

Tools and strategies for designing inclusive and sustainable scientific meetings

Silke B. Chalmers¹, Suzanne Madgwick², Bethan Lloyd-Lewis³, Urszula L. McClurg⁴, Salah Elias^{5,6}, Peter Andersen⁷, Ralitsa R. Madsen⁸, Vaishnavi Ananthanarayanan⁹, Felicity M. Davis^{1,10-13}

¹Department of Biomedicine, Aarhus University, Aarhus, Denmark

²Biosciences Institute, Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, United Kingdom

³School of Cellular and Molecular Medicine, University of Bristol, Bristol, United Kingdom

⁴Institute of Systems, Molecular and Integrative Biology, University of Liverpool, Liverpool, United Kingdom

⁵School of Biological Sciences, University of Southampton, Southampton, United Kingdom

⁶Institute for Life Sciences, University of Southampton, Southampton, United Kingdom

⁷Department of Molecular Biology and Genetics, Aarhus University, Aarhus, Denmark

⁸UCL Cancer Institute, University College London, London, United Kingdom

⁹EMBL Australia Node in Single Molecule Science, Department of Molecular Medicine, School of Biomedical Sciences, University of New South Wales, Sydney, Australia

¹⁰School of Pharmacy, University of Queensland, Brisbane, Australia

¹¹School of Biomedical Sciences, University of New South Wales, Sydney, Australia

¹²Aarhus Institute of Advanced Studies, Aarhus University, Aarhus, Denmark

¹³Danish Research Institute of Translational Neuroscience, Aarhus University, Aarhus, Denmark

Conferences are formulaic – whilst their location and content vary from year-to-year, their design and composition have remained largely unchanged for decades. Using the standard conference model, many of the barriers that exclude marginalised scientists at their home institutes are perpetuated or amplified at scientific conventions. Here, we offer a new formula for individuals, societies and organisations seeking to create more diverse, inclusive and sustainable meetings.

Conferences are immensely valuable – they are where we share data, develop new ideas, draw inspiration, and grow and nurture networks. They also represent a forum to showcase unpublished or unfinished stories to potential future reviewers in a setting where criticisms can be readily and openly discussed, disputed and contextualised. But the benefits of these age-old scientific get-togethers are not shared equally. Gender, race, institute, name and age biases influence the selection of talks and prizes. Carer responsibilities, geography, disability, visa requirements and financial disparities preclude the attendance of many. Inflexible presentation formats often fail to accommodate neurodiversity and speech disfluencies within the community, creating environments where many feel unwelcome or the need to mask. Night networking fuelled by excessive alcohol has the potential to create exclusionary, uncomfortable and occasionally unsafe environments for women and other delegates. For these reasons, the conventional conference model *must* be updated to ensure diversity and inclusivity are built into their design, and to minimise the environmental impact of these important events. These updates will not only help to ensure that all scientists can benefit from conferences equally, but will form an important part of the wider movement to improve research culture¹.

In this article, we used principles from 'design thinking' to reimagine the conference experience. We started by asking *why* things are done the way they are done: is it the best way, the only way, or simply the most familiar way? Using this approach, we developed suggestions for small and large actions that have the potential to create considerable positive impact on conference culture and by extension the wider research environment (**Fig. 1**).

We also use this opportunity to implore scientists to broaden their definitions of scientific "excellence" to something more than simply belonging to the elite universities and publishing in "high impact" journals. Excellence, when defined by the fundamental expansion of human knowledge or the ability to relieve pain and suffering in society, relies on integrity, rigour, openness, kindness, diversity and inclusion. Conference programs should enable delegates to broaden their intelligence across more than one axis. This means hosting sessions, which go beyond a traditional "power-hour", that are dedicated to improving research culture. These sessions must be intelligently designed and led by expert external consultants.

Early considerations

When to plan your meeting. International meetings should be planned to enable sufficient time for the acquisition of entry visas following delegate acceptance². This should be paired with the prompt distribution of accurate visa support letters when requested. Conferences should be arranged to avoid weekends as well as major holidays and observances, including non-Western observances. These boundaries extend to any pre- or post- early-career workshops/symposiums.

Where to host the meeting. Organisers should reflect on previous venues (as well as the make-up of the organising committee itself) and consider how the inclusion of locations and members outside of North America, Europe and the UK could benefit the community. Sponsorship of new committee members may be required (for more information about sponsorship see Ref³). Organisers should also be cognisant of geopolitical factors that may impinge on the basic rights of their delegates. One such example is the recent decision by the American Association of Immunologists to move IMMUNOLOGY2024TM from Phoenix to Chicago, a decision that will help to safeguard rights of pregnant colleagues in attendance. Venues should be inspected to ensure physical accessibility by all. Buildings should be equipped with accessible bathrooms, gender-neutral bathrooms and lactation/changing rooms. These should not be the same room. A separate prayer room and dedicated quiet space should also be available.

Selection of speakers and keynotes. Diversity, in its broadest sense, must be considered when selecting speakers⁴. This includes, but is not limited to, diversity in race, gender, culture, age, sexuality, career stage, disability, geographical location and institutional affiliation. Not all forms of diversity are visible and assumptions or requests to divulge sensitive information are more-often-than-not inappropriate. Nevertheless, efforts to broaden inclusion, whilst breaking down barriers to attendance, will help move the needle in the right direction.

In selection of speakers, particularly keynote speakers (who are often afforded the time and liberty to reflect not only their science but their experiences in science), organisers are encouraged to look beyond

conventional metrics and consider the individual's lifetime efforts to improve academic culture. These achievements should be equally highlighted alongside their scientific achievements in introductory bios.

Options for childcare. A lack of childcare is a major impediment to conference attendance, particularly for breastfeeding mothers and primary carers. There is no one-size solution to this problem. Offering onsite childcare is often an insurmountable challenge at academic venues and, when it can be offered, the question arises – is it fair to ask a colleague to leave their child with a stranger in a city where childcare laws and practices may differ from their home state? One alternative could be providing grants that facilitate the travel of a trusted carer. Organisers should also consider normalising a culture of supporting parents who wish to bring accompanying children into lecture rooms and dining halls, whilst ensuring the full and genuine inclusion of these delegates throughout the meeting.

Avenues for virtual participation. Removing obstacles for equitable in-person attendance is the ultimate goal, however, many of the above challenges can be alleviated by adopting a hybrid format⁵. For large meetings, this could include the creation of various hub sites, which also serve to minimise the environmental impact of conferences, whilst preserving the spirit of in-person events⁵. Virtual attendees must feel included in the main conference, an act that is bolstered by the adoption of technical chairs and avenues for online attendees to interact.

Event planning and execution.

Registration. Registration can too simply be viewed as a tool for the collection of fees, abstracts and minimum data. It is, however, an early opportunity to improve inclusivity through respectful language and the avoidance of restrictive categorisations. Open and optional input fields should be considered. Mechanisms to collect accessibility needs and dietary requirements must be present. Avenues to communicate phonetic pronunciation of delegate names should be offered.

For conferences where the number of attendees is capped, registration often becomes a mechanism for selection; in these cases, we strongly suggest full transparency of selection criteria, coupled with unconscious bias refreshers for the selection committee, to avoid unintentional gatekeeper behaviour.

Conference website. When designing the conference website, organisers should consider adding information about sustainable travel (e.g., green accommodation, food and transport options). Comments about “walkability” should generally be avoided or paired with alternate transport information for those for whom walking to/from the venue is not a viable or comfortable option.

Social program. Conferences are a great opportunity for colleagues to get to know one another outside of the lab or lecture hall. A few small adjustments can help to ensure that these events remain respectful, welcoming and safe for all. This includes limiting the supply of alcohol, ensuring the drink menu contains enjoyable non-alcoholic options⁶ and nominating a responsible person as a mental health first-aider. For evening events, organisers should consider steps to ensure the safe return of delegates to sites of accommodation.

Meet-up event for newcomers. Organisers may wish to consider a meet-up event, ahead of the main conference, to reduce feelings of social isolation or anxiety that can be brought about by partaking in work-related travel alone. One method is to provide the opportunity for newcomers to meet in a cafe and travel together on public transport to the welcome reception. This informal and practical act may also serve to break down barriers that inhibit some attendees from utilising public transport in foreign countries.

Conference meals. To improve sustainability, organisers should consider meat menus as opt-in, rather than opt-out. Single use plastics should be avoided. Where possible, local and seasonal produce should be favoured. Recycling and composting options should be clearly labelled and explained, so that delegates are empowered to make the most environmentally responsible decisions about the waste products they generate. Sites for refilling water bottles should be visible and accessible. All dietary restrictions should be respected without question and foods clearly labelled.

Conference bags. If used, conference bags should focus on functionality. Functional conference bags are multi-use (e.g., canvas tote bags) and may include items such as re-fillable water bottles, public transport cards etc. Universities are increasingly supplying recyclable name tags and multi-use lanyards, which themselves can be made from recycled materials. Name tags should include phonetic pronunciation guides and pronouns when volunteered by delegates during registration. Academic titles should be universally and accurately used on all name tags or not used at all. Strategic placement of give-back boxes near the exit will help to ensure that lanyards and other items can be re-used or recycled. Free COVID-19 testing kits and masks could be offered at the registration desk on a voluntary basis, to help protect the physical and mental wellbeing of delegates. Glossy brochures should be avoided.

Hybrid meeting considerations. Conference auditoriums must be inspected to ensure infrastructure for streaming of talks and discussions is functional. Whilst live-streaming is immensely valuable for remote participants, time-zone incompatibilities continue to limit access. To address this, presentations could be recorded and, with speaker permission, made available for a limited time on a protected server. The utilisation of a technical chair, whose responsibility it is to ensure that online attendees can see, hear and participate in lectures and questions is invaluable. This person, working with the main chair, would also be responsible for fielding questions from online attendees. Avenues for posting anonymised questions for the technical chair to present to the speaker is a powerful act of inclusivity. The technical chair should also be responsible for transferring unanswered questions to a suitable forum for the speaker to address at a later stage. When possible, video conferencing platforms should be enabled with closed-captioning for hearing impaired folk. Streaming rooms for presenters or attendees and the option for pre-recorded talks for all speakers (virtual or in-person) are strategies that can help to ensure that all scientists have avenues to best communicate their research.

Session chairs. Chairs have a responsibility to ensure that their speakers feel welcome and comfortable. Chairs should arrange to meet speakers ahead of time to ensure titles, bios and pronunciation are correct. They should ensure that questions are enabled and encouraged from the entire audience. To support this, we suggest a holding slide that reads: “*if you feel confident asking questions, we ask that you occasionally exercise a thoughtful pause to allow others an opportunity to speak*”. In the interests of diversity, inclusion and

early-career support, we strongly encourage the inclusion of a PhD or Postdoc chair in every session, who is afforded equal opportunities to engage with the speakers and the audience.

Poster sessions. Both virtual and in-person attendees should be provided options and instructions for digital poster presentation, including options for uploading a digitally-accessible poster and pre-recording. This can be done using a cloud-based server, where non-editable and non-downloadable poster PDFs can be paired with audio/visual recordings in uniquely identifiable folders on restricted and time-limited weblinks. Chairs should be placed in poster halls for presenters, judges and attendees to sit on if needed. Sufficient time should be allotted in the program to give poster presenters ample visibility and exposure at the meeting.

Prizes and travel awards. To ensure that all researchers who are eligible and willing to be judged for poster and oral prizes are seen by the judges, organising committees could consider using QR codes for poster/talk identification. This would enable judges to have important information at their fingertips (e.g., career stage and eligibility for prizes), provide a channel for them to declare any potential conflicts-of-interest, and allow assessments to be rapidly collated and shared with the panel. Criteria for the assessment of posters and oral presentations should be clearly defined and transparent to both judges and presenters. Judging panels should be diverse and inclusive. Pre-recorded presentations should be considered equal in value to in-person presentations.

Awards for travel should be prioritized, where possible, in the budget. The use of open input fields in registration forms may enable organisers to collect needs-based information. If allowable in the budget, travel supplements or incentives could be provided to encourage travel by bus or rail.

Other acts of inclusion. Academics often engage industry partners for financial support at conferences and workshops. However, industry representatives are typically side-lined in lectures and social events. This furthers an already growing divide between academic and non-academic career paths, creating an air of false superiority in the academic ranks that can be felt and propagated by the next generation. If invited, industry partners should be included in all activities and afforded the full respect they deserve.

Organisers should consider creating the position of a mental health first aid representative. This person should be introduced at the beginning of the meeting and identified in the conference booklet. They would be a safe and neutral first point of contact for attendees at the meeting who may be experiencing distress or discrimination. Conference organisers must have mechanisms to promptly receive the feedback of the mental health first aider and feedback must be taken seriously.

Free pads and tampons should be placed in bathrooms and replenished daily.

Evaluation and future planning. At the end of each conference, delegates and organisers should be provided an opportunity to anonymously reflect on their experiences. These thoughts should be formalised and provided to subsequent committees to allow for iterative improvement. Designs for the next meeting (including venue and committee membership) should be transparent, fair and well-considered. It is certainly not appropriate for the conference “baton” to be passed between old friends and allies.

Individual and institutional responsibilities.

Creating change within old systems is not easy. It requires that the need for change is sufficiently large and that solutions are strategically (or fortuitously) timed. When we consider the design of our scientific conventions, we speak of challenges that are rooted in academia's biggest problem—that is, a pervasive and enduring lack of diversity and inclusion in the academy. There is an urgency to solve this problem, but there is also an *opportunity* to leverage the changing mindsets and technological advances born during the pandemic to stimulate this change. We therefore argue that there is no greater need nor better time to reimagine and reinvent conferences.

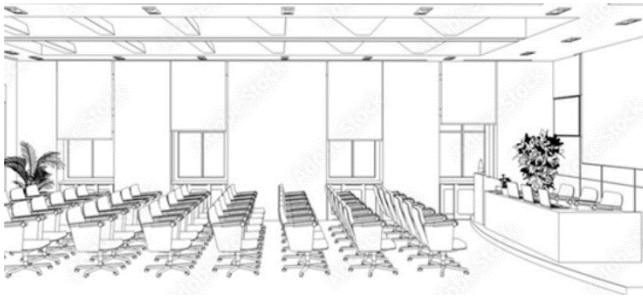
Structural changes, which formed the basis of this article, can and should be introduced by organising committees immediately, at the insistence of the universities that host them and the funding bodies that enable them. These stakeholders have the greatest ability, and thus the greatest responsibility, to create change. Individual conference-goers can also use their influence to advocate for structural transformations (**Fig. 1**). Whilst the balance of power and responsibility lies with the organisers, there are some actions that must be led at the level of the individual. Participants must begin to understand their own privilege, educate themselves about diversity-related issues and use inclusive language. Assumptions (often based purely on physical appearance) of another delegate's career stage, their contribution to the field or their understanding of it are totally unacceptable. Delegates should ask questions out of curiosity and appreciate the value of allowing others an opportunity to both speak and be heard. Early-career researchers should be supported and encouraged at every stage. Conferences, after all, are an opportunity to further one's knowledge, not to limit it through self-importance, self-indulgence and exclusionary attitudes.

Acknowledgements

We first acknowledge our individual biases and privileges, which undoubtedly influenced this manuscript, and apologise for any oversights or omissions. We would like to extend our thanks to all members of the @NewPICellDev community who attended the ECCDB meeting in Denmark, where some of the ideas included in this manuscript were implemented or discussed. SM is funded by an MRC Career Development Award (MR/T010789/1). BLL is funded by the Academy of Medical Sciences/Wellcome Trust/the Government Department of Business, Energy and Industrial Strategy/British Heart Foundation/Diabetes UK Springboard Award [SBF003/1170], and the Elizabeth Blackwell Institute for Health Research, University of Bristol and the Wellcome Trust Institutional Strategic Support Fund (204813/Z/16/Z). ULM is funded by the NWCR (RDG2021.15) and MRC (MR/X00855X/1) as well as an EMBO Installation Grant. SE is funded by the MRC (MR/R026610/1). RRM is funded by a Sir Henry Wellcome fellowship (#220464/Z/20/Z) and is also a paid member of the UK Committee on Research Integrity (UK CORI). VA is funded by EMBL Australia. FMD is funded by the NHMRC (#2003832) and the Novo Nordisk Foundation (#NNF20OC009705). We are grateful for conference funding from the Novo Nordisk Foundation (#NNF21OC0072611, NNF20OC0062124), The Company of Biologists (#SCG7) and EMBO (w21/19).

Figure proposal. We would like to include a figure that both summarizes our main text, as well as uses text boxes to highlight select important concepts. We would like these text boxes to be color coded to indicate that they are directed at specific groups: presenters, attendees, chairs/judges

Panel A: presentation room



Please depict the following in this panel:

- Diverse audience, speaker and session chairs.
- In the audience, please include a parent with small child
- Please depict the speaker on the screen to highlight a hybrid format

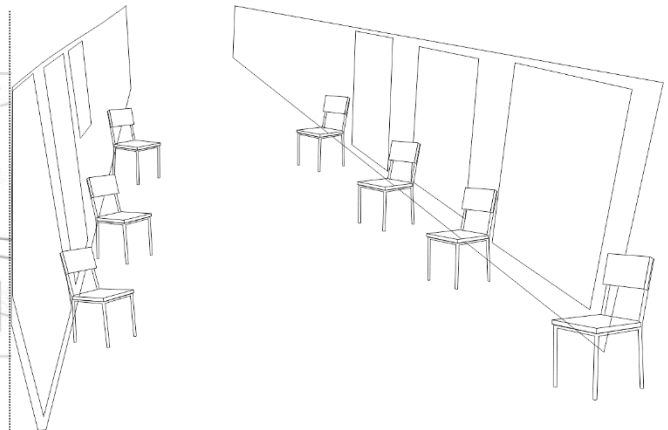
Information we would like to include in text boxes:

(Text box color for presenters) Keynotes and invited speakers should enquire about inclusion and environmental conference initiatives before agreeing to present. Consider making yourself available after your talk if comfortable to do so.

(Text box color for session chairs) Chairs should encourage questions from in-person and virtual attendees.

(Text box color for audience) Audience members comfortable asking questions should consider allowing space for others to speak. Where possible, make environmentally conscious travel plans.

Panel B: poster session



Please depict the following in this panel:

- Diverse audience, poster presenters and judges.
- Water refilling stations and attendees with reusable water bottles
- Chairs available (with some in use!)
- One judge please holding a tablet device-

Information we would like to include in text boxes:

(Text box color for chairs/judges) All judging should be conducted with a transparent marking criteria. Judges should be have a refresher of unconscious bias prior to judging.

(Text box color for audience) Audience members should avoid assumptions during discussions (ex. "tell me about what you do and where you do it?" instead of "you a postdoc?" "whose lab are you in")

References

1. What researchers think about the culture they work in. *Wellcome* <https://wellcome.org/reports/what-researchers-think-about-research-culture>.
2. Ebrahimi, O. V. Sidelined by bureaucracy. *Science* **378**, 922 (2022).
3. Parsons, C. & O'Connor, P. You've heard of mentorship in science, but what about sponsorship? *Nature* (2023) doi:10.1038/d41586-023-00123-z.
4. BiasWatchIndia. *Trends in Genetics* **37**, 295–296 (2021).
5. Sarabipour, S. *et al.* Changing scientific meetings for the better. *Nat Hum Behav* **5**, 296–300 (2021).
6. Forrester, N. Reconsidering the role of alcohol in the scientific workplace. *Nature* **600**, S86–S88 (2021).