

## THE PATH TO A MORE ACCESSIBLE AND INCLUSIVE FUTURE OF MEETINGS IN ASTRONOMY

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### ABSTRACT

The Future of Meetings (TFOM) began as a symposium dedicated to exploring the future of interaction in 2020, framed around key themes of accessibility, inclusivity, sustainability and technology, and with its roots in the astronomy community. Throughout our work in TFOM, it has been clear that the standard meeting practices taken for granted as a given in astronomy (and science) have long been inaccessible to many, creating a “normal” that is both exclusive and unsustainable. Conversely, the rapid advances in effective online means of communicating and collaborating open up a wealth of new possibilities for redefining what is required to succeed in astronomy, from the ground up. In this proceeding, we outline the lessons learned from and core recommendations of TFOM, specifically in the context of accessibility and inclusivity in astronomy. In the wake of pandemic disruption, we have a unique chance to rewrite the fabric of collaboration within our field. By doing so, we can establish new attraction and retention practices, maximising inclusivity while minimising environmental harm at a critical turning point for our long term survival as a species.

### RESUMEN

El Futuro de las Reuniones (TFOM) comenzó como un simposio dedicado a explorar el futuro de la interacción en 2020, enmarcado en temas clave de accesibilidad, inclusión, sostenibilidad y tecnología, y con raíces en la comunidad astronómica. A lo largo de nuestro trabajo en TFOM, ha quedado claro que las prácticas estándar de cumplimiento que se dan por sentadas en astronomía (y ciencia) han sido durante mucho tiempo inaccesibles para muchos, creando una “normalidad” que es exclusiva e insostenible. Por el contrario, los rápidos avances en los medios en línea efectivos de comunicación y colaboración abren una gran cantidad de nuevas posibilidades para redefinir lo que se requiere para tener éxito en la astronomía, desde cero. En este procedimiento, describimos las lecciones aprendidas y las recomendaciones centrales de TFOM, específicamente en el contexto de accesibilidad e inclusión en astronomía. A raíz de la interrupción de la pandemia, tenemos una oportunidad única de reescribir el tejido de la colaboración dentro de nuestro campo. Al hacerlo, podemos establecer nuevas prácticas de atracción y retención, maximizando la inclusión y minimizando el daño ambiental en un punto de inflexión crítico para nuestra supervivencia a largo plazo como especie.

*Key Words:* sociology of astronomy — history and philosophy of astronomy

### 1. THE OLD NORMAL

The 2019 world of academia looked radically different in many ways to the one we find ourselves in today. While there has been a growing advocacy of

the need to adapt academic practices for maximal sustainability (e.g. Williamson et al. 2019; Stevens et al. 2020; Burtscher et al. 2021), travel around the world was frequent and generally expected as part of a normal career. In astronomy, we travelled for conferences, for collaboration meetings, for training and education, for workshops and for observing trips, to name just a few. It was rare to see a conference or workshop of any scale take place in a form other than in person, unless it was designed as part of a project-based (globally-distributed) collaboration - and even then it was more common to see the majority of collaboration members travel to one physical location with others dialled in from afar. Online access to attend conferences was extremely rare, despite the growing awareness that the ability to travel

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frequently from home was a combination of a number of complex factors of privilege that many existing and would-be collaborators do not have (see e.g. Henderson 2021). Often, it was standard practice to travel even if the activity taking place could be adequately reproduced in an online setting. Travel budgets for many institutions were large as a result, and the most prestigious academic positions tended to come with the addition of a large travel budget, widening the gap in access to science for countries without the same capacity or funding for travel. The great benefits of in-person interaction were widely recognised, but rarely made explicit as the main reason to travel to a destination.

Accessibility and inclusivity were far from optimised in the previous ways of meeting and collaborating. While travel may be seen as a perk for those in academia, there are many in our society unable or unwilling to travel that were thus not able to be part of many conferences and conversations. Whether this is due to reasons such as to limited access to funding/permission/visas (either due to lack of seniority or geographic/socioeconomic location), limited time or capacity to travel, ethical motivations (wanting to limit carbon emissions), challenges for those with disabilities, or personal reasons (caring responsibilities, cultural barriers), there are significant barriers preventing easy in-person interaction for many. Thus greater access to conferences and collaborations is needed to enable a more diverse group of people to progress in academia. Similarly, even when access was available, being able to have a voice and feel included was often a problem for researchers from minority groups and diverse backgrounds as well as junior researchers. While access and inclusion did not necessarily improve universally during the pandemic due to factors like balancing family care with working from home or sub-optimal remote work conditions (Aczel et al. 2021; Grska et al. 2021; Else 2021), the technology to get “everyone in the room” and on a more equal footing provides an opportunity to move forward with a greater focus on ensuring accessibility and inclusivity are front of mind when planning research interactions.

Now, we find ourselves at a turning point for how we choose to continue forwards in academia. It is perhaps too easy to dismiss the last two years of COVID-19 related restrictions as a kind of ‘blip’ that is better to forget, conflating all of the negative aspects of a global pandemic with any possible good to come from it. It is true that this period has exerted an extraordinary amount of pressure on people in all sectors, and especially on the most junior and vul-

nerable members of our academic community (Lpez-Vergs et al. 2021). However, the last two years have also shown us that there can be more flexible ways of working and collaborating (without travelling) which still enable us to carry out our jobs, interact effectively with others around the world, and progress the field of science. Much that was taken for granted before is now being questioned, in academia, in industry, and in broader society (e.g. Williamson et al. 2021). For all of the bad that came with COVID-19, we are also presented with a unique opportunity to learn from this period and properly rewrite the rule book on what it means to be an academic, a scientist and (in the case of this proceeding’s context) an astronomer. Best practice for online interaction is still rapidly evolving, but it is already clear that designing meetings to take place using internet-based tools and applications can provide great benefits in terms of accessibility, inclusivity and sustainability, when technology is leveraged to its full potential.

This proceeding will explore the future of meetings in astronomy with a focus on improving accessibility and inclusivity, based on lessons learned from our work in this space. It provides a written accompaniment to the talk presented as part of the 2nd Astronomy Beyond the Common Senses Workshop, which took place in November 2021. Resources associated with the talk can be accessed on our website<sup>9</sup>.

## 2. THE FUTURE OF MEETINGS

In September 2020, we<sup>10</sup> hosted a symposium on “The Future of Meetings” (TFOM) to explore what the future of interaction (especially in science) might look like today, tomorrow and in the future. The origins of this began in late 2019 when conversations about increasing sustainability in astronomy merged with discussions about the coming generation of technology, especially mixed reality. We focused the conference around four key themes which have stayed as the foundation of what we explore within TFOM: accessibility, inclusivity, sustainability and technology. The symposium featured many excellent speakers with a diverse range of expertise, and we made significant efforts to capture as much of the learning as we could from the gathering via our legacy archive<sup>11</sup> and in the form of a detailed report<sup>12</sup> released in December 2020. We also pub-

<sup>9</sup><https://thefutureofmeetings.wordpress.com/2nd-workshop-on-astronomy-beyond-the-common-senses>

<sup>10</sup><https://thefutureofmeetings.wordpress.com/the-tfom-organising-committee>

<sup>11</sup><https://thefutureofmeetings.wordpress.com/archive>

<sup>12</sup><https://zenodo.org/record/4345562>

lished our lessons learned specifically in the context of the future of astronomy (Moss et al. 2021).

Since TFOM, a number of the original organising committee members along with others interested have continued to champion the core values of TFOM through a community of practice, sharing lessons learned via numerous avenues and advising on how others might adapt their own meetings and conferences to increase accessibility and engagement. We have also continued to experiment and explore, with the aim of contributing to the global quest for best practice in a new normal. While the pandemic has acted as an instigator for changing how we connect and collaborate, we believe it is critical that this is not seen as a temporary inconvenience. Instead, the ways we adapt now, and the commitment we make to preserving the positive changes brought about by the pandemic, can provide the foundation of lasting change in academia that will help realise a much more inclusive and accessible field.

### 3. LESSONS LEARNED FOR ASTRONOMY

A key outcome from TFOM was the identification of eight main recommendations that we found underpin best practice for interaction, which we summarise in Fig.1 (short form: DAISERVE). Our intention is that if these elements are taken into account when designing an interaction of any format (e.g. conference, meeting, workshop, etc), these elements provide a foundation for best practice to maximise the benefits of the interaction for those involved.

Figure 1 gives an overview of the meaning of each recommendation, and we refer readers to the full TFOM report for further detail on ways to incorporate these in meeting planning. While DAISERVE is applicable on an individual meeting basis, we also feel it can apply more generally when considering the future directions of a field. In the context of astronomy, we find ourselves asking the following questions based on TFOM:

- **Digital-first:** how can online mechanisms help us conduct astronomy more effectively and efficiently across states, nations and globally?
- **Accessibility:** what steps can we tangibly take to improve the accessibility of research-oriented activities for all astronomers?
- **Inclusivity:** are we designing our scientific workflows to include, or exclude?
- **Sustainability:** how do we minimise the environmental footprint of our work in astronomy at all scales in the shortest possible time?

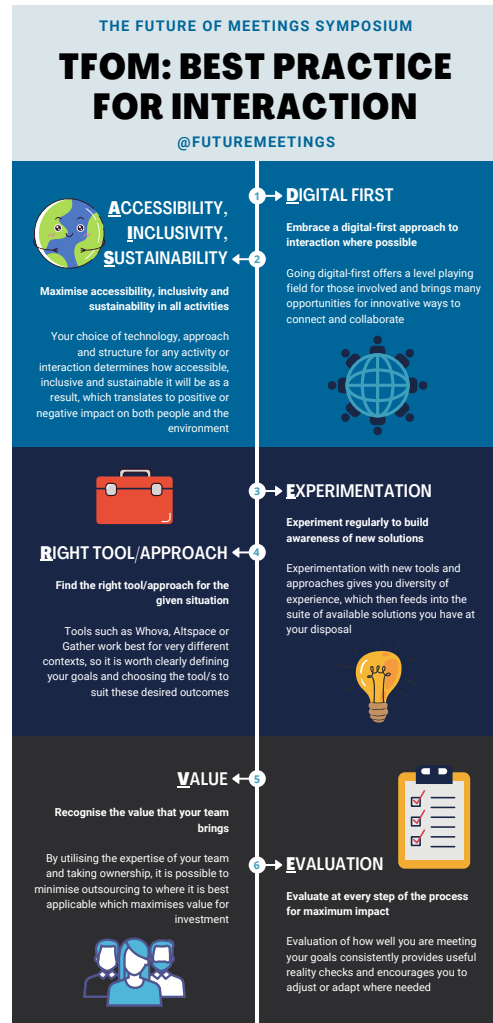


Fig. 1. Infographic summarising key recommendations from TFOM as best practice for interaction.

- **Experimentation:** are we ensuring that our established practices are backed by experimental evidence and open to improvement?
- **Right tool/approach:** will astronomy be flexible and adaptable in the face of changing best practice for technology and approach?
- **Value:** how are limited funds best distributed to make our interactions effective and impactful institute-wide, nationwide or worldwide?
- **Evaluation:** can we assess and adjust our course during the next year, decade, century?

### 4. IN-PERSON VERSUS ONLINE FORMATS

In recent times, meeting in an online format has become synonymous with screen fatigue. Current technologies (video calls or mixed reality) are often

lamented for not yet being able to reproduce the richness of in-person interaction. However, in our work as part of TFOM, we have found that many of the worst parts of online meetings come from poor meeting design or a lack of clear meeting purpose rather than an intrinsic limitation of the online format.

There are certainly caveats to online interaction, but we note many issues can be mitigated with adapted meeting design that is more suited to the purpose. This is an area we should be focusing widespread efforts on improving and optimising. It is true that access to the technology required for effective online participation (e.g. hardware, internet, power) can be a critical barrier, but this can be helped by considering these factors when designing the meeting and potentially by providing accessibility support to improve access for those affected. Better integration of communities without reliable access to internet or power is an important topic requiring significant effort and attention, and while technology may not (currently) be easily accessible, we argue that international travel can be just as much a barrier and the cost of technology once can help many times in the future, unlike a single travel grant. Even if travel funding is made available to support those most in need, this model is not scalable, requiring a different approach if the goal is to improve accessibility and inclusivity worldwide.

In terms of issues with respect to engagement or ability to engage, a large part of this again falls to better meeting design, e.g. providing mechanisms, tools and agenda items that allow for meaningful interaction, making better use of synchronous time for interactive content, and avoiding content overload. Another key aspect is related to cultural adaptation, in terms of virtual conference and meeting attendance becoming more normalised and given the space/time it requires to take part. Skills in technology are improving, and we argue that competence with online forms of interaction will soon become as widespread a skill as using computers or programming is in the current era. We come back to the notion of “being there” later in this proceeding.

## 5. NEXT STEPS FOR ASTRONOMY

Given the above considerations, in this section we outline some tangible next steps that we recommend be taken to future-proof astronomy on various timescales, particularly in the context of accessibility and inclusivity as the primary goals.

### 5.1. *Today: What can already be done now?*

- **Minimise in-person reliance:** getting people together in person (in all contexts, but espe-

cially large governing bodies such as the IAU and international/national societies) should only be done when it is justifiably beneficial, and with explicit awareness and acknowledgement of who is excluded when doing so.

- **Design digital-first:** ensure that any meeting or conference can be attended as effectively remotely as in person, and make sure there are mitigation plans for all possible scenarios.
- **Leverage technology to maximise inclusivity:** many tools already exist to improve accessibility (e.g. automated captioning or multilingual support) and should be used, as well as paying attention to the accessibility and inclusivity of different platforms/formats
- **Offer accessibility support:** it should be standard practice in all contexts to ask (not prescribe) what people might need, and to dedicate funds to accessibility grants that enable easier remote attendance.
- **Use face to face sparingly:** making use of asynchronous tools (e.g. text chat, online documents) and sharing relevant materials in advance helps to dramatically reduce the need to meet live (or for long) which lowers pressure on people in terms of too many meetings.

### 5.2. *Tomorrow: What can we do in the near future?*

- **Combine with global effort:** by collaborating with cross-disciplinary groups to share best practice and lessons learned, we greatly advance our own ability to adapt effectively.
- **Implement new practices:** fundamental tenets should include diverse representation throughout, accessibility and inclusivity considered from the start and best practice expectations in interaction regardless of format.
- **Experiment with and evaluate new approaches:** for example, DAISERVE<sup>13</sup>, Rae et al. (2021) and Lowell et al. (2022).

### 5.3. *Future: What might long-term goals look like?*

- **Adapt funding structures:** funding streams dedicated specifically for new purposes that facilitate global collaboration (especially online) should be developed, while minimising expectation to travel in existing structures/grants

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- **Adopt/design mixed reality:** existing tools in virtual or augmented reality can already greatly enhance interaction, while direct engagement with developers will help meet specific needs and maximise accessibility/inclusivity
- **Create new support paths:** choices should be made to minimise barriers to entry for all to the greatest extent possible, especially in terms of supporting flexible career pathways
- **Enable global astronomy:** we can seek to realise truly location-agnostic collaboration in astronomy, via equitable access to technology while minimising the impact of funding gaps

## 6. REFLECTIONS AND RECOMMENDATIONS

Hollan & Stornetta (1992), facing head-on many of the challenges we mistakenly think are unique to our current period, remarked: “*In our view of the future, it is not so much distance that will be abolished, but rather our current concept of being there.*” In their perspective, the limitations in online formats came not from problems with the technology itself, but with our incessant insistence on (above all else) reproducing what we would do in person. By doing so, we essentially diminish our chances of realising the full potential of new and upcoming technologies by binding ourselves to the questionable assumption that what we have done in person in the past is anything like best practice.

It is telling that three decades later, we are still debating the same supposed limitations of online interaction. While there are real, tangible benefits to meeting in person that are worth preserving for specific contexts, we suggest that purposeful, engaging and immersive online interaction should play a dominant role for our global field. Our challenge to those in the astronomy, scientific and academic communities is to look less at what cannot be done online that could have been done in person, and instead consider what online interaction has enabled that has never been possible in person. An Honours student can present their work at an international conference years before they would have had access to the funding to do so. New purpose-driven collaborations distributed worldwide are suddenly feasible even if there would never have been a chance to cross paths serendipitously in person (e.g. Frost et al. 2021). Observatories can be efficiently run 24/7 by distributing operations globally without the need for shift work. Colleagues across a continent can meet up for virtual mini-golf, catching up naturally

as if they were together even though they work in remotely-distributed teams.

The current era is only the beginning, and it is up to us to collectively decide to aim for a new normal rather than unquestioningly preserve now-outdated traditions. Established as it may seem, the system was ultimately our making, and so we can remake it for the better. In TFOM, we look to the future and we see endless opportunity for a connected world that is immensely more accessible, inclusive and sustainable than the one left behind in 2019.

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