and sending locations. The advantage of two-way software is the short time delay.

After testing different available options, including WebEx, Skype for Business, Blue-Jeans, and Jitsi, we decided on Zoom. It appeared to have the best combination of reliability and transmission quality. We also liked the customer service.

Zoom has a free version that works well for communication between two parties but has a time limit for meetings with multiple parties. For that reason, we chose the commercial version "Zoom Pro" with a monthly fee of about $20. We needed one Zoom Pro license for each streaming-out room at each hub (i.e. for each regular talk room; not for the virtual rooms).

We might also have used a Webinar software offered by a company like Citrix, Adobe, or WebEx. After some research, we realized that our YouTube/Zoom solution gave the best performance for our relatively low budget. But the possibilities are constantly changing, so future conference organizers should check out current options (test them at local research presentations).

Backups

It is important to avoid any technical problem that might delay the start of a talk. At ICMPC15/ESCOM10, we avoided delays by backing up every channel of communication in real time: Zoom acted as a backup for YouTube and vice-versa. In other words: we ran YouTube and Zoom simultaneously in all talks. The technician at the front of the room switched from Zoom to YouTube at the start of each talk and back from YouTube to Zoom at the start of the question period, without turning off either stream. We started the YouTube stream during the break before a session and maintained it throughout the session. Afterwards, each YouTube file contained 2-4 talks, which could later be separated by editing.

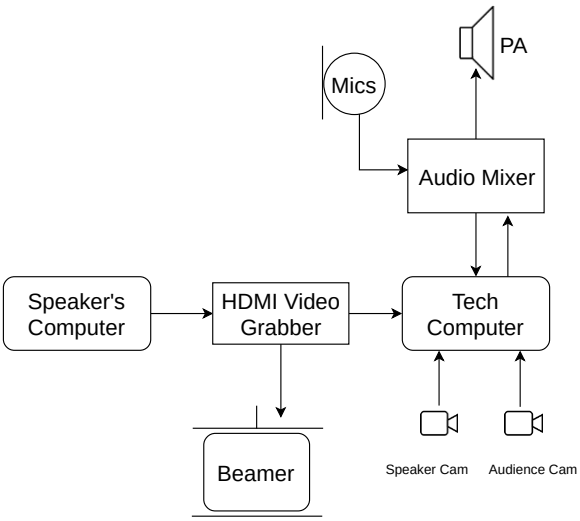
We also backed up videos for later viewing. If the encoder (hardware or software) permits a local recording during the stream, this can be used to make a backup. If two-way communication fails, Jitsi can be used as a backup. The advantage of Jitsi is that a meeting can be started immediately without login in and with a customizable URL. If this URL is communicated, the other party can join immediately, again without logging in. But the quality of Jitsi is not the best.

In addition, we connected a regular cellphone with a long cable. If two-way communication fails, participants can use the phone to ask questions (Zoom explicitly provides this option). Again, this was not necessary, but it was reassuring to know that it was available. It was sometimes used by technicians for behind-the-scenes communication. A telephone connection is very reliable, but

the audio quality is worse than online communication services. (See below for further information about communication among technicians.)

Hardware

The easiest hardware solution for streaming out is a regular laptop with cable internet connection (to maximize internet speed) and a built-in camera and microphone. The laptop can be placed on the presenter's podium (lectern, pulpit). Ask presenters to prepare their Powerpoint files in 4:3 format (not widescreen 16:9; to change this format on a PC, click on Design and then on Slide Size). Install OBS software on the laptop and use it to mix the talking head of the presenter with the Powerpoint screen. After that, send the mixed signal to YouTube or Zoom.

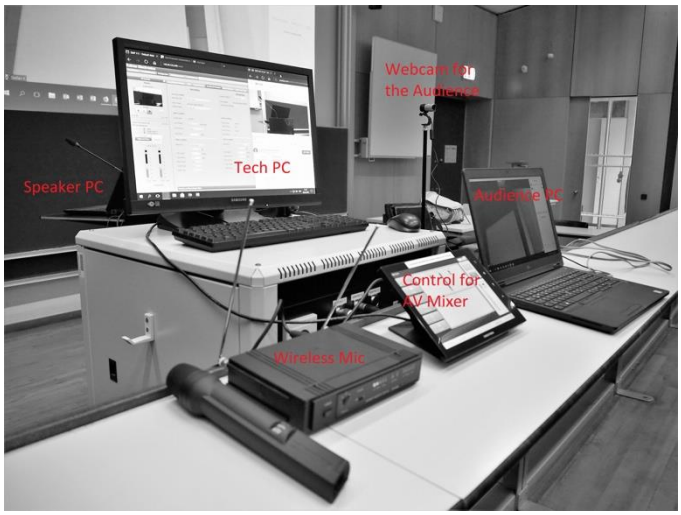


This can theoretically be done on a single laptop, but in practice it works better on two, so the presenter and technician have separate screens. The presenter's laptop runs Powerpoint and the technician's laptop takes care of the streaming. The output of the presenter's laptop is connected to a hardware device (HDMI video grabber, cost: roughly $100), which appears as a webcam on the technician's computer, as shown in the diagram.

By "presenter's laptop" we mean a laptop that organizers make available to presenters. They should bring their materials on two USB sticks (one acting as a backup). Clarify in advance that it is not possible at this conference to present from one's own laptop, which can cause additional problems and delays.

You will need an external camera and microphone for the presenter's face and voice. The camera should be at the height of the presenter's head. The microphone is closer and lower. The camera and microphone should be placed such that the presenter is not distracted by them. The situation for the presenter should feel as natural as possible. The best way to test this is to have someone give a regular talk with a regular audience and talk to them about it later. Note that lighting is important to ensure that the presenter's face is clearly visible. Test the lighting both during the day and in the evening.

A single external microphone can be used for audience members asking questions. But things will move faster in the question session if there are 2-3 wireless microphones: one for the



presenter and 1-2 for the audience. For that, a hardware mixer is needed. Cheap ones are available.

It is crucial that questions and answers can be heard at remote hubs. We asked all participants to hold the microphone quite close to the mouth, explaining that amplification levels need to be kept low to avoid acoustic feedback.

Two-way discussions can be improved by including a video picture of the audience (giving a feeling of presence) as well as the picture of the presenter's head and the Powerpoint slides. This solution can be realized either with two computers that join a Zoom meeting, or with a separate camera operated by an assistant. In a YouTube stream, live webcam images can be mixed with ppt slides in OBS. Another way to encode the video signal before sending to YouTube is to use a hardware encoder. At our conference, that option was available at two of the hubs (Graz, Sydney). The details are beyond the scope of this guideline.

Timekeeping

If the conference program includes parallel talks at different locations, it is important to ensure that they start exactly on time. We instructed session chairs to start each talk at the advertised time within ten seconds. In most cases that is what actually happened, and no-one had a problem with it, because we helped them with a special timing tool.

The TACT website was developed by Hannes Karlbauer in collaboration with Richard Parncutt. TACT stands for Tonal Academic Conference Timekeeper. The abbreviation TACT reminds us that it is necessary to firmly but tactfully remind presenters when their time is up. TACT is an internet page that shows the time in UTC as well as the local time at each conference hub. Toward the end of each conference timeslot, it plays music to ensure that the discussion following the talk stops on time.

- Three minutes before the end of the timeslot, the message "Time's up" starts flashing silently.

- Two minutes before, the music starts, gradually getting louder for about ten seconds. We created a library of non-copyright music for this purpose. Creating such a library is an interesting task by itself. Colleagues with access to composition students can for example ask them to send short sound clips in reply for announcing them in the program. On request we may be able to provide all or part of our library.
- One minute before the start of the next talk, the music stops. Presenters and audiences quickly got used to this implicit signal: silence means stop talking and sit down.

Throughout our conference, TACT ran on a separate computer in each room with an external loudspeaker. For this, we had no additional equipment costs because old laptops and loudspeakers (cheap PC monitors) were available from our IT department or privately.

TACT did not alert the presenter about the number of minutes to go before the start of the discussion following each talk. Instead, student assistants held up signs with “5 minutes to go”, “3…”, “1…”, and “Time’s up!” This more personal approach seemed more appropriate.

Technical assistants

We had one technical assistant and one non-technical assistant (two each for plenary keynotes) in each live talk room, in addition to the chair and the presenter. The technical assistants were coordinated by a head technician. They were given contracts and paid at a rate corresponding approximately to regular student assistants. The non-technical assistants (also called hospitality) received course credits in exchange for their working time.

The technical assistants were studying audio engineering or similar and had trained for about two days before the conference began to get to know our setup and procedures. Training included rehearsing communications with conference presenters and showing non-technical assistants the basics.

During the talks, the technical assistants sat at the front of the room next to the presenter and chair. The non-technical assistants were in the audience and passed around the microphone(s) during the discussion.

Just before the start of the conference, technicians were given all access rights and passwords along with technical guidelines. See the appendix for checklist for setting up and monitoring a talk/discussion.

Technical communication

Technicians need to be able to communicate independently of the conference streaming system. They need to say things like: “Everything fine from your end?”, “Please turn up your microphone!”, “Are you ready for a question from your hub?” or “We can’t hear you!”

One option is to use an instant messenger on the technicians’ private phones. While this might seem obvious and easy, one has to make sure beforehand that everyone knows which number to write to for which room at which time. Also everyone needs to agree to one app. This can be difficult since some don’t like WhatsApp for security reasons (or can’t use it due to older operating systems) and in some countries open source apps like Signal are not supported.

One of our hubs had a dedicated mobile phone, with an international flat rate, which was very useful. If there is one phone in every room, technicians know which number to contact. Speaking quietly on the phone can be quicker than writing when critical situations occur. A lot of technical communication was done in the chat window of the two-way software, but this isn’t ideal, since during the discussion it may be visible to participants.

We gave a lot of thought to setting up these various channels of communication in advance. In retrospect, that was one of the main reasons we managed to avoid technical delays.

Global foyer

Participants at all four hubs had the opportunity to electronically meet colleagues from other hubs, spontaneously or at planned meetings. Breaks were timed to make this possible at different locations.

Each hub had a quiet room near the coffee area with a number of computers, each with a (built-in) webcam, a headphone amplifier, and a USB Microphone. To avoid background noise, there were acoustically absorbent walls between the computers. In many cases, up to three people could sit at each computer and talk to up to three people at the remote location. People spoke into one central microphone but wore separate headsets.

A small 4-channel headphone amp and a USB microphone cost less than 60 USD. The microphone had a cardioid pickup-pattern. Cheap headphones were provided and participants could also use their own.

The software we used was Jitsi. It is more convenient than Skype because it does not require logging in and no accounts need to be created. Every computer was constantly connected to a computer at another hub, so anyone could walk up to one of them, sit down, and start talking to someone, as in a typical conference coffee break.

Reflection

For many colleagues, personal communication at conferences is more important than attending talks. The basic ideas for successful research projects are often born during face-to-face communication. That is also where a lot of the personal motivation to do research comes from. Successful research means hard work, so motivation is important.

If the discussion about semi-virtual conferencing is confined to issues of this kind, one might reasonably argue that the traditional single-location conference should be maintained in spite of problems with accessibility and cultural diversity. But there are two important counterarguments. Both involve the *contexts* within which academic conferences are situated and without which they would not exist. These contexts have historical, social, political, economic, ethical, technological and environmental aspects.

The first counterargument is that single-location conferences are traditionally elitist, excluding most of the world's population for financial reasons. Large numbers of colleagues do not respond to calls for papers because they cannot pay for travel, registration, and accommodation. The identity of these missing colleagues is unknown to participants, so they are easily forgotten. The main criterion for inclusion in the conference program is ultimately financial, regardless of how good the review procedure is. This issue is seldom addressed, although many colleagues in all disciplines are concerned about financial inequities in other areas, and almost everyone will agree that institutional discrimination of this kind is both unethical and counterproductive.

The second counterargument involves the survival of humanity and the right to life of a billion children in developing countries. It goes without saying that these things are immeasurably more important than academic conference traditions. Every participant at every academic conference will agree that they are of paramount importance. But the topic tends to be avoided.

The aim of this reflection is not to initiate such a discussion, but to go ahead and solve the problem in practice. The more colleagues try out ideas like those we have presented, and the better the technology becomes, the better will be the "conference experience". In future, people will wonder why we took such a long time to take advantage of the benefits of modern communication technologies, just as we today wonder why we continued to use overhead projectors for 10-20 years after the advent of Powerpoint in 1987.

We welcome feedback of any kind on this document, which will help us to improve it. Please contact the authors directly.

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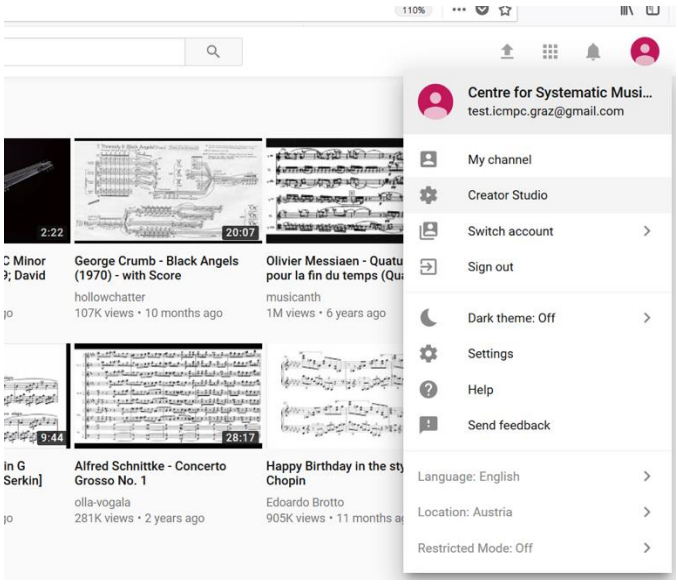
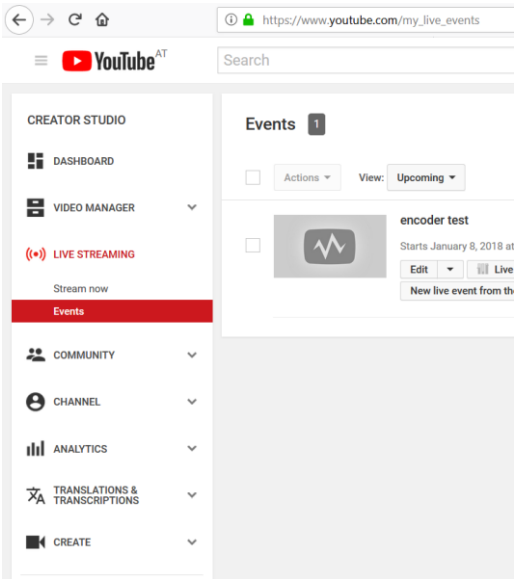
Appendices

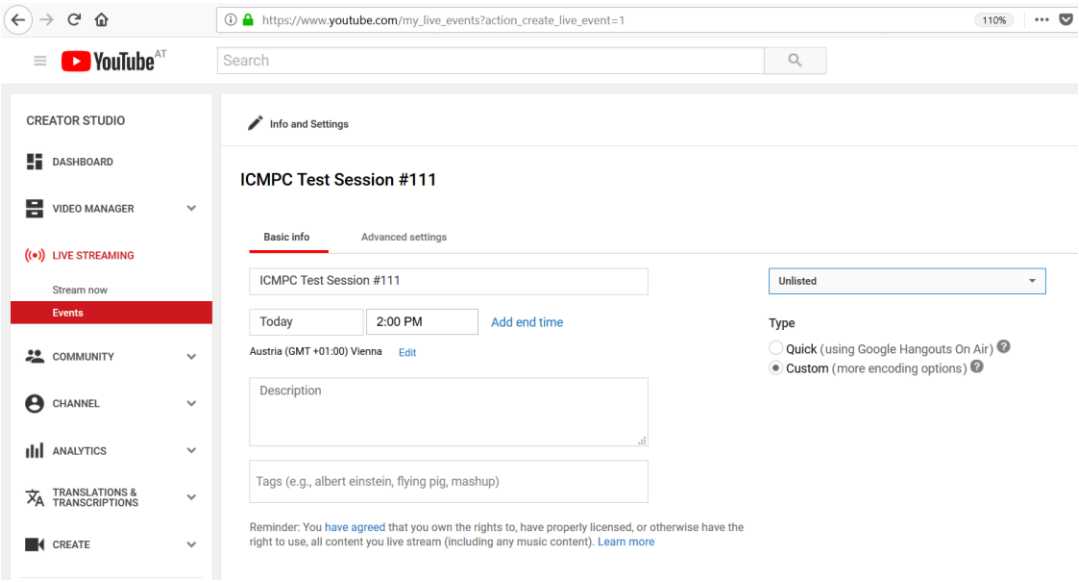
1. Setting up a YouTube stream

Here is how setting up a YouTube stream looked like in March 2018. This could be subject to changes, but the basic principle remains the same. Note that YouTube alone won't do the stream. You need to encode the data and send it to the YouTube server, either with hardware, or with software such as Open Broadcaster Software (OBS), see below.

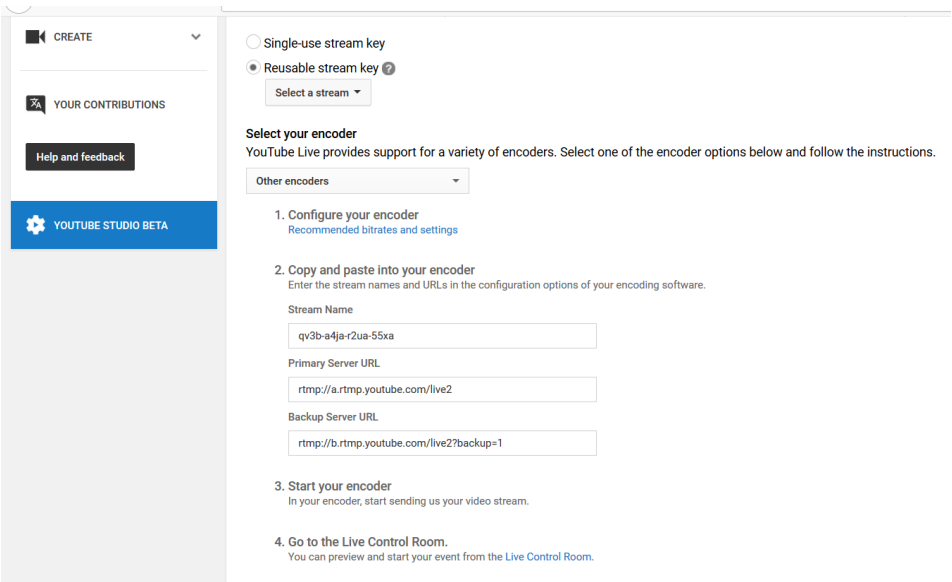


1) After logging in to your YouTube account, select "Creator Studio" after clicking on your logo icon in the upper right corner.
2) Here you can select "Live Streaming" on the right. Under "Event", you have the option to schedule streams by clicking on "New Live Event" in the upper right corner.

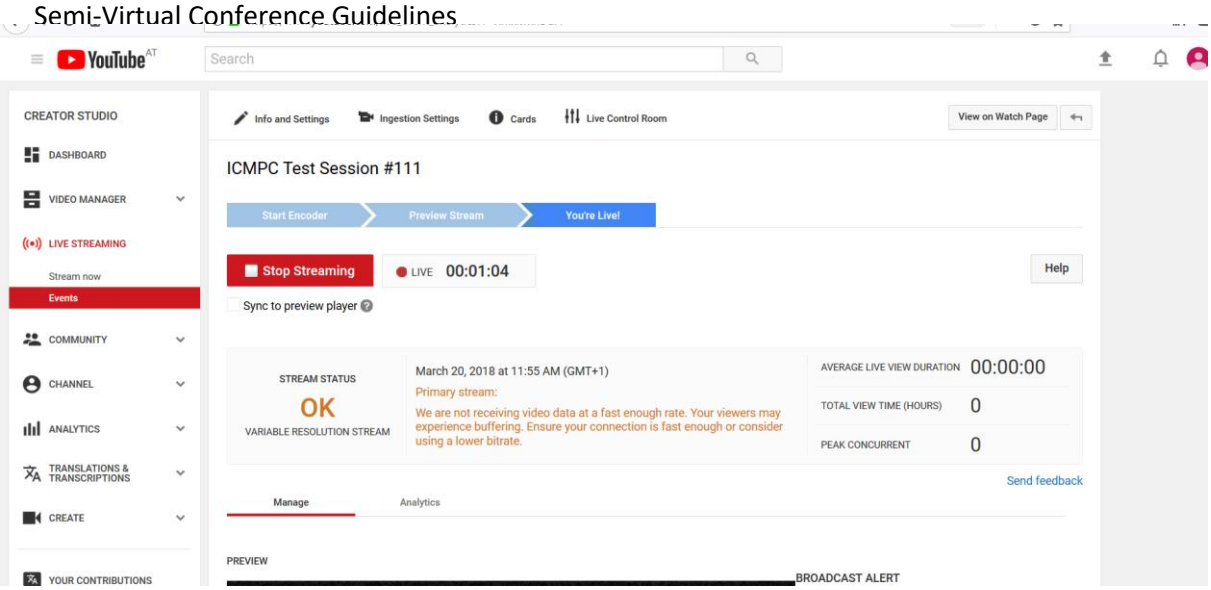




3) Enter event name and starting time on the top of the page...



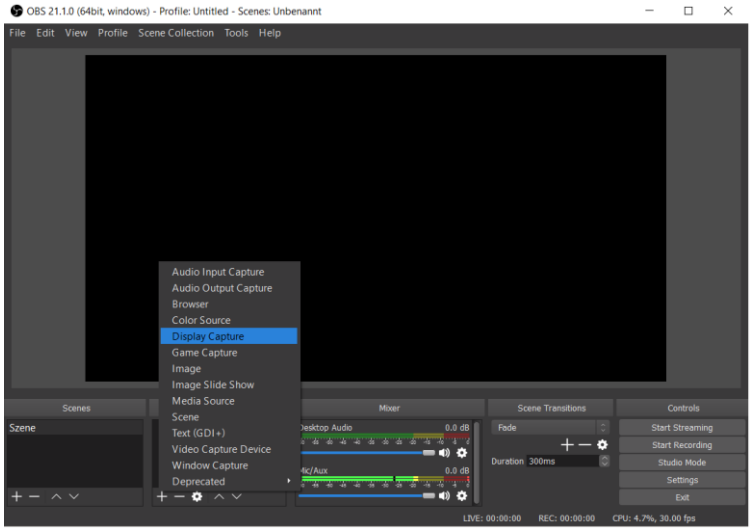
4) ...and copy the stream data provided at the bottom of the page to your encoder/OBS.



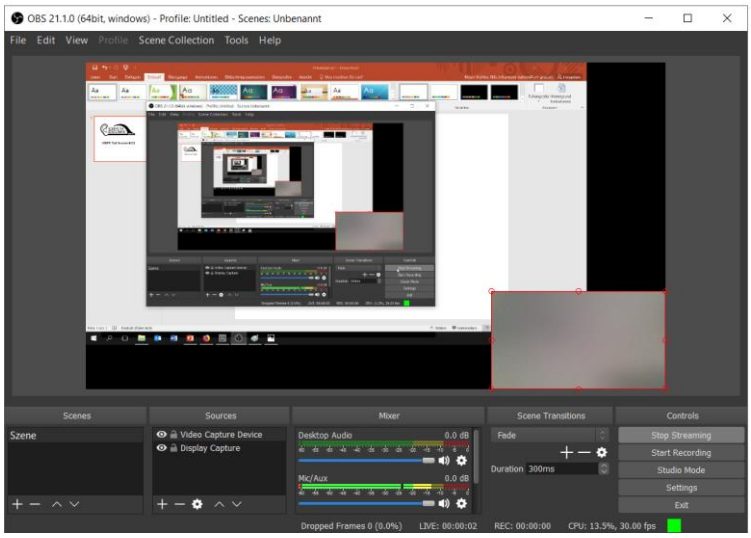
5) After going back to “Live Streaming” -> “Events” you can enter the “Live control room”. Here you can monitor the stream in real time. In case all the options on the encoder/obs are correct and it is running, the stream should be active.

2. Using Open Broadcast Software

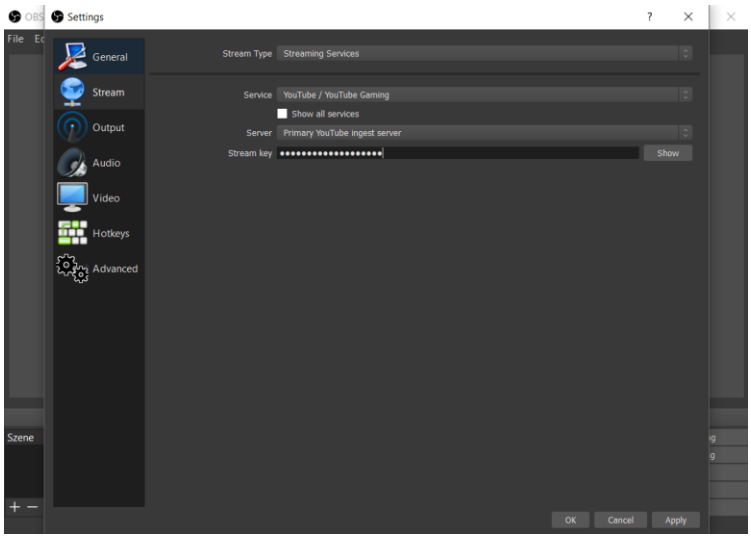
Here is how you create a live stream in OBS. You need to do this prior to starting the YouTube stream.



1) After opening OBS, add two new sources in the section in the middle: Video Capture Device for the camera and Display Capture for the power point. Move the camera picture to the lower right corner and the display capture to the middle of the screen. We recommend to use 4:3 format for the slides, since if you move the screen capture correctly, there will be space left for the camera picture. If you are using an HDMI Grabber, it will also show up as source and you will use it instead of the screen capture.



2) Now go to Settings in the lower right corner and select Stream. Paste the stream name from the YouTube setup to the Stream Key field.



3) After hitting Start stream a green box should appear and the stream is live. One problem with using OBS becomes apparent here. When doing a screenshare, we are also showing unwanted content when closing Powerpoint. We haven't succeeded yet in sharing a separate screen with Powerpoint only, but maybe it is possible as well.

3. Checklist for technical assistants

Here is what the technician in each live room did before the start of each session at our conference at the Graz hub, with a hardware encoder. Every conference will have a different setup and a different list.

- check TACT is on
- start Zoom meeting with audience-PC and display on big screen
- join Zoom on presenter-PC
- connect to other hub
- check presenter-PC didn't join audio, but video is activated
- check correct mic inputs are active and correct output
- say hello on all 3 mics (audience, chair, presenter) to check the level in the room
- wait for your remote colleague to confirm that the level is good on the far end
- open Powerpoint on presenter-PC
- open the first presentation and activate laserpointer in Powerpoint
- display presenter PC on big screen
- check streaming link is correct
- check streaming mode is correct: presentation large, camera small
- start encoder on Tech PC
- start YouTube stream on Tech PC
- open stream in new tab
- check the stream, also audio
- When it's time, tell the presenter to start and mute the mic in Zoom

After the talk - before the discussion:

- switch to Zoom on audience PC
- if the presenter wants to use a screenshare, help
- check the second assistant has access to Moodle/YouTube on the tech-PC