# THE FUTURE OF MEETINGS

Authors: TFOM Organising Committee

## Outcomes and Recommendations

# EXECUTIVE SUMMARY

Over a period of three days (15th - 17th September 2020), we organised and hosted an entirely-virtual symposium on "The Future of Meetings" (hereafter, TFOM). This report collects our findings and observations over the entire period from conceiving the symposium to the post-event phase. Our goal is to share the many lessons we learned in putting TFOM together, as well as our recommendations for best practice for interactions (especially of a virtual kind) going forward. We treated this symposium as a chance to experiment with many different approaches (both technical and sociological) to discover what worked best and where improvement is needed. We hope this document is useful for those considering future ways of optimising virtual/digital interactions.

**Key TFOM recommendations:**

1. Embrace a **D**igital-first approach to interaction where possible
   *Going digital-first offers a level playing field for those involved and brings many opportunities for innovative ways to connect and collaborate*
2. Maximise **A**ccessibility, **I**nclusivity and **S**ustainability in all activities
   *Your choice of technology, approach and structure for any activity or interaction determines how accessible, inclusive and sustainable it will be as a result, which translates to positive or negative impact on both people and the environment*
3. **E**xperiment regularly to build awareness of new solutions
   *Experimentation with new tools and approaches gives you diversity of experience, which then feeds into the suite of available solutions you have at your disposal*
4. Find the **R**ight tool/approach for the given situation
   *Tools such as Whova, Altspace or Gather work best for very different contexts, so it is worth clearly defining your goals and choosing the tool/s to suit these desired outcomes*
5. Recognise the **V**alue that your team brings
   *By utilising the expertise of your team and taking ownership, it is possible to minimise outsourcing to where it is best applicable which maximises value for investment*
6. **E**valuate at every step of the process for maximum impact
   *Evaluation of how well you are meeting your goals consistently provides useful reality checks and encourages you to adjust or adapt where needed*

A graphical representation of these recommendations follows on the next page. Please see Section IX of the report for elaboration on these recommendations.

**Acknowledgements**
*We would like to acknowledge the CSIRO Research Office for their support, funding and enthusiasm, which were critical to the success of TFOM. We would also like to thank CASS and IM&T for their support in the early stages of proposing this symposium. A very big thanks to everyone who helped make TFOM happen: our invited speakers and panellists, Partner Sponsors, workshop providers, exhibitors, contributors, Whova support, partners/families/friends of all involved, the extended committee support team, TFOM social pioneers, and everyone who embraced and participated in TFOM!*

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THE FUTURE OF MEETINGS SYMPOSIUM

# TFOM: BEST PRACTICE FOR INTERACTION

@FUTUREMEETINGS

## ACCESSIBILITY, INCLUSIVITY, SUSTAINABILITY

**Maximise accessibility, inclusivity and sustainability in all activities**

Your choice of technology, approach and structure for any activity or interaction determines how accessible, inclusive and sustainable it will be as a result, which translates to positive or negative impact on both people and the environment

## 1 DIGITAL FIRST

**Embrace a digital-first approach to interaction where possible**

Going digital-first offers a level playing field for those involved and brings many opportunities for innovative ways to connect and collaborate

## RIGHT TOOL/APPROACH 4

**Find the right tool/approach for the given situation**

Tools such as Whova, Altspace or Gather work best for very different contexts, so it is worth clearly defining your goals and choosing the tool/s to suit these desired outcomes

## 3 EXPERIMENTATION

**Experiment regularly to build awareness of new solutions**

Experimentation with new tools and approaches gives you diversity of experience, which then feeds into the suite of available solutions you have at your disposal

## VALUE 5

**Recognise the value that your team brings**

By utilising the expertise of your team and taking ownership, it is possible to minimise outsourcing to where it is best applicable which maximises value for investment

## 6 EVALUATION

**Evaluate at every step of the process for maximum impact**

Evaluation of how well you are meeting your goals consistently provides useful reality checks and encourages you to adjust or adapt where needed

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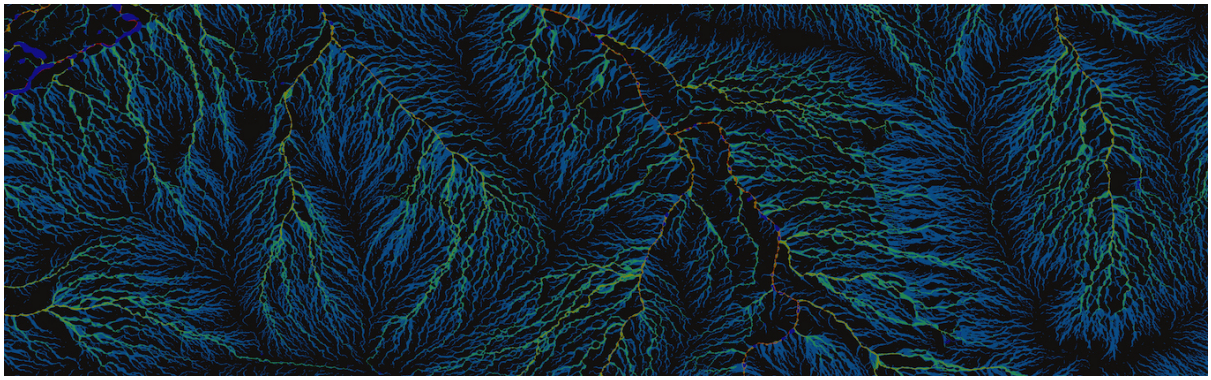


# I. Origins of TFOM

In this section, we cover the origins of The Future of Meetings (TFOM), from initial conception up until the point where we received approval and funding to go ahead with the conference. We have grouped each topic as a series of mini-sections each framed by a question (along with lessons learned), with the goal of making this document an easy to read and search through as possible. We will continue to use this format and approach where appropriate throughout the following sections.

**– Where did the original idea for TFOM come from?**

Initial conversations about properly adding virtual components to meetings started within CSIRO Astronomy and Space Science (CASS) in late 2019. One of our committee members (Glen Rees) gave a co-learnium talk about the status of mixed reality (including both virtual and augmented), and a few of us (Vanessa Moss, Glen Rees, George Hobbs) were in discussion about adding a completely-remote component to George's upcoming symposium on "Finding the Unknown". By January 2020, it was agreed that Glen would lead the coordination of a virtual segment of this conference, and we would use this to test various ways of interacting remotely. Natasha Hurley-Walker (who later became an early member of the TFOM committee) was also involved in these discussions, and was lined up to present her talk remotely from Perth to the primarily Sydney-based audience. John Zic (also later a committee member) was going to provide a telepresence robot for this session as well. When George informed the CSIRO Research Office about this development, we were happy to hear that they were very supportive of the initiative, to the extent that George suggested we consider forming an entire symposium on the topic of virtual interaction and collaboration. Vanessa agreed to take the lead on putting the proposal together and forming a committee, and thus the initial idea for TFOM was born!

*Lesson learned: Initial ideas and discussions can grow effectively into more ambitious projects if encouraged and supported at the right points of the development stage*.

**– How was the TFOM Organising Committee put together?**

The TFOM Organising Committee (TOC) started based on its origins as a small group interested in exploring the notion of better and more prevalent virtual interaction. Vanessa, Glen, George, John and Natasha were early members of the committee, and from there the committee initially grew via word of mouth and network connections to interested people. It was a high priority from early on to endeavour to have representation on the committee from as many CSIRO Business Units (BUs) as possible to ensure the conference could be put together from a cross-disciplinary and comprehensive stance. For similar reasons, it was also extremely important and valuable to ensure we had members of the committee who were external to CSIRO to ensure that the focus and scope of the conference broadly took into account diverse perspectives and insight.

During the initial Expression of Interest (EoI) phase (which involved interested parties filling in a Google form), we allowed people to nominate if they were interested in being part of the organising committee, and followed up directly to include them as part of the committee if they were keen to be. We were very open with forming the committee because we felt that we would get the best symposium by taking into account a broad number of perspectives from interested people to shape the outcomes. We did

not distinguish between Scientific Organising Committee (SOC) or Local Organising Committee (LOC), but rather had the expectation that both were extremely important to be covered by the committee as a whole. In reality, some members contributed more in an SOC fashion and some in an LOC fashion, but the final TFOM was really the result of many people's hard work over several months leading up to it.

In the end, the TOC included a core group that worked on many aspects of the meeting, alongside an extended support network primarily within CSIRO who were very helpful in assisting with specific aspects of the conference. Additionally, we had supporting committee members who were primarily involved due to their interest in the conference outcomes rather than directly contributing to the orgainisation. We have preserved the full list for TFOM in our legacy archive[1].

*Lesson learned: Seeking diversity of perspective in a committee is an extremely effective way to ensure broad relevance for a project with various stakeholders. It is recommended to find ways to remain open to future contributions where possible, as this gives interested people a way to get involved and also is an opportunity to divide organisational work more effectively.*

**– Was it always about dealing with COVID-19?**

Actually, no! As noted above, the path to TFOM began in late 2019, and we were already putting a proposal together by January 2020 (prior to the point at which the seriousness of COVID-19 was realised). Our initial driving force was sustainability, along with the desire to engage more effectively with emerging technologies for virtual interaction, but the importance of adapting in the face of COVID-19 and remote work helped make the case for TFOM more compelling to a broader audience.

*Lesson learned: You may start out with one set of driving goals, but it is very important and helpful to adapt to the current context in order to make clear that what you are doing is relevant more broadly.*

**– How was funding secured for TFOM?**

We were fortunate within CSIRO in that there is specific funding available each cycle for what are defined as Cutting Edge Science and Engineering Symposia. These symposia are meant to be one-off gatherings designed to address a particular current topic that is at the cutting edge of science. They cannot be part of a series, and should also ideally have broad alignment with both the specific area of CSIRO's goals and CSIRO's overall goals. We were a little unique in TFOM in that most of us on the TOC (TFOM Organising Committee) were not specifically leading research in the area of virtual interactions ourselves, but we felt it was an extremely important topic to bring people together to discuss and share ideas so that collectively, within CSIRO and beyond, we could all improve. In addition to the Research Office funding, CASS also agreed to provide financial support to TFOM ($5000 AUD).

*Lesson learned: It is good practice for an institute or organisation to have funding available to support new ways of thinking or doing things such as workshops or symposia, and we were very grateful to have access to this kind of support from CSIRO.*

**– How was sponsorship arranged?**

Although we explored the possibility of event management, we chose to take on many tasks within the committee ourselves. As a result, this meant that we could keep our budgetary expenses more limited compared with a normal conference (in-person or virtual). This also meant that we didn't need the concept of sponsorship in the same way, because we planned the symposium to be run within the limits of the budget we had been granted from the CSIRO Research Office and CASS. In terms of sponsorship, we were most interested in this in the form of services that sponsors could provide that would help make running TFOM much easier, and so we adopted an approach of looking for potential Partner Sponsors rather than classic tiered monetary sponsorship as is commonly seen in large-scale conferences. Monetary contracts would also have been lengthier in terms of organising these and more difficult than partnering with a company or organisation for beneficial services.

Partner sponsorship wasn't organised in any particularly structured way, but instead evolved as part of conversations with people that we were working with us as part of putting TFOM together. Our final list of Partner Sponsors (along with the service they provided) was as follows:

[1] https://thefutureofmeetings.wordpress.com/the-tfom-organising-committee

- **AARNet (https://www.aarnet.edu.au ):** provision of access to AARNet-hosted Zoom Webinar and Meeting functionality prior to and throughout TFOM, which was really critical as we had identified Zoom as a key platform in terms of mitigating technical risk in certain circumstances and in terms of its general levels of accessibility (plus additional security gained by using AARNet Zoom)
- **Fujitsu (https://www.fujitsu.com/au ):** provision of 3 ideation workshops without cost to the TFOM program, developed as part of a consultation process between Fujitsu and the TOC
- **Glue (https://glue.work ):** provision of access to a Glue space for TFOM attendees to try out, plus 3 hands-on sessions where Glue staff could answer questions of attendees in the platform
- **TriviaHub (https://www.triviahublive.io ):** provision of discounted rate for TriviaHub-run TFOM trivia event
- **Cisco (https://www.cisco.com/c/en_au ):** provision of virtual support for TFOM opening and closing sessions, both of which were run in Webex
- **Whova (http://whova.com ):** provision of small discount for Whova platform and extensive consultation prior to TFOM

*Lesson learned: Money is not the only way to effectively engage in sponsorship, and in a virtual context (e.g. in the absence of excessive venue, catering or event management costs), it may actually make sense and be more beneficial to adopt a partner sponsorship model.*

### – How were the goals of TFOM decided?

Initially, we looked critically at what a reasonable scope for TFOM should be, trying to balance between the broad big picture view and ensuring that we would also address the details effectively. In our early committee meetings, we used virtual tools such as Mural[2] to brainstorm questions that we wanted to address as part of TFOM, and worked on collecting these into more general categories that we could use to structure the program. Through these discussions and brainstorming, we iterated towards our four key themes (accessibility, inclusivity, sustainability and technology). We also recognised that we wanted to look at what solutions would be available on different timescales, which led to the structuring of the agenda in three days focused on today, tomorrow, and future.

One of our supporting committee members, Ben Leighton, structured our themes and goals based on discussions into the symposium description (or mission statement) that we used both during our call for Expressions of Interest (EoI) and in advertising the symposium itself. During the call for EoIs, we also asked those who filled in the form to rank which topics and themes they were interested in, which helped give us insight into shaping the program. We did the same during the process of registration, to ensure we were tracking towards a conference that attendees would find useful and informative. All of these actions combined eventuated into our final goals and themes, so while it was a substantial process, we feel that this made the symposium evolve into something that did reflect well on what the needs and interests of the community were at the time.

*Lesson learned: The process of establishing clear goals and themes for an effective conference is something that benefits from various kinds of input over time, both from the organisers and from their target audience.*

### – To charge or not to charge?

The organising committee had a lot of discussion regarding if we charge a registration fee to attend and, if we did, how much do we charge. Many conferences will charge a fee to recoup expenses or enhance the experience they will offer. Some larger conferences charge because they are a corporation or organisation reliant on this income and need the funds to keep themselves from going bankrupt. These normal considerations did not apply to this symposium. Overall, our expenses were able to be covered via the Research Office funding, or via the services that were provided through sponsorship and grants. However, we did have a lot of discussion on whether by paying a small fee people would feel more invested in attending after registering, as with a free symposium many may register just because it is free but opt-out of attending either live or at all.

[2] https://www.mural.co

In the end, we decided not to charge as we didn't want to introduce any barriers to entry for people. If we charged a fee, some may need to ask workplaces to use their budget. We also didn't want to prevent people that wanted to attend and use this as a learning experience that may not relate to their current job or business. With input from some of our attendees, there were also some that were unemployed, looking to up-skill or looking for contacts which a free conference allowed them to develop. We were in the fortunate situation that we did have a budget to support putting TFOM together, and this enabled us to offer free registration. We would note that a virtual conference removes many of the costs that make an in-person conference extremely expensive to organise, in particular venue hire, catering and travel cost reimbursement, and as such we would advocate that registration fees for online conferences (and in-person conferences) should reflect what is provided in terms of virtual venue and value for cost.

*Lesson learned: The inclusion of a registration fee for a virtual conference may be justifiable to help recover costs (e.g. virtual platform, AV technology), but using a fee to encourage participation should be considered with awareness of the barriers to entry it will introduce for potential participants.*

**– How does TFOM identify itself?**

The official title for TFOM was "The Future of Meetings Symposium" and the money we secured was specifically for the creating of a symposium. Typically a symposium is defined as a small event with a unique and specific focus. Often this includes having invited speakers with particular expertise in that topic and is limited to a shorter number of days than a conference. We have covered all aspects of a symposium but we intended to cover a much broader engagement with allowing for contributed content. By removing the requirement of a fee, we also hoped to make this a very well attended event. This has more likeness to a conference.

*Lesson learned: The exact names of conference, symposium or meeting are good to be aware of, but ultimately not important in terms of the bigger goal of bringing people together for a specific reason. Make sure to build a program that meets your goals.*

**– How did you decide on the branding of and graphic design for TFOM?**

From the beginning it was important to us that TFOM be a future-facing scientifically-inclined conference, and thus aimed for our branding to match this as much as possible. Early promotion and branding was done in a placeholder manner within the committee due to the need to already have some visual presence online for gathering interest. We were also in a complex position of being a CSIRO-hosted symposium with significant external stakeholder interest (and external committee members), so it was really important to us that we balanced the aspects of being CSIRO-funded but not solely CSIRO-facing. We made use of an internal image repository available to CSIRO staff called Tardis, which collects photos and graphics from different parts of CSIRO that reflect the work done by CSIRO staff or research. From this repository, we found the "Water Flows" image that we have used throughout this document and in many parts of our branding, feeling that the image resonated with our themes of being connected via networks, as well as being visually striking and also highlighting our connection to CSIRO. We also put together a graphic in Canva which we made use of for gathering EoIs.

Although at the early stages we had started conversations about collaborating with internal CSIRO branding to get more official graphic design, most of the activity happened a lot closer to the time of the symposium (primarily due to time constraints for everything to come together). From these conversations, we were able to work with the branding team to get various CSIRO-themed graphics for advertising the conference on social media or otherwise. We found in this process that it was a bit challenging to ensure that our themes as a conference and our vision could be reflected accurately when working within other potentially-competing brand guidelines, but part of this may have been amplified by the short timelines which we had available. This also translated into how to balance the kinds of restrictions that might apply to an organisation as a whole in terms of keeping consistent branding, versus how these guidelines should transfer when the graphic design end goal is a one-off conference that needs to be as context-suitable as possible to raise relevant interest in a world of constant digital overload. We definitely expect that these kind of challenges apply to other organisations, and would like to see more flexibility in policies in terms of branding that account for the specific needs and purpose of a given graphic design project, as well as giving a stronger voice to those who ultimately need any output to meet their goals and outcomes.

For the legacy archive, we are using an unofficial logo that we designed within the committee after TFOM to symbolise ongoing activities, making use of the catchphrase that evolved from our agenda structure: Today, Tomorrow, Future. This also captures the hashtag we used on Twitter throughout the conference (#TFOM) which we will continue to use in future to highlight what we're doing. What TFOM looks like in the next stages is the subject of discussion, depending on whether we continue as a group to actively explore these themes in the future and what form this exploration might take.

We give examples of the various kinds of graphics we used in the figure below.

*Lesson learned: Branding can be a little complicated in the context of large organisations with strict branding guidelines, where the project-based vision for a specific graphic design item might not necessarily carry through to execution stage due to other possibly-conflicting constraints. It would be good to see evolution of systems which better balance the need for any organisational constraints on branding against meeting the needs of a specific and strongly vision-driven context (with organisers as primary stakeholders) such as a symposium. It is generally better to start conversations about graphic design and branding as early as possible so that visual material can be available to help market a given event or conference from the beginning for maximum reach.*

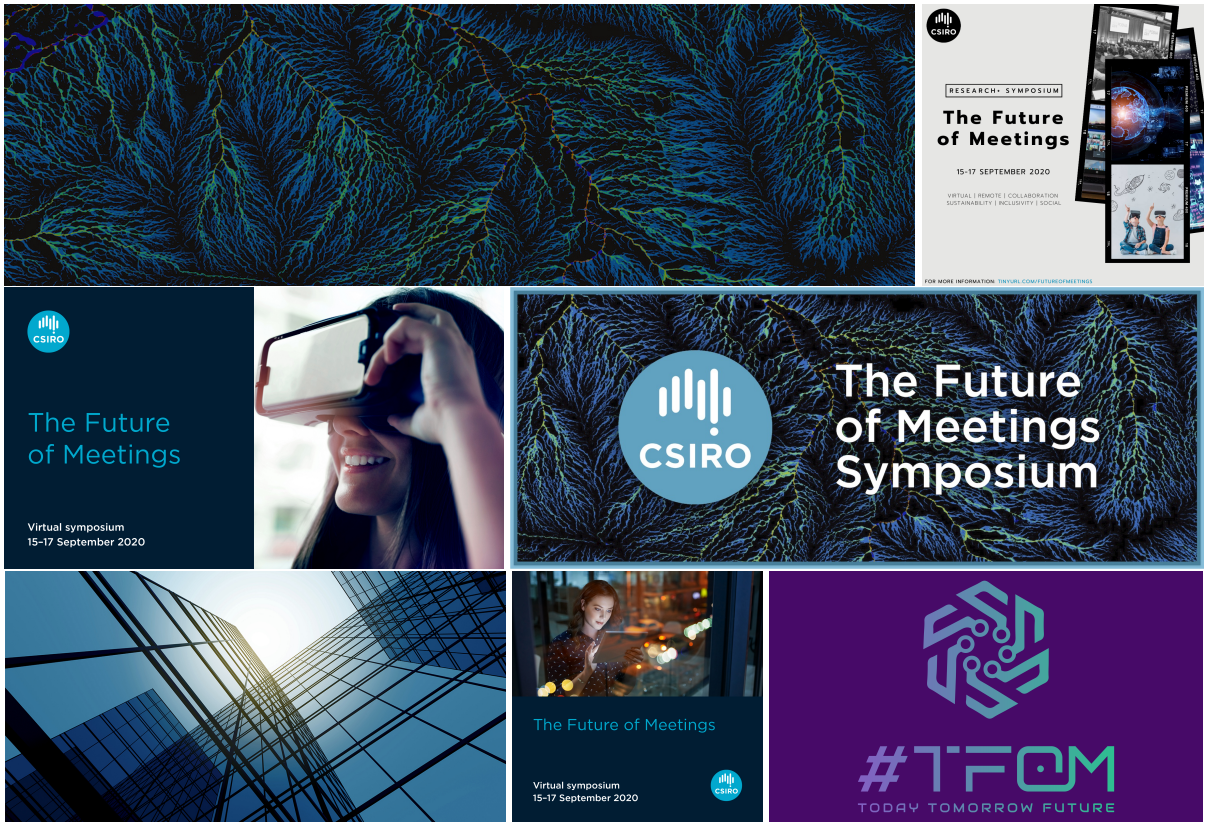
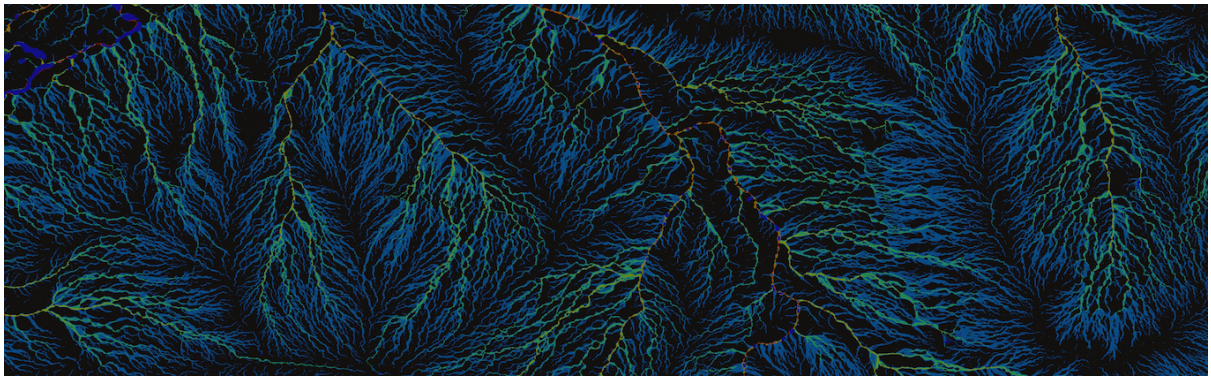



Figure 1: Example graphic design used throughout the life cycle of TFOM. From left to right, starting at the top: water flows background, Canva-designed promotional graphic, CSIRO branding social media image (rectangular), water flows promo image, CSIRO branding hero image, CSIRO branding social media image (square) and post-TFOM logo.



# II. Building TFOM

Here, we cover the process of putting TFOM together once we had secured approval and funding to hold the symposium. This includes brainstorming the program, planning the technical approach, defining the scope of the symposium and figuring out what our key goals were in TFOM. This section covers planning up until the point of the start of TFOM itself.

**– What tools did the TFOM Organising Committee find useful during the building process?**

We made use of various tools during the process of planning TFOM, using different platforms or services for different purposes. Though we did make use of a lot of tools, some of them were more important in terms of our total workflow. Overall, our choices with respect to tools did help make our lives easier, even though there were a variety of them! One thing also to note here is that our organising committee never once met in person throughout the whole process, and most of the committee has never met in person before either. Because we were organising everything completely virtually, this resulted in more digital-first approaches to all of our planning and building, but this generally seems to have made for a much more trackable and transparent planning process. The tools we used for planning and building TFOM included (the * indicates the most important tools we used):

- ***Confluence:** Via CSIRO, we had access to the Atlassian suite of digital collaboration tools, including Confluence. We were given our own TFOM space thanks to CSIRO IM&T which became the main area in which we documented plans, coordinated activities and also stored meeting notes. Critical sections of our Confluence included speaker tracking (suggested speakers and the record of who had been invited), tracking marketing and promotion of TFOM, tracking the technical workflow of invited and contributed content, tracking potential conference platforms, dividing responsibilities in terms of working groups or back-end management, keeping record of symposium outcomes (such as expertise sharing), listing members of the TFOM committee and general community, and keeping the history of all meeting notes. It was only possible to make effective use of Confluence thanks to the ability to add external members of CSIRO as guest users with editing privileges, otherwise we would have needed to use another more accessible service.
- ***Slack:** A Slack space was initially set up while we were exploring potential ways of hosting TFOM, and this evolved into an extremely useful conversation space for our geographically-dispersed committee. Different channels were set up for planning various aspects of the conference, saving a lot of email spam being sent, and the ability to quickly DM someone was really useful too. We continued using the Slack after the conference to stay in contact while wrapping things up, and also additionally set up an #advice channel where we have invited single-channel guests from outside of the committee to join and ask us questions that may help in their conference planning. For some committee members, Microsoft Teams was the preferred platform of communication and so they were best reached or communicated with via Teams. We considered using Teams for TFOM, but given that we had a number of committee members external to CSIRO, we wanted to make sure accessibility to conversations was maximised for those members also.
- ***Email:** We did make use of email for “official” communication since that was likely to reach the broadest set of the TOC. CSIRO helped us set up a TFOM mailing list which consists largely of committee members, and this was used to send any broad relevant announcements or meeting

notes. We had considered setting up a committee mailing list for external people (e.g. attendees) to reach us on, but ultimately did not pursue this option.

- ***Webex:** During the planning process we had a standing weekly meeting (one hour long) which we made regular use of during the months leading up to TFOM. The majority of these meetings were carried out in Webex because it was easiest to have one standard way of meeting, although we did try other tools very occasionally (e.g. Zoom, Gather). We did see a number of technical issues using Webex as the primary video platform, especially for our external committee members, so in retrospect we might have adopted a different tool early on if we'd known this. After TFOM, we continued to use this standing meeting but switched it to a half hour slot since there was generally less to cover, and as of concluding this report we will meet only as necessary.
- ***Overleaf:** This report began and ended its life as a shared Overleaf document, so that we could jointly edit it easily as a committee. That was extremely valuable in terms of being able to divide and conquer the writing of different sections and in ensuring everything was kept in sync, although there was a slight learning curve for members of the TOC who had not used LaTeX before. Overall the use of Overleaf to construct this report worked really well and we didn't encounter any issues with the process, other than some very minor cursor-jump issues when multiple committee members were all editing very enthusiastically at the same time.
- **Cloudstor:** We used this AARNet file-sharing service[3] as the main repository to which speakers could upload their recorded content or additional material. This was very useful as there were no file size limits or overall limits in terms of the folders to which we were uploading, since it was a service provided to the academic community. A few speakers did have some issues uploading to Cloudstor, and so we set up a secondary receiving service using Dropbox.
- **Da Vinci Resolve:** This was the video editing software used to stitch speaker introductions and speaker videos (plus header/footer slides) together and export to a format compatible with YouTube or Vimeo. We used the free version, which is extremely feature-rich and more than met our needs, including basic editing, transitions, audio adjustment and noise reduction.
- **Google Forms:** Google Forms was used to initially collect expressions of interest in TFOM, which helped us initially shape and plan the symposium. We also used it for both our pre-event and post-event surveys, as well as for gathering speaker bio information, networking bingo, content permission and accessibility grant info, among others. The ease of use to set up and get relevant info from made this a suitable choice, although we could have possibly made use of other survey tools in a similar way. Privacy of information shared may be an organisational concern with Google Forms and other tools, and this may need to be considered more in the future.
- **Google Sheets:** We used Google Sheets for any necessary online spreadsheets that requiring complex formatting or manipulation which could not be easily carried out using Confluence tables. The most notable example of this was our Facilitation Planning spreadsheet[4] which we used to track the overview of who from the committee needed to be where when, especially in terms of chairing and moderating sessions. We could have potentially used the Microsoft suite as a substitute for the Google tools, however we found that the Google suite was easier for our external committee members to make use of in terms of access permissions.
- **Google Slides:** We made the choice to use Google Slides for a few key elements of TFOM, the most important being our Speaker Guidelines slide deck[5]. This ended up being a very useful choice in the sense that we could easily update the slides if needed to make small changes or add additional instructions, compared with a static document that might have been emailed to speakers. We also hosted the slides for the opening and closing ceremonies in Google Slides so they could be shared easily.
- **Google Docs:** We used Google Docs for any collaborative documents we needed to edit, which included tracking the contributed content, hosting the runsheet for the opening/closing ceremonies, hosting instructions for connecting to Gather or Altspace, and storing live versions of any official text such as our registration announcement calls.

[3] https://www.aarnet.edu.au/network-and-services/cloud-services/cloudstor
[4] https://docs.google.com/spreadsheets/d/1CTACI7TsXMHB_C9b52XfHgyqCORhX5b5dWTqKq4HO-Q
[5] https://docs.google.com/presentation/d/1F2aGUyZ-RzYYmOgA25lJXM5U9fUgeCDvbrpQiUVUPqQ

- **Trello:** This Kanban board style issue tracker was used for tracking the status of contributed content, importing information from the registrations and moving cards to different columns depending on whether we had actioned them or not.
- **Canva:** We made some use of Canva to produce simple graphic designs, such as our initial EoI graphic and the infographic summarising our lessons learned. We recommend it as a very useful and easy to use tool for produce high-quality, visually-appealing graphics.

*Lesson learned: Currently, the process of putting together a successful virtual conference may require making use of a number of different tools to optimise the best approach for a given task. We would expect that this will get easier over time as more tools become streamlined or cross-integrated, but we would still advocate for making the effort to identify the right tool that suits what you are trying to achieve.*

## Choosing a conference platform

**– How did you find platforms to consider?**

We found these in a couple of ways. The main way was a lot of searching on the internet for what existed, as well as websites which recommended different options and compared them. The secondary way was by attending various online meetings of different forms and assessing how the platform used worked in practice. In fact, for some of the platforms we had researched independently, it was really valuable to be able to join a conference using them to see how they worked in reality and what their limitations might be. In theory, word of mouth may have been a useful way to choose a platform, however perhaps because we were in the early period of people still reacting to fully-online virtual conferences, the most common thing we saw in practice were Zoom webinars, which we knew wouldn't alone meet the needs of what we had in mind for TFOM.

For any platforms that seemed properly promising to consider in detail, Vanessa as lead on technical platforms would start a conversation with the platform via whatever their standard sales approach was (one-to-one call, webinar, live demo, etc.) and gauge how suitable it was. This process was carried out for about fifteen platforms, from which three platforms (Whova, SpotMe, OnAir) were selected for in-depth analysis by a subset of the TOC. After this, we did an analysis of all the features as well as value for budget, and settled on Whova as our platform of choice. You can find a comprehensive list of virtual conference platforms in the resources section of this report.

*Lesson learned: To find the best platform to suit your needs, it is really important to explore various options, so you learn what is available (which you may not have known) and can make the best decision based on your particular goals and constraints. In a virtual context, the choice of platform is critical as it forms the virtual venue within which your attendees are able to interact (or not), so we strongly advocate for taking the time to find a platform that will work for you.*

**– Which factors determined a platform to be a contender?**

We considered many factors in making our decisions on platform based on what our goals were and what our intended use cases were likely to be, including:

- Capacity to deliver key content streams:
  - Embedded pre-recorded video
  - Embedded live video streams
- Capacity to deliver key interaction methods streams:
  - Q&A functionality for each presentation
  - Chat functionality for each presentation
  - Ongoing chat/discussion groups separate to content
  - Support for exhibitor booths
  - Support for social breakouts
  - Means for participants to interact with each other directly through the platform

- Cost
  - Is it within the budget of this conference?
    We took this aspect to be roughly aligned to venue hire fees for a physical conference
  - Is the cost reasonable for the functionality the platform provides?
    Online conferences are in their infancy right now, and the adage “you get what you pay for” is not always true yet, and in our opinion often looks like being a very poor metric at this stage
- Technical know-how required (of organising committee and of attendees)
  - How much technical support is provided by the platform’s staff?
  - How much direct control does the platform give to organisers?
  - Can the platform support multiple methods of media delivery?
    e.g. streaming meetings from Zoom, Webex and other meeting platforms; streaming video content from YouTube, Vimeo or other video platforms; are live and pre-recorded content handled differently; what social interactions are supported by the platform and are they extensible to external social interaction platforms?
  - Is the platform solely web-based? Solely app-based? Both? Are there multiple ways for attendees to interact with content?
  - Is the platform built around or readily capable of supporting accessibility measures?
  - Can “spaminess” level be controlled?

**– How were video platforms like Zoom and Webex assessed and chosen?**

We considered a number of options for our video call functionality, comparing the features and functionality of various tools. The two strong contenders were Webex (as the platform of choice within CSIRO) and Zoom (the most widely used tool globally at this time). These two services (and others like Teams, Google Meets, Skype, Zoom Webinars, BigBlueButton, GoToWebinar) have slightly different features, performance and system requirements, so it is (as always) about picking the right tool for the job.

Due to the way we structured our delivery of content (i.e. live-streaming to YouTube/Vimeo in all situations other than open discussion calls) the actual choice of calling platform was less about its stability at large numbers and group management features, and instead focused on small scale stability, video quality, embedded live-streaming functionality (which turned out to be less important than we thought as there are some great streaming tools that can be used to handle this separately) as well as organisers and presenters familiarity with the platforms.

During the conference we tried both Webex and Zoom for a variety of live talks and panels and both performed adequately. Doing it again we would use a single service for primary with another as backup rather than alternating, simply to reduce overhead. In this case, we would likely have chosen Zoom over Webex simply due to greater community familiarity with it, better cross-platform and low-bandwidth performance, and its ability to embed seamlessly in Whova and other platforms. However we note that this is likely to evolve with new updates and competing services coming online in the next few years.

*Lesson learned: Carefully consider the content delivery flow in regards to what call platforms to use. Do you really need to have 500 people sending video and audio to each other in a single call? Or is it likely most of them will be passive listeners with the odd question that can be fed in by text? Make sure that the call platform you need covers exactly what you want, and check you are not paying for features you don’t actually need for your context.*

**– How were delivery platforms like YouTube and Vimeo assessed and chosen?**

In addition to call platforms like Webex and Zoom, we decided early on that the majority of our content should be live-streamed as well. This was initially suggested as a way to reach a wider audience, but quickly developed into the primary method for content delivery. For stability and reaching a large audience on a budget, YouTube was a very strong contender. We would not have to worry about the platform falling over due to high attendee numbers (as it routinely handles streams to millions of people

at a time) and it provides a wide range of hosting, live-streaming, premiering and embedding solutions with a very well known and mature user interface.

Unfortunately we found out after some heavy digging that YouTube only supports Livestream Embedding for content providers with several thousand followers and thousands of watch hours (or those with a 'grandparent' account from before these restrictions were made). To be clear, YouTube supports Livestreaming in the YouTube platform and the embedding of uploaded videos from account creation, but not Live-stream Embedding without a long-standing account. Frustratingly, YouTube does not provide a way to pay to make this limitation go away and in addition there are risks in terms of ads being displayed if the provider's channel, video or account is accidentally set to monetised (something that can in theory be avoided but a worry nonetheless). Furthermore several of our early testers complained about the suggested watch next feeds at the end of the video (these are based on the watcher's habits but we nonetheless got feedback about the content being unrelated or unprofessional). Finally while we had the option of a personal account that met these conditions available from several members of the TOC, we decided that using a personal account was not sufficiently professional looking for the conference and re-branding it may cause last minute technical issues should YouTube lock the account if they deem the name and branding changes as suspicious.

YouTube does provide an excellent feature in its Premiere functionality. This allows you to upload a video and set it to be released at a set time with a 2 minute countdown video beginning at that time, this countdown then seamlessly transitions to the uploaded video and plays from start-to-end once (in lockstep for all viewers) before becoming an ordinary video for replay. While Whova also allows this on its internally hosted videos (i.e ones we upload to Whova itself) we had worries that Whova would struggle with delivering video on scheduled releases to 1000+ attendees.

Our alternate delivery option, Vimeo, offers a similar range of functionality to YouTube but is a paid for, ad-free service. Embedded live-streaming comes only at one of the highest tiered accounts "Vimeo Premium" which is unfortunately only available for a yearly subscription at $1140 AUD ($95 AUD/month). Further, Vimeo of any account type does not offer YouTube Premiere-like functionality, but it does ensure no adverts or suggestions will be shown.

In the end we decided to use both YouTube and Vimeo in conjunction. YouTube for all pre-recorded content scheduled as Premieres on a new TFOM-branded account and Vimeo as a backup host for pre-recorded. For Live-streams we made Vimeo our primary service with a personal long-standing YouTube account running as a backup stream. This way we got the best functionality from both systems for TFOM attendees and organisers (the Premieres were the TOC's only kind-of-quiet time during the event) while having a professional look to all videos and a secondary service which could be swapped out on the Whova back-end in just a few seconds should the primary delivery service fail.

As a follow-up note, the tech landscape is a constantly evolving place. Since TFOM, YouTube has updated its policy on advertisements to suggest that all videos, even those which are not monetised, will soon feature ads with no choice on the part of the video owners. If YouTube follow through with this policy, then we cannot recommend them in the slightest for conferences of any kind, and would instead advocate for services which are less commercial and perhaps more academically-focused to become the standard. In the meantime, Vimeo is an alternative to consider.

*Lesson learned: Backups, backups, backups! Our assessment of the technical workflow for TFOM alongside the definition of backup plans for if a method failed meant we were very prepared and that everything ran smoothly. Things can and will go wrong, so make sure you have backups in place.*

*Lesson learned: YouTube Premieres are fantastic and can serve to give your organising committee a vital breather / chance to put out fires elsewhere!*

*Lesson learned: You need a well established YouTube account to do embedded live-streams (but embedded videos and non-embedded livestreams are fine with new accounts).*

## Building the agenda

**– How were the speakers chosen?**

Potential speakers were identified based on the desire to bring together a diverse cross-section across a range of disciplines covering the key TFOM themes. Suggestions arose from a combination of net-

work connections to members of the committee, recommendations via the committee's broader external network, research into people associated with a particular theme, and from organisations directly, such as Atlassian, Slack, Microsoft or WeWork, who were contacted due to their role and influence in the future of meetings and work. For large commercial organisations we found it was important to contact the appropriate people. Where possible, speakers were informally contacted first to gauge interest and availability, and then this was followed up with a more formal invitation if relevant.

Fairly early on it was decided within the committee that we did not want to have any subset of our speakers be paid, balancing the desire to have speakers from a variety of contexts and disciplines versus the belief that the money was better spent elsewhere, a general wariness of the speaker-fee ecosystem that exists for very large profit-driven conferences, and wanting to be fair to all invited speakers. Deciding not to charge for TFOM and not having costs to recoup helped in the decision-making. That said, we did acknowledge that speakers are giving time in preparing a talk for a conference and we wanted to help where we could in terms of supporting them for the time spent (especially since normal conferences would potentially offer travel support). Our offering of accessibility grants to speakers was our way of offering a small amount of monetary support to speakers to help in preparing their talk.

*Lesson learned: When dealing with large corporations it was important to find the appropriate people to contact - often it was necessary to get past the marketing people.*

*Lesson learned: The world of speaker fees was a revelation. In some contexts, it was suggested that substantial speaker fees are a standard part of conferences, though the lack of costs involved for the speaker, apart from time, made this issue a bit greyer and it is certainly not standard for academic contexts. We were really appreciative of the passionate and interesting talks given by speakers who were part of TFOM, and we hope that the future world of conferences finds a comfortable balance between recognising invited speakers for giving their time and expertise, but not encouraging a for-profit conference-as-big-business ecosystem.*

**– In what ways were speakers chosen to be diverse?**

Some of the goals of TFOM were around experimenting and trying to inspire new ways of thinking. One of the implementations of that was the diversity of speakers we had provide content.

One of our TOC committee members works with primary school children as part of an outreach program call "STEM Professionals in Schools". The students are very passionate about climate change and the future of the planet, so they were given the option to provide their opinion on why we should care about sustainability via a pre-recorded video. The school provided permission slips to the students' parents and the video was only available to those registered for the event and 30 days afterward. However, this approach provided a significant amount of impact on attendees. It was eye-opening for some to get advice or opinions from those that we have overlooked in our every day life.

When selecting invited speakers we looked for diverse opinions and approaches. Part of this was actively seeking the contribution of the Disability Advocacy Resource Unit, to learn how to make conferences accessible to a diverse range, from a disability perspective. From an age perspective, our youngest speakers were the primary school children, and our oldest a post-retirement honorary fellow. In terms of overall diversity of speakers, we kept track of who we had invited, and actively sought to balance gender of invited speakers. We also aimed to obtain a balance between industry and academic institutions, as well as across different levels in seniority. When dealing with organisations, we found we often had to actively ask for a female speaker, which we hope will not be necessary in the future, as there is no reason to expect that the best person to present technology talks would be male. We were able to attract a number of very exciting speakers to TFOM, regardless of gender, age, or disability, and we hope we found a fair balance. We certainly believe the rich diversity of perspectives brought to TFOM was a huge part of what made it an interesting and successful conference, so we would encourage future organisers to seek to maximise diversity as much as possible for best outcomes.

*Lesson learned: It is important to seek a diverse range of speakers, but when left to appoint a speaker for a conference many organisations will suggest a male. It is important to actively seek out minority groups to ensure their voices are heard.*

*Lesson learned: The wisdom of children is golden. While it is important to be mindful of laws regarding minors on camera, we strongly advocate for seeking the opinions of youth, especially in a conference about the future, which has the biggest impact on them.*

**– How was contributed content handled?**

On the registration form one of the questions was “Would you like to contribute?” and there was a selection of options including talk, discussion, or workshop. When a registrant selected this option, the information was uploaded into a Trello board. This way a selected group of the TOC could organise the information, follow-up with the attendee if their intention was not clear or group by type of contribution.

All registrants (speakers and attendees) that selected talks or discussion were given the option to either:

- Create a recorded talk or handout in the expo space and be a part of the panel discussion.
- Start a community chat – This was an un-moderated discussion that anyone could participate in for any suggested topic.
- Initiate a virtual meetup – Inside the Whova conference platform virtual meetups could be setup and they didn’t have to take place during the 3 day conference. This was in place so like-minded individuals could discuss a topic of choice.

About half of those registered to contribute content ultimately chose to have a personal space in the Exhibitors section of the Whova conference platform. This allowed for the display of a pre-recorded video of up to 10 minutes (TFOM guideline) or a poster (as a handout, up to 10 MB - Whova limit), have a chat window for discussion of their content, and the ability to set up virtual meetups with attendees. In addition to the exhibition space, we organised 4 x 30 minute sessions and 1 x 60 minutes of different themes on each of the three days as a panel discussion where the panellists could discuss a theme and attendees ask direct questions.

The panel discussions were a good format to discuss the theme of the various talks and provide attendees with a live question and answer time. It also served as a way to highlight the content for those attendees that did not take the time to watch the contributed talks or view the contributed posters. By keeping the panels to a small number of people, everyone had a voice. Each panel session had a moderator that fed the questions to the panel and made sure the conversation was kept on track and on time.

For those that registered to run a workshop, if the topic did not conflict with those already scheduled we worked with the group to help setup Zoom sessions, provide attendees with the login details, and added it to the agenda.

*Lesson learned: Contributed content ended up being a considerable amount of work with chasing people for recorded talks in time, and perhaps being too flexible with accommodating talks after the deadlines. Our recommendation would be to have a hard deadline with no talks accepted after that, and to have this be as much in advance of the conference as feasible.*

*Lesson learned: Have clear rules about expected content to avoid irrelevant or unsuitable contributions (in our case we had a few extremely sales/product marketing talks we had to request be changed). This was a by-product of hosting an extremely broad, cross-disciplinary conference and might be less of an issue for a more focused conference.*

*Lesson learned: Consider having a meritocratic approach to talks with varying labels and prominence in the agenda being decided after the talks have been submitted as prerecorded content.*

**– How did speakers record and submit their content?**

While there are numerous, free, advanced-recording apps out there that are relatively easy to pick up and produce great results, we decided that expecting speakers to learn these just to record was perhaps too much of a commitment (though we do think the more familiar everyone becomes with audio/video recording and editing apps the better digital conferences will be!).

Due to time constraints we requested that the speakers record their talks using something like Zoom which would ensure that their Audio, Screen Share and Video were recorded properly and in sync with a resolution of (at least) 1080p. We also requested that they leave 5-10 seconds of audio and video at both ends of their recording to leave us enough material for a smooth stitching of the start and end splash screens. Finally we also requested that they do a trial run of a few min before doing a full recording to check for technical issues and to watch the whole recording back before submission.

While many of our speakers followed these suggestions, those that didn't went in two different directions. They either used a more advanced technical solution which they were clearly familiar with and it worked well, or used a tool very much unsuited for the job and did not perform a review of the recorded content. This meant several videos had to be corrected at short notice by the TOC in video editing software and in some cases re-recorded very late in the process.

Talks were encouraged to be uploaded to a CloudStor upload point which was a simple html link which prompted an upload box, however we also ended up receiving them via email, Dropbox and several other methods as well.

*Lesson learned: Have a clearly defined standard for everything, especially video recording methods and live-stream camera/audio quality. Then leave plenty of time for when people ignore these standards.*

*Lesson learned: Consider setting a very early first deadline for a full recording with later deadlines for iterations/re-records as needed.*

## Building an exhibition hall

**– What was the role of the exhibition hall?**

A virtual exhibition hall is essentially a place to showcase small amounts of user-contributed content. The uses for such a space extend far beyond the traditional model of product demonstrations or lead gathering. For example, many face-to-face academic conferences include a poster session, in which attendees can contribute a printed poster describing their research, rather than give a talk about it. Poster sessions provide an opportunity for other conference attendees to seek out topics of interest and independently inform themselves of recent results. The same function can be filled with a virtual exhibition in which attendees contribute multimedia assets relating to their research and post contact information for follow-up or collaboration opportunities.

For TFOM, we went one step further and posted contributed talks in the exhibition hall, marked with a special identifying prefix to group the talks by topic. We also created virtual booths for sponsors and exhibitors in the traditional way. Virtual poster sessions or contributed content can in fact be far more rich in an online space, with the option to include movies, images, audio clips, fact sheets, etc. Whova also provided a persistent chat channel for each exhibitor, allowing attendees to converse with exhibitors and contributors throughout the event, much more efficiently than would be possible in person.

*Lesson learned: Online conference platforms have inherited a narrow view of what an exhibition hall should provide. We managed to group and categorise participants using title prefixes, but platforms should develop more powerful tools for dealing with contributed content.*

**– How was the digital exhibition hall configured and constructed?**

Different aspects of the digital exhibition hall were assigned to different TOC members. Contributed talks were checked and uploaded to YouTube before being embedded in an exhibition booth with appropriate naming conventions. Sponsor and exhibitor booths were arranged by a different committee member. Although it was possible for exhibitors to edit their own booths using a private link, we configured each booth with a baseline set of information requested via email in advance. This served to normalise the look and feel of the main menu. Although some exhibitors were very enthusiastic about adding their own content, many were also willing to leave the baseline assets as is.

*Lesson learned: Developing an efficient workflow for organisation of the exhibition hall is important. Stock questions should be developed for introductory emails to exhibitors, along with a clear description of expectations and options.*

## Preparing for TFOM

**– How was the TFOM Code of Conduct put together?**

The organising committee agreed on the importance of having a code of conduct for TFOM to ensure a harassment-free experience for all attendees and encouraging a professional, respectful and inclusive

environment. To make this event more accessible, no fees were charged therefore increasing the potential for misconduct. Consequently, a thorough code of conduct was of utmost importance, highlighting expected conduct, unacceptable behaviour and describing the procedures for reporting and addressing misconduct. Agreement to the code of conduct was required for any attendee to register to the symposium. Two options were provided to report incidents and/or misconduct, either via email to one of the organising committee members or anonymously by filling a Google form. Fortunately, we received no reports and the moderation of all talks, chats and Q&A sessions were eased by the compliance of all attendees to the TFOM code of conduct.

A review of existing codes of conduct for both physical and virtual events was undertaken to establish the TFOM code of conduct. It revealed that codes of conduct are commonly segmented into the following sections:

1. Expected conduct;
2. Unacceptable behaviour;
3. Enforcement;
4. Reporting an incident or misconduct; and
5. Attributions.

Additionally, the codes of conduct used for physical conferences had to be revised for virtual conferences in order to include additional type of misconducts such as trolling, copying and redistributing data from presentations without the author's permission, and unauthorised access or malicious changes to the conference website, hosting tools or any related systems.

The code of conduct for TFOM was adapted from previously written code of conducts, including the Geek Feminism wiki[6], created by the Ada initiative and other volunteers, and the "London code of conduct"[7] originally designed for the conference "Accurate Astrophysics Correct Cosmology", held in London in July 2015, and adapted with permission by Andrew Pontzen and Hiranya Peiris from a document by Software Carpentry. Both are released under a Creative Commons Zero licence for reuse. The TFOM code of conduct is also based on the code of conducts from the 2020 Design Conference[8], 2020 virtual Goldschmidt[9], American Geophysical Union[10], and European Astronomical Society Annual Meeting (EAS 2020)[11].

*Lesson learned: Establishing a clear set of expectations of attendee behaviour is really important, as well as having procedures in place for how any violations will be treated. It is also important to provide ways for attendees to report any misconduct either directly or anonymously. We were lucky in that we did not have any violations of our code of conduct during TFOM, and we would note that having a code of conduct is a good way to ensure people come into a collective meeting with the right mindset.*

**– In what ways were requirements and stakeholder interests gathered for TFOM?**

As mentioned earlier, we did use surveying at various stages of TFOM to make sure that we were building a conference that would meet the needs and interests of participants. In terms of attendee needs, such as accessibility requirements, we gathered insight into those as part of the registration process and asked people to note any accessibility needs that we could cover. Needs raised this way included subtitles, recordings, transcripts, compatibility with screen readers and a general appreciation that a virtual conference like this was more accessible for various reasons. On this point, we would like to note that suggested best practice for accessibility in conferences is to ensure you have a general level of accessibility (e.g. captions, accessible venues (virtual or not), etc.), but also to ensure you make it a very open process for people to let you know what their needs might be - and to act on those to the greatest extent possible.

For defining stakeholder interests, the first level was via gathering expressions of interests via our EoI form. Via this form, we could gauge both what people were interested in when it came to the topic

[6] https://geekfeminism.wikia.org/wiki/Conference_antiharassment
[7] https://github.com/apontzen/london_cc
[8] https://www.thedesignconference.com.au/code-of-conduct/
[9] https://goldschmidt.info/2020/codeOfConduct
[10] https://www.agu.org/Plan-for-a-Meeting/AGUMeetings/Meetings-Resources/Meetings-code-of-conduct
[11] https://eas.unige.ch/EAS2020/codeconduct.jsp

of “the future of meetings” as well as in what ways they might like to engage with the conference (including attending, speaking, exhibiting or helping to organise). In fact, we actually recruited some speakers, exhibitors and organisers via this form, which was really great. The second phase of gathering interest was when we opened the registration form, which collected both info about an attendee but also rankings of interest in particular topics or content. We also obtained information about access to VR/AR headsets, so that we had an idea of who attending may be interested and could access these kinds of technologies.

In this way, we could identify the topics that attendees were most interested in, which included best practice for virtual interaction, tech tools to support virtual meetings, communication/engagement and the future of work. Finally, we conducted a pre-event survey that collected insights from attendees on recent experiences with virtual interactions, which parts of TFOM they were looking forward to and what they were hoping to get out of it, how they were planning to attend and what context they were coming from (in terms of employer and occupation). We used information from all of these inputs to match against our planned program and thus define TFOM to meet both needs and interests.

*Lesson learned: By ensuring we gauged interest and needs of attendees throughout the process of planning and building TFOM, we could be confident that the content of TFOM would be relevant and interesting to the community. As a result of surveying people for their particular interests, we recognised the strong desire for addressing best practice which influenced our decision to write this report on our lessons learned.*

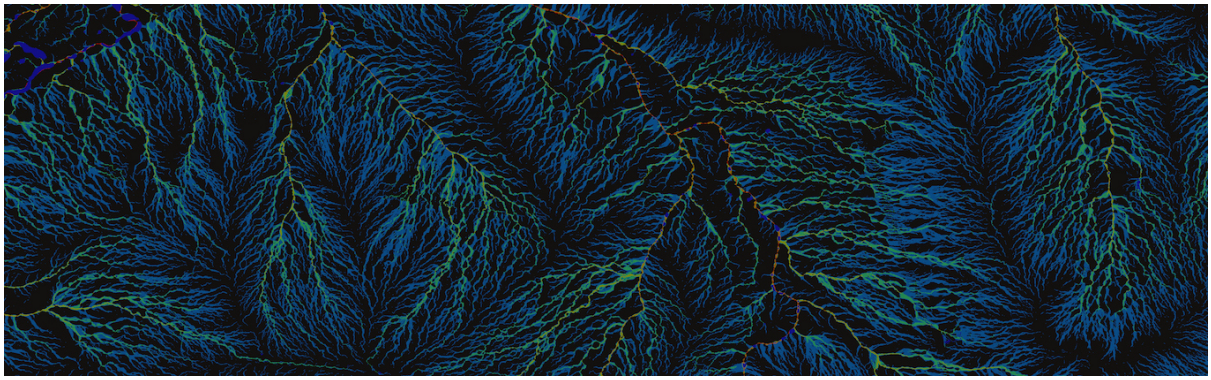
**– How was awareness raised of TFOM, and what role did social media play?**

As mentioned, it was really important to us as organisers to bring together a diverse cross-section of the community (especially in Australia) for TFOM. We felt that everyone is affected by what the future of meetings might look like, independent of their field, and we saw this as a great chance to address the topic from a truly cross-disciplinary perspective. This was reflected then in how we chose to advertise the conference, because we wanted to make sure we were going to reach audiences beyond CSIRO itself or the academic community. As outlined above, our committee was formed with the goal of being very cross-disciplinary itself, and that mean that the committee was well-connected to various parts of CSIRO and the broader academic community to get the word out. Our advertising of TFOM thus began with internal and external mailing lists or committee networks that included organisations we wanted to have on board for these discussions, such as universities, the EMCR (early-mid career researcher) Forum, AARNet (the Australian academic research network), the Pawsey Supercomputing Centre, the Australian eResearch community and more.

We also used social media (particularly Twitter) using a dedicated TFOM account to start gathering the community and get them excited about the symposium. When the conference was less than a few weeks away, we tweeted once or twice a day to highlight a particular invited or keynote speaker and the topic they were going to cover. We advertised the opening of registration through Twitter and LinkedIn. In addition, we encouraged speakers, workshop facilitators and committee members to share their excitement for TFOM approaching and to distribute knowledge of its existence throughout the community. We also utilised internal organisational social platforms including Yammer and MS Teams to target relevant interest groups of staff within CSIRO. By posting to various relevant Facebook groups, we also created additional interest in and awareness of the symposium.

In terms of the impact of our marketing and advertising of TFOM, our pre-event survey indicated that word of mouth and internal CSIRO advertising accounted for roughly a third each of attendees who filled in the survey. Other significant factors included institutional emails, newsletters, LinkedIn and Twitter, which is consistent with our distribution strategy. It is interesting to note how much impact word-of-mouth had on gathering interest in TFOM, but somewhat difficult to know exactly what that means in practice. In any case we were really pleased to see a diverse cross-section of people representing different communities as part of TFOM, and in that sense consider that our awareness-raising methods for TFOM were successful in meeting our goals.

*Lesson learned: It was good that we thought carefully about the target audience for TFOM, and what kind of community we wanted to bring together. This had a significant impact on how we advertised the conference, and who we advertised it to, but ultimately we also just wanted anyone interested in the topic to be able to join so hopefully we achieved that!*



# III. Running TFOM

In this section, we cover the process of running TFOM, starting on 15th September 2020 and concluding on 17th September 2020. One key observation going into this section is that although the live days of the conference were certainly busy and exhausting, there was also a lot of work in the lead-up and post-TFOM, depending on the role of an individual committee member. We will cover this in more detail below.

**– How did you manage live panels & live talks?**

Although most of the content was pre-recorded, we also had a small amount of live content. Our live content came in several forms: Live Talks, Live Panels, Live Q&A Video Calls, Live Text Q&As and Live Chats. Panels were limited to a maximum of 5-6 panellists and came in two main forms, Invited Panels with a dedicated panel chair and organising committee members acting solely in hidden supporting roles, and Contributed Panels, made up of attendees who contributed their own presentations along with a member of the organising committee to act as the panel chair.

We used Zoom as the panel meeting platform (a normal call rather than a webinar) but streamed the live video feed via another service, Vimeo. This allowed the panellists and the organisers to confer via Zoom prior to beginning the live session as well as in secret via the Zoom chat function during the panel. One organiser acted as the primary streamer with control over activating the live feed, a different organiser acted as the calls technical host and a third for feeding questions to the Panel Chair or acting as the Panel Chair themselves (introducing the panellists, managing questions from the audience and keeping the panel balanced and on time). Each session was booked in advance through both Zoom and Vimeo, with the two pre-linked to reduce the amount of effort required on the day to just clicking ”start custom live-stream” from within the call. Links to each session were also stored on an internal wiki. An auxiliary streamer was also present in the Zoom call on most occasions to manage a backup stream via YouTube, and it was on this stream that we also supplied automatic closed captioning.

The streamers and other additional support (moderators, tech support etc) were present in the Zoom call for the duration of each panel, but kept their video and audio off during the event itself. Zoom and Webex feature a mode in which only the call participants with active video appear in the grid view. Prior to going live, the streamer would brief the participants on the situation and give a verbal countdown along with hand signals to indicate when the stream would go live, blanking their video and audio at the last second. The MC then took over after a pause of a few seconds to let the stream begin. At the end, the streamer closed the live session and re-activated their video feed to let the panellists know that they could talk freely.

For the panel discussions and Marita Cheng interview Q&A, questions were fed to the MC through the Zoom chat functionality, without filtering. This was a lot to read and process for the MC and it may have been better to filter and consolidate the questions into a more manageable form. The initial plan was to prioritise popular questions through the voting facility but this was not used by many of the participants.

*Lesson learned: The very on-the-spot nature of “live” makes it absolutely necessary to be super prepared with attention to all the details, so that unexpected hurdles can be easily overcome. This includes interactions both on-screen and behind-the-scenes. With the number of people involved it was essential*

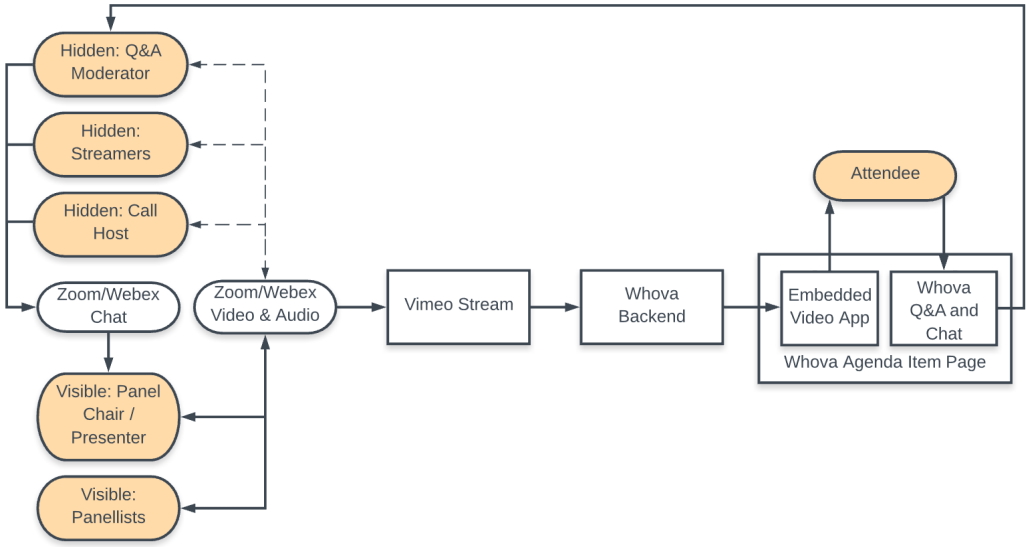



Figure 2: A simple overview of people and services required to power the live video presentations and panels primary livestream (for the 'backup' stream overview see the Captioning questions). Call Hosts were responsible for the setup, activation and call technical issues, Streamers took care of the various live streams, Q&A moderators fed the Panel Chairs or Presenters questions from the Whova Q&A on the session. Panelists, Panel Chairs and Presenters filled their normal roles. All of the above people simply connected to the call as they would a normal Zoom/Webex call. Attendees viewed the talk through the Whova platform via an embedded Vimeo stream and left questions in the Whova Q&A board and Whova chat.

*to have clear instructions on how the session was to be run, especially how questions were to be asked, and an understanding of individual roles. For technical hiccups, always have a Plan B.*

**– How did the contributed panel discussions work?**

As mentioned above, contributed content through talks and posters were grouped into themes and the contributors assigned to a panel discussion session. Due to timezone constraints, not every contributor was able to attend their allocated session, and there was no guarantee that the panellists would attend, as they were not chased as a speaker would have been. Nevertheless, all panelists joined their calls on time and the sessions appeared well-attended, despite running in parallel with the workshops. As these sessions were designed as an opportunity for the panellists to talk about their work, there was a reliance on questions from the audience, which were not always forthcoming, so it was necessary to have questions prepared in advance. To ensure that all panelists were given equivalent time and promote active exchange of ideas, it was recognised that the moderator needed to have a firm hand in steering the course of the discussion.

*Lesson learned: The main lessons learned from the running of the panel sessions was the need to have backup questions prepared and the importance of strong moderation and time-keeping.*

**– How did you manage live Q&As (using text chat) for pre-recorded talks?**

Questions from the audience during pre-recorded talks were handled through Whova's Q&A and chat functionality accompanying each presentation. The presenter was expected to attend and interact with attendees via these channels during their talk. The Q&A and chat functionality was actually enabled as soon as a speaker was allocated a slot in the agenda and allowed to persist after the talk. As such, they could begin interacting with their attendees well before their session and continue conversations afterwards as well. Overall we found that very few questions were posted before the session time, with most of the activity occurring during the session and directly following, with some discussion threads being picked up and continued through the more general Community posts.

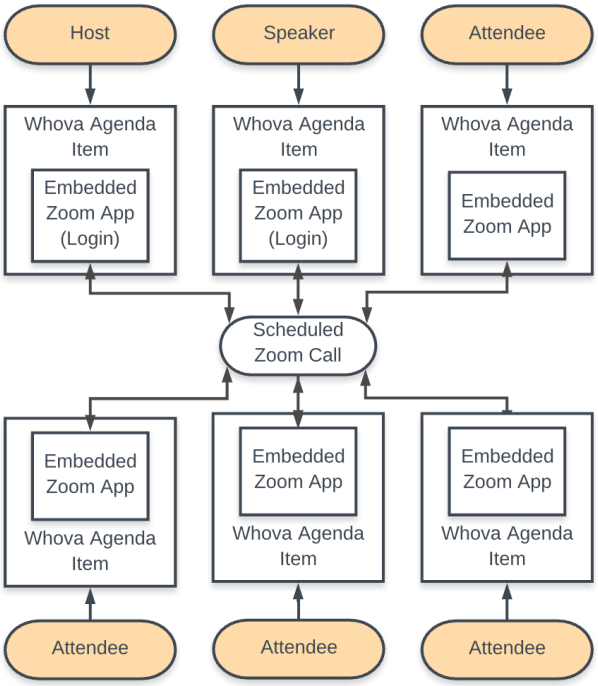



Figure 3: A simple overview of services required to power the live video call question and answer (Q&A) sessions at TFOM. Attendees, hosts and presenters alike simply navigated to the Live Q&A agenda item in the Whova platform and would be automatically joined to the embedded scheduled Zoom call. Host and moderator rights were set on the Zoom platform when scheduling the call and could be transferred or duplicated from within the embedded Zoom app, if more moderation was needed.

*Lesson learned: Capability for the audience to up-vote questions is good, but don't rely on up-voting to pick which questions to ask a panel.*

*Lesson learned: Having the speaker interacting directly with Q&A and chat during their video is an excellent way to provide real-time engagement, helping to address one of the common criticisms of virtual events with pre-recorded content. This should not however be expected of speakers during live video sessions.*

**– How did you manage live Q&A video calls?**

The Live Q&As were handled by embedding large group Zoom calls into the Whova platform. From the organisers end it was a simple as scheduling a Zoom call (on an account with an appropriate Zoom subscription) and assigning co-hosts to act as moderators before adding the scheduled Zoom call link to the appropriate Whova Agenda item. For TFOM our sponsor AARNet provided 5 Zoom host accounts with unlimited meetings of up to 500 simultaneous users per meeting. For other conferences where this is not an option, the equivalent Zoom package we would have gone with if AARNet had not sponsored us was the Zoom Pro package (10 hosts, unlimited meetings, 300 people per meeting at $279 AUD per month) with possibly the "+ Large Scale Add-on" for 500 or 1000 attendees (an additional $50 - $126 AUD per month per host). Either way, the Zoom and Webex price plans are very reasonable for short term events and can be made almost unnecessary with careful balancing of livestreams, smaller calls and breakout rooms.

The calls were embedded seamlessly into the Whova platform with attendees being automatically added to the call (after a standard camera/mic access prompt) whenever they navigated to a Whova Live Q&A agenda item during the appropriate time. As such, all heavy lifting for these sessions was handled in-app by Zoom and hence most issues would have depended primarily on the individual attendees' own internet connection (though none were reported). If this had failed, we had backup Webex calls scheduled using basic accounts which could be instantly copied into the Whova back-end to replace the embedded Zoom app (though doing so would prompt the user to download and install Webex).

*Lesson learned: During the live Q&A events there is a need to prepare similar to a panel session, with prepared questions and a moderator. Also, it helps going into the session knowing how exactly you want attendees to ask question (i.e. by taking themselves off mute or through the chat function).*

**– Did TFOM have any content delivery problems and how did you avoid them?**

Generally TFOM delivered content for the majority of attendees very well. We received some minor complaints regarding technical issues in some of the independent workshops and had to occasionally delay starting by 30 seconds to a minute when we had back to back live-stream sessions. Overall though we were very pleased to avoid the technical 'meltdowns' seen in many online conferences.

Critical delivery failures can occur when any part of a digital conference's infrastructure fails to handle the number of attendees trying to use it. Sometimes this can snowball to the extent that technical issues prevent the organisers from being able to communicate with service providers or even each other. Given TFOM's relatively large registration limit of 1500 attendees, this was a failure mode we made every effort to eliminate during planning. Our background research suggested that many critical delivery failures arise from using the wrong tool for the job, or using a tool in ways that were not intended.

Developing and demonstrating scale-able and robust delivery methods was a major goal for TFOM. We focused on having tools we were confident with (by testing everything many times) and eliminating single points of failure in communications or delivery.

Examples of this include the scheduling of most events in both Zoom and Webex and pre-testing of all call rooms both by the organising committee and in conjunction with speakers (to test their connection, secondary connection, camera and microphone quality). In addition, pre-recorded videos were hosted on both YouTube and Vimeo and live-streams were captured in two different ways, using the inbuilt live-stream feed (to Vimeo) and a backup to YouTube. The backup stream was delivered by a dedicated TOC member (present in each call) directly capturing the audio and video using live-streaming software and directing the output to a different endpoint.

For live captions we had both human and AI driven captions in key events and for communication we had the Whova platform, direct email lists for emergencies and the TFOM Slack channel for organisers, presenters, workshop runners and exhibitors (which could have been expanded in an emergency to include all attendees). We had one session where the human captioner did not show up, so it helped to have the AI driven captions as a quick replacement option.

*Lesson learned: Make sure to leave enough time between events for the organisers or technical personnel to have time to setup the next session when mixing in live content.*

**– How did you provide two separate streams for live events and why?**

The two streams ended up being a balance between functionality and redundancy. In many ways the "back up" stream was more technically advanced than the prime. Being managed by dedicated streaming software, it could stream in higher resolution (4k or 1080p) compared to the video call's inbuilt live-streaming capacity (720p), provide splash screens, music, audio balancing & control, animations, logos and live captions, and allow us to seamlessly change between scenes. The downside was that it required a single dedicated person on a single system, introducing a key point of failure.

As such we provided two streams, one directly linking the video call to a live-streaming service (robust but out of our control) and one live-stream via dedicated third party software (OBS[12]/Streamlabs[13]) with all the professional features.

On the Whova back-end this meant we effectively had two links we could swap out in seconds to set which stream was visible to the attendees. This capability was used once when human error killed the prime live-stream for one of our events just as it started. In addition, the second link was always listed in the item description for those needing captions or preferring the other content delivery service.

*Lesson learned: It is important to have redundancy built in and to have multiple organisers know how to change between them on a moment's notice.*

[12] https://obsproject.com
[13] https://streamlabs.com

**– How were captions provided for pre-recorded talks?**

Captions for all the pre-recorded talks were embedded before upload as part of the YouTube/Vimeo captioning systems using the American speech-to-text company Rev's[14] video captioning service. This service takes standard video formats as input and creates an initial caption file for the video. Using Rev's inbuilt captioning tool, an organiser/reviewer can double check and edit/correct the captions if desired. The final output is available in one of the many standard captioning formats which can then be uploaded and added to the appropriate YouTube or Vimeo content. Rev cost $1.25 USD per minute of video at the time of our conference and also offers alternative language subtitling at rates of $3 - $7 USD per minute. Finally, although live events had immediate subtitles provided via a different route, we also got the recordings of those streams professionally captioned using Rev after they concluded.

*Lesson learned: It was good to use a captioning service that allows manual editing of the captions. This is because the AI often has a hard time correctly assigning a word choice to technical terms, indigenous language words, or speakers with strong accents.*

**– How were captions provided for live sessions?**

Captions for all the live sessions were created and delivered using 2 of the 4 possible methods we tested. These options were:

1. Manual live captions inside Zoom
2. Manual live captions via a third party tool (Used)
3. AI live captions inside Zoom
4. AI live captions via third party tool (Used)

**Option 1: Manual live captions inside of Zoom**, required a professional human captioner inside the video call. This solution displays captions directly inside the Zoom window for anyone who wishes to see them. This was the least desirable of the options we explored, because the inbuilt Zoom captions are small, not easy for the captioner to use and difficult to see on the outgoing stream using anything but the built-in live-stream service. In addition to this, professional manual captions are very expensive, usually costing about $200 AUD per hour (with a 1 hour minimum). There is also a risk that the captioner fails to attend or has technical difficulties.

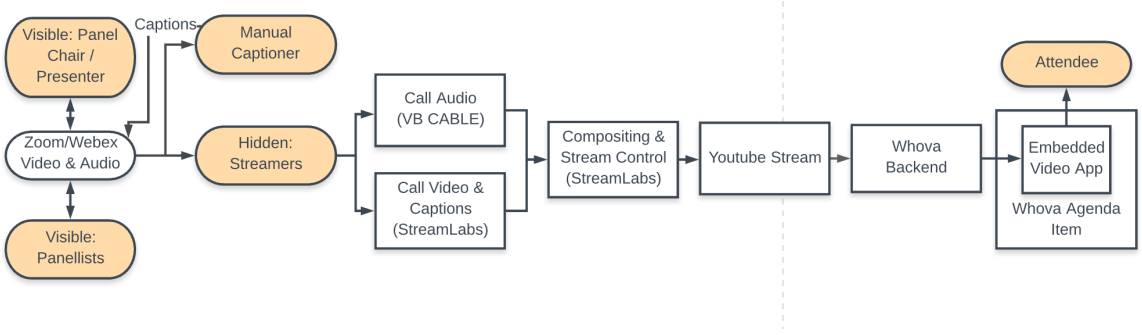



Figure 4: A simple overview of the services and people used to power the Captioning Strategy Option 1: Manual live captions inside of Zoom. Orange denotes people, white denotes processes/software.

**Option 2: Manual live captions from a third party tool**, works similarly to Option 1 and still requires a professional human captioner inside the Zoom call. However, in this scenario they type captions to a third-party website-based tool. This allows attendees to have a separate website open with captions set to their desired size, colour, highlighting etc. It gives the attendee complete control over the captions, but retains a considerable cost burden which is prohibitive for many smaller or less well-funded conferences. Finally, due to the intrinsic delay in standard live-streams, there can be a significant offset between the captions and the video stream. We solved this by embedding the caption service into the secondary live-stream itself using the same method as outlined in Option 4. This option worked well and the human captioner generally handled unusual accents better than Option 4's AI.

[14] https://www.rev.com

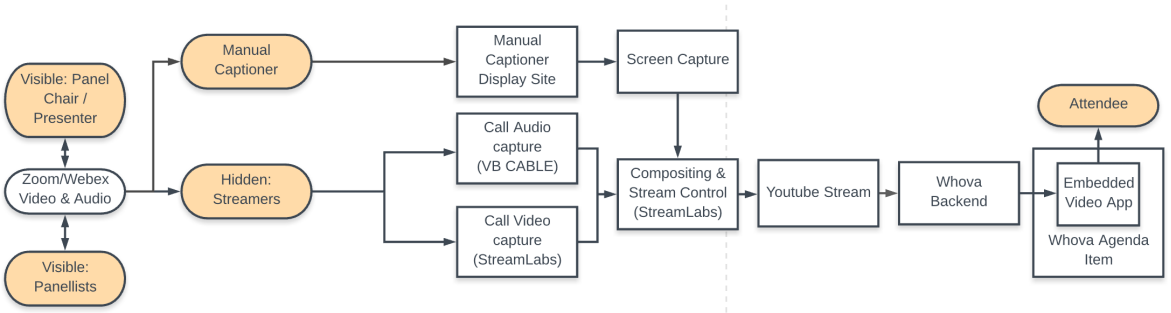



Figure 5: A simple overview of the services and people used to power the Captioning Strategy Option 2: Manual live captions via a third party tool. Orange denotes people, white denotes processes/software.

**Option 3: AI Captions inside of Zoom**, is possible using the custom Zoom live-stream hook. Various AI captioning services (with both free and paid options) can connect directly to the call's in-built live-stream feed, pass it into an AI auto-captioner and return the results directly into the Zoom window for display in the same way as Option 1. Unfortunately, the result is often slightly delayed, and also consumes the only in-built live-stream hook available in Zoom. This means it is not possible to use an AI live captioner while also streaming directly to YouTube or Vimeo. This is a good option when everyone is directly participating in the call (e.g. in a regular meeting), but was not suitable for TFOM due to our use of live-streaming for robust content delivery.

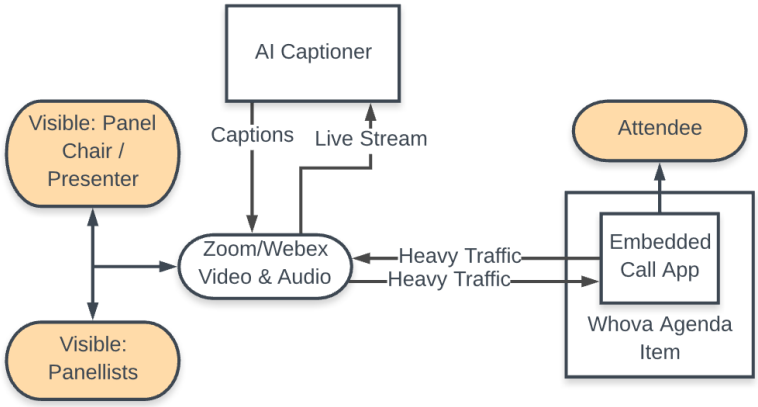



Figure 6: A simple overview of the services and people used to power the Captioning Strategy Option 3: AI live captions in Zoom. Orange denotes people, white denotes processes/software. While it may look the simplest, it is actually the one most likely to cause a complete delivery failure as it forces all attendees into a single call.

**Option 4: AI captions using a third party tool**. We were able to integrate live AI third party captions directly into our secondary backup stream. To do this, the backup streamer (see above for details) connected to the call and fed it into a Livestream Event on YouTube. To get the captions into this stream, the audio was split out of the call using a virtual speaker and connected to a virtual mic using the free VB-CABLE software[15]. This virtual mic was then selected for use when starting up the free web-captioner service[16] in the same way you would select a physical microphone. The web captioner service displays its output as text on a continually scrolling website. The colours, size, font and background colour of the site can be customised by the end user to suit their needs. This website output was additionally captured in real time with the free OBS/StreamLabs software (the background was removed using a

[15] https://vb-audio.com/Cable
[16] https://webcaptioner.com/

chroma key) and composited together with the YouTube/Vimeo stream event using the same software. While this solution worked well, it was unfortunately only possible on the backup stream as it required an intermediate step unavailable with the one-click streaming options built into the video call systems. Overall, the AI captioning worked well, but we did notice significant transcription errors with certain accents and on lower quality speaker audio connections. Even so, these services will improve over time (and the one we used was free).

The options available can be employed as needed to ensure that all material is presented with captions, while accommodating the level of effort or cost that best suits a particular event. For TFOM, we used a hybrid approach of high-quality, manually corrected captions on all pre-recorded content with a few select live events professionally and near perfectly captioned at 1.25 USD per minute within 24 hours of their conclusion. For the remaining live content, we used AI services and concluded that these are a viable alternative.

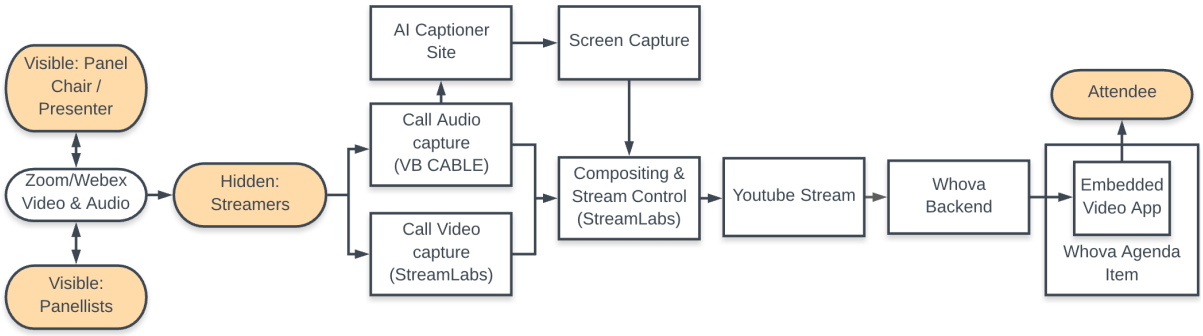



Figure 7: A simple overview of the services and people used to power the Captioning Strategy Option 4: AI live captions via third party tool (Recommended). Orange denotes people, white denotes processes/software.

*Lesson learned: Experiment with different accessibility options before the event so you know what the limitations are. If you decide to use a human captioner, contact the service a least a week before the event so you can confidently get a person assigned to the event. If you need someone who can physically translate into sign language, make sure to contact the service at least a month ahead of time.*

**– How were the workshops handled?**

TFOM hosted a series of daily workshop sessions run by Fujitsu, Sarah Jenkins, The Inclusive Organization and Glue, respectively:

- Future of Collaboration Powered by Fujitsu's Human Centric Experience Design
- Evaluation - your best friend in planning and assessing online events
- Inclusive Design Thinking Workshop
- Glue Open Hours

and several one-off workshops:

- A Workshop About Distributed Workshops (Gilleran, Weiley)
- Notiv Workshop (Notiv)
- Pique Global: The 4 Rooms of Change Session (Pique Global)
- Cisco Workshop (Cisco)

The task of actually running the workshops was left to the workshop facilitators, with the TFOM committee assisting in registration, which was handled through the Whova platform. These workshops were free to attendees but had a session cap for which an added registration step was required. The Whova

phone app provided an ”Enrol” button for workshops. However, due to a bug this was not available on the browser, requiring interested participants to be added manually by contacting the TOC. This led to uncertainty surrounding registration - how to register at all and whether registration had been processed - and required distribution of attendee details via alternative means (e.g. email).

Some workshop facilitators requested the opportunity to deliver a “dry run” of their content via the conference platform in advance of the symposium. We supported this where possible and felt that both the TOC and the workshop facilitators learned valuable lessons as a result.

*Lesson learned: Providing workshops as a part of the symposium was a good idea, and leaving the responsibility for workshop content to the facilitators works well, provided there is a clear line of communication. Clarity around how to enrol (and availability through* all *primary interface mechanisms), and broad understanding of how attendance details will be distributed, is very important. Offer workshop facilitators an opportunity to deliver a dry run through the platform if desired.*

**– How could participants ask for help during or before TFOM?**

We endeavoured to be as available as possible to answer questions that attendees or speakers might have in the lead-up to TFOM. We noted that they could get in contact with us via email, which was either directed to the Chair of the committee or to the relevant lead on a given aspect of the conference (e.g. exhibitors, contributed content, etc) or directly via the Whova platform. We organised two pre-TFOM virtual meet-ups in the two weeks before the conference, one using Webex and one using Zoom, which roughly 10-20 people attended in each case. The Whova platform also came with a category in the Community section called “Ask Organisers Anything”, and we made it clear in our communication that attendees could post messages there if they had any questions. Attendees could also direct messages to a member of the committee on Whova. Finally, we put up an FAQ (Frequently Asked Questions) area in the Logistics section of the Whova platform, which we added to as more questions arose. Between these various methods, we felt we were able to provide help as needed to participants.

*Lesson learned: Finding ways to be available to attendees was important, especially in a virtual context, and we sought to have at least a few ways that people could get in contact with us if needed.*

**– How did TFOM build a sense of community?**

To encourage community engagement, the committee made extensive use of the chat functionality accompanying each agenda item, tweets, and Whova’s Community feature. Recognising the importance of community connections and inclusion, the TOC ensured there were committee members in each session posting ice-breakers in the chat box to spark interest and generate questions.

The Whova Community section provided functionality for organiser announcements, arranging meet-ups, sharing articles and posting topics to generate discussion. Additionally, the phone app had added features such as ice-breaker questions and better photo sharing. The TOC promoted the Community from the moment the TFOM Whova site was opened to the public mid-August. This proved very popular with 37 articles shared and 45 discussion topics posted, ranging from the frivolous (conference catering) to more serious considerations. Opening up the discussion early had the benefit of generating and maintaining interest within the community. Speakers also chose to make use of this feature to provide background for themselves, particularly relevant to the diverse TFOM community, who may not have been familiar with them. However, the volume of activity closer to the time of TFOM meant that many topics were buried. Furthermore, the Whova platform pushed gamification as a means of boosting audience participation, offering Leaderboard points for various activities. Unfortunately, this had the effect of encouraging Leaderboard ”gaming” creating bogus posts and activity which had the effect of swamping more serious discussion.

*Lesson learned: Community engagement is very important for the attendee to feel personally invested in proceedings. However, there needs to be some degree of moderation for the content to stay relevant.*

*Lesson learned: Gamification can increase engagement but comes with risks in terms of attendees potentially misusing the system, so consider its use carefully.*

*Lesson learned: Seeding the conversation or demonstrating how community functionality works can be important in terms of giving attendees more confidence in interacting. If a social space is quiet and*

*empty, it may stay that way. Organisers can help with getting the conversation started, but should also make sure they are supporting attendees in contributing to the conversation as much as possible.*

**– What social events were run?**

TFOM incorporated a number of social events which were spread throughout the conference, in addition to the message forums in the Whova app. These were (in rough chronological order):

- **Altspace watch party**
  This was less of a specific social event and more the parallel streaming of content in a more social space, via Altspace VR (see elsewhere in this report for a detailed write-up). While the Whova platform provided some degree of human connection via the Chat, Q&A and Community sections, Altspace enabled people to watch the talks together in an auditorium setting as well as to chat during or between talks. Though Altspace is not infinitely cross-platform, it is currently possible to connect into it via VR headsets, Windows and Mac. This kind of immersive environment does provide a way to bring people together more naturally, and is recommended for those who might want an alternative to the standard video call.
- **Social breakout: Gather**
  On the first day of TFOM, we organised an hour-long session in Gather.Town (described in detail elsewhere in this report) for attendees to meet each other and explore the capabilities of the Gather platform. Around 40-50 people attended at least part of this session, and we did hear some positive feedback on the platform overall. In retrospect, our enthusiasm to showcase the various kinds of worlds that you could have in Gather meant people were spread out a bit too much, so we probably could have limited it to a more condensed area (that said, we did also have to account for potentially 1000 people showing up). Gather adds the spatial dimension to what would otherwise be a normal video call, but that spatial dimension adds a lot and we also really appreciated the low barrier to entry for Gather as a browser-based (no install required) platform.
- **Glue Open Hours sessions**
  We partnered with Glue, who hosted three separate sessions that were focused on making the Glue platform available to attendees to try out on whichever platform worked for them. Glue is great for being readily cross-platform between VR headsets, Windows and Mac, so most attendees could get into the platform on their chosen device. To attend, they needed to register via an external Glue-hosted form which we linked to from Whova, and this would get their email address access into the demo Glue spaces over the course of TFOM. Attendees could choose to come to one of the Glue Open Hours sessions organised for each afternoon of TFOM to speak with a Glue rep directly and ask any questions. We heard from our Glue contacts that these sessions went well and were well-attended, but we don't have any detailed statistics.
- **Networking session: TFOM Bingo**
  On the first day of TFOM, we also organised a virtual bingo session hosted in Gather. People were given access to an online bingo card[17] which they could make use of during the session to chat with other attendees and note any bingo categories which applied. Over the course of this 1 hr session, around 20 unique attendees took part in the networking. In retrospect, we could have advertised this a bit more effectively and more in advance, but ultimately we found that attendance to social events was a small fraction of overall registrants (which we believe is symptomatic of people being more choosy about what they attend in virtual settings when they are not physically displaced from home as well as attending TFOM alongside normal work/home responsibilities). Nevertheless, we had a couple of Bingo winners, and we definitely think this is a nice approach to networking that gets people talking with each other.
- **Cook along with CSIRO**
  We organised a cook-along event for the first evening of TFOM, which took place between the end of the main program and the panel session scheduled for 22:00 AEST (to account for timezones of panellists). We partnered with CSIRO researchers into nutrition who were also involved with CSIRO's range of cookbooks on healthy and low-carb nutrition, and they provided a great and tasty recipe for attendees to follow on the night. We made the recipe available on the Whova platform in advance (but perhaps could have done so sooner for a larger turnout), and in a world

[17] https://docs.google.com/presentation/d/1ccLtsRtOLnqeA8H299QGXp-VbxVIWiWqS4apMoVPddM

of bigger budgets and easy (and sustainable) logistics, we would have loved to be able to provide ingredients similar to how Marley Spoon or Hello Fresh work (perhaps an avenue for future organisers to explore). We don't have a good measure on how many people were actively cooking along on the night (some people were just watching rather than cooking as well themselves), but we would guess maybe on the order of 10 people max were cooking along live. In retrospect, it might have been nice to opt for a vegetarian recipe to align more with our sustainability theme, and as an organiser writing this description who benefited from their mum cooking the recipe for them, I can note it could have been a slightly less complicated or shorter duration recipe. Overall though, this was a fun activity to put together and we would definitely recommend people to explore this concept of cook alongs further in future.

- **Social breakout: Virtual group walk using World Walking**
  This was an attempt to try to bring people together while apart, while also embedding a degree of physical activity where possible. In initial discussions, we talked about this session being on the topic of mindfulness (during a walk) or something that could bring some calm and relaxation to people's lives during TFOM, but in practice we did not have enough time to find a suitable partner we could work with to make that kind of concept a useful reality. We were still keen to get anyone interested out and walking, so we looking into apps that would support a virtual group walk. We came across World Walking, which was a free and easy to use app that people could enter steps with via a browser-based platform or using their phone app. We set up a virtual walk around Australia, and then anyone interested could sign up to join the TFOM group (and that walk), and contribute to the walking during the 45 min session we had allocated for the walk. In that time, roughly 12 people contributed to 30,000 steps, which was nice for such a short session. It's worth noting that actually there were 21 members in the group, but some people did not add any steps which suggests that we probably could have explained more on how to use the platform for maximum engagement. The people joining could also share a photo to the group, which was a nice feature for community building. Thinking back on this, it could have been nice to have this be running well before the conference and have people be able to contribute steps over a longer period of time, as well as having the dedicated session during TFOM. We have actually kept the platform running since then and did initially encourage people in the group to continue adding steps, but looking at the statistics now, there are only three people who have continued to contribute to the walk (all of them being TFOM organisers!). This virtual walking was a good initiative overall, and we'd recommend it to be further explored for future virtual social events.
- **Social meetup: Games night**
  The Whova Community section came with the ability for attendees to organise social meet-ups, either virtually or in-person (where relevant). We didn't really publicise this much or encourage much usage, and it is unclear whether people would have used it more if they had had more encouragement. As a demonstration of functionality, one of the TFOM organisers scheduled a games session to take place during the evening of the second day of TFOM. Since this was a very informal get-together, we didn't really advertise it much. On the night, we had 5 people join for the games which included 3 organisers and 2 attendees. It was a really fun session where we tried different online games and played them, and we would have liked to see this kind of thing a bit more formalised if we'd had more time to organise it. We have since connected afterwards with one of the attendees of this games night to participate in a BOF session on virtual conferences based on lessons learned from TFOM, so it was indeed a nice way to get to know other people and form connections! We would certainly like to see other takes on games nights as part of virtual confrences in the future, as this seems like a promising and fun way to connect virtually.
- **Social breakout: iSee VC**
  This was a slightly belated addition to our social breakout plans, based on the offer of the iSee VC team to host a social breakout in their platform. This took place on the 3rd day of TFOM, where an hour-long session was scheduled for people to get into the platform, chat and try it out. iSee VC (described in detail elsewhere) is similar to Gather in the sense of trying to blend video calls with more spatial autonomy for participants. Instead of small 8-bit avatars moving around a map like Gather, iSee VC uses people's video as their avatar, with directional audio and the ability to move around which is quite effective. We don't have exact statistics but we heard from iSee VC staff that roughly 40 people attended this session. One limitation of this platform is that it does require downloading software, however they do have some workarounds in place if people do not have the admin rights to their computer. As noted elsewhere, requiring the installation of

software can be quite a barrier to entry if an organisation has locked down people's access to their company-provided computers, and we hope this restriction can be addressed in the future. Since TFOM, we have partnered with iSee VC to offer a social get together after a live event celebrating an anniversary for radio astronomy in Australia, and that went really well overall, and we will look at other ways to potentially partner with iSee VC in future where appropriate.

- **TriviaHub online trivia**
  We scheduled a trivia night following the closing of TFOM, with the goal of providing a post-symposium fun activity that people could dial into. For this, we partnered with TriviaHub, who offer a hosted service where one of their team members runs the entire event. Like other paid-for social events, we struggled with trying to estimate the likely attendance and we had to cater for much larger numbers than ultimately manifested on the night. We could have handled up to 500 attendees, but the actual attendance to the trivia night was 16 people divided into three teams. This was a fun session with a great line-up of questions (including some on CSIRO!) that were put together by TriviaHub, though it was a bit of a pity we did not manage to encourage larger participation from the registered attendees of TFOM. This again seems to come down to people being quite time-poor in the current period (thus not prioritising activities which are not seen as necessary), and to virtual social events seemingly coming second to other commitments or activities in people's lives. Overall, we think online group activities like trivia can be a very successful way to bring people together, but in our case we perhaps could have done a better job of convincing attendees that it was worth investing their time in such activities.

*Lesson learned: There are many creative ways (we feel that we only scratched the surface) to bring people together in a virtual context that can be very effective in recreating the in-person notions of serendipitous interaction as well as human connection. We tried varied approaches on this theme of social events during TFOM, and while we had some success and a lot of fun in doing so, we noticed that many people did not engage with the social aspects of the TFOM program.*

*Lesson learned: It is often noted that when a conference is held in your local city you are less likely to participate in social events and dinners. In a fully remote setting like TFOM, we found that the vast majority of people had other things to do so socialising with conference attendees was low on most people's priority list it would seem. Perhaps this is a cultural change that will come over time as virtual activities become more normalised and socially acceptable (and well-executed), but we really hope to see more initiatives (and higher participation rates) in this area in future!*

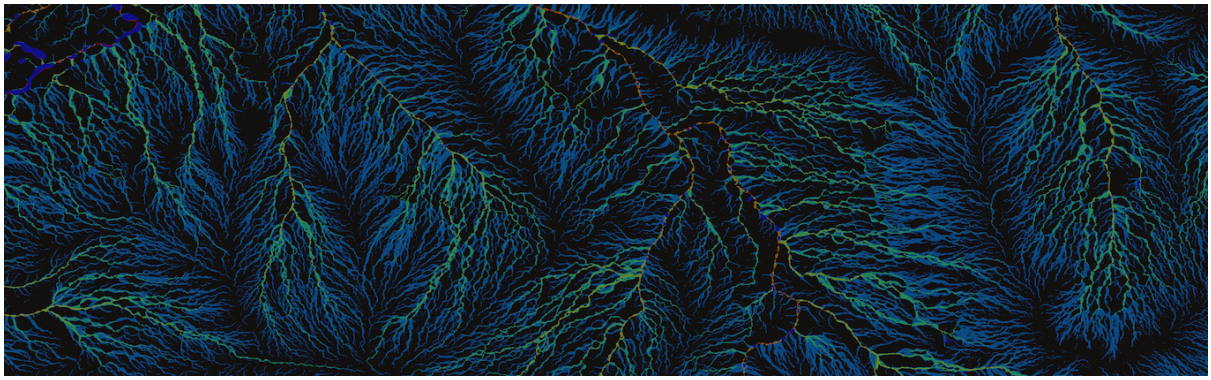
**– What role did social media play during the event?**

Social media is becoming a broadly defined area and is generally associated with ways of freely communicating to others. Although there are many forms, we focused on LinkedIn and Twitter during and leading up to the symposium. However, we did note that many participants also posted within Facebook to share their experience, but as organisers, we did not spend much time in this platform.

In the early stages of TFOM, we created a Twitter account for TFOM that was run by 3 of the organisers. During the TFOM event, we had someone that took "behind-the-scenes" pictures and posts for the live events, someone that posted about the streamed events as they were happening and we took turns highlighting comments or speakers as time permitted.

During the symposium, we also had advertised certain events on LinkedIn through various organisers. Also, many of our keynote or invited speakers and workshop leads advertised their upcoming content.

*Lesson learned: It helps to obtain speakers' Twitter handles prior to the start of the event so you are not trying to tweet something, listen to talks and find the speaker on Twitter all at the same time.*



# IV. Post-TFOM

For this section, we consider the period immediately following TFOM and outline what was involved in the wrap-up. This included finalising content and following up on various aspects of the conference.

**– To what extent did TFOM "end" at the conclusion of the main conference?**

Similarly to an in-person conference, there were a number of things still to do even after the main three days of TFOM had wrapped up. To maximise accessibility, we were committed to processing all live content into the same format as we had for the pre-recorded content, including getting it professionally captioned, so this took time to achieve for all the sessions which were delivered live during TFOM (e.g. the opening/closing, panel discussions, etc). We also began the process of writing this report, which has been an ongoing and considerable effort from a subset of the committee. We were working through finalising the post-event survey, which also involved the process of assessing it and getting it approved from the ethics perspective (which we had not anticipated as being necessary based on discussions earlier in the TFOM planning process). It was during this post-TFOM phase that we also sought final speaker preferences and consent regarding the long-term availability of content, though in retrospect this is something we could have actioned earlier with more time available.

This period also involved bringing together all of our final budget items (including our detailed sustainability calculations for carbon offsetting), so that we could provide this in a report to the CSIRO Research Office and also in terms of assessing our overall budget usage during TFOM. In this period we also dealt with other TFOM-related activities such as processing accessibility grants, prizes and speaker gifts. We started the process of transitioning content to a longer-term archive location on WordPress, which we mention in more detail below with respect to persistence of content. To keep track of everything, the standing committee meeting that we had had weekly in the course of planning TFOM stayed in place. Although starting in October 2020 we reduced its length from 60 min to 30 min. We also acted in a consulting capacity during this post-TFOM time (and continue to do so where relevant) to provide advice within CSIRO or to outside organisations on what we learned as a result of putting TFOM together and what we suggested as best practice for virtual interactions (including accessibility and inclusivity).

*Lesson learned: Virtual conferences are in no way less work than their in-person equivalents. At every stage of the process, TFOM has required effort and input from a number of committee members and this has extended into the post-TFOM period. We expect the finalisation of this report, alongside a separate report to the CSIRO Research Office, (and final budget accounting) to mark the true beginning of the end of TFOM.*

**– How are we sharing what we learned before, during and after TFOM?**

We have been working on this report of lessons learned, outcomes and recommendations since the end of TFOM to bring everything together in as coherent a way as possible and hopefully share useful insights to a wide range of interested people. We are also planning within the committee to look at holding one-off events in early 2021 to bring the TFOM community together and reflect on lessons learned since the conference.

As mentioned above, we have been very open about sharing our lessons learned from putting TFOM

together as well as our advice for best practice in virtual interaction, and we have been doing this in various ways since the conclusion of TFOM. We have seen examples of where choices we made for TFOM have spread to a broader community and been used elsewhere, such as the Bureau of Meteorology making use of Gather.Town for their annual R&D workshop, the ACAMAR astronomy conference adopting Whova as their conference platform, the CASA-VLBI 2020 workshop making use of World Walking, and the 75th anniversary for radio astronomy in Australia hosting a social meet-up event in iSee VC after a series of online talks.

In terms of direct consulting and expertise sharing, we have been contacted by various people to offer advice on different aspects of what we learned from TFOM. We have been keeping track of these via an expertise-sharing record in our TFOM Confluence area, which has the nice advantage of making writing this section quite easy. Since TFOM, we have provided advice, outlined best practice or presented on lessons learned as part of the following conferences: SARA2020[18], ACAMAR[19], AWS Educate[20], NHISS[21], eResearch Australasia 2020[22], AARNet Networkshop[23], SynBio FSP Workshop[24], OzDHI-2020[25] and SIGGRAPH Asia 2020[26]. There are also a number of conferences and symposia that we have provided advice to which don't currently have website URLS that we can link to. In addition, we started an #advice channel in our TFOM committee Slack space where we invite external interested people to join and get in touch easily if they have any questions about anything. We are continuing to consider ways we can share our key messages of TFOM with people as well as provide advice on how best to approach virtual interaction and why it is important to do so. We are really happy that many people saw how we approached TFOM and have since asked for advice or recommendations, as it is an encouraging validation of TFOM as an exploratory virtual conference.

*Lesson learned: Outcomes from a conference can be varied, especially for conferences that take place in a virtual form. In our case, more classic forms of output like a conference proceedings are less relevant than sharing knowledge and experiences in more informal ways, such as video calls or instant messaging channels, and we are keen to continue to find ways to help others make virtual interaction work best for them.*

**– What steps were taken to guarantee persistence of content and legacy value of TFOM?**

One of the greatest things we have found about conducting a virtual conference like TFOM is the potential for content to have a life cycle well beyond the closing date of the symposium. While, as noted above, it was a considerable amount of effort on the part of our speakers to record and for us, as a committee, to process all talks into uploaded content with correct metadata and captions, these talks now exist in an easily-shared form (assuming speaker consent to do so). Of speakers who replied to our consent form, 75% were happy for us to make their content available indefinitely accessible and only 5% wanted it taken down after the post-conference viewing period (1 month in duration). Almost 90% of speakers gave permission for the content to be as public as possible (e.g. not unlisted on YouTube), and 85% were happy for us to convert the talks to other formats that might be more accessible for others (e.g. audio file, transcript). For us, it is great to be able to continue to host this content and be able to share our speakers' insightful messages on the topic of the future of meetings beyond TFOM itself, and we are very grateful to our speakers for giving us the permission to do so. We would note for future organisers that it is critical to respect the rights of speakers in this space, and that in future if any speaker contacts us requesting content be removed, we will do so. We do not claim to own the content in any way, and simply would like to facilitate speaker content to reach a broader interested audience where applicable.

As of this report, all of the relevant TFOM content has been ported from our conference platform Whova to our legacy WordPress archive[27]. We have focused so far on providing access to content in its existing form (e.g. a hosted talk on YouTube), but we will be adding the alternative forms over the coming weeks

[18] https://www.cosmos.esa.int/web/sara2020
[19] https://acamar.org.au/events/acamar-virtual-workshop
[20] https://aws.amazon.com/education/education-webinars
[21] https://www.edison.re.kr/web/nhiss
[22] https://conference.eresearch.edu.au
[23] https://networkshop.aarnet.edu.au
[24] https://events.csiro.au/Events/2020/October/16/Synthetic-Biology-FSP-Nov-2020
[25] https://events.csiro.au/OzDHI-2020
[26] https://sa2020.siggraph.org/en
[27] https://thefutureofmeetings.wordpress.com

as it becomes available. In additional to hosting TFOM content, the archive will also be the place where we store other relevant information, such as our code of conduct and detailed outcomes (like this report). We will also work with Whova to keep the virtual venue up as long as feasible, so that those interested can log into the platform and get an insight into what TFOM was like. We are also planning to use our Twitter platform to re-advertise talks (with speaker permission), to bring awareness of the talk messages to a broader audience. Overall, we have been pleased to see that it is not a requirement to have been present at TFOM live to benefit from the content shared, and we will continue to do what we can to ensure ongoing legacy value from TFOM content as long as it is useful.

*Lesson learned: A virtual conference where content is recorded and formatted in as professional a form as possible leads to a great potential for legacy value for this content and the ability for the conversations started at a conference to live on well beyond that time. That said, we believe content ultimately belongs to the speaker or contributor, and so strongly advise that future organisers do seek this consent (respecting speaker rights) and make their plans for legacy value of content as clear as possible (and ensure that it is motivated by good intentions such as sharing the conference messages broadly).*

**– How were speaker gifts handled for TFOM?**

As many reading this will know, keynote and invited speakers often receive a small gift at conferences in person to thank them for their contribution to the conference. We wanted to do the same for our conference, however needed to come up with a solution that would work well for our geographically-distributed speakers as well as be in line as much as possible with our goals of sustainability. We researched different options and decided to offer two options to speakers depending on their preferences:

1. the option to plant some trees in a location of their choice via One Tree Planted[28], or
2. an online gift card that could be used to purchase something of their choosing via an Australian virtual Mastercard provider.

We asked speakers to fill in a form and register their preferences, and then we provided the gifts after that. The partnership with One Tree Planted went really well. They worked with us to ensure the right trees were planted for the right people and we would strongly recommend them as a great partner for sustainable speaker gifts. The virtual gift cards were more complicated in that we found out after purchasing that the cards were only intended for people within Australia (which wasn't listed on the website or in the terms and conditions), so we had to source alternate gift cards for international speakers that had asked for a gift card. For these speakers, we opted for Amazon gift cards as relevant to their location as possible.

*Lesson learned: We recommend getting creative for conference speaker gifts (if applicable), especially in the case of virtual conferences. We also recommend that effort be made to ensure that these gifts are as sustainable as possible.*

**– How did TFOM measure its impact on the environment to ensure sustainability?**

Sustainability was a primary focus for TFOM, in terms of exploring widely accessible communication methods that support long-term engagement, but also in terms of understanding and neutralising the external impact of meetings on the environment.

For a digital meeting, emissions are primarily associated with storage and transmission of data as well as device power to attend on, all of which are proportional to the number of attendees.

The first step we took was to determine the number of participants actively involved in TFOM. For an online-only event it can be difficult to accurately determine participation, since it is common for only 20 - 30 % of registered participants to actively engage with the event, for people to attend only the sessions they are interested in and for content delivery to happen both during and after the session. The use of pre-recorded content provided a way to cross-check the number of active participants by analysing metrics provided by the content hosting platform. Although there were about 1200 registered participants, the average number of simultaneous viewers for any of the pre-recorded content was roughly 160. Rounding this to an estimated 200 active participants provides a small buffer to account

[28] https://onetreeplanted.org

for attendees that engaged in real time with other content besides the most popular session, as well as emissions due to ongoing, post-live viewing.

While estimating the carbon offsets for a physical conference based on travel is well constrained (see below for what TFOM would have been if done in-person), estimating the carbon footprint of a digital conference is more difficult, due to the increased uncertainty in our knowledge of the supply chain. Most of the energy usage associated with TFOM is assumed to arise from the processing power and storage associated with recording, editing, uploading, and streaming of video content to multiple users. Our reliance on cloud services such as Vimeo and YouTube makes it difficult to identify the physical resources utilised for many of these activities. Therefore, key factors such as the energy generation method cannot be determined on a case by case basis and as such we utilise statistical estimates based on the latest world and Australia based power mix with current estimates for mega-scale data center power usage for 2020. While our best estimates for TFOM 2020 are available below, we note that the carbon footprint of online services changes as quickly as the technology underlying the services themselves and hence should be updated whenever this calculation is attempted.

We base our expected emissions on several estimates, including the IEA's[29] and the SHIFT project's[30] 2020 estimates of carbon dioxide equivalent per hour ($CO_2$e/hr) of streamed video, as well as several 2015-2017 $CO_2$e/GB estimates[31,32] updated to 2020 using their fitted curves[33,34] and converted to $CO_2$e/hr using 3.6GB per hour (8Mbps) of 1080p video as recommended by YouTube[35].

From these sources we determine an average of 0.345 kg $CO_2$e (carbon dioxide equivalent) produced per hour of video streaming at 1080p resolution. This estimate includes power for servers and home devices as well as the appropriate fraction of the servers, networks and home devices manufacturing emissions. The streaming services used to host TFOM content provide statistics from which we can derive the number of hours watched. Using our estimate of 200 participants, combined with the distribution of 'watched hours' from our post event survey, we estimate that watching TFOM content produced 3.93 kg $CO_2$e per person from video-streaming during and after the event, which is vastly reduced compared with the cost of physical travel.

Estimating additional factors such as the energy usage of each attendee at their home location (based on average Australian consumption[36]) could account for significantly more than the streaming costs. Instead, we attempt to count only the additional home emissions caused by participation in TFOM, which would amount to additional hours of typical office lighting. Assuming in-person attendees would still be using their laptops and lights for their average watch hours, the additional carbon cost is a small fraction of the streaming service cost bringing our per attendee estimate to a total of 4.01 kg $CO_2$e per person or about 802 kg $CO_2$e for our estimated 200 attendees. To ensure our calculations covered all areas of activity, we also included estimates for live video conference sessions during the organisation of TFOM, within the committee and with external collaborators as well as emails to and from the organising committee, online messaging via Slack and laptop usage and home office lights usage for TFOM planning hours. This added about 620 kg to the initial emissions.

Our final estimates for the digital 200 active attendee TFOM with their average watch hours plus including organising committee related activities (such as video calls for planning and organising) comes to 1420 kg $CO_2$e total. Compared to a TFOM-like in-person conference estimate of 1400 kg $CO_2$e *per attendee*, digital is hands down a huge improvement in terms of sustainability. Finally we note that in terms of plastics, paper and other waste TFOM digital was vastly reduced compared to its in-person equivalent. There was no over-catering waste, no flyers, no paper maps, no program books, no conference gift bags and no non-digital communication to third party sponsors, vendors, organisers or attendees. TFOM itself was organised completely online, none of the organisers met in-person during the planning of TFOM and as such all of our planning material and travel is digital.

[29] https://www.carbonbrief.org/factcheck-what-is-the-carbon-footprint-of-streaming-video-on-netflix
[30] https://theshiftproject.org/en/article/unsustainable-use-online-video/
[31] https://www.emergeinteractive.com/insights/detail/does-irresponsible-web-development-contribute-to-global-warming
[32] https://www.fastcompany.com/90171268/internet_impact_visualized
[33] https://www.emergeinteractive.com/wp-content/uploads/2020/07/Evaluating-the-Energy-Consumption-of-Mobile-Data-Transfer-2018.pdf
[34] https://www.emergeinteractive.com/wp-content/uploads/2020/07/Electricity-Intensity-of-Internet-Data-Transmission-Untangling-the-Estimates-2017.pdf
[35] https://support.google.com/youtube/answer/1722171
[36] https://ahd.csiro.au/other-data/typical-house-energy-use

Python code for the TFOM emissions calculations is hosted on GitHub and available on request (may be made open source in the near future).

*Lesson learned: There is currently no standardised method or data to calculate carbon emissions associated with online activities, a tool to help with this would be very helpful in the future.*

*Lesson learned: Virtual meetings have vastly lower environmental impact than in-person meetings. In the case of TFOM, a comprehensive offset of the digital emissions works out to be approximately 0.5 % of just the direct travel emissions of its hypothetical physical equivalent. The monetary cost to offset the conference in this form even in as little time as one year is low enough to comfortably fit into a conference budget. We recommend conference organisers give serious thought to the environmental cost of their meetings and plan to offset accordingly to ensure sustainability of their work in the long term.*

**– How much $CO_2$e would TFOM have produced if it was hosted physically?**

The high carbon cost of travel associated with physical meetings is well known. Research has shown that people employed in fields that rely heavily on conferences can contribute several times the carbon footprint of the average human[37]. It was therefore important for the TFOM organising committee to quantify the carbon cost of TFOM in its digital, online-only format (see above), and compare this to the estimated footprint of an equivalent physical conference to demonstrate the sustainability benefits of a digital-first approach.

For calculating the carbon footprint of a TFOM-like in-person meeting we here assume that in-person attendance emissions are dominated by emissions from air and car travel to and from the conference from the attendees home, which in turn depend strongly on the number of attendees and the distance they travel. While additional costs such as hotel power, eating out, infrastructure manufacturing and maintenance are all valid additions to this model, they are beyond the scope of this report to calculate accurately and ultimately should not be a huge difference between similar lifestyles emissions in a attendees home country. Thus they are excluded from the in-person model.

Much like for the digital TFOM estimates, the first step we took was to determine the number of participants that were actively involved in TFOM, and use this to estimate the number of attendees with enough interest to have attended in person. For an online-only event it can be difficult to accurately determine participation, since it is common for only 20 - 30 % of registered participants to actively engage with the event. The use of pre-recorded content provided a way to cross-check the number of active participants by analysing metrics provided by the content hosting platform. Although there were about 1200 registered participants, the largest number of simultaneous viewers for any of the pre-recorded content was 180. Rounding this to an estimated 200 active participants provides a small buffer to account for attendees that engaged in real time with other content and would still have attended the conference.

Registration information provided the point of origin for each participant, which was used anonymously for these calculations. Unfortunately, it is impossible to determine (without prior consent) which 200 registered participants were actively engaged. This makes it difficult to estimate the travel distances involved. To approach this statistically, we took a random sample of 200 registered participants from the total pool and determined the equivalent distance travelled based on their listed city, assuming that the physical conference would have taken place at CSIRO's Marsfield Headquarters in Sydney, Australia. We then repeated this 100 times and calculated both the mean and standard deviation of the sample to estimate the typical distance travelled and the uncertainty in this value. It should be noted that the uncertainty derived in this way does not account for systematic errors, such as uncertainty in actual and life-cycle emissions from forms of transport used.

While we statistically sampled from our attendees in terms of who would have attended, we did not just assume that each attendee travelled the same distance. For each possible attendee to physical TFOM, the travel they would have taken was broken down into several components, for those closer than 200km the carbon footprint of a their physical journey was estimated as:

- For locals closer than 70km, their emissions were calculated as a daily return drive to the conference venue.

[37] https://www.nature.com/articles/s41550-020-1169-1

- For locals between 70km and 200km, their emissions were calculated as a single return drive to the conference venue (as they would presumably stay at a hotel)

For those further away than 200km the carbon footprint of their physical journey was estimated as a combination of the the following components:

- Return road travel for an assumed typical 30 km distance from home to the nearest airport
- For those whose distance from Sydney was less than 3300km we assume Domestic Air travel emissions for the full distance, above this we assume International Air travel emissions for the full distance
- Return road travel from Sydney airport to CSIRO Marsfield

The conversion between distance and carbon emissions utilised factors published by the UK government in 2020[38].

In total, we determined that physical travel for a meeting equivalent to TFOM would have produced slightly over 1400 kg $CO_2$e per person, with a statistical uncertainty of about 10 %. Using 200 attendees, this amounts to *280,000 kg $CO_2$e for an in-person TFOM as a whole*. Despite the rather large size of this estimate we wish to highlight that it still does not include additional (and substantial) emissions costs associated with the physical venue itself, in-person activities such as a conference dinner, personal travel at the destination or the costs associated with producing fuel and manufacturing or maintaining transport infrastructure.

In addition to this TFOM in-person would have produced numerous non-emissions based waste in the form of pamphlets, flyers, programs, banners, posters, gift bag items, maps, catering waste and more. Finally we note that to offset a TFOM-like physical conferences 280,000kg of emissions using trees in a single year (as we did for actual TFOM), would require nearly 48,000 saplings planted, totalling $64,000 AUD (more than twice our total budget).

Python code for the TFOM emissions calculations is hosted on GitHub and available on request (may be made open source in the near future).

*Lesson learned: Properly offsetting even (mostly) domestic conferences like TFOM results in offsetting costs that are in some cases more than the entire conference buget. As such carbon offsetting needs to be properly priced into in-person conference attendance.*

**– How did TFOM offset its impact on the environment to ensure sustainability?**

In order to be as sustainable as possible, we used a portion of the conference budget to offset the equivalent carbon emissions ($CO_2$e) estimated above and aimed to do so in less than 1 year.

We note that most carbon offset schemes assume 50 years to offset each year of emissions. TFOM believes these approaches are insufficient as they will continue to increase $CO_2$e emissions year on year for the next 50 years. Hence we aim for a 1 year offset time in order to offset TFOM before its next occurrence or iteration.

While there are issues with any form of carbon offsetting or capture, tree planting is a standard, well constrained and well documented carbon capture method, with numerous secondary environmental benefits. As such we have chosen to offset TFOM's $CO_2$e emissions by funding re-forestation projects for our full carbon emissions (directly as an offset), and in addition to this indirectly offset a small bonus amount by providing tree plantings as an option for speakers instead of more traditional wine or chocolates.

Using the sapling based carbon capture rate of 5.8 kg per year[39,40], we calculate that we need to plant 241 saplings to absorb a TFOM-equivalent amount of carbon dioxide in their first year of growth. Doing this via One Tree Planted ($1 USD per tree) cost roughly $325 AUD, or approximately 1% of our conferences budget to offset all attendee, speaker and organising conference emissions including device and infrastructure power as well as an appropriate percentage of manufacturing emissions.

*Lesson learned: Offsetting carbon emissions of digital conferences using trees is relatively inexpensive.*

[38] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020
[39] https://onetreeplanted.org
[40] https://www.carbonpirates.com/blog/how-much-carbon-do-trees-absorb

**– How can I initially estimate carbon offsets for digital conference budgets?**

We strongly encourage all conferences to do their own offset calculations to account for differences in planning, travel arrangements and venue. This is especially true for digital conferences as the estimates for digital conference emissions is highly dependent on your delivery mechanism, the devices your attendees use and the rapidly changing $CO_2e$ per GB ratios driven by the continual improvements to energy grid mix and technological advancement. However we provide two rough rules of thumb for 2021 based on TFOM estimates:

- 0.1 saplings planted for each hour watched by each attendee

Or as a even more general rule of thumb if you do not plan to track individual watch hours, we suggest:

- 2 saplings planted per attendee for a 5 day conference + 100 trees as a flat rate for the organization aspect

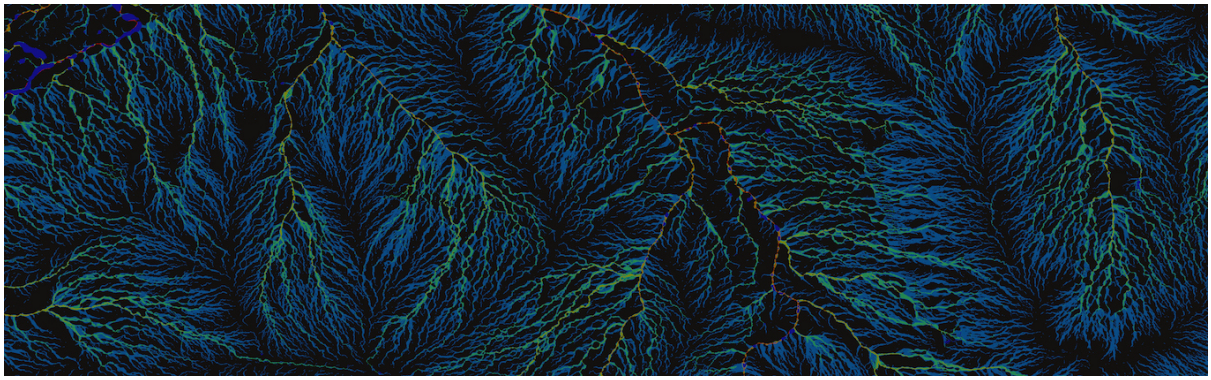
Though we note that the more general rule assumes 8 hours of video based conference attendance per attendee per day, which is likely to be at little high given screen fatigue with current video based conference systems. This slight over estimate is designed to be 'fail-safe' in that it aims to offset nominally 'full conference attendance' in the scenario where watch statistics are not tracked.

**– How can I further minimise digital conference emissions?**

The major driver of digital conferences emissions in current platforms is video content. For large multi-person calls this adds up rapidly, so for environmental aspects we suggest attendees keep their videos off during presentations (though acknowledge social reasons for keeping them on).

While one to many delivery methods (i.e using YouTube) are an improvement on multi-user calls, the truly conscientious conference planners could aim instead to provide slides separately alongside audio narration, vastly reducing data transfer amounts and hence carbon emissions.

Finally despite common misconception, simulated meeting places either in VR or desktop use far less bandwidth for group meetings and discussion than video calls. While they need send rather large world data (10MB - 200MB) to get started, it can be re-used throughout a conference or for multiple years without update (ignoring app updates which also apply to video apps). This reduces real-time data transfer to just positional data and audio. In comparison to HD video at 3.6GB an hour this is a huge improvement. Hence virtual representation may be an extremely effective way to reduce $CO_2e$ from digital conference emissions yet further, even after photo-realistic avatars become the norm.



# V. Evaluating TFOM

Finally, we consider the process of evaluating TFOM in this section. This includes prior, during and after the event itself, and gives insight into how we evaluated the event to ensure the maximum amount of learning.

**– Why was evaluation considered a key aspect of TFOM?**

There are many reasons to evaluate a meeting. Discussions through "Expressions of Interest" and pre-event surveys help shape the event and gain interest. Post-event surveys are important for evaluating how well the participants thought the content was delivered and what can be learned for future events. For TFOM, all of three of these forms of evaluation were implemented.

The Expression of Interest form was sent around in the early planning phase of the event to determine the interest level and make some guess on the number of attendees to be planning for, as well as identifying key topics that people were interested to see addressed.

The evaluation process was important to TFOM specifically to assess:

- The background of participants and the role they play in their job to understand our target audience and who finds the symposium most appealing
- The experience the participants had and their views before and after the event
- The understanding of the knowledge they developed during the event and what events were most helpful achieve that level of understanding
- The change of attitudes toward various technologies from prior to the event to after and if people are amenable to changing to more virtual interactions
- The engagement with the event and if people found it useful for building new connections

*Lesson learned: We encourage all involved in meetings, events and conferences to make evaluation a core part of their processes from beginning to end, to ensure that goals and outcomes (as well as how measurement of meeting these) will be clear.*

**– How did TFOM generally approach the process of evaluation?**

The TFOM committee contracted the assistance of Sarah Jenkins from Jenesys Associates Ltd to assist in building a pre-event and post-event survey. The pre-event survey was focused on understanding what attendees expectations were going in to the event and what they hoped to gain from attending. We also had a question regarding how attendees expected to attend the event. Within the post-event survey we were more focused on how much of the event they attended and what they thought of the quality of the event. We did find the need to add in some of our own specific questions based on our knowledge of the population of people likely to be attending, compared with initial outlines for the surveys.

In both the pre- and post-event survey we did not ask identifying information and ensured that attendee answers could not be matched between the two surveys. This was to meet the requirements of the ethics approval process in terms of using the information from the survey in this report.

In retrospect, evaluation was a critical part of the process and if we had had more time, it would have been ideal to prioritise this higher as a core aspect of putting together an event or conference. By adopting an evaluation mindset early on, it ensures you are clear about what the goals and outcomes of an event may be, and this helps a lot in terms of defining the event itself. Working with Sarah was great because of her experience in evaluating various kinds of events, meaning we were not starting from scratch in terms of how we wanted to evaluate TFOM.

*Lesson learned: Employing the help of someone like Sarah was a big help in constructing our overall goals for evaluation, including the surveys, although specific domain knowledge is very important in defining evaluation itself and overall goals. Evaluation should become a core part of planning an event, in order to ensure every element and decision is ultimately aligned with identified goals and outcomes.*

**– How did we get ethics approval to use the information in this report?**

In order to share the information from the post-event survey we needed to obtain ethics and privacy approval as the survey is a form of human data. Because we did not start this process before collecting info for the pre-event survey, we are not able to discuss the details of that within this report. The exact process will be unique for each organisation, but in general we contacted the ethics team and they sent us the necessary paperwork to be presented to the committee that meets every week. As we were collecting de-identified information to be used in a statistical way, the process was simple and expedient. We note here that Australian Human Research Ethics Committees (including the HREC of CSIRO) need to conduct human research in accordance with the ”National Statement on Ethical Conduct in Human Research”, to ensure standard and systematic approaches to ethics across the country.

*Lesson learned: Start this process well before the event if you have a committee that is from multiple organisations or if you would like to share the results of an event survey. In some instances, ethics approval may be required to email attendees. In fact, ethics should be approved before approaching any potential participants as the recruitment of participants is part of the methodology and is assessed by the ethics committee. We would suggest having a conversation with your relevant HREC as soon as possible in planning any kind of event to ensure you are covered and that any required approval can be granted early.*

**– Was any evaluation carried out prior to TFOM itself?**

For TFOM, we issued a pre-event survey to registered attendees and received 147 responses. The ethics approval we obtained (as described above) only covers the post-event survey due to the timescales on which we applied for this approval (a key lesson for future organisers to ensure the ethics process is started well before your event, even if you are not sure it will be required). As such, we are not able to discuss the findings in any details within this external-facing report. In any case, the main high-level things we gained from this survey were direct insights into people's recent experiences (both good and bad) with virtual meetings and their expectations going into TFOM. The survey overall did provide many valuable insights, and with more time between the survey responses being gathered and TFOM itself, it would have been useful to digest the responses in greater detail and ensure we could act on them as best as possible. We will make use of the information gleaned via the pre-event survey internally within the committee to inform any future activities we might undertake following TFOM.

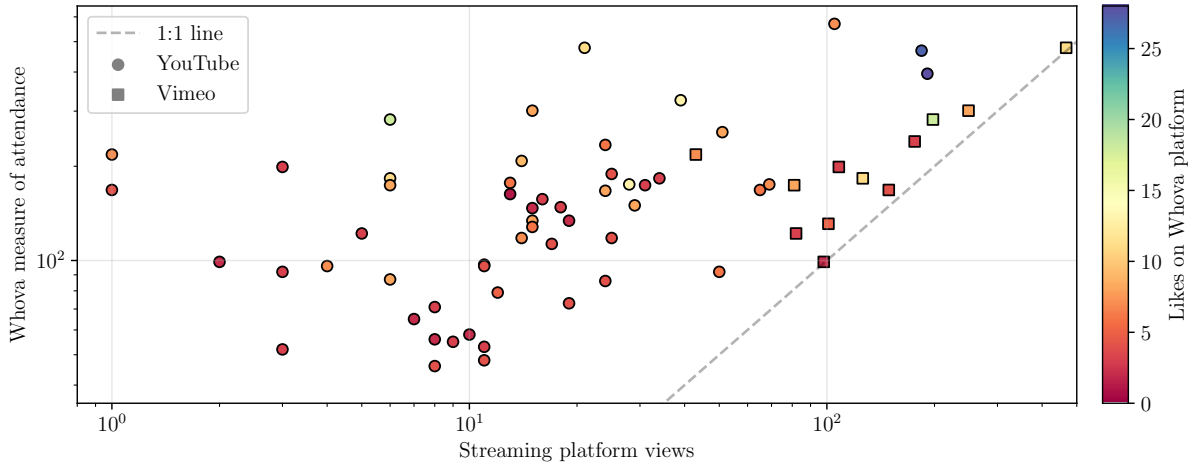
*Lesson learned: Evaluating this survey more thoroughly, earlier, would have allowed us to be more prepared for the fraction of attendees that attended the event asynchronously. However, the survey allowed us to gauge the level of excitement that people had for the symposium and both their experiences and expectations, so was an important and informative aspect of evaluation. If we had known in advance that this would need to come under ethics approval, we would have actioned that sooner so we could share the results of the survey in a meaningful and useful way.*

**– How many people attended TFOM, and how was this divided between synchronous and asynchronous views?**

We initially assumed that since we were conducting TFOM virtually, it would be straightforward to determine our attendance statistics. However, in looking at both our YouTube and Vimeo statistics, it appears that there are some incongruities in terms of how the numbers are calculated, likely due to the fact that we embedded these services within Whova. For example, all Exhibitor-hosted content was set by

the Whova platform to autoplay, and we found evidence online[41] suggesting that any views of content set up in this way would not be counted within YouTube's analytics. While there isn't much evidence suggesting that embedded Premiere content would be similarly affected, it does seem that in general the viewing numbers are lower than we would have expected based on the numbers of people who indicated attendance as well as live interaction on the day. As such, to try to gauge attendance, we look at this on a few different angles beyond simply the viewing stats from YouTube or Vimeo directly.

To address the question of statistics, we draw quantitative information from the Whova platform, YouTube and Vimeo. Via Whova we have an indication of attendance, which appears to track attendees who either added the video to their agenda or who viewed the content live on the day at its scheduled time of screening. In addition, we have the metric of likes, which tracks if an attendee liked a particular agenda item. From YouTube and Vimeo we consider views, noting that this does not necessarily reflect completing viewing of the content or distinguish unique viewers from repeat viewers. An additional qualification here is that pre-recorded content was handled differently to live content: pre-recorded content was set up on YouTube as a Premiere, to stream live at the scheduled time, while live content was streamed directly to Vimeo due to YouTube limitations with embedding live content on external platforms. As such, any live content is best measured via the Vimeo stats for tracking live attendance, while pre-recorded content relies on YouTube analytics.




We summarise the statistical overview in the figure above. On the x-axis we show the viewing statistics as indicated by YouTube and Vimeo for a given agenda item (YouTube is shown as circle markers, Vimeo as squares markers). The y-axis tracks Whova's measure of attendance. If the Whova attendance was completely equivalent to the attendance measured by streaming platforms, the points would appear on the 1:1 line shown as a dashed grey line on the plot. Colour of points indicates numbers of likes given to the agenda item by attendees via the Whova platform, but otherwise does not add anything significant to the analysis. What is very clear from this figure is that although YouTube and Vimeo were embedded in the Whova platform in exactly the same way, the statistics for content as measured by the two streaming platforms are completely different. YouTube consistently indicates a very low viewing number, while Vimeo is generally much closer to the 1:1 line and thus more in line with the attendance as indicated by Whova. Our conclusion based on this is that our initial suspicions of YouTube analytics not tracking attendance reliably are correct, and we believe this is primarily due to the fact that Whova has implemented autoplay for embedded YouTube content (in the case of Premiered content, autoplaying by Whova if the time on the agenda item matched the scheduled time). As such, it would seem that the YouTube stats as they are only track people who chose to view the content on YouTube directly, as opposed to embedded in Whova. That said, we are not entirely sure about how YouTube analytics work, only that they seem very inconsistent when compared with similar measures of attendance via Whova or Vimeo.

To touch briefly on asynchronous attendance, we consider only views that have occurred since the conclusion of TFOM on 17th September 2020. We don't have a way to track this via Whova as there is no time dimension to the statistics provided, so we can only look at this from the perspective of YouTube (whose analytics we think are severely affected due to embedding on Whova) or Vimeo (which

[41] https://stackoverflow.com/q/18215489/2862694

we did not use for post-TFOM access to content, only to embed livestreams). As such, our view of asynchronous or post-TFOM attendance is likely to be quite incomplete. In any case, if we look at the total Vimeo or YouTube stats from 18th September 2020 to now, these come to a total of 75 views (Vimeo) or 690 views (YouTube). Due to the caveats noted, we think these are lower limits on the actual views over this period, but at least they provide some indication of the post-TFOM attendance. Note that if people watched content at a later time that better suited their timezone (but took place within the "live" three days of the symposium), we do not have a good way to separate this out with the current approach. It is unclear whether we can pull out views as a function of exact time from either YouTube or Vimeo analytics, but if we could, then we could compared when views occurred versus the scheduled time of the content. This could be an avenue to explore in future.

To conclude on this, we found it was a bit challenging to pin down exact attendance numbers due to the technical workflow that we had chosen to implement. It is interesting to note that in the case of structuring a conference in something like Zoom or Slack, tracking attendance is much easier because it is much clearer what counts as someone attending as well as being all within the same platform. Transparency of analytics is something that is quite important, particularly in the case of when views may not be counted due to criteria imposed by a platform. We would hope that this kind of attendance tracking would get much easier over time, and would suggest that this is best done by the virtual venue platforms (like Whova) because these platforms have the best chance of seeing the attendance properly and of being explicit about how metrics are calculated.

*Lesson learned: Being clear from the outset about how metrics like attendance will be measured is a good approach to take, and we also recommend investigating exactly how analytics are measured to ensure you know how to interpret the resulting statistics.*

**– What were the demographics of the TFOM attendees?**

Based on those that filled out the post-event survey, 73% of the attendees were from the University/Research sector with 54% of attendees having jobs in STEM (Science, Technology, Engineering, Maths). The other popular sectors were Public and Private sectors of industry, totaling 20%. The attendees were mainly from the STEM sector (52%), Education and Training (15%) and Information Technology (12%). Although smaller fractions we also did have people from Business Management and Administration, Government Administration, Health Services and Agriculture & Food industry.

*Lesson learned: Making the conference accessible, willing to experiment, and advertising broadly allows for more industries to come together and interact.*

**– How well did TFOM address the key themes of accessibility, inclusivity, sustainability and technology?**

Within TFOM, there were four key themes: Accessibility, Inclusivity, Sustainability and Technology. The responses to the survey were overall very positive (around 90% good or very good), with our lowest rating being sustainability (73% good or very good). Reflecting on this feedback, even though the virtual symposium in and of itself can be seen as more sustainable, there were not a lot of talks focusing solely on this theme and we could have highlighted our sustainable choices more clearly.

For more discussion on what we did to address the various themes see Section VI.

*Lesson learned: It would not have been hard to include more focus on sustainability and outward communication on the efforts put into the organisation to make the event sustainable.*

**– What were the post-event survey questions?**

- Did you mainly attend the Future of Meetings Symposium as?
- Which day(s) of the Symposium did you attend?
- How much time per day, on average, did you spend connected to the Symposium on the day(s) you attended?
- Would you have attended an in-person version of this Symposium, e.g. without COVID-19 limitations?

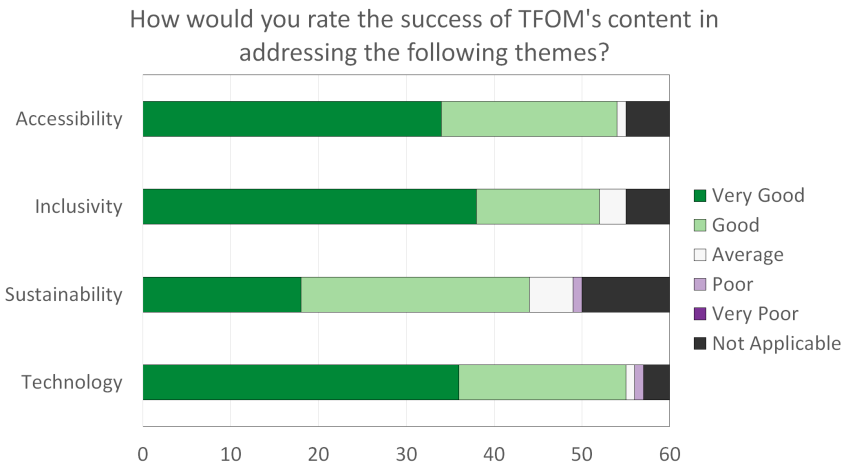



Figure 8: A chart showing how people thought we addressed each of the key themes. The x-axis shows the number of people that answered the survey question.

- How do you rate your overall experience of The Future of Meetings Symposium?
- How do you rate the ease of use of the online platform (Whova) used for the Symposium?
- How do you rate these aspects of The Future of Meetings Symposium?
- Which of the following sessions did you attend?
- What, if anything, did you feel could have or should have been removed from the TFOM program?
- How would you rate the success of TFOM's content in addressing the following themes?
- How much do you disagree or agree with the following statements about the Symposium?
- How, if at all, has the Symposium affected your feelings or views about online interactions in relation to your work/studies?
- What do you wish you knew before the start of TFOM that you know now?
- How, if at all, do you intend to implement or use in the future anything you got from the symposium, e.g. knowledge, best practice, contacts?
- How, if at all, has the Symposium affected your views about the future format of conferences in a post Covid-19 world?
- Which scenario would you personally prefer for the future format of conferences?
- Which of the following best describes your organisation or employer?
- Which of the following best fits your occupation?

**– What did the responses to the TFOM post-event survey reveal?**

Overall we had 60 responses from the post-event survey, which represents a small fraction of those that registered for the event. For these responses, we had 8 speakers, 2 exhibitors, 9 organisers and 48 attendees provide feedback.

In general (as shown in Figure 9) most (85%) of the respondents attended the first day with 47% stating they watched the recorded material on their own time. Most clarified that they picked the workshops or sessions that were of most interest or relevant to them with over 71% stating they spent less than 4 hours a day engaged in the symposium. There did appear to be a bit of divide among the attendees for those focused on the keynote sessions and workshops and those that prioritised the technology demonstrations like iSeeVC, Altspace and Gather.Town. Very few people attended or prioritised the social events based on these responses.

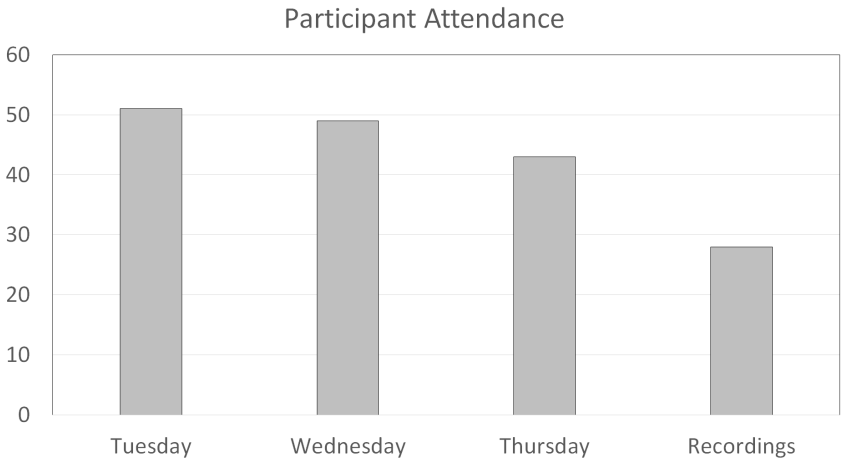



Figure 9: Figure showing the number of participants that stated they were present for each of the days of the event.

In the survey we asked if respondents would have attended if the meeting was in-person. Around 45% said yes or if there was little travel involved. Upon clarification, some suggested the experience was better than they expected but they wouldn't have travelled for it with the information they had going into the symposium. Of the respondents, 27% suggested they would not have attended if it was in-person but it was not clear exactly why this was the case, although it was presumably due to ease of access and less disruptive nature of online meetings.

When asked to rate their experience of TFOM, 52% said it was very good and 38% said it was good, summing to a 90% good rating, as shown in Figure 10. We received 1 vote for poor and 1 vote for very poor, however, these came from respondents that attended a single event or very few events. Those that engaged with the content and the symposium more, voted that the event was enjoyable.

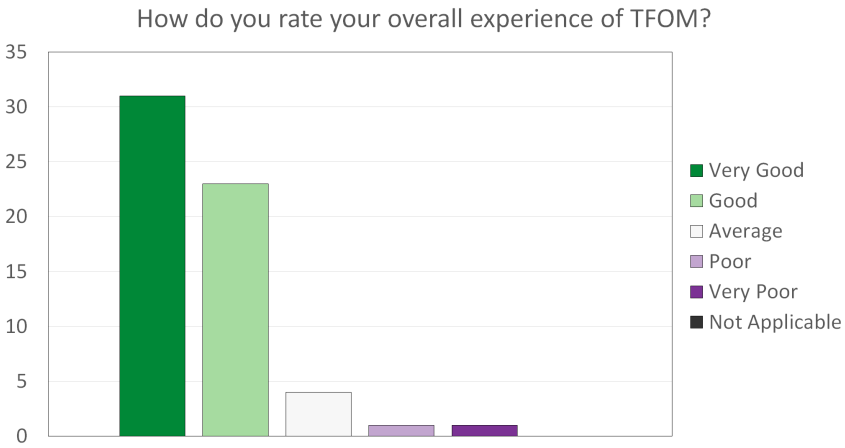



Figure 10: A chart summarising the experience of those that attended the event. The two negative reviews came from attendees that participated in a single event and was not pleased with the content.

For this symposium we chose Whova as the platform to host the meeting and used a combination of mobile and web access. Responses revealed that 80% of the respondents liked the platform and was happy with the performance. The other 20% of low ratings came from a combinations of the requirements of using the phone application to sign up for workshops or interact more personally. We did receive a few comments that the application was hard to navigate and had a high technology barrier to entry. Some people would also have liked a messaging system like Slack where they could go back through and search the conversations more easily than in the Community section of Whova. A few people also complained about not having questions answered or that it was hard to find out if the questions were answered. We also received a few complaints about the large number of notifications sent by Whova, the organisers, the polling system, etc, making it hard to manage.

For the content, the highest rated item was the keynote and invited talks, with the recorded and live content and workshops also rating very highly overall. See Figure 11 for a summary. Many of the respondents to the survey did not attend the social activities or exhibition space, and we saw more of a spread in ratings for social activities, exhibitors, panels and contributed content (though these spreads were generally dominated by a N/A response indicating the respondent did not engage with this content). Generally, people stated the quality of the content could be very hit or miss, that there were some amazing talks and discussions and some content that was poorly executed. That said, there were no ratings of poor or very poor for any of the content, with the exception of a single rating of poor from one person who attended one event and did not like it.

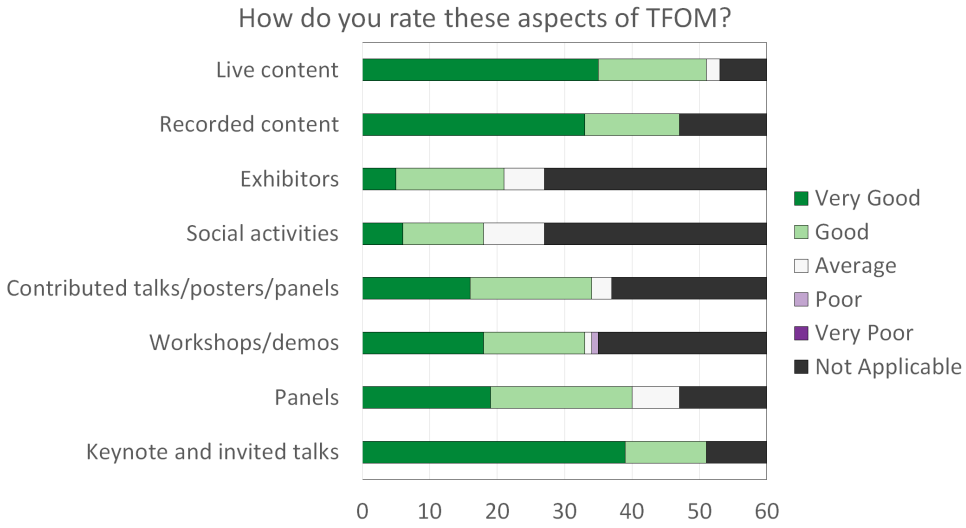



Figure 11: A figure showing the interaction the respondents had with the various content types at the conference. “Not Applicable” means the respondent didn’t attend.

Overall, the program attendance was pretty even along the main aspects of the event (we considered only content other than keynotes and invited when assessing attendance in this question). The recommendations for missing aspects were graphic facilitation, mental health or psychology, how to make hybrid conference models work, and time scheduled to watch recorded/contributor talks. Although the social sessions were typically not broadly attended, there were suggestions to have a virtual lunch room where people could come and go and chat. There were also suggestions that it would have been nice to have suggestions of places to go to participate or try virtual reality headsets (difficult during COVID-19 closures).

Not a lot of respondents had suggestions about what was missing. A few people mentioned that it would have been good to have the talks more focused on the academic side of the tools and more on what we can use today to help with online collaboration and conferencing. A few respondents suggested that the content was too forward-thinking or technologies that are not fully available for every-day work.

We also asked a series of 5 statements and asked people to rate them:

- I learnt something new about the technology to support online interactions - 93% agreed
- I made some useful new contacts – 38% agreed
- I found out more about best practice in online interactions – 85% agreed
- I felt encouraged to share my virtual experiences – 57% agreed
- I learned how to make virtual interactions more inclusive – 80% agreed

The results shown in Figure 12 suggest that overall, respondents recognised that the symposium made them more aware of the tools available to increase online interactions and how to make those interactions more inclusive. They also recognised a greater need for technical literacy as we move forward with more online interactions. Respondents used phrases like being more inspired, looking forward to more practical inclusions to digital collaborations, that online collaborations can be effective, and how to

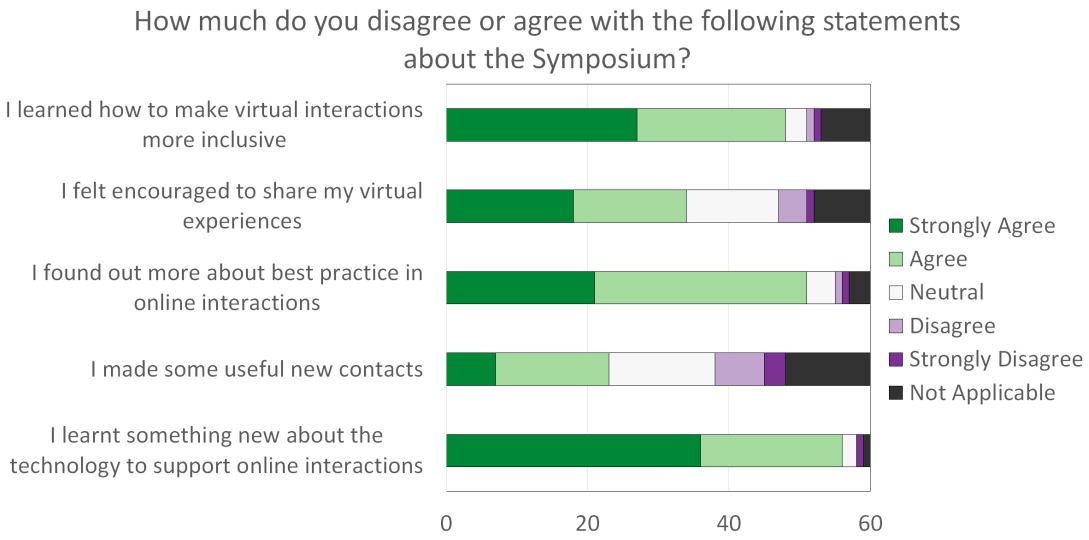



Figure 12: A figure showing how respondents agreed or disagreed with a series of statements about the symposium. Most people did leave the symposium with learning something new about digital technology.

make online interactions more accessible. They also recognised that online collaborations can be done well but take more effort than people often recognise.

With respect to the lower ratings for making contacts, we did have several networking and social events but they did not have very high attendance and we had not prioritised the formation of networks and collaborations as very high on our list of key goals for TFOM. We could have done more to encourage connections being formed between attendees. Importantly this downside seems to be a key theme in many discussions around online conferences and meetings, this may be partly a social issue in terms of attendees having more pressing concerns from their normal lives, but may also be a simple technical issue with chats and video calls being single-conversation channels, a problem that may be offset as remote work tools improve in the future. In terms of respondents feeling encouraged to share their experiences, our key ways of facilitating this were through the opportunity of contributed content and the discussion areas throughout the platform (chat, Q&A, and discussion topics), which did not necessarily work for everyone and so we could have more effectively found ways to draw out people's voices and experiences in this area.

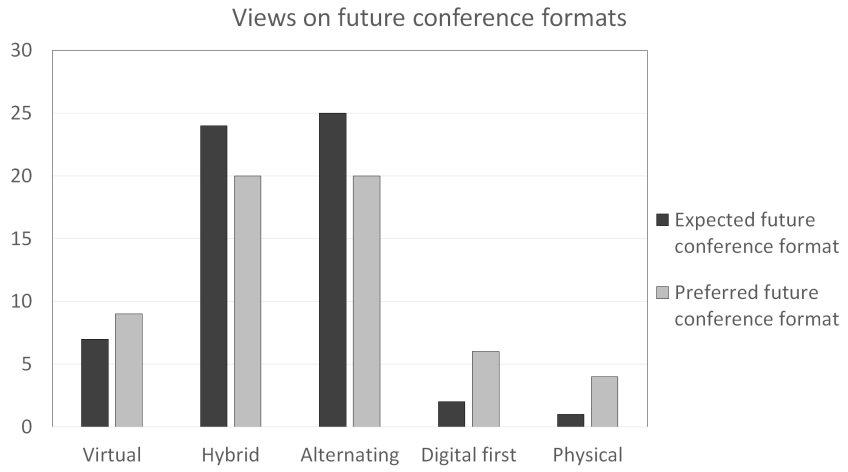



Figure 13: A graph showing how respondents felt the future of meetings would be handled.

**– Based on the outcomes of TFOM evaluation, what are the key takeaways?**

Going forward people recognised that they should leave their camera on more often as it makes interactions more inclusive and more engaging. Respondents recognised that there are a lot of tools out there and it gave encouragement to find them and use them. They also recognised that interactions like brainstorming are still possible but the problems may need a little more rethinking. Of the respondents, 40% thought the future of meetings will be hybrid and 42% thought that it would be alternating between virtual and physical. Only 12% thought that most meetings will move to a virtual format. Given the choice 33% preferred the idea of hybrid, 33% would prefer alternating, and 15% liked virtual. It is 7% that still prefer all of them to be in person. When asked for the reason for their choices, most liked the idea of options of travel and face-to-face interactions but don't want to feel left out when they opt not to or are unable to travel.

*Lesson learned: While both surveys are probably of very high interest, they are largely disconnected. It would have been very interesting to relate the post survey to the pre-survey to see whether participant expectations have been met by designing both surveys concurrently. That leads back to the above comment of applying for ethics approval early and with all surveys conducted prior, during, and post event in mind.*


Figure 14: Word Cloud of what people think the Future of meetings will look like.

**– What if any disclaimers did you have to add to the TFOM survey?**

As part of the survey process, as we wanted to share the results we had to work with governance on the laws around the Privacy Act and the Ethics committee. As such, these disclaimers had to be added to the survey. Although each institution may handle this differently, the same general considerations will need to be made by any given organising committee.

"Your responses will be anonymous. If you have provided us with your email address, your responses will be confidential with only a small group of organisers having access to the data. Data will be de-identified (if you include your email address) and stored in a secure computer for 6 months. This project has been granted approval by the CSIRO Human Research Ethics Committee.

Your personal information is protected by the Privacy Act 1988 (Cth) and CSIRO will handle your personal information in accordance with this Act.

If you have chosen or should you choose to provide your email address, your personal information, including your email address and responses to the survey, is being collected for the purpose of conducting the Future of Meetings Symposium (the Symposium) post-event survey.

Your survey responses will be anonymous unless you choose to provide your email address, indicating your potential interest in discussing any aspects of the Symposium further.

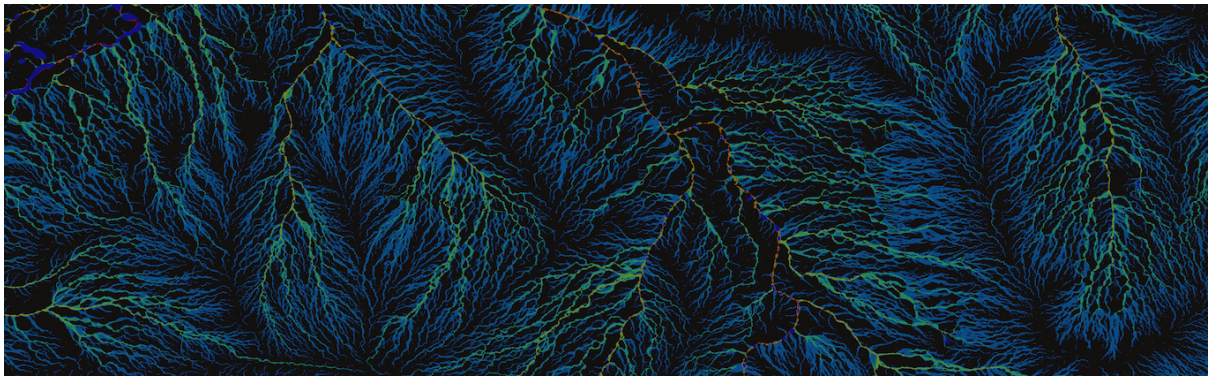
This application is being conducted using Google Forms, which uses data centres in countries outside of Australia, including the United States. This means the information collected in this survey may be transferred outside Australia and stored on Google servers in other countries, including the United States. By submitting this survey, you agree to this transfer of your information overseas. You can find out more about how Google handles your personal information at Google's Privacy Policy.

Results from the survey will be de-identified and aggregated, and included in a wider published report about the Symposium, available upon request to the public.

If you do not provide your personal information, you will not be contacted to discuss any aspects of the Symposium further.

The CSIRO Privacy Policy available at https://www.csiro.au/en/About/Access-to-information/Privacy outlines how your personal information will be handled, including details about how you can seek access or correction of the personal information we hold about you and how you can complain about a breach of the APPs and how CSIRO will deal with the complaint. If you require further information on how your personal information will be handled, please contact privacy@csiro.au."

*Lesson learned: Working with the Ethics committee and the Privacy Governance team much earlier on would have allowed a more thorough evaluation of the results from the surveys (pre and post), registration information, and the expression of interest.*



# VI. Key themes of TFOM

In this section we assess the four key themes of TFOM in terms of why we chose them, how we addressed them as part of TFOM and what our overall impact in these were.

## Accessibility

The process of making the conference accessible started even before registration. Prior to choosing a platform, a portion of the organising committee met with the Disability Advocacy Resource Unit (DARU)[42], an organisation dedicated to advocating for those with disabilities, which gave early feedback on ideas on accessibility. This included making sure the conference platform was text-to-speech compatible.

During registration, we asked what people needed (i.e. closed caption, Auslan (Australian Sign Language), text to speech services, etc.) and offered a simple process to apply for an accessibility grant for both speakers and attendees. The recommendations the committee provided was not limited to those relating to physical impairments.

In the lead up to the event, we put together a comprehensive list of speaker guidelines, that included how to record the talks with accessibility in mind. This included ideas like not covering your mouth with a microphone, being conscientious of your background, and the speaker being visible during the recorded talk.

During the event, a large portion of the content was recorded and all talks and panels were closed captioned. This was done through a combination of the paid service (**Rev**) for the recorded content, an AI service for the live content, and a captioner hired through Deaf Services Australia. After live services ended they were also close captioned using Rev and re-uploaded. This was done because during live sessions there is always the trade of between speed and quality, and hence captions done after the fact are usually superior.

Manual live captioning done through a paid service was initiated by creating an account at Auslan Connections[43]. An administrator through Deaf Services Australia helped setup the account, create the bookings for the event, and search for available captioners.

Captioning costs are:

- Remote live captioning – $236.50 / hour, minimum 1 hour
- Onsite live captioning – $258.50 / hour, minimum 2 hours

During this process we found that Zoom has a built-in captioning service that can integrate with the live captioner we hired. However, for the WebEx sessions the Deaf Services group provided us with links we could share with the attendees, where the manuscript was being streamed during the talks. The problems with this were associated with how we streamed information into the Whova platform. We took the WebEx session and streamed them through YouTube live, which had a time lag of about 10 seconds. The captioner was sitting in the live session but had to process and type the information. So the captions were slightly early in comparison to the stream in Whova. The major benefit was that

[42] http://www.daru.org.au
[43] https://bookings.deafservicesqld.org.au

the live captioner was much better at manuscripting the session when people had strong accents, in comparison with the AI service struggled with certain accents, but was a free service which kept in exact step with the spoken feed.

What we gained from the experience was that by accounting for the various small-case scenarios or subgroups of people, we made a better conference for everyone. The variety in the ways to interact, participate, and generally be involved made the meeting overall more inclusive and accessible.

## Inclusivity

The Future of Meetings (TFOM) symposium organising committee placed a large focus on the idea of accessibility and inclusivity; evaluating the broad definition of the word. The organising committee offered grants for all attendees and speakers to increase accessibility and inclusivity. Examples listed on the form included uses of childcare, mobile data, or technical equipment to improve the likelihood of being able to attend and participate; decrease the barrier of attending.

Despite most people carrying around computers in their pockets every day, many are still hesitant to try new technology. Our symposium tried to offer a stress free, inclusive learning environment to try new ideas of virtual interaction. This included free demonstration of new software programs and giving access to the conference platform weeks ahead of time so people could get comfortable on their own time.

That being said, even accessing the platform itself was a challenge for some, so we did try to provide a variety of ways for someone to seek or ask for help. To accommodate this, we had a number of people ”on-call” for support and a “Ask Organizers Anything” discussion thread that was monitored by many members of the committee. In the background, we had a Slack Channel that was labeled “help” so if an organisers noticed an attendee was having an issue, we could tag an other organisers to help with the problem.

## Sustainability

Virtual conferences offer the ability be more inclusive to those that can not travel. But for those of us who do have to travel for meetings on a regular basis, we are increasingly aware of the impact these trips have on our carbon footprint. A single return international flight can instantly increase an individuals carbon footprint by several tons (more than many people emit in a year) and as such represents one of the most significant individual carbon emissions which can be reduced. However flights are not the only issue, with regular single person car journeys being a close second in terms of carbon emissions, we should take steps to reduce travel where-ever possible. Because of this, effective remote meetings, with the associated reduction in travel have potential for huge sustainability improvements.

As part of our TFOM sustainability goal we calculated the $CO_2$e emitted both for TFOM in its digital form, and what it would have emitted had just our average 200 simultaneous-attendees (out of 1200 registrants) had attended in person. We calculate that the direct travel related emissions of in-person TFOM alone would have reached $>$ 280,000 kg $CO_2$e, nearly 200 times the comprehensive offset we determined for the same number of attendees for TFOM digital, (a mere 1420 kg in total). To phrase it another way, the $CO_2$e from TFOM digital was less in total than the emissions of just 1 of our international attendees flying to attend in-person.

In terms of other measures of environmental impacts, conducting TFOM digitally resulted in far less waste. By not needing name badges, printed programs, pamphlets from sponsors, and maps to move about the area we vastly reduced our paper waste, and even in terms of food purchased at hotels and restaurants (which have a much higher carbon footprint due to additional transport, staff labour and ingredient rarity) we reduced our waste compared to in-person greatly.

## Technology

This symposium addressed the theme of technology in a variety of ways. Participants could attend talks addressing available technologies, the history of some technologies, the way of the future, how we can make it work for us and a range of other topics. Technology was a theme woven throughout the entire conference, as a key enabler of our other key themes. There were also a number of workshops where attendees were taken through exercises of how virtual interaction could be improved via technology. It was clear throughout TFOM that many barriers to better virtual interaction were now being lowered thanks to advancing technology, and the most future-facing content hinted that there is much more to

come in this space of technology as a facilitator, especially when considering the rapidly growing areas of mixed and extended reality.

During the symposium we encouraged developers of online platforms to demonstrate their tools. This was done in a series of social breakouts, panel discussions, virtual reality co-screenings, and workshops. Some of the platforms highlighted are listed below, with a bit about what they are, what they excel and what situations may benefit from their use.

**Whova Platform (https://whova.com ):**

Whova is a conference platform that offers the abilities for full virtual or hybrid design conferences. It includes a web application and a phone application, at the time of our symposium the mobile application was still slightly more feature rich than the web platform, but this is rapidly changing.

*Pros*: The platform was available in advance and allowed a number of ways for attendees to interact through the community section. The customisation ability for the organisers was easy to use and had a good degree of flexibility. The platform is extremely feature rich, and compared with other contenders, it was capable of meeting our needs for TFOM for a very reasonable cost.

*Cons*: To fully interact with the conference, an attendee or speaker would need to download the mobile application. This was a barrier for some as they either didn't have the space to download another application or did not have desire. We got around some of this by helping people through the organisers administration side of the application and Whova are slowly removing this requirement.

**iSee VC (https://www.iseevc.com.au ):**


Figure 15: A screenshot of iSee VC's TFOM Event.

The iSee VC program is a 3D virtual world that allows interface between attendees in the classroom or meeting in a more organic or natural way. Instead of all participants sitting in a gridded window, they can move around a shared virtual space (not VR), watch videos, choose who to speak to, and organically move between multiple conversations at once. Importantly the directional and localised audio allow for better distinguishing of voices, something especially useful for visually impaired attendees and a feature highlighted by everyone as a vast improvement over normal video calls. During the symposium, iSee VC partnered with us to offer our participants free access for a month. In the agenda, we set aside one social interaction time with a variety of environments for people to explore and interact with.

*Pros*:

iSee VC offers a range of environments and a bit of flexibility when designing that space. It is known to operate at low bandwidth as it has been optimised to work at schools. It also uses a person's video, instead of a random avatar and has localised and directional audio so you can tell where and who is talking instinctively. It's a great improvement over video calls for organic interaction in large groups and most of our cons are minor issues which will be hopefully ironed out as the platform continues to mature.

*Cons*:

iSee VC is one of the more expensive video conferencing platforms (which is fair because it is substantially better than most video platforms out there today) but when compared to its competitors in the VR/AR/XR space its primary advantage is in the conveyance of facial expression by video, an advantage it will not keep for long with recent developments in photo-realistic facially-tracked avatars. Bringing spatial audio/video to video calls is fantastic, but brings its own unique challenges. From the need for new UI designs for interacting with screenshares, videos and objects in a 3D space to little things such as missing audio cues (such as footsteps) and the wide box like shape of the video panels making it difficult to keep track of people around you. Finally while iSee VC beats normal video calls hands down for organic interactions in large groups, we noticed that for smaller groups these benefits are less important and it ends up getting used more like a traditional video platform. Requires a (simple) software install.

**Gather Town (https://gather.town ):**

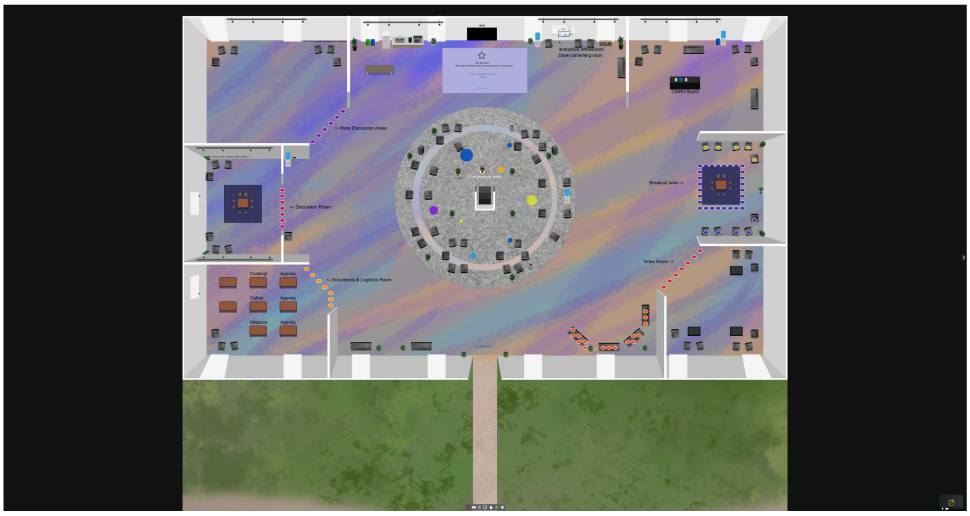


Figure 16: A screenshot of the Gather.Town TFOM Event.

Gather.Town is a virtual 2D world that really shines on social interactions due to its distance drop off audio and video system. It can accommodate up to 2000 simultaneous attendees and offers a variety of spaces to bring back the feeling of running into friends or co-workers in the hallways, while still working from home or in different facilities. It even offers private video chats by simply maneuvering you and your chosen colleagues avatars onto linked sets of chairs or inside certain designated rooms. During the symposium, Gather gave us a complimentary upgrade to unlimited use of their advanced objects inside their free world builder tool, which include things such as synced videos, interactive whiteboards, interactive posters, exhibitor stands, in-app shared Google docs editing and more. In the agenda, we set aside a number of social times dedicated to using Gather with a variety of environments for people to explore.

*Pros*:

As a browser-based app Gather offers a variety of ways to accommodate the office, conferences or school situations with extremely low barrier to entry, complete customisation options and a variable price structure. It also has a extensive free version with no sign-up to try it out with up to 20 people per room indefinitely, a dedicated easy to learn world builder and (paid) access to large group upgrades and advanced interactive objects which could reasonably power most of a conference in Gather alone (synced videos, interactive whiteboards, interactive posters, exhibitor stands, in app shared google docs editing and more).

*Cons*:

Uses 8 bit avatars in a 2D game like world for navigation, which users found (paradoxically) either too old or too advanced. Audio/Video drop off is a bit abrupt and the more advanced interactions and controls are not immediately clear. Paid options are ‘per person’ which makes estimating costs for a

conference (especially a free one which typically has huge variation in sign-up/attendance ratios) difficult to estimate.

**Altspace (https://altvr.com ):**


Figure 17: A screenshot of the TFOM Altspace Event. Videos were simulcast to the main screen with Agenda boards being updated daily. Additional social space and couches were available behind the theatre seats for attendees to use during post-talk discussions.

Altspace is a free application that allows users to interact, attend meetings, experience concerts and take part in a variety of other events in a shared virtual 3D world. Altspace can be accessed using a desktop screen or via a virtual reality (VR) headset with both providing substantial improvement over video-conferencing but VR being a huge improvement in sense of presence. During TFOM, we ran a simultaneous Altspace Event that ran for the full duration of the 3 day conference in a world edited to suit our purposes. While we used a very standard 'presentation theater' template to keep CPU overheads down for any visitors on mobile headsets, we could also have made our worlds much larger and advanced than we did, by making use of the inbuilt world editing and event management tools. TFOM's Altspace Event space allowed for up to 80 people in a single instance of the event and would have scaled to several thousand by seamlessly spawning new instances which all see in real time anyone on stage and the stage screen[44].

Onto our stages screen we simulcast all of our pre-recorded TFOM talks into the Altspace event at their Agenda specified times, which allowed people to watch the conference material then immediately talk, move around and interact with each other after it finished, just as they would in a physical conference. Finally we note that there was no technical reason we couldn't have streamed all of our events into Altspace (pre-recorded and live) or even had live presentations conducted in Altspace by the Speaker, and streamed to the Whova platform using Altspace's dedicated in-world virtual camera system. We were simply limited in people power for moderating the Altspace worlds in addition to Whova.

*Pros*:

Altspace supports Windows 10 Desktop mode (i.e no headset needed) as well as nearly all VR/AR/XR headsets. It provides an inherent sense of 'presence' when interacting with others when in VR and uses directional and location based audio to ensure you can tell who's talking and where they are, instinctively. Altspace provides a good selection of event tools such as synced video watching, synced web browsing, moderation toolkits, private or public event management pages, linked worlds and assignable roles for things like moderation, presenter, world builder etc. It complements these with good presentation tools such as a stage only accessible to presenters/hosts, Slides integration, mic amplifier, laser pointer,

[44] Altspace has since reduced their standard attendee limits back down to 30 per instance, as the 80 person limit was a special measure to help organisations work around COVID. Unfortunately 80 people per instance caused performance issues on the oldest Altspace supported headset; the Oculus Go and thus they returned to 30. Once Go is no longer supported this will possibly increase again

video player and web broadcasting systems. Overall it's fantastic for organic many-to-many interaction and for one-to-many content delivery like presentations that benefit from having a person on stage to engage with.

*Cons*:

Limited Mac support, requires a (simple) software install. Supports 2D but still has biggest impact in VR. Requires user to create a free Altspace account. User controls are are well established standard video game control schemes but this can overwhelming for users who have not played any video games before. Conveys body language but limited facial information. Difficult to convey the benefit of VR for those watching in 2D. Strong resistance / fear of the *perceived* technical competency required.

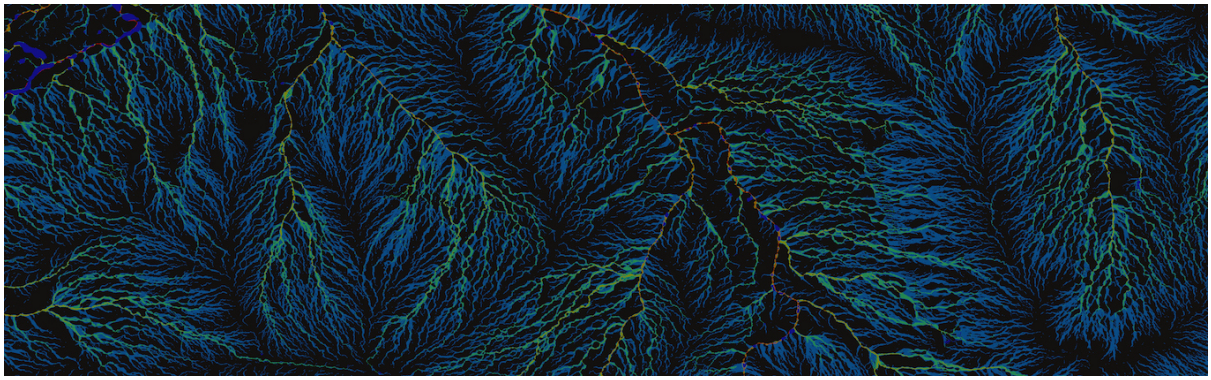
**Glue (https://glue.work ):**


Figure 18: A screenshot of the TOC within Glue's TFOM virtual space.

Glue states on its website that it is "... a virtual extension of your workplace – a space where dispersed, high-performance teams come together to learn, share, plan and create." It is a 3D virtual reality space designed using a virtual reality (VR) headset. People select from a series of avatar that most closely resembles themselves and all can interact as you would in a normal meeting space.

*Pros*: Has plenty of business focused integrated tools such as presentation capabilities, whiteboards, post-it notes, 3D model import, freehand 3D drawing and more. It has shared persistent team worlds, and shared team files. It provides spatial audio, multiple shared virtual worlds to move and interact in and custom business solutions for their clients. Works in 2D on Mac & Windows and most VR/AR/XR headset. Glue team is very engaged and happy to set up demos.

*Cons*: Glue is focused on close collaboration between small teams in a persistent virtual office. While it can scale to a large conference on a technical front it is not focused on them and thus has less easy to access moderation, organisation and management tools. It's not easy to try yourself without contacting Glue. It works best in a headset for that sense of immersion but by doing so you lose easy access to most of your work related apps (you can load them in a PC based headset as part of the headset OS of course, they are just more of a hassle to use). This also applies to all VR apps but since Glue is work focused rather than social focused it is more of an problem here. Requires a download and Glue subscription.



# VII. Case studies and perspectives

In this section, members of the committee or other relevant parties have written specific focused contributions on particular aspects of TFOM. Our goal with having this section is to provide an avenue for more personal reflections that we feel are useful insights for readers into TFOM, as opposed to our broader and more generalised commentary throughout this document. These insights can be treated in a “behind the scenes” sense, but it should also be noted that they are offered by particular people and thus the opinions represented may be more subjective. We have not edited these perspectives to represent committee or editor consensus, as we have done elsewhere in this document.

## Reflections on Chat and Q&A moderation – Rika Kobayashi

As someone who is camera-shy and feels strongly about ‘ordinary’ people having a voice, hence taking a special interest in contributed content, I signed up for the behind-the-scene tasks of chat and Q&A moderation. I am not sure what I was expecting. We had allocated two people each for chat and Q& A moderation but, on the whole, the role could possibly have been handled by one person. The main expected task of moderating inappropriate or disrespectful comments was not needed. Restricted access and our code of conduct may have done the trick. Thus for the majority of sessions moderation was not really needed. However, watching over chat raised interesting issues. As part of the organising committee we used chat and Q&A heavily to start conversations and engage the community. I think this worked and it was good to see lively discussion take-off, the most I’ve seen in any online meeting I’ve attended. In other meetings, I have seen chat being used by the community high-fiving their cliques, which I found alienating, or pushing their own agenda, which I found disrespectful of the speaker. For TFOM I found chat largely complementing the talk, though there have been comments made about the disrespect of “talking” while someone is speaking. And chat, Q&A and Community posts were occasionally hijacked by people self-promoting and pushing their own agenda. I was particularly annoyed with people putting in plugs for their companies and namedropping friends into Speaker questions and discussion posts.

The Q&A moderation unexpectedly for me took off in a variety of directions: live Q&A requiring dealing with live questioners, live Q&A requiring feeding questions to panel, live Q&A requiring interviewing the speaker and chairing the contributed panel. All these required synthesising questions and making judgement calls on the spot. Having prepared questions in advance helped to give breathing space but I was relying heavily on using vote popularity to help me choose questions and no-one used that in any of my sessions. It also proved impossible to ”mark as answered” questions on the fly, which also complicated question wrangling and trying to remember whether a question had already been addressed. Nevertheless, I feel that the live Q&A sessions were a huge success. I emphasise live as Q&A engagement seems to drop off after the session ends. I think it helps to be in the moment and I think attendees felt more validation by speakers dealing with their questions personally. I felt that the questioners appreciated being named, and it was important to do so, as it meant they were noticed in an otherwise anonymous medium.

## Perspective on virtual meetings, inclusivity and TFOM – Goedele Roos

I will speak about my experience from the view of a participant, but with some background of organizing virtual meetings and dealing with inclusivity issues as I lack the mobility to travel. I enjoyed being at

a conference where all of the participants and speakers shared the opinion that there are many other ways beside travelling to 'meet' (or at least work together with) people. It was very supporting to be in a community and hearing ideas from others. TFOM covered technical aspects (e.g. newest technology) as well as human dimensions (e. g. inclusivity, how to organise a virtual workflow/discussion) and the broader world-problems with focus on the climate. For me, all these aspects made TFOM a very strong symposium. I've learned, besides all other things that if you make your conference better for one sub-group, you improve it for all.

The conference-organization was excellent, with good access to the talks, the Q&A and the chat. The live-stream was very smooth. Sometimes the time for discussion was a bit short and I would have liked to see discussion sessions scheduled. Also, the lack of private chat was a bit of a barrier to fully engage with other participants on the spot. The availability of contact details of speakers and participants made personal contact possible afterwards. Information was up to date. I think TFOM did a very good job in providing accessibility grants. The topics that were covered are very broad and for me it was an important conference, making people conscious about several aspects of meetings. Also, the combination of panel, lectures and workshops made it a very strong experience.

From the conceptual point of view, it was a very welcome meeting touching on different aspects of a meeting. Maybe the following points are also worth thinking about, maybe in a follow-up conference to continue the discussion and to shift habits:

- How to convince people change their minds about travelling and virtual conferences (from our experiences with running a virtual meeting for 6 years before the COVID-19 pandemic, I know that many people have hesitations/prejudices or simply don't feel comfortable in a virtual meeting. Inclusivity also means bringing these people on board and making it acceptable for them.)
- What about women in meetings: do men get more chances to present their work and how can we give voices to women?
- What have disabled people to tell about their experiences with technology/opinions of others? How to deal with prejudices like working from home is not 'real' work? Maybe a workshop on how to make people aware of the problems disabled persons have to face can be very useful to give handholds.
- What have people from developing countries to add? Is more advanced technology useful to bring information to countries like India/Chile/etc.? What would people from these countries need to be included and to stop the rich-poor polarization of the world?

## On the importance of encouraging experimentation – Vanessa Moss

Experimentation was a core part of TFOM, from the beginning. We adopted the mindset from day one that there was no "one tool to solve them all" and that we would need to experiment, test and iterate to a solution that best suited our needs in terms of meeting the vision for the symposium. There are two aspects of this experimentation angle that I really want to point out in this brief perspective: 1) it is incredibly vital that an experimentation mindset is encouraged within organisations as much as possible, and 2) it is important that we as individuals recognise that experimentation should be a part of everything we do, in order to make sure we are using the right tool for the job.

On the first point, it is worth reflecting on the fact that TFOM could never have happened if there had not been encouragement and support for exploring the theme of future meetings at important stages throughout the proposal phase. The enthusiasm on the part of the CSIRO Research Office for us to conduct a virtual component of an existing symposium, combined with encouragement to put in our own proposal, was the first step towards making TFOM happen. We were also supported within the CASS and IM&T Business Units to get permission to submit the proposal out of cycle due to the timeliness and relevance (when the initial proposal call was cancelled). We were granted the full funding we requested despite the fact that we were exploring somewhat unprecedented parameter space, which we are hugely grateful to the Research Office and assessment committee for. And when we put out our initial call for expressions of interest (to gauge what topics people were keen to hear about), we got many more responses than we expected, which was also very encouraging. My main point here is that at critical points in the initial conception of TFOM, we were encouraged to go forwards and assured that this was an idea worth pursuing. This made all the difference in being able to put TFOM together, and I strongly advocate that organisations continue to support and encourage experimental innovations

to the greatest extent possible as we move forward. It should not be expected that every experiment will be a success, but it will guarantee learning that leads to progress and innovation, which is equally important.

On the second point, we spent a considerable amount of time and effort exploring all kinds of options for TFOM throughout the planning process. We attended virtual meetings, conferences, summits, events and webinars of all kinds with the goal of identifying other approaches taken. We always kept the mindset that we wanted to use the right tool for the right purpose, and that informed our decisions throughout. Although it was a bit more effort on our part to upskill and experiment with tools, we did ensure we had a broad range of technical tools at our disposal (e.g. Whova, Zoom, Webex, YouTube, Vimeo), and we used each tool where it was most suitable. We also did a lot of hands-on testing in order to determine the optimal workflow and what our technical back-up options would be. This meant we knew what was best to use in a given situation and why we were choosing a particular course of action. The main takeaway on this point is that it is really important to make sure there is a research phase when planning any kind of virtual interaction, where you consider carefully what your goals and constraints are and look at what the best tool to use is. And when you decide on some options, be willing to experiment with these to make sure that they will meet your needs. Experimentation doesn't always lead to success, but it was a critical part of our TFOM planning process. A general attitude of experimentation in all things is highly recommended!

## The benefit of in-house & short management chains – Glen Rees

In a similar vein to our focus on experimentation, TFOM undoubtedly benefited from doing the vast majority of our planning, admin, building and running of the conference 'in-house' within the TFOM committee. Designing our own content delivery approach, doing our own technical testing, our own administration, our own speaker contacting etc, allowed us to focus on moving quickly, testing lots of new ideas, give a personal touch to new contacts and be sure of our implementation for everything we did. Now while this is not always possible (for example if certain skill sets are just not naturally available in your organising committee), it is still something we encourage organisers to strive towards, as the benefits from this were substantial.

During planning, the shorter your communication chains the quicker you can get responses, there is no waiting days or weeks for queries or answers to percolate through various divisions, event managers, IT support or management. For TFOM our communication chains were never longer than 1 step from any third party we brought in (workshops, speakers, sponsors etc) to the relevant person not just in charge of managing a key aspect, but of doing a key aspect. Hence questions from our externals got answered quickly and concisely with no need to consult many additional groups. This also applied during the running of TFOM. By keeping the team small and run sheet detailed, it was always immediately obvious who was the 'go to' for any issues and who was expected to be where and when.

Finally this also applied to technical issues. TFOM was run on the Whova platform which has a fantastic back-end system which focuses on bringing control to the conference organisers themselves with no need for third party involvement. This combined with us taking considerable ownership of our video delivery systems (we were account hosts on video calls, direct runners of streaming software and owners of YouTube & Vimeo accounts) meant we could, and did, fix any technical issues immediately.

A prime example of this is when a bug in the Vimeo 'start stream' button resulted in the stream being cancelled and the video linked in the Whova page to end. To co-ordinate fixing this through a traditional long management chain of Streamer $\rightarrow$ LOC Member $\rightarrow$ Tech Support $\rightarrow$ Event Management $\rightarrow$ Event Management's Tech Staff, to request a fix, diagnose the problem and then action the needed changes could easily have taken 15-60 min, while the entire conference waited. Indeed, this is a nightmare scenario that happens far too often at digital conferences. As it was, because our TFOM committee member *was* the streamer, they knew exactly what had happened and which committee member to contact to check the status of the backup stream and which committee member to contact to request a swap to the backup stream in the Whova platform (and they could have done it themselves if responses were slow). This diagnosis and fix was done in under 30 seconds, short enough that most attendees didn't even notice the starting delay. So to summarise, in house ownership and short management chains allow you to get more done in less time, work more efficiently with third parties and react quicker to unexpected problems on the day.

## The Challenge of Focus – Natasha Hurley-Walker

My main task during the conference itself was to live-tweet the talks on our group Twitter account, @futuremeetings[45]. I hoped to help advertise the conference to participants who weren't sure what to attend, and reach a wider audience who might not have heard about the conference. As a speaker at many conferences, I always appreciate it when the conference tags my own Twitter account with a nice nugget from one of my talks. So my challenges were threefold:

- Know the schedule well enough to be able to advertise talks in advance of their start;
- Find all the Twitter handles of all the speakers and their institutes and tag them appropriately;
- Pay close attention to every talk and extract some of the most interesting points, while leaving enough mystery that people might be tempted to go watch the talk instead of just following my tweets!

The first two points would have been easier if I had spent a bit more time preparing: in future I would recommend conference organisers get Twitter handles from speakers ahead of time, and Twitter's web app now allows you to schedule tweets in advance, which would have been great for talk announcements. It was the third point that was the real challenge. I needed to focus continuously on the talks from 7AM to 4PM, with only a short break to grab some lunch. We had social breakout sessions but, like a conference photographer, I was there to capture the moment, rather than relax and enjoy myself.

So sure, being on the TOC is tiring — everyone knows that! Why is this interesting? Because what I was doing is what we organisers (optimistically) expect people to do when they attend a conference — go to all the talks, pay attention, and learn the main points. But as seen from our attendance statistics, only a vanishingly small number of people actually did this. I have attended tens of conferences and workshops, and there were some big differences doing this online compared to real life:

- The tempting distraction of the other tabs and programs on my laptop meant I had to continuously exert a small amount of willpower to stay focused;
- The nearness of my screen meant my eyes became strained over time;
- Screen-based social breaks meant "Zoom fatigue": conversations don't flow so naturally when you can't quickly register microexpressions and body language, and everyone having different backgrounds and audio timbre means more work for your brain to interpret... and of course, no break from the screen!

All of these factors worked together to make it incredibly fatiguing to sit online and do those most basic of tasks: pay attention and learn. Certain talks were easier to pay attention to than others. But what our viewing stats show is that just one boring talk was enough to switch people off, and unless they had an overwhelming interest in a particular topic, they didn't come back. So the techniques that the good speakers used are essential, not just good advice:

- Stick to a few key messages and intersperse them well through your talk so that participants learn new information but are not overwhelmed by it;
- Be funny, make jokes, use analogies, and entertain;
- Use clever visual design, such as integrating your video feed into or in front of the slides, and make liberal use of animation. Think YouTube rather than Powerpoint!
- Don't make it about you: people have come to the talk to learn your key takeaways, not your life story;
- Short is sweet. TED talks are no more than 12 minutes long, and for good reason!

While all of these things mean more work for speakers, prerecording the talks means that they can be used over and over again. For the foreseeable future, we're all going to spend a lot less time in airports, so we should use that time to make presentations that really pop. Otherwise, your talk is probably doomed to be playing quietly in another tab while your listeners check their email.

[45] https://twitter.com/futuremeetings

## Digital natives vs Digital immigrants in remote meetings – Glen Rees

One of the most common points of feedback we heard at TFOM was that, while the online discussion and content delivery was good, it was still missing something on the in-person version, mainly in regards to big, open-group discussions and organic interactions.

The people raising these concerns were more often the more senior (both experience and age wise) attendees, but it was also very apparent that these attendees were by no means technologically challenged. Their use of the TFOM conference platform and continual use of Zoom, Webex, Slack, Git, various programming languages, operating systems and more for their work, puts them firmly in the technologically skilled category, and even in the skilled remote worker category. So why then do they seem so disproportionately impacted by remote work, and specifically the loss of 'human connection' when working remotely?

A potential answer to this is that senior colleagues are by definition the most impacted by their team's drop in social-cohesiveness caused by swapping to remote work, because while they may use technology for remote *work*, its definitely fair to say many of them didn't grow up with remote-*socialising*, at least not in quite the same way as their younger cohorts. Hence it's perhaps unsurprising that more senior attendees report missing that in-person 'human' connection far more often when forced to work fully remote: it just doesn't scratch the social itch for them.

On top of this, the point of conferences and meetings varies widely for different levels of seniority. With the students or junior attendees they are mainly there to learn, early-career attendees are interested in hearing some talks and getting their own research or work promoted, and senior attendees are focused on the big picture, the chance to discuss with their peers and competitors, to make sure they are up to date on what people are thinking for the future.

Because of this it seems senior staff actually face a double hit from the swap to remote work. In order to do their work, they need organic interactions and big group discussions in a way their less senior colleagues do not, and these are by far the hardest to do remotely using current methods. On top of this their experience to date of close human connection is vastly more dominated by in-person experiences, making it harder for them to separate the feeling of closeness from physical proximity.

This is an important problem then, as discussion among senior members are vital to picking good directions for an organisation in the long run and for co-coordinating efforts on a large scale. One potential solution is to begin a strong drive to getting those most affected by the lack of in-person social more used to remote socialising. Whether it's via structured activities such as company remote socials or unstructured additions like encouraging more general personal chats before/after remote work meetings as an important substitute for low-level continual interaction in person, there is much to be explored. Unfortunately this requires a time commitment, ideally from personal time, which many more senior staff members are often low on.

So perhaps the solution *is* just to leave it for a while. In some ways if in-person meetings are 'dead' then those who have known them longest and best are of course going to be the ones most hurt by their loss. But time does heal all wounds, maybe we should come back round to the idea of remote conference discussion sessions in a few years when the people that feel most lost without the physical versions have had a chance to grieve, to become more used to the concept of remote social, and are ready to try the new tools that evolve to solve these issues going forward. It may never be 'the same', but it will be close, and even if its not, eventually we may all come to appreciate that 'different' does not always mean 'worse'.

## Accessibility grants and finance for TFOM – Amanda Gray

The Future of Meetings Symposium's Organising Committee recognised CSIRO's commitment to fostering a fair, equitable and inclusive workplace with the aim that everyone has a full sense of belonging. We wanted to extend this commitment to the symposium and ensure that it was accessible to anyone wishing to attend.

As this was a virtual symposium, the usual restrictions with respect to distance and cost of travel did not apply, however we thought that participants may face other obstacles, some of which were:

- lack of equipment, eg. headsets, webcams

- not being able to cover internet costs incurred streaming a 3-day meeting
- working from home with children who would need care during the symposium

To address this, we offered a limited number of accessibility grants, up to the value of AUD$150 per person, in the form of a reimbursement of the cost of purchasing items that would allow participants to take part in the meeting more effectively. Participants applying for the grant were asked to provide details of their circumstances and what they wished to purchase with the grant. This information was reviewed by select members of the TOC, who would decide if a grant would be awarded. Special consideration was given to applications that would increase inclusion and diversity amongst our conference participants. A budget of $5000 was allocated for these grants. Details about the grant and how to apply were provided on the symposium website. Emails were also sent out to participants reminding them that the grant was available and how to apply.

In total, we received 12 applications for accessibility grants. Grants were awarded to all 12 applicants. Of the 12, four applicants didn't claim a reimbursement despite follow-up from the organising committee.

We also recognised that invited panellists and speakers presenting at the symposium may also need support, or be required to purchase technology to attend or prepare for the meeting. We offered reimbursement of these costs in a manner similar to how travel expenses would be reimbursed to speakers presenting at a typical, in-person symposium. Expenses would be reimbursed up to the value of $300 for keynote speakers and $175 for invited speakers and panellists. A budget of $7125 was allocated for these reimbursements. Information on how to claim a reimbursement was provided via direct email. Speakers and panellists were also given the option to 'donate' their funds to the accessibility grants funding pool for general participants. Four speakers chose to do this to the value of $950. A further four speakers claimed reimbursements totalling $678.

While we received feedback that accessibility grants and speaker reimbursements were a good initiative, we received a very small number of claims when compared to 1200+ people who registered for the symposium. A main reason for this may be that many people most likely would have set themselves up to work and attend virtual meetings from home at the beginning of the COVID-19 pandemic. Some participants may also not have considered their circumstances to be worthy of receiving the grant, or were not aware of the accessibility grants despite their advertisement by the committee.

Although uptake was low, offering these types of grants and reimbursements would still be beneficial for future meetings as they did fulfill their purpose by making the meeting accessible to those who may have found it difficult to attend without it.

## The barrier to entry problem – Glen Rees

The barrier to entry problem for TFOM came in many flavours but can essentially be summarised by the eternal trade-off between getting the benefits of a new and improved system and getting 1000 new users into said system for the first time. This sort of issue is most obvious when considering your conference platform. Do you go for a feature-rich advanced platform that requires a bit of learning and moderate hardware to get the most of, or have it accessible to everyone, with the resultant hit to quality?

Of course, there are arguments for both sides, but while there has recently been an admirable push for equal accessibility at physical meetings by ensuring everyone has the resources to attend, for digital meetings the opposite seems to happen. Rather than raise everyone to a minimum of 'normal' attendance, Digital meetings are more often held to a 'lowest common denominator' approach. To put it another way, it is not often that one would hear in academia "John Doe can't afford to present his incredible work if we host the conference in an expensive hotel this year, we should host it at a budget venue instead". The common practice has been to offer travel aid and grants to allow relevant but less funded experts to attend. For digital, however, the thought of requiring $3000 AUD for a decent PC or VR headset to enable a substantially better remote conference for all is somehow laughable, yet they are comparatively similar prices, and the tech is much more reusable/shareable than a flight.

To address this problem partially in TFOM, we took a 'lowest common denominator PLUS' approach. Namely, that our core content should be available on any platform / setup, but that there should be a number of sister events in a variety of more advanced platforms available for a higher quality experience for those with the inclination, and financial assistance for anyone who needed hardware or software improvements to allow them to attend. Some of these more advanced platforms were in the form of

scheduled social events at specific times, some were commercial platforms that had demos available on request, and yet others were well-established ecosystems that were run completely alongside TFOM.

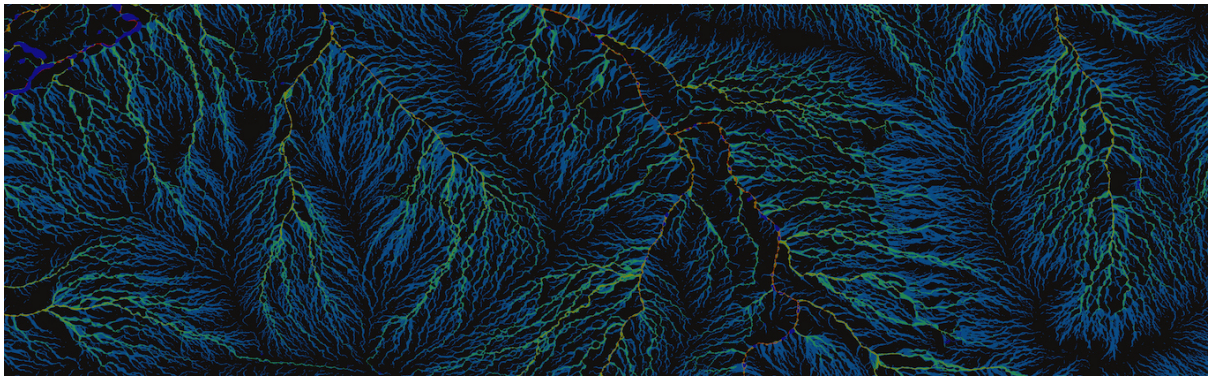
What we noticed in regards to these platforms, was that far fewer attendees made use of them than the main conference platform. But this effect was far more pronounced than anticipated, especially given the sheer variety of devices and OS's our advanced platforms supported (Mac and Windows, laptop and desktop, VR & AR, phone and tablet, all had support in one advanced platform or another) and our stated grant scheme which encouraged applications for tech purchases.

One of the most common forms of feedback we received on this subject was that despite all of our advanced platforms coming with 1-click download and installs, many people were disappointed that these tools were not included inside the web-based Whova platform. For many, the thought of downloading several different apps made the benefits seem insufficient.

Now for some of these people getting into the advanced platforms was indeed far harder than necessary due to strict install-restraints imposed by their company's IT department, but for others it was the *perception* that it was going to be difficult that stopped them, which was surprising as these are standard, commercial-grade apps with standard setup procedures similar to the Apps our attendees were already using (Zoom, Whova etc).

How then is it best to address these issues? For truly new approaches such as full VR, the solution is no doubt some combination of pre-conference training and increased user familiarity with these systems through general exposure. For standard commercial apps the problem appears to be more social than technical and thus much harder to address. When you hear colleagues who have spent weeks to install a particularly archaic and convoluted piece of academic software claim that clicking 'Get' on the Microsoft/Apple store is 'too hard', it's hard to know where to start.

Despite these issues all of our advanced platforms received very positive feedback from those who did manage to attend. While this may of course be partly due to survival bias, it is still encouraging that those who made it into the advanced tools often commented on how (after a small learning curve) these tools made improvements in the most commonly raised problems with remote work; namely their improvements to presence, space, directionality, organic interaction and general suitability for large many-to-many focused events. Hopefully as familiarity with these new types of platforms becomes more common, everyone will be able to enjoy the benefits of the improved remote collaboration, remote meeting and remote events they enable.



# VIII. Lessons learned

In this section, we have synthesised the various lessons learned from the document into overall thematic lessons learned, with the goal of highlighting these for future organisers to be aware of.

### Starting from scratch for a virtual conference is a good thing

For TFOM, we were fortunate to be designing the symposium as a virtual-only conference by design from the beginning, and this meant we could rethink how an online conference might work and how it might best be structured. For example, we inserted breaks between agenda items as much as possible, made content available asynchronously by default, trialled new ways of virtual social connection and experimented with the role of pre-recorded versus live content. It is best not to start from the premise that an in-person conference is best practice or that a good virtual conference emulates an in-person conference in entirety.

### Be flexible and willing to experiment

It is important to be open to new ways of doing things and not be fixated with tradition. Experimentation, particularly covering diverse perspectives, allows finding the optimum approach.

### Have a clear vision...

Clear goals and themes form the backbone of an effective conference. This enables experimentation and flexibility, especially adapting to unforeseen problems. Having a clear vision also makes decision-making easier, such as what tools to use, what content to include etc.

### ... and clear communication lines

A clear vision must be accompanied by clear communication lines so that the whole team is working to the same end. Especially in remote interactions where participants may feel a disconnect it is important to let everyone know what is going on. Everything needs to be explained thoroughly from code of conduct to what is happening on the day.

### Have the right tools for the right job

Putting together a successful virtual conference may require making use of a number of different tools to optimise for best approach for a given task. As with much of TFOM we were exploring new technologies and tools, trying out a few provided a bigger picture of their various capabilities as to which were best suited to particular goals and constraints.

### Practice, practice, practice

As we were exploring uncharted territory we took every opportunity to have dry runs of the various aspects of the conference, from practice streaming sessions through pre-meets of the speakers to walk-throughs of the social events. The Fujitsu workshop scheduled a practice session for TOC members which uncovered some issues which could be smoothed out before TFOM itself. And from experience of other remote meetings, at the very least carry out a sound-check and locate the share screen button.

## Schedule enough time to properly plan the conference

And then schedule some more! Expect to work additional hours and out of band (e.g. interacting with overseas providers and contributors) to do the job thoroughly and well. Make a clear plan with milestones and set goals for each stage in the process.

## A free event may get more sign-ups but they are not guaranteed to turn up

Building a sense of community is especially important in remote interactions. To engage with the conference the attendee must feel invested in it, at least personally if not financially. Inclusivity and allowing attendees to have a voice through chat, contributed content, the Community and social events was important for encouraging engagement.

## Social events are difficult when people are not displaced from normal contexts

Maybe there is actually less demand for social interaction than proponents of traditional face-to-face conferences may have thought, and much of that apparently organic social interaction is borne from not having other things to do. Nevertheless, building relationships between virtual attendees is likely to help people feel connected to the conference and to each other, so while social event turnout may be low, it's still really important.

## It is hard to get people to adhere to deadlines

This is not news, of course, but cat herding is a perennial problem. If deadlines are too early contributors may feel they are unreasonable and push back, however if they are too late, there is an unreasonable amount of pressure on the conference staff to prepare the content for distribution (e.g. QC, captioning, upload). This is difficult to balance, stress is likely! Whichever role you play in this equation of deadlines, try to make sure your actions minimise stress where possible.

## People are reluctant to install too much extra software...

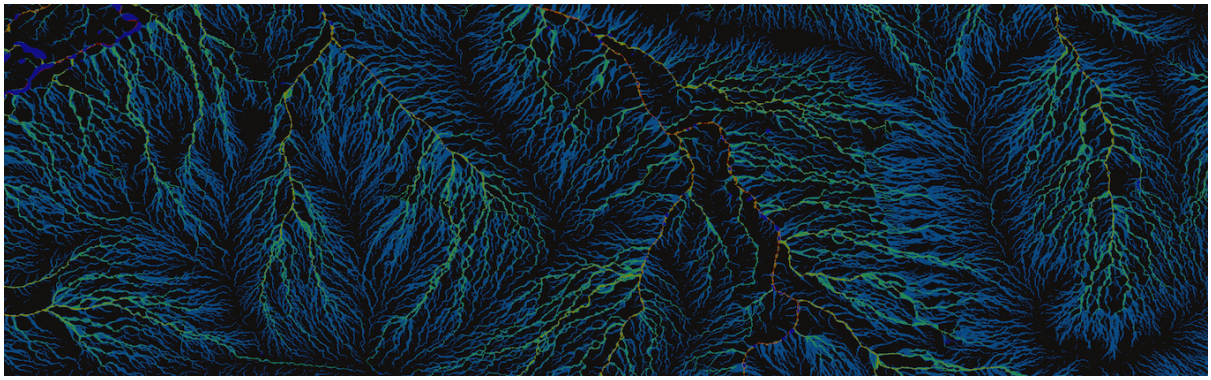
Some institutions prevent the installation of software on work machines, requiring either formal escalation of permission or installation by central IT staff. As such apart from participants' reluctance to install more than one or two things generally, it may be very difficult to require installs, as such web-based experiences may be both preferred and more accessible.

## ...but when they do they often find it worth the effort

While we had some issues with requiring additional software, overall our more advanced platforms got generally favourable reviews, with feedback focusing mainly on the big improvements they provide in many-to-many contexts, which are almost impossible to have effectively in video-call based platforms.

## You can never have too many backup plans

Murphy's Law states than anything that can go wrong, will go wrong. And even if they don't go wrong, dead silence at question time is never a good look. Hoping for the best will inevitably uncover problems in places where they were least expected. It is therefore important to have failovers, pre-prepared questions, backup plans and alternative means of interacting with participants in the event of technical problems and outages. This doesn't just mean technical glitches, participants and presenters themselves can be affected by personal issues and even natural disasters! So hope for the best, but expect the worst.



# IX. Recommendations

In this section, we summarise our recommendations for those reading this report and looking to see where actions can be taken. We start with our key recommendations which summarise the overall conclusions we have reached based on TFOM, and then cover recommendations based on your particular context (as an organiser, organisation, funding body, participant, etc).

## Key TFOM recommendations

### – Embrace a Digital-first approach to interaction where possible

*Going digital-first offers a level playing field for those involved and brings many opportunities for innovative ways to connect and collaborate*

We recommend digital-first because based on our experience with TFOM, this is one of the best (and only) ways to keep things accessible, inclusive and sustainable while also removing the hierarchy between those meeting in-person and those meeting virtually. While hybrid conferences may one day evolve into something that works well, our current view is that hybrid conferences which focus on adding a virtual element to an otherwise in-person gathering will not resolve the fundamental imbalance between in-person and virtual participants and thus cannot be recommended in their current form. However, it is worth noting that hybrid in the form of connected local hubs can be a successful way of improving sustainability and accessibility, as reported by Martha Merrow with respect to the CARE model she developed.

Overall what is very important is having balanced and fair participation. It is interesting to point out that Atlassian (based on the policies of acquired company Trello) have been adopting an “all in-person or all digital” approach to their interactions. That said, another strongly emerging theme of 2020 is the need for flexibility in approaches to how we work and interact. This is why we emphasise digital-first as a good approach that will allow flexibility based on the needs of any participants in a given interaction while maximising accessibility, inclusivity and sustainability. A digital-first approach can additionally achieve much of what the hybrid approach gives at a fraction of the financial costs. Note, we are not saying there is no room for in-person in the future - but that any in-person interactions should be supplemented as much as possible by digital-first communication mechanisms and be designed with careful consideration of who is not able to fully participate in person.

→ **Suggested actions:**

- Give preference to digital forms of communication over in-person
- Ensure that chosen methods allow everyone involved to have an equal voice
- Design networking to be via virtual means regardless of location
- Avoid scenarios with a majority of people in-person and only a few virtual participants
- Focus on ways of connecting people that remove emphasis on their physical location
- If doing things in-person, consider who is not given access and whether this is okay

- Establish methods to check on whether the ways of communicating are working for everyone
- Ensure there is always an effective digital-first way of connecting (by design) for any interaction

**– Maximise Accessibility, Inclusivity and Sustainability in all activities**

*Your choice of technology, approach and structure for any activity or interaction determines how accessible, inclusive and sustainable it will be as a result, which translates to positive or negative impact on both people and the environment*

We identified four key themes when we were putting TFOM together: accessibility, inclusivity, sustainability and technology. Amongst these themes, technology acts more as a facilitator or enabler whereas the others are what we believe should become standards defining all interactions. Since TFOM we have been involved in discussions in parallel with groups advocating both more sustainable and more accessible approaches to interaction in the future, and there are many parallels between the two in terms of why they are important and also challenges in turning aspirations into policies. We recommend that all those reading this to make these themes at the forefront of your considerations for all events and interactions you either organise or are involved in, and constantly challenge yourself with the questions: is this sustainable, is this accessible, is this inclusive?

It has already been encouraging to see various organisations making steps in this direction in the form of policies at the high level, and also the addition of features like captioning or accessibility statements to events. It is often pointed out in discussions about accessibility that the process of making things more accessible generally leads to improvements that benefit everyone, not just those with accessibility needs. In the case of sustainability, all measures at all levels that can be taken to improve our actions as a community are critical at this point.

→ **Suggested actions:**

- Be clear about accessibility measures in place for a given interaction
- Give participants a way to make any further accessibility needs known
- Enable accessibility features for all meetings, not just when required (e.g. live captioning)
- Make content available before and after a meeting, to allow others to participate asynchronously
- In group interactions, give ample opportunity for everyone to contribute
- Assess your interactions to see if anyone might have been unable to fully participate (and why)
- Consider, quantify and minimise the carbon impact of your research or work activities
- Calculate the carbon footprint of interactions, and offset them via appropriate schemes or trees
- Use in-person interaction sparingly, as it minimises accessibility, inclusivity and sustainability

**– Experiment regularly to build awareness of new solutions**

*Experimentation with new tools and approaches gives you diversity of experience, which then feeds into the suite of available solutions you have at your disposal*

We strongly encourage a mentality of experimentation to expose yourself to various solutions that exist. Throughout the processing planning and building TFOM, we were constantly trying out different tools to see how they fit with a given workflow we had in mind, and this meant that we were aware of all of the limitations of a given tool or approach. It then made it very easy to lock in a technical workflow, because we had a suite of possibilities that we could choose from as well as a working awareness of their features and limits. By experimenting directly yourself, you also are checking what the user experience might be for a given approach, which is an important aspect of then (as outlined below) choosing the right tool for the right purpose. Experimentation with different approaches additionally channels the growth mindset (see the work of Carol Dweck), which is argued to be an optimal mindset for maximising growth and achievement by starting from the premise that we can in fact grow and develop in positive ways based on being challenged and trying new things. The approach and tools for any given interaction can always be improved, and so we recommend to ensure you are constantly on the lookout for new opportunities on how to do things better!

→ **Suggested actions:**

- Encourage and be open to the trial of new approaches and tools for a given interaction
- Set aside dedicated time on a regular basis for experimentation to try new tools
- Keep track of possible new tools and approaches in a centralised location, e.g. a Padlet
- Carry out experiments in a group that can provide diverse perspectives on the outcome
- Consider aspects such as accessibility, inclusivity and sustainability when experimenting
- Channel a growth mindset as much as possible when it comes to existing processes and structures
- Ensure that policies do not impede the ability to find the best and most suitable solution

**– Find the Right tool/approach for the given situation**

*Tools such as Whova, Altspace or Gather work best for very different contexts, so it is worth clearly defining your goals and choosing the tool/s to suit these desired outcomes*

This recommendation is related to the previous one, in the sense that experimentation with varied tools and approaches gives the ability to then choose the best tool/approach for a given situation. There is a tendency to aim for a one-size-fits-all solution particularly when it comes to conferences, but this should be balanced against whether the chosen tool/s are fit for purpose and actually meet the goals of a given interaction. It seems likely that we will see more streamlining and cross-integration of tools in the future which should make easier to combine solutions or to adopt more all-in-one approaches. For now, we recommend that choices for a tool/approach are made with consideration of what the given interaction should look like (e.g. one-to-many, many-to-many, small group, etc) and what the goals and expected outcomes of the interaction are. This is especially relevant when it comes to meeting culture in organisations and the value of regular standing meetings (especially status updates), as well as whether an interaction needs to be synchronous or whether similar (or better, more inclusive) outcomes could be achieved by doing something asynchronously. For that purpose, we would additionally encourage those reading this report to look critically at their own meeting culture and determine whether a live interaction (in-person or virtual) is the right approach to achieve your goals (and indeed, what those goals are).

→ **Suggested actions:**

- Clearly define the goals and outcomes from an interaction, as well as requirements
- Make a shortlist of potential candidates and trial these where possible to see if they are a good fit
- Ensure you are aware of constraints within your organisation when seeking the right tool/approach
- If a tool/approach requires investment, consider short and long terms gains/costs from adopting it
- Treat the adoption of a new tool/approach as experimental, and be open to feedback or change
- Discuss your needs with others who may be aware of other solutions to your context
- Evaluate the approach on a regular basis, combining this with experimentation for new approaches

**– Recognise the Value that your team brings**

*By utilising the expertise of your team and taking ownership, it is possible to minimise outsourcing to where it is best applicable which maximises value for investment*

One of the distinctions that we feel set TFOM apart was our ownership over and investment in the entire process of putting the symposium together, from conception to wrap-up. This sense of ownership meant that it was really important to us to understand the philosophical motivations of the conference, the technical workflows and how everything in between fit together from the big picture to the details. Our recommendation is that future organisers critically assess what capability they have within their committee (or indeed, form a committee around the capabilities needed) and ensure those involved in organisation are engaged and invested to the greatest degree possible in the outcomes from the given meeting or conference. We recommend that those involved in organisation have aspects that they can take ownership of and direct, and this will enable you to divide and conquer the load as well as building a more effective team.

It should be noted that we are not advocating that nothing ever be outsourced, and we recognise the value that external parties can bring to the organisation of an event or conference. What we instead suggest, as outlined in the perspective on in-house above, that you aim to keep communication lines short and take ownership where feasible, and invest budget in external services where you are sure this is of value to the event and cannot be done in-house. Outsource effort where needed and appropriate and within the constraints of available budget, but recognise that you and your team bring a lot of value to the organisation and that virtual interaction is a very empowering shift that allows much more organiser control and ownership than ever before.

→ **Suggested actions:**

- When designing an event, conference or meeting, list what capabilities are needed for it to succeed
- Actively recruit committee members based on their expertise, capabilities and interest
- Consult with other organisers for advice based on their recent experiences
- Be willing to share advice and lessons learned on the conclusion of your event or conference
- Discuss your needs with external parties and be clear about what your expectations are
- Balance outsourcing against the factors of time, cost, processes involved and expected result
- Rank capabilities needed in terms of in-house, nice to outsource and necessary to outsource

**– Evaluate at every step of the process for maximum impact**

*Evaluation of how well you are meeting your goals consistently provides useful reality checks and encourages you to adjust or adapt where needed*

Evaluation was critical to the success of TFOM, because it meant that through the whole process we were constantly asking ourselves if we were on track and if we were still in line with our original vision (or whether that vision needed to be adapted). Adopting a mindset of evaluation is also similar to being willing to adapt and pivot based on changing circumstances, so it has some parallels in terms of being as agile as possible throughout a project (e.g. taking the steps to act based on the results of evaluation). We worked with a professional evaluation consultant (Sarah Jenkins) which was very valuable, as she helped us define our goals going into TFOM as well as how best to structure the pre-event and post-event surveys. In retrospect, while we did actively seek input and feedback throughout the process of putting TFOM together, we probably could have take action based on the evaluation to a greater extent, especially if we had had more time available. That said, we strongly recommend that evaluation be a part of any interaction that takes place, as it will also ensure you are clearly defining your goals and desired outcomes from the beginning and that you actively seek to confirm they were achieved (and if not, why not) at the end.

→ **Suggested actions:**

- Make sure the goals and outcomes of any event or interaction are clearly defined from the start
- Alongside goals, identify ways that success will be quantitatively or qualitatively measured
- If relevant, partner with experts in evaluation to define a clear path for evaluation
- Involve organisational representatives of ethics and/or privacy as early as possible in the process
- Provide ways for stakeholders to give insight and feedback through the process of an interaction
- Ensure that as well as evaluating, you commit to taking action on addressing the outcomes
- Keep track of choices and decisions made (and why) to help you evaluate success later
- Hold yourself accountable to evaluation and make the outcomes clear to stakeholders as well

## Context-based TFOM recommendations

**– If you are an organiser**

- Ensure the goals of your meetings are well established so that the most appropriate technologies can be selected
- Attempt to make the conference as diverse as possible (consider diversity in various aspects like gender, culture, seniority, field of expertise, and more). Similarly, aim for diversity in the committee itself by setting up the organising committee accordingly. This can be supported by putting together a formal diversity statement and speaker invitation policy
- Consider including a Diversity and Inclusion position within the committee so that someone is accountable for this aspect of a conference
- Ask the participants prior or during the registration what their needs are (in a free-form text box) and act on those to ensure they can participate to their best potential
- Adopt the appropriate technology (e.g. live auto-captioning) to ensure all participants can actively participate to the event and network with other participants
- Consider if a digital-first approach may work for you to avoid remote participants feeling isolated, as is the case for many hybrid events which prioritise the in-person community
- Consider online social activities that bring all participants together
- Establish a code of conduct that all participants, including organisers, can reference and abide to
- Consider calculating the carbon footprint of the event and offsetting this with an appropriate scheme (e.g. planting trees)
- Trial different tools first and to make a checklist of what is actually needed to successfully organise a diverse, inclusive and sustainable event
- If you are contracting a company to organise your events, ensure that all aspects required are being taken care of, as often many may be missed (e.g. code of conduct)

**– If you are a meeting facilitator or Master of Ceremony**

- Recognise that your role can be the glue that holds an online event together and ensure engagement for both speakers and attendees
- For an Australian-based event, undertake/organise a Welcome to Country or Acknowledgement to Country
- Mention the procedure to follow in case of an emergency drills and indicate where the amenities are (e.g. toilets)
- Explain clearly everything what is going to happen during the event, what is coming up next, what is expected from the participants (e.g. proper conduct), and who to contact for queries
- Work with any technical support staff to establish clear workflows for during an event
- Be open to needing to monitor different platforms for content if needed
- If facilitating a discussion, monitor the contributions of different speakers and seek to get contributions from all present
- Prepare live contributors to the greatest extent possible by sharing clear, concise instructions and organising test sessions prior to the live event
- Consider the benefits of live interaction (and technical risk associated) vs. the ability for pre-recorded one-to-many content to be available in advance
- Be as technically prepared as possible to help things run smoothly on the day, and familiarise yourself with the technologies being used
- Keep your camera on throughout the event so that speakers have someone to “talk” to as an audience

**– If you are a participant**

- Ensure you communicate to the organising committee what your needs are and what may help you make the most of the event
- Familiarise yourself with any terms of joining or code of conduct, and be sure to abide by them
- Be willing to try new things and go beyond your comfort zone if organisers have provided creative agenda events
- Set aside dedicated time to attend an event, whether it be virtual or in-person, and try to give it as much of your attention as relevant
- Look out for opportunities to connect with others in a virtual setting, and test networking tools if relevant (providing feedback to organisers if it works or not)
- Contact organisers with any questions or difficulties you might have, as they will be happy to help as best they can
- Take responsibility for an event by being prepared and familiarising yourself with the agenda and platform
- Read the emails that are sent to you by organisers, to ensure you don't miss any important information (and provide feedback to organisers if the emails are not containing enough useful content)
- Always provide feedback on any event with suggestions on how things could have been done better for next time, and be sure to point out also the things that did go well so they get repeated!
- Consider the event and its attendance from the perspective of others who may not have the same accessibility needs as you, and look at how things could be done better
- Take note of things that are done particularly well for any conference or event, and either use these for your next event or pass the info on to people who may benefit from this knowledge
- Be patient and understanding as much as possible, recognising that everyone is trying their best and that virtual conferences especially are still in their infancy stage while they evolve into better practices for online interaction

**– If you are a presenter**

- Speaks clearly and adjust your pace
- Organise your slides so that everyone can see what you are showing
- If presenting online, check the technologies you have access to and request help from the organisers in advance if needed (e.g. reliable internet connection; microphone close to your mouth)
- If recording a talk, be sure to record a brief snippet before starting to make sure that your audio and visuals are all coming through as expected
- Seek guidelines from organisers on what they expect in terms of a presentation (whether it be recorded or live), and ensure you follow what guidelines are provided
- When presenting, consider whether your talk would still make sense if someone couldn't see your slides or hear your voice
- Stick to the time limit that has been allocated to you, and if you are not sure how long your talk will be, do a practice talk
- Be creative in recorded talks and look for examples of what others have done in this space, recognising the need to technically upskill over time
- If presenting live, consider recording your talk in advance as a backup option in the case of technical difficulties on the day
- If a test session is organised prior to your session, ensure you join it on time to make it easy for organisers to stay on top of everything

- Advocate for greater accessibility where possible, and ask whether certain options are available (e.g. live-captioning, pre-recorded content streaming, etc)
- Be sure you understand the technical workflow as much as possible so that you are prepared for how things will work on the day, especially if live
- If a deadline has been set for provision of a pre-recorded talk, make sure you meet that deadline so that content has adequate time to be prepared by organisers
- Recognise that it will take time to adjust to presenting virtually and being comfortable with this setting, and treat each experience as a chance to learn and improve

**– If you are a workshop lead or facilitator**

- Explain clearly to the participants what is going to happen during the workshop and how that relates to the conference or event
- Circulate any material or instructions well in advance, and ensure that attendees can ask questions if needed
- Remind the participants that the code of conduct they abide to also applies to this workshop
- Check with the organising committee to ensure someone is moderating if needed
- Make sure your content is as cross-platform as possible, without making assumptions about operating system
- Set up a dry run or technical workflow demo with the organising committee if appropriate, to ensure everything will go as planned
- Take ownership in the delivery platform and be sure to know how to operate things during the workshop where needed
- Schedule regular short breaks if the workshop of considerable length and ensure that attendees get a break from the screen
- Use platforms and tools that allow workshop participants to feel part of a community where possible
- Make the goals and outcomes of a workshop very clear from the outset, as well as how attendees will know if these goals have been met
- Account for the possibility of technical difficulty on the part of workshop organisers or attendees, and have backup plans as much as possible
- Make it clear what the value of attendees having their video on will be, and give them the choice to have it off if necessary
- Check delivery platforms for their accessibility, and if provided by organisers, advocate for more accessibility wherever possible
- Consider the benefits of asynchronous collaboration and communication, and identify what is best done (and of value) in a live setting

**– If you are a moderator**

- Make sure a code of conduct has been set up so that expectations are clearly managed, and implement the procedures highlighted in there in case of breach
- Make sure moderation guidelines and policies are established for all moderators to maximise consistency
- For events with a virtual component, ensure the Q&A and chat function is being moderated actively
- Give any offenders the chance to improve and correct their behaviour, but if they repeat violations of the code of conduct, ban them from the conference

- Familiarise yourself with the tools available for moderation and ensure you know how they work in practice in different scenarios
- Prepare for the worst, but expect and hope for the best (and set expectations for the best amongst attendees)
- Ensure there are multiple people available in case of multiple moderation issues at once (it is better to over-cater for moderation than under-cater)
- Put someone in charge of moderation that has experience who can lead the planning for any moderation needs
- Take any necessary steps before the conference to minimise the need for moderation (e.g. turning off comments on YouTube if appropriate, limiting the conference to registered attendees only, etc)

**– If you are providing technical support**

- Keep short lines of communication with any key parties, including the chair and moderators for the sessions as well as attendees
- Develop concise reference documents for the presentation workflow and fault-finding procedures
- Test everything in full production mode (end to end) well before the event
- Have hot-swap backups for streaming services and practice switching between them
- Prepare as much as possible in advance, ensure all services are linked and scheduled
- Consider various possible modes of failures and have workflows in mind to mitigate or response to these
- Ensure that you have enough technical support staff to deal with all aspects of the conference (e.g. livestreaming, video platform management, user support, etc)
- Leave enough time in the agenda for technical support to switch between activities, ideally half an hour to give enough time to setup and prepare speakers/streams without the need to rush
- Be as much of an expert as possible with the technical platform (as well as possible failure modes)

**– If you are an academic**

- Consider the funds necessary for students or staff to be properly equipped for conferences that have a virtual component (e.g. headset with a microphone component) and if needed discuss with the university to set up a fund for this
- If you have a well-established reputation and are invited as a keynote speaker, consider delegating it to an early or mid-career academic who would also do a great job, by suggesting someone else to the committee. This is extremely valuable for that person in regards to their career, and that would also promote diversity to the conference
- If requested to speak at a conference that requires travel, consider whether it is justifiable to travel from a sustainability perspective. If it is, then be sure to lengthen the trip to maximise the benefits from the travel and carbon offset the emissions appropriately. Otherwise, advocate for the ability to be able to virtually participate
- Reflect on the in-person benefits of a conference (as opposed to remote), and ensure those are maximised for conferences you choose to attend in-person - for example, organic networking or collaboration building
- Where possible, be aware of timezones and be flexible when organising meetings that involve international collaborators (and be willing to take turns of timezones are always inconvenient for someone)
- Trial and experiment with remote collaboration tools, taking an active approach to testing and using any new tools that facilitate virtual collaboration

- Collaborate closely with industry on best ways to work remotely, and share lessons learned from both contexts as much as possible

**– If you are in education**

- Limit screen-fatigue by making classes shorter, handling breaks differently, and ensuring the lessons are designed to be held virtually
- Encourage a two-way communication environment that is as interactive as possible
- Develop/use tools for feedback and social interaction
- Where possible, make classes smaller for less anonymity and more close interaction (or encourage working in small groups via e.g. breakout rooms)
- Get creative with the use of technology that enables teaching and learning in less traditional environments
- Consider the value of synchronous versus asynchronous communication, and use asynchronous tools where possible to build community amongst students (minimising the use of synchrony to where it is really needed)
- Acknowledge that in remote education, the single biggest factor that is missing is the sense of community and social connection to other students and the lecturer, and take steps to mitigate the effects of this
- Community building requires informal communication as well as more formal communication, so encourage the use of relaxed interactions to better enable people to connect
- Ensure hands-on, high-engagement activities where possible and maximise interactivity and participation in all aspects of education

**– If you are an organisation or company**

- Provide the necessary support so your employees can experiment, adapt and follow best practice
- Prioritise flexibility in the ways people work, and have initiatives to enable this
- Make funding accessible for the purpose of finding new, better ways of working, interacting and collaborating
- Evaluate existing policies on a regular basis to ensure they are not anachronistic compared with the modern working culture
- Recognise the need for workers to become digital citizens, and support them to do so
- Look to governing and funding bodies for their recommendations for how best to support staff for attending virtual events and for how to be as accessible, inclusive and sustainable as possible
- Develop and implement initiatives for community-building within the organisation that are digital-first by design and provide ways for everyone to be part of the conversation, no matter where they are or in which timezone

**– If you are in events management**

- Regular contacts with the organising committee and ensure the goals of the meeting are clear
- Encourage the committee to aim for the meeting to be inclusive, accessible, diverse, sustainable, and environmentally-friendly. This can be achieved by providing various options/packages (e.g. offsetting carbon footprint; adding a code of conduct to the web page and registration process, etc)
- Provides ways for a committee to get timely responses, and preference mildly-asynchronous forms of communication (e.g. instant messaging) over emails or phone calls to keep communication simple and effective

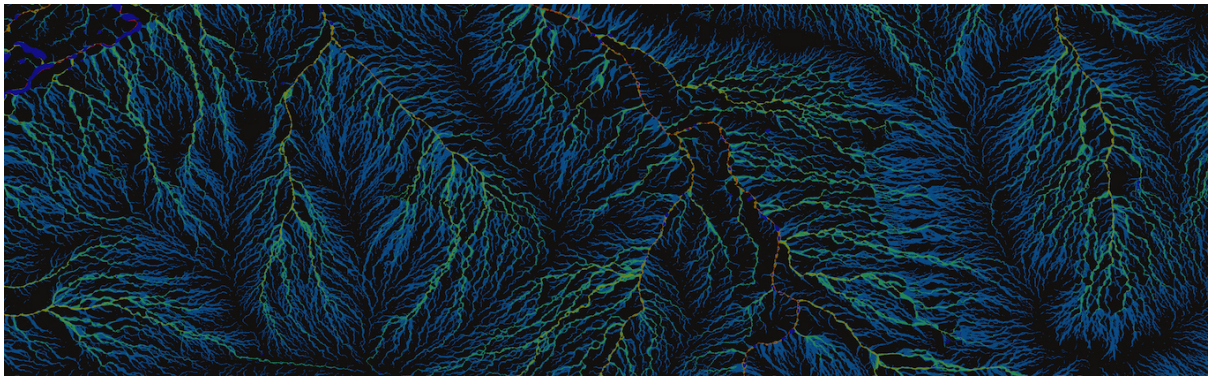
- Provide ways for organisers to have more autonomy in making things happen for a conference, rather than needing everything to be managed through third parties
- Scale the type of event management to suit the organiser, ranging from completely hands-off organisers to organisers who want more ownership in the workflow
- Streamline and automate processes where possible for maximum efficiency
- Make the value of events management very clear in a virtual context, and be willing to showcase examples of successful event support in this space to boost organiser confidence
- Offer pricing that scale fairly from small events with small budgets to larger events with considerable budgets, and scale the level of support accordingly

**– If you are a funding body**

- Make it a requirement to access funding that a code of conduct is established, with clear guidelines about how it will be enacted
- Enact guidelines that require the organising committee to make the event diverse, accessible, inclusive, and sustainable
- Hold conference committees accountable for their practices by 1) including these themes in the grant application and asking them how they will be covered, and 2) asking the committee to report on these after the event
- Recognise the value and importance of effective virtual connection and collaboration, and make sure there is extensive funding available to support activities in this space
- Consider the establishment of awards or funding programs dedicated specifically to initiatives that are accessible, inclusive, sustainable and/or technologically progressive
- When awarding funding, put limits on the amount of carbon emissions that are acceptable as a by-product of the research or conference being funded and encourage applicants to budget for effective carbon offsetting

**– If you are a governing body**

- Promote a digital-first approach to conferences due to the huge financial and environmental benefits of doing so
- Set up a code of Ethics and Professional Conduct that can easily be found online. These are important to set a baseline for any events sponsored by the governing body and may be used as a starting point for the event itself
- Provide grants that may help make the event more accessible and inclusive, such as child care facilities on site, covering registration fees for students or other persons in need, and funds for captioning presentations
- Publish guidelines and expectations on interactions in the relevant field that maximise accessibility, inclusivity and sustainability, and encourage all those within the realm of governance to follow these guidelines
- Provide grants where possible to projects or conferences designed to explore and enact best practice for virtual interaction and collaboration
- Invest effort into ensuring there are clear, reliable and systematic ways for people to calculate the carbon emissions associated with a domain-specific activity, and also provide guidelines on how best to carbon offset these activities within a year of emission
- Encourage a culture where attending a digital conference is seen as a valid way of travelling “away from work” similarly to in-person conferences, and publish recommendations on how organisations can support their staff in this



# X. Visions for the Future of Meetings

In this section we present three visions for the future of meetings, synthesised from ideas presented and lessons learned from the conference. We aim to imagine conferences and interactions which minimise the downsides and maximise the upsides of virtual conferences, while recreating the key parts of physical meetings where relevant.

## TED talks and Unconference discussions – Natasha Hurley-Walker

One of the big challenges for any conference is paying continuous attention, and this is exacerbated in a virtual format, with tempting distractions a mere click away. Shorter talks which stick to key information presented in an entertaining way are much more watchable. The well-known TED conference is a classic example, with a hard limit of 18 minutes, and a strong recommendation to convey the information in just 5 to 10 minutes. Analyses of YouTube videos show that the most successful videos tend to be as short as one minute, and rarely more than 10 minutes long. Watching long talks in a non-local timezone is extremely challenging.

Long noted by physical conference attendees, and echoed by TFOM participants, discussion sessions are by far the most memorable and enjoyable parts of any conference — everyone can participate, and new ideas are created, which can lead to new collaborations and projects. In 2020 many academic conferences had to hastily transform into an online format, and while it was relatively easy to produce a day of talks, managing discussion becomes much more difficult.

Synthesising these two points, we present the following vision. Speakers record 5-minute videos of their work, incorporating good design and limiting the information conveyed to the key points. These are made available to conference participants at least one month ahead of the live conference. They would be tagged with rich metadata, which would be used to produce recommended videos for each participant. For instance, ECR and PhD work could be given a higher profile, and work from outside the participant's region or country could be recommended above that from nearby. One could even scrape Google Scholar and recommend videos on topics that the participant is interested in, but from people they have not co-authored with!

About two weeks before the conference, participants are given the option to sign up to see longer versions of the talks, and participate in discussions around key themes (which could also be crowd-sourced). At this time they can each also specify a preferred time zone or range of time availability. The conference organisers run a minimisation routine to collate this information to unite speakers and those interested in their work, producing custom schedules for everyone, as well as making available information about all sessions so that people can join in to any session. Talk sessions can be as long as the speaker needs, and could be in any format the speaker feels would be useful to convey the information, e.g. presenting live data, asking for feedback, or a traditional 50-slide deck with unreadable figures and Comic Sans fonts. Discussion sessions would be facilitated and key points recorded.

Alongside the conference, a "backchannel" of asynchronous messaging would be used so that participants can easily message each other and set up new rooms for spontaneous discussions (e.g. Slack, Discord). The conference would be bracketed by opening and closing ceremonies in as common a time zone as possible, to which all participants would be encouraged to attend, and bring a time-appropriate

beverage. This design echoes some of the features of “unconferences”, which are participant-driven and encourage people to take part in and even create the sessions they most want to see.

## The future of meetings is Mixed Reality (MR/XR) – Glen Rees

The future of *communications*, let alone conferences and meetings, is Mixed Reality (XR). Now this might seem a bold statement for those unfamiliar with the current gen of Virtual Reality (VR) and Augmented Reality (AR) headsets, but in 10 years time we will have long ago passed the XR equivalent to the ‘iPhone 1’ moment (which released only 13 years ago in 2007) and the use of XR will be mainstream. We will have had our first cohort of students entering work that came of age with these devices, they will be as familiar with them as we are with laptops, tablets and smartphones, and the UI quality and integration of XR headsets into our existing education, social and work systems will be as comprehensive as any other device that we use today.

I think it’s important here though to re-iterate that this is not some far-off fantasy. Current consumer headsets already provide massively immersive social experiences with humans interacting via avatars that accurately represent (in real-time) their eye-movement, body-language, hand-movements, finger position and voice/mouth movements. This is done in a shared virtual world with immersive spatial audio, allowing you to pinpoint where both voices and environment sounds are coming from, as well as share videos, documents, websites and screens in an interactive fashion.

Development for the next-generation of XR headsets is already in progress, with a strong focus on upgrading these existing systems to produce real-time facial expressions on photo-realistic avatars and photo-realistic, real-time, real-world scanning. This will allow users to control a ‘digital twin’ indistinguishable from their physical bodies[46,47] for use in professional XR contexts, in a exact digitally reproduced copy of their or their colleague’s current physical surroundings if desired[48,49]. Integrating these developments in XR with recent advances in robotics and machine-learning hints at a very different work environment in 2030, a time when even remote *physical* labour might be the norm[50].

For many reading this in 2020, this probably seems far-fetched, and right now XR is probably something you have not yet seriously considered as a viable alternative to a professional, in-person or video-call based conference or meeting. Indeed, other than perhaps for immersive, dedicated training systems for high-risk professions (e.g in health, military and heavy industry jobs), XR systems are largely perceived as a just a revolution in entertainment. This is unfortunate, because while current XR is undoubtedly game-changing in the world of entertainment (pun intended), the biggest impact these systems are already having on the world is the vast improvements they offer in effective remote socialisation, which is a huge part of what people feel is missing in video-call-based remote meetings, conferences and networking.

In their current form, XR headsets already provide a fantastic synergy with standard remote meeting practices, largely because they can mitigate one of the biggest complaints people have about current remote work: the general lack of presence or “human connection”, and the organic flow of interactions in the large many-to-many style events that are so crucial to academic and business networking. This is because XR embodies a user as a physical avatar within a shared world with spatial audio, allowing us to potentially use the full suite of human to human communication languages (eye contact, body language, gestures, directional and distance based audio etc) to ease every aspect of our interaction. This in turn allows many-to-many communications in an identical manner to physical events and provides a sense of presence, of actually ‘meeting’ people that is nearly impossible to reproduce in 2D.

XR is of course not perfect, there are still the technical issues and bugs inherent in any new and quickly evolving system, as well as the issues of competing platforms (with varying feature lists). Despite this, by far the biggest barrier to the uptake of XR in conferences and meetings seems to be not technical, but social, stemming from a combination of user inexperience, the challenge of keeping skills up to date given the rapid pace of evolution in XR systems and ultimately the lack of availability and funding for headsets as a legitimate professional tool. If you can mitigate these factors enough however, XR goes a long way to fixing the most common problems people have with digital interactions.

[46] https://www.pinscreen.com
[47] https://tech.fb.com/codec-avatars-facebook-reality-labs/
[48] https://www.microsoft.com/en-us/hololens
[49] https://www.engadget.com/2019-09-25-facebook-ar-livemaps-3d-planet-mapping-augmented-reality-glasses.html
[50] https://www.bbc.com/news/business-54232563

## The decline of synchronous communication – Vanessa Moss

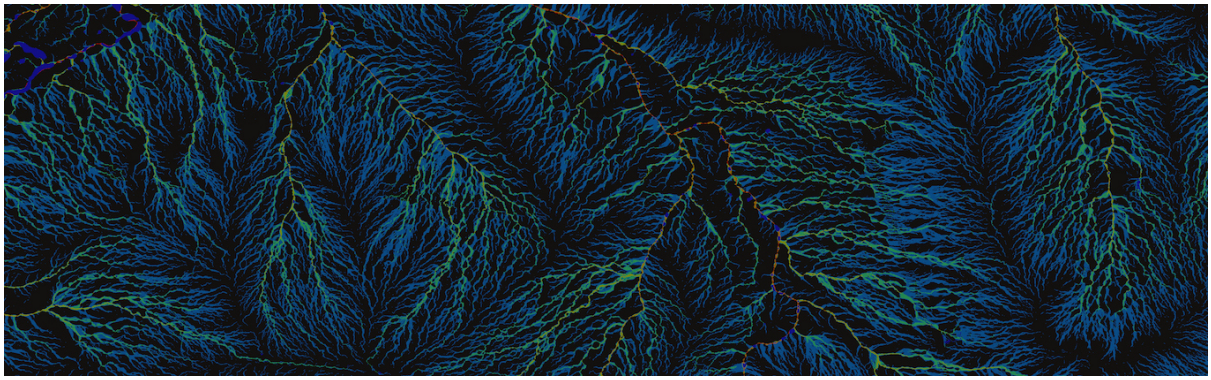
One of the aspects explored and discussed a lot in putting together TFOM was the notion of synchronous versus asynchronous means of communication and collaboration. This was also touched on with respect to meeting culture in academia and around the world, where it is clear that a meeting (often, a regularly-occurring one) is used to try and achieve outcomes, even though a live synchronous meeting is not necessarily the best means of communication for the context. It was also apparent to us that many of the challenges encountered with transitioning a physical conference to a virtual one started with the premise of assuming that what is done for physical conferences is best practice, but actually it is something that has been inherited from a century of holding conferences in similar ways despite advancing technology.

A valid question to ask in this context is: what is the role of the conference in a world where you can instantaneously communicate with anyone, anytime, from anywhere? Some of our TFOM speakers presented amazing visions of a future that doesn't seem too far away, where it is essentially also possible to *be* anywhere instantaneously - not via physical teleportation, but thanks to the increasing effectiveness of virtual, augmented and extended reality as described in the above vision and elsewhere in this document. A hundred years ago, it was nearly impossible to communicate effectively across large distances due to the technology to do so being in its infancy. So the relevant people would instead transport *themselves* across large distances, at great cost, to spend dedicated time together because this was the only way to communicate at the depth required to make scientific progress. Now, we have continued this trend of conferences to the point where the carbon footprint of academics (and industry professionals) is significantly above that of the general population, but it is not clear whether the tradition of conferences is continuing in the most effective way now that technology can fill many gaps.

Synchrony is an important factor to consider going forward, and an aspect that will likely continue to decrease in an increasingly connected world that will never (unfortunately) get around the fact that the Earth is round and thus timezones will play a role. Society has placed much emphasis so far on the synchronous: meeting live, discussing live, giving talks live, collaborating live, socialising live. As part of TFOM we explored the balance between synchronous and asynchronous by prerecording content as much as possible and also ensuring that (speaker consent permitting) there was legacy value to our content by keeping it available. We asked ourselves constantly: what is the value that attendees will get for coming to TFOM live? We'd heard many stories about how online events and conferences received high registrations, but not necessarily high turnout on the day (the word-of-mouth rate we heard is about 30% of the registrations for a one-off event, or less for a conference especially if it is on a broad topic). Conversely, many of us on the committee reflected on how a condensed period like an in-person conference can be truly excellent for forming new collaborations and brainstorming ideas for new projects, but how this enthusiasm very often fades once people return back to their home institutions and contexts.

The vision I suggest here is that, as a society, we will see the continued decline of synchrony and of expectations to collaborate in a synchronous manner. In a perhaps strange-sounding way, this is correlated with the decline of the landline phone (and I would expect, the decline of mobile phone numbers as primary means of contact over the next decade). It is a dichotomy of contemporary times that we are both much more available than ever before thanks to the infinite suite of ways to communicate, but at the same time are finding it increasingly necessary to have ways of indicating and controlling our availability. Services like Slack, Microsoft Teams and Jabber have grown in popularity thanks to their ability to combine asynchronous contact with colleagues with the ability to shift into synchronous chat, phone calls or video calls as necessary but not by default. Collaboration that would typically be done live in front of a whiteboard with post-it notes can be ported easily to virtual whiteboards that are constructed over time, capturing the input of colleagues around the world instead of those who happen to be in the same room at the time. Academic collaborations have long been a globally-connected effort, especially in fields like astronomy, but there is now an ever-increasing acceptance and adoption of digital means of communication that is enabling easier connection than before, such as online colloquia that are accessible beyond institute walls, conferences that are digital-first by design and international working groups who may meet regularly in a live format but also communicate and collaborate constantly via online tools. We've also seen the effects of this in lecture halls (both in-person and digitally), where university students are increasingly opting to minimise any of their live interaction in favour of digesting content (particularly lectures which are often a one-way conversation) at a time that suits them better.

Expecting synchronous participation from people in any kind of activity is going to be something that requires increasing justification of value for effort as we go forward from the present day. In all things we do, we should be asking ourselves: is this something that needs to be done synchronously for whatever reason, or could it be better done either asynchronously, or as a mix of both (with some asynchronous preparation and then a synchronous component)? Would it be more effective as a short email, a brief chat message, a wiki post, a collaborative whiteboard, or a notification on a messageboard? If we can truly make use of synchrony when it actually matters, we will see a significant increase in productivity and a huge increase in our ability to be globally inclusive and accessible, regardless of timezone or location. This should be a goal at the forefront of the minds of institutions and companies which want to succeed in a properly-globalised world, because access to diverse input and perspectives should not have borders, and synchrony is, in many cases, unnecessary for achieving desired outcomes.



# XI. Resources

In this section, we have collected various resources and platforms that may be of interest and use to those reading this report. We have grouped them into alphabetical categories, each sorted alphabetically, and note that we have made no attempt to rank the tools listed here. Some of the tools or platforms listed below were used during TFOM (and if so, we have highlighted them throughout the document), while others were recommended to us or came up in research for virtual events.

We do not necessarily endorse or recommend any resource listed here, but instead encourage you to investigate it comprehensively in order to decide if it might be a good fit for your context. If there are any resources you think are missing from this list, please feel free to get in contact with us and let us know!

Additionally, we note that many of the resources (as well as various articles not listed here) are collated in the TFOM Online Noticeboard[51], and highlight this as an additional resource to check out.

### Accessibility Tools

- **3PlayMedia** - Video Captioning, Transcription, Audio Description, Subtitling
  https://www.3playmedia.com
- **Aegisub** - Advanced Subtitle Editor
  http://www.aegisub.org
- **Ai-Media** - Creating accessibility, one word at a time
  https://www.ai-media.tv
- **Amara** - Award-winning Subtitle Editor and Enterprise Offerings
  https://amara.org/en
- **Rev** - Transcribe Audio to Text — Transcription Company & Website
  https://www.rev.com
- **Zoom Live Captioning (Rev)** - Automatic Live Captions for Zoom
  https://www.rev.com/zoom-live-captions
- **Webcaptioner** - Automatic Free Live Captions for any audio input
  https://webcaptioner.com/

### Communication Tools

- **Confluence** - Your Remote-Friendly Team Workspace
  https://www.atlassian.com/software/confluence
- **Discord** - Your Place to Talk and Hang Out
  https://discord.com
- **Slack** - Welcome to your new HQ
  https://slack.com

[51] https://padlet.com/vamoss/tfom

- **Yammer** - Collaborate & Connect with the Yammer App
  https://www.microsoft.com/en-au/microsoft-365/yammer

**Conference/Event Management Platforms**

- **6Connex** - Virtual Environments — Event Management
  https://www.6connex.com
- **Accelevents** - Seamless & Affordable Virtual Event Software
  https://www.accelevents.com/virtual-events
- **BigBlueButton** - Open Source Web Conferencing
  https://bigbluebutton.org
- **Brazen** - Virtual Career Fairs & Online Hiring Event Platform
  https://www.brazen.com
- **Communiqué** - Virtual Trade Show Software — Virtual Conference Platform
  https://www.virtualtradeshowhosting.com
- **Converve** - Your all-in-one solution for successful networking events
  https://converve.com
- **Gather** - Better spaces to gather around
  https://gather.town
- **GigTV** - Online Events Made Easy
  https://www.gigtv.com.au
- **HexaFair** - The #1 Virtual TradeFair, Virtual Expo & Virtual Summit Software
  https://www.hexafair.com
- **HireVue** - Video Interview Software & Platform
  https://www.hirevue.com
- **iEvent** - Best Mobile Apps for Events & Conferences Management
  http://www.ieventapp.com
- **iSee** - Making Virtual Collaboration Great
  https://www.iseevc.com.au
- **MiniConf** - A virtual conference in a box
  http://www.mini-conf.org/index.html
- **ON24** - Experiences that Scale, Engagement that Matters
  https://www.on24.com
- **OnAir** - Software for Virtual & Hybrid Events
  https://eventsair.com/onair
- **Pathable** - Virtual Event Engagement Reimagined
  https://pathable.com
- **RunTheWorld** - Goodbye boring virtual events
  https://www.runtheworld.today
- **Sched** - Manage your conference with an interactive app for attendees
  https://sched.com/conference
- **Slido** - Audience Interaction Made Easy
  https://www.sli.do
- **SpotMe** - Digital Experiences & Virtual Event Platform
  https://spotme.com
- **Swoogo** - Your virtual events just stepped into the spotlight
  https://get.swoogo.com/virtual-events

- **Teooh** - Host Large Scale Events and Online Conferences
  https://www.teooh.com/virtual-events
- **vFairs** - Host seamless virtual events for a global audience
  https://www.vfairs.com
- **Virbela** - A Virtual World for Work, Education & Events
  https://www.virbela.com
- **Virtway** - An immersive experience in the virtual 3D world
  https://www.virtway.com
- **Wooclap** - An interactive platform that makes learning awesome
  https://www.wooclap.com
- **Whova** - Award-winning Event Apps and Event Management Software
  https://whova.com

**Digital Avatars**

- **Loom.ai** - Real-time 3D Avatars for Enterprise
  https://loomai.com/product
- **Pinscreen** - AI-Driven Virtual Avatars
  https://www.pinscreen.com

**Digital Productivity Tools**

- **Evernote** - Best Note Taking App - Organize Your Notes with Evernote
  https://evernote.com
- **Google Workplace** - Everything you need to get anything done, now in one place
  https://workspace.google.com
- **Magic** - Your Specialized Remote Workforce
  https://getmagic.com
- **Meeter** - Fast Call Initiation, Calls & Meetings in one place
  https://trymeeter.com
- **Notiv** - The Meeting Recorder With More
  https://www.notiv.com
- **Overleaf** - Online LaTeX Editor
  https://www.overleaf.com
- **Roam** - A note taking tool for networked thought
  https://roamresearch.com
- **Toggl** - Simple & Beautiful Tools that Help Teams Work Better
  https://toggl.com
- **World Time Buddy** - Time Converter and World Clock - Conversion at a Glance
  https://www.worldtimebuddy.com

**Graphic Design**

- **Canva** - Collaborate & create amazing graphic design for free
  https://www.canva.com
- **Experience Illustration** - Product, service, strategy, communication design
  http://experienceillustration.com
- **Gimp** - GNU Image Manipulation Program
  https://www.gimp.org
- **ThingLink** - Improve engagement and reach for your visual media
  https://www.thinglink.com

### Networking tools

- **Coffee Roulette** - Connecting your employees through great communication
  https://coffee-roulette.com
- **Converve** - Your all-in-one solution for successful networking events
  https://converve.com
- **MINGLR** - Experimental software system supporting ad hoc, private videoconferences
  https://minglr.info
- **RandomCoffee** - Better relationships for better work
  https://www.random-coffee.com
- **RunTheWorld** - Goodbye boring virtual events
  https://www.runtheworld.today
- **Swapcard** - Event App & Matchmaking & Virtual Events, powered by AI
  https://www.swapcard.com

### Online Training/Resources

- **Atlassian** - Work Life (blog)
  https://www.atlassian.com/blog
- **AWS Educate** - Webinar series on remote learning
  https://aws.amazon.com/education/education-webinars
- **CARE Conferences** - CArbon REduced Conferencing
  https://careconferences.org
- **The Carpentries** - Recommendations for Teaching Carpentries Workshops Online
  https://carpentries.org/online-workshop-recommendations
- **Disability Advocacy Resource Unit** - Accessible online meetings
  https://www.daru.org.au/lesson/accessible-online-meetings
- **Ken Hiltner** - A nearly carbon-neutral conference model
  https://hiltner.english.ucsb.edu/index.php/ncnc-guide
- **Slack** - Several people are typing (blog)
  https://slack.com/intl/en-au/blog
- **Zoom** - Support during the COVID-19 pandemic
  https://zoom.us/docs/en-us/covid19.html

### Remote Collaboration and Interactivity Tools

- **Bitbucket** - The Git solution for professional teams
  https://bitbucket.org/product
- **GitHub** - Where the world builds software
  https://github.com
- **GitLab** - DevOps Platform Delivered as a Single Application
  https://about.gitlab.com
- **Jira** - The #1 software development tool used by agile teams
  https://www.atlassian.com/software/jira
- **Mentimeter** - Interactive presentation software
  https://www.mentimeter.com
- **Microsoft Teams** - Group Chat — Free Chat
  https://www.microsoft.com/en-au/microsoft-365/microsoft-teams
- **Miro** - An Online Visual Collaboration Platform for Teamwork
  https://miro.com

- **MURAL** - MURAL is a digital workspace for visual collaboration
  https://www.mural.co
- **Padlet** - It's a beautiful day, make something beautiful
  https://padlet.com
- **Poll Everywhere** - Host interactive online meetings
  https://www.polleverywhere.com
- **Trello** - Trello helps teams work more collaboratively and get more done
  https://trello.com

**Social Activities/Platforms**

- **Cameo** - Personalized videos feat. your favorite stars
  https://www.cameo.com
- **Gather** - Better spaces to gather around
  https://gather.town
- **Goats on Zoom** - Add a Goat to your next video call
  https://www.cronkshawfoldfarm.co.uk/goatsonzoom
- **Crowdpurr** - Virtual and Live Crowd Trivia
  https://www.crowdpurr.com/live-crowd-trivia.html
- **The Escape Game** - Virtual Escape Room - The Escape Game Remote Adventures
  https://theescapegame.com/remote-adventures
- **iSee** - Making Virtual Collaboration Great
  https://www.iseevc.com.au
- **Kahoot!** - Learning games — Make learning awesome!
  https://kahoot.com
- **QuizWitz** - Play the party quiz game online!
  https://www.quizwitz.com/en/party
- **Roblox** - A global platform that brings people together through play
  https://www.roblox.com
- **Scavify** - Virtual Team Building
  https://www.scavify.com/virtual-team-building
- **TriviaHub** - Virtual Trivia Events
  https://www.triviahublive.io
- **TriviaMaker** - Quiz Creator — Create Your Own Trivia Game Show
  https://triviamaker.com
- **Watch2gether** - Watch Videos, Together
  https://w2g.tv
- **World Walking** - a simple, free and fun way to help you keep active
  https://worldwalking.org

**Streaming Tools**

- **Manycam** - Live video software & Virtual Webcam
  https://manycam.com
- **OBS** - Open Broadcasting Software
  https://obsproject.com
- **Restream** - Multistream to 30+ Platforms Simultaneously
  https://restream.io

- **StreamLabs** - The best free live streaming software on Windows and Mac
  https://streamlabs.com
- **VB-Audio Cable** - VB-Audio Virtual Apps
  https://vb-audio.com/Cable

**Video Conferencing Software**

- **BlueJeans** - Video Conferencing, Screen Sharing, Video Calls
  https://www.bluejeans.com
- **Cisco Webex** - Video Conferencing, Online Meetings, Screen Share
  https://www.webex.com
- **Google Meet** - Premium video meetings, now free for everyone
  https://meet.google.com
- **GoToMeeting** - Online Meeting Software, Video Conferencing & Web Conferencing
  https://www.gotomeeting.com
- **Microsoft Teams** - Group Chat — Free Chat
  https://www.microsoft.com/en-au/microsoft-365/microsoft-teams/group-chat-software
- **Zoom** - Video Conferencing, Web Conferencing, Webinars, Screen Sharing
  https://www.zoom.us

**Video Recording/Editing Software**

- **Camtasia** - Screen Recorder & Video Editor
  https://www.techsmith.com/video-editor.html
- **Da Vinci Resolve**
  https://www.blackmagicdesign.com/au/products/davinciresolve
- **Loom** - Video Messaging for Work
  https://www.loom.com
- **mmhmm** - Clear, compelling communication for everyone
  https://www.mmhmm.app

**Video Hosting / Streaming Platforms**

- **Twitch** - The world's leading live streaming platform for gamers
  https://www.twitch.tv
- **Vimeo** - The world's leading professional video platform
  https://vimeo.com
- **YouTube** - Enjoy the videos and music you love, upload original content, and share it all
  https://www.youtube.com

**Virtual Office Platforms**

- **Arthur** - Virtual Real(i)ty
  https://arthur.digital
- **Qube** - Facilitated service on a multi activity campus
  https://home.qube.cc
- **Sococo** - Online Workplace for Distributed Teams
  https://www.sococo.com

**VR/AR/XR Apps for Social**

- **AltspaceVR** - Be there, together
  https://altvr.com

- **BigScreenVR** - Watch movies and hangout with friends in virtual reality
  https://www.bigscreenvr.com
- **Facebook Horizon** - Explore. Play. Create. Together.
  https://www.oculus.com/facebook-horizon
- **High Fidelity** - Live Spatial Audio And Virtual World Technologies
  https://www.highfidelity.com
- **Hoppin'** - Multi-User Immersive Teleportation Using 360° Videos
  https://hoppin.world
- **Mozilla Hubs** - Private social VR in your web browser
  https://hubs.mozilla.com
- **NEOS** - Neos Metaverse
  https://neos.com
- **Rec Room** - The best place to build and play games together
  https://recroom.com
- **Sansar** - The world's leading social virtual reality platform
  https://www.sansar.com
- **VRChat** - Create, Share, Play
  https://hello.vrchat.com

**VR/AR/XR Apps for Work**

- **ENGAGE** - VR Education & Corporate Training Platform
  https://engagevr.io
- **EXP360** - Leader in Virtual Reality for Business
  https://exp360.com
- **Garou** - Pioneering spatial computing
  https://www.garou.io
- **Glue** - Universal Collaboration Platform
  https://glue.work
- **Immersed** - Work Faster in VR Than in Real Life
  https://immersedvr.com
- **MeetinVR** - Business Meetings & Collaboration in VR
  https://www.meetinvr.com
- **Microsoft Dynamics 365** - A new vision for work
  https://dynamics.microsoft.com/en-au/mixed-reality/overview
- **MRXPO** - Virtual event platform for conferences and trade shows
  https://www.mrxpo.com/wp
- **Rumii** - VR Communication and Collaboration For Training and Education
  https://www.dogheadsimulations.com
- **Spatial** - How Work Should Be
  https://spatial.io

**VR Headset Suppliers**

- **Magic Leap** - Reality is just beginning
  https://www.magicleap.com/
- **Microsoft Hololens** - Mixed Reality Technology for Business
  https://www.microsoft.com/en-us/hololens

- **Oculus** - VR Headsets and Equipment
  https://www.oculus.com/
- **Valve** - Upgrade your experience
  https://store.steampowered.com/valveindex
- **VIVE** - Discover Virtual Reality Beyond Imagination
  https://www.vive.com/

# Afterword: Today, Tomorrow, Future

So the question you might be asking yourself at the end of this: what next? Where do we go from here, as the already-infamous year that was 2020 draws to a close? There is no doubt that this has been an unusual and often challenging year, testing the absolute limits of all of the existing structures of society. But there have also been some positive things to come out of this year, and we hope that both The Future of Meetings Symposium and this report fit into that category. In fact, wrapping all of this up by the end of 2020 was really important to us, so that these reflections and recommendations could be an outcome of a year that wasn't *all* bad.

In this report, we have done our best to summarise everything we learned in designing and executing TFOM, and we hope that you have found some useful tips and recommendations that will help you in making choices for how your future interactions might look like. While we recognise that the report is quite comprehensive, we have attempted to bring things together concisely via our lessons learned and recommendations sections with the goal of making our advice to you, the reader, as clear as possible. Our key recommendations summarise our call to action, and can be even more concisely summarised as DAISERVE (if you happen to like a good acronym, or even a passable one).

As Chair of the TFOM Organising Committee, I want to take the chance now to echo the thanks and acknowledgements stated as part of our executive summary. To everyone who helped make TFOM a reality, thank you so much for being willing to go on this exploratory journey and to ask the big questions about how we meet, why we meet, and how we *should* meet in the future. An especially big thanks to the TOC members who put in much effort to bring this report together! Thinking back to where this all started in early 2020, back when we thought that the devastating Australian bushfires were going to be the worst part of 2020 and wanted to do what we could from the perspective of sustainability, we've come such a long way and I'm really grateful to everyone who has been part of evolving TFOM into what it eventually became. Our key themes of accessibility, inclusivity, sustainability and technology are on my mind now in everything I do, and I hope through this report we have conveyed some of why we chose to highlight these as important overarching themes.

I truly believe that we can and should adapt our processes and structures to be as digital-first as possible. While it may still be sometimes beneficial to meet face-to-face, it is important to make sure that in-person interaction is used only when it is truly necessary and with full awareness of the cost of doing so for people and the environment. Flexibility also needs to be a key theme of shaping the way we work and interact in the future: what works for one person is not necessarily a good fit for another, and maximising both happiness and productivity will come from finding solutions that work for each person's context. So look at your own context, and the contexts of those around you, and challenge yourself to think about whether things could be done differently, fairer, better. Be willing to try new ways of interacting and working, and come at them with an experimental and evaluating mindset so you can find the optimal approach. Ask yourself whether you need to look outwards for a solution to a problem or for a capability, or whether you can look inwards to yourself and those around you. Channel a growth mindset, and never stop seeking to improve!

One of the many virtual conferences I attended lately was SIGGRAPH Asia 2020, a pretty exciting and different virtual venue to visit for a radio astronomer. The words of *Over The Moon* director Glen Keane when asked about international collaboration have stuck in my mind since then. He said when he left Disney, he was struck by a desire to "live creatively without walls". He spoke about how for *Over The Moon*, his large monitor was his window to a world of collaborators in China, Canada, Spain and The Netherlands, and how wonderful it was to be connected to everyone in this way, working with people all around the world. The Year That Was 2020 has tested us in many ways, but it is undeniable that we are much more globally connected and aware than we've ever been before, and that for the first time in the history of humanity, we've been forced to look well beyond the walls around us on a regular basis.

For me, I think that is one of the best things to come out of this year, and I hope that TFOM is one of the many steps we can take towards realising a future that is forever without walls.

*Vanessa A. Moss*
*Chair of the TFOM Organising Committee*
*December 18, 2020*

***Acknowledgement of traditional owners***

*We acknowledge the Traditional Owners of the lands from which all involved in The Future of Meetings came together and we acknowledge their vibrant living cultures and knowledge systems. We pay our respects to Elders past, present and emerging.*

***Header image credit***

*Our primary header image ("Water flow patterns") used for this symposium showcases some of CSIRO's work in agriculture: "Water flow patterns, Western Darling Downs, near Miles. Our high resolution models help farmers and land managers by using aerial photography to see processes not visible to the human eye, such as water flow patterns under trees in forests". We think that the connected network shown in this image has a lot of similarities to the ways we are all connected in these current times, and thus it seemed like a very well-suited image for our symposium. This image is part of CSIRO's collection, but owned by Neil Huth and Elizabeth Meier, CSIRO Agriculture and Food.*

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