LONG LIVE THE SCIENTIFIC CONFERENCE

Researchers are redefining twenty-first-century conferences at which delegates set the agenda .

BY EMILY SOHN

Before she attended her first 'unconference', astronomer Lucianne Walkowicz had attended plenty of traditional scientific meetings. Large or small, all followed a similar format. There were invited speakers, short question-and-answer sessions, and maybe some extra time for discussion at the end of the day — time that was often cut short by sessions that ran longer than planned. The most valuable moments for her always came during lunches and other small-group gatherings, when real conversations happened. There were never enough of those.

"How are you going to watch 20 talks and then talk about everything you thought of at the end of the day?" says Walkowicz, who is based at the Alder Planetarium in Chicago, Illinois, and is spending the year as the astrobiology chair at the Library of Congress in Washington DC. The disconnect seemed especially surprising to her, given the audience of fellow astronomers. "For a group of people who are great at doing math, I don't understand how people think the math is going to work out on that timing."

In 2012, Walkowicz went to the annual Science Foo Camp (abbreviated to 'Sci Foo'), where a group of multidisciplinary researchers created the agenda on the first day by gathering in a common area at Googleplex, Google's headquarters in Mountain View, California, and filling out and sticking Post-it Notes to an empty agenda on blank white foam boards. Most sessions at this 'unconference' were based around discussions and everyone had a voice. Junior researchers mingled with Nobel laureates in a dramatic shift from the hierarchy that normally forms when lectures and panels define who is most important. Now an unconference veteran, Walkowicz organized Decolonizing Mars in 2018 that focused on the ethics of exploring Mars — an experience, she says, that forged a sense of community over the possibility that human exploration could damage the 'Red Planet', among other ethical issues.

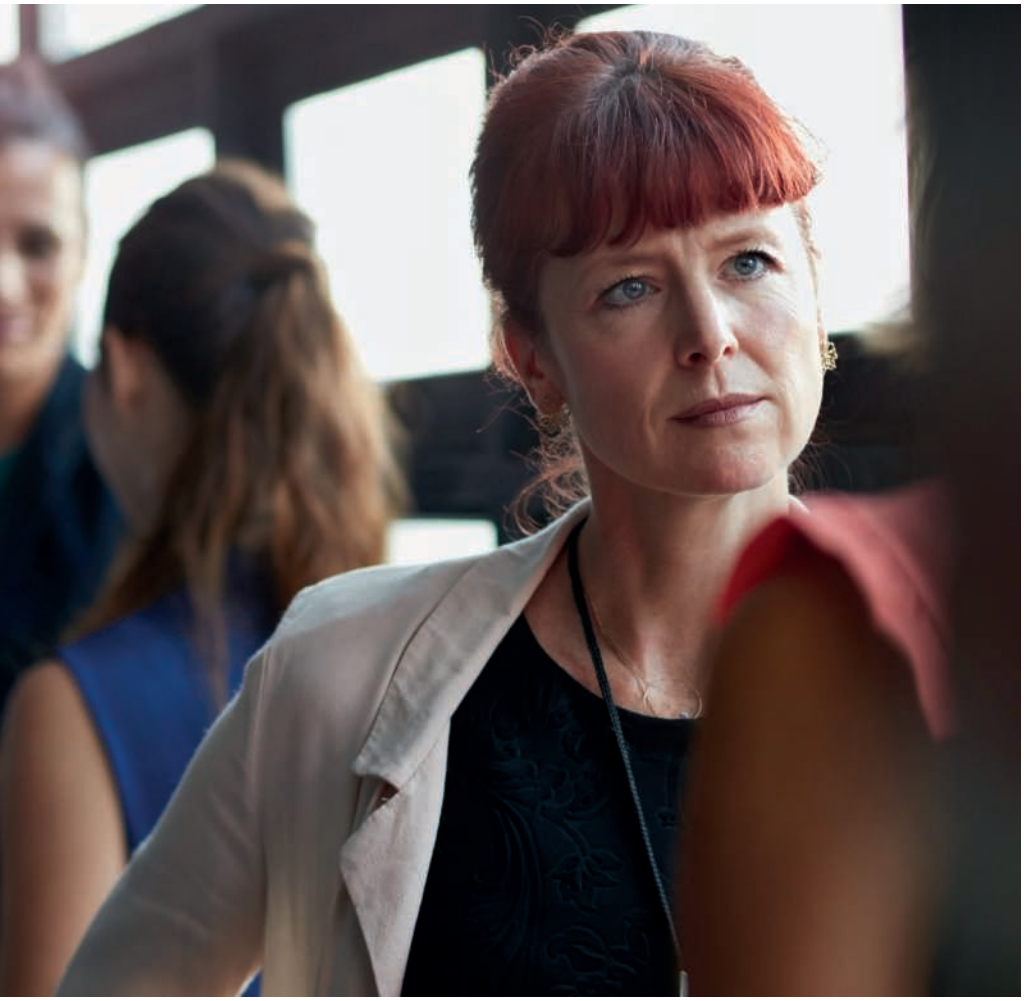
> "VIRTUAL MEETINGS WILL REPLACE FACE-TO-FACE MEETINGS WHEN VIRTUAL HONEYMOONS REPLACE FACE-TO-FACE HONEYMOONS."

As conference organizers increasingly integrate new technologies for efficiency and entertainment, researchers such as Walkowicz envision a different kind of future for conferences, one that zeroes in on what motivates scientists to go to conferences in the first place: to share ideas, forge collaborations and make connections. New formats and tools are also helping to level the playing field for researchers from all sorts of backgrounds in a variety of career stages.

"In this era where we have all of these various remote meeting technologies, what is the point of getting on a plane?" Walkowicz asks. "Why not build a meeting around interactions between you and your peers, and the things you can get uniquely by being in the same place?"

CHANCE ENCOUNTERS

The rise of the internet sparked a vision of the future that made face-to-face meetings obsolete. And although plenty of work now happens through online seminars, video calls and even virtual conferences, the 'death of distance' theory never quite panned out. In-person conferences remain standard fare for scientists. And stories abound of collaborations that started at scientific meetings, including one between Stanley Cohen and Herbert Boyer, who made a major breakthrough in developing recombinant DNA technology in the early



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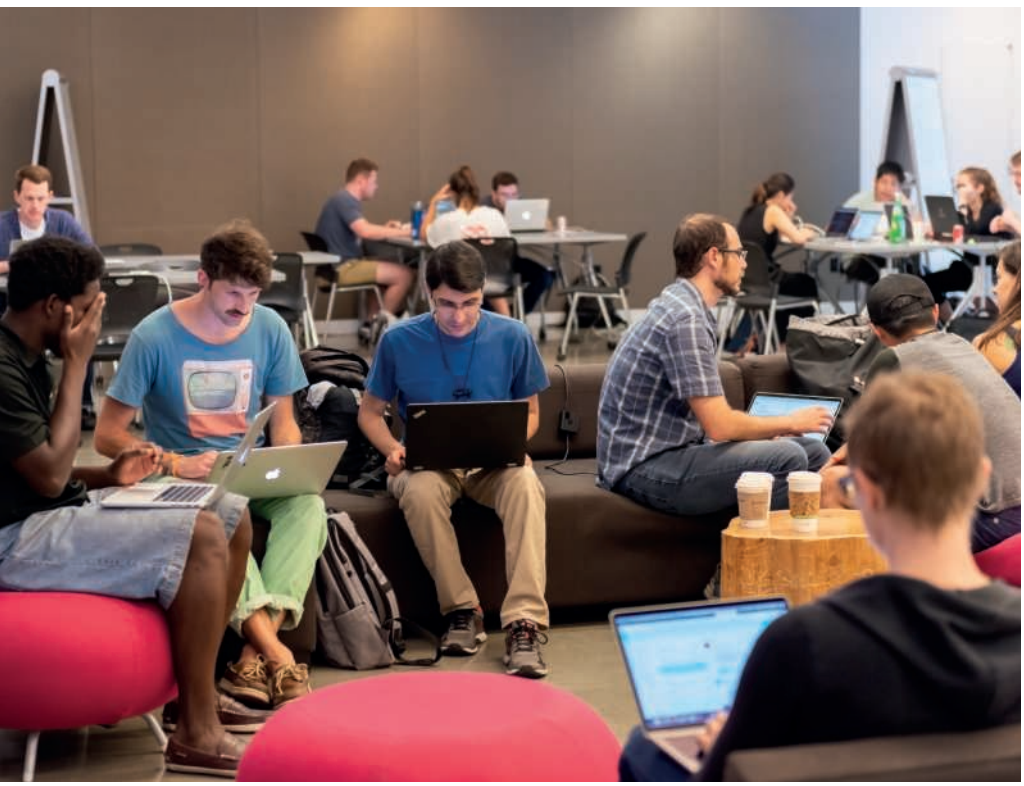

ALEX ALSPAUGH/UNIVERSITY OF WASHINGTON

Participants collaborating on their chosen projects during the summer 2018 Neurohackademy.

DIVERSE VOICES

Giving people more time to connect and collaborate is a core goal of AstroHackWeek, an annual workshop that brings together several dozen astronomers and data scientists to exchange ideas, work on projects, learn from each other and develop new collaborations. Hack weeks have led to publications between people who otherwise would likely never have met, says organizer Daniela Huppenkothen, a researcher at the interface of astronomy and data science at the University of Washington, Seattle. Colleagues run similar hack events, over weeks or just a day or an evening, for scientists from other fields.

Huppenkothen became involved in organizing the workshops in 2014 and the concept quickly became too popular: far more people applied than she had room to include. To choose attendees fairly, Huppenkothen and a colleague developed an open-source algorithm called Entrofy, which selects participants based on a list of predetermined attributes, and aims for a mix of junior and senior researchers, experts from various disciplines, and racial and gender diversity. Participants have told Huppenkothen that they appreciate the transparency of the selection process, which eliminates the worry that they didn't make the cut because they weren't good enough.

Big meetings will always have their place, says Huppenkothen, who still joins thousands of other astronomers at the American Astronomical Society meeting each year. But the success of Entrofy and hack weeks illustrate the potential for scientific meetings to increase both discussion time and minority involvement, which often get dismissed as too difficult to achieve. "There's often a sense of, 'Oh, we couldn't find the people,'" she says.

A similar push for equality is behind a women-only line-up of speakers at an upcoming microbiome conference, says organizer Sandrine Miller-Montgomery, an executive at the University of California Center for Microbiome Innovation. In the past, she had boycotted meetings that, she felt, had made no effort to achieve gender equity. Again and again, she says, she was told that there were too few women in the field and those who existed were booked elsewhere.

Miller-Montgomery didn't have any trouble. Almost all of the women she initially invited accepted. So far, about 25 women are slated to speak at the February 2019 conference. "If we can do two days with only women speakers, give me a break," she says. "We can do two days with 50:50." **E.S.**

ADAM SCHULTZ/MIT SOLVE

Solve's Executive Director Alex Amouyel speaks during the closing plenary at Solve Challenge Finals.

1970s after walking on the beach and sharing sandwiches during a conference in Hawaii.

And it's not just anecdotal. Studies suggest that physical proximity drives scientific progress. Research into a campus construction project in Paris, for example, revealed what happened after researchers were randomly reassigned to new offices. Researchers started new collaborations across fields and published innovative papers in high-profile journals that used a wider variety of keywords compared to previous publications by either collaborator.

The benefits of proximity apply to conferences, too. According to one recent study, researchers who attended one of the Gordon Research Conferences, which take place across the globe and focus on pre-publication frontiers in science, were more likely to collaborate with other attendees and to be cited by them after the conference, even if they were new to the conference community.

Travelling to meetings incurs significant costs, says Christian Catalini, who studies the economics of innovation at the Massachusetts Institute of Technology (MIT) in Cambridge. But those costs are often worth it in the context of scientific progress, his research suggests. For one project that has been submitted for publication, Catalini and colleagues analysed data on collaborations between thousands of chemists before and after the introduction of low-budget airline routes around the United States in the 1990s and 2000s. When new, low-cost routes appeared between two cities, results show that collaborations between chemists in those cities increased by about 50%. Projects that resulted from those collaborations were more novel, cross-disciplinary and more frequently cited than projects between two researchers in the same institution. The findings reinforce the idea that innovation blooms when people get together, especially when getting together becomes cheaper and easier.

Distance has not died, Catalini adds, because technology has not been able to replace the eye contact, undivided attention and serendipitous interactions that happen in real life. "At conferences, you get exposed to ideas," he says. "But often the most important part is when the presentation breaks and everyone mingles and you may talk to people you don't usually talk to."

> "EVEN WHEN INTENTIONS ARE GOOD, TECHNOLOGIES SOMETIMES FAIL TO HIT THE TARGET."

Even as scientists remain motivated to meet in person, they often have a lot of conferences to choose from, says Francis Friedman, a trade show and branding expert and president of the New York City-based consulting firm Time & Place Strategies Inc. And new technologies can add some flash as enticement. Friedman has seen video demonstrations of speakers appearing on stage as holograms, as well as smart badges that allow participants to exchange information instantly with exhibitors.

Behind the scenes, emerging innovations are helping meetings to run more efficiently for both organizers and attendees, adds Corbin Ball, an events-technology analyst in Bellingham, Washington. Mobile event apps, for example, allow people to view conference agendas on their smartphones and participate in interactive polls during sessions. Some apps also give people the ability to contact other attendees and offer feedback to organizers. Early-stage facial recognition technology is helping expedite the check-in process at some meetings. And advances in artificial intelligence are being used to develop chatbots and 'Alexa'-style smart speakers that could answer frequently asked questions

Beacon technology, which uses Bluetooth Low Energy to alert apps when a smartphone is near a certain location, is also making its way into conference halls. By tracking the movement of people indoors, the technology gives organizers and exhibitors information about how long people spend in front of booths or how crowd patterns wax and wane in various locations throughout the day. Potential applications include interactive maps for navigating conference venues and the possibility of using precise location information to track an individual's exact location in a conference. Already, some smart badges employ various methods to alert people when someone is nearby who they might like to meet.

These tools are not threatening the existence of conferences, Ball says. They simply add value. "I always say virtual meetings will replace face-to-face meetings when virtual honeymoons replace face-to-face honeymoons," he says. "The drivers of meetings are still the same: bringing people together for education and networking. Technology is an enabler to make them more efficient."

NEW ACQUAINTANCES

Even when intentions are good, technologies sometimes fail to hit the target, says Alex Amouyel, executive director of MIT Solve, which hosts conferences and meetings between private sector leaders and academics that aim to solve major world problems. During one meeting that she organized at her previous job with the Clinton Global Initiative, a nonprofit organization that brought together world leaders to discuss solutions to major problems, data showed that college students were most likely to download the conference app, while high-level delegates from corporations, foundations and governments tended to ignore it. Messages sent through the app rarely received responses. "There are a lot of features in these apps that end up being very underutilized," she says.

People weren't necessarily going to sessions either, Amouyel adds. Tracking data showed that attendees frequently left talks early. Some went to just one session during the three-day conference, choosing instead to hang out in the lounge much of the time. "Why bring people together in first place? It's still about face-to-face meetings and networking," she says. "You don't necessarily need to be there in the room listening to someone presenting something." ■

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