Survey: The Future of Conferences Post-Pandemic

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Technology disruption in the world of technical conferences

Conferences are events for learning, networking, offering critical feedback, ideating, marketing, and socializing. As Crista Lopes [1, 2] outlined, the history of conferences extends back to the Renaissance. For almost 500 years, conferences were in-person events. However, late in the 20th century, technology made it possible for virtual participation: initially through multi-party audio (telephone) calls and later using multi-point video conferencing. At the dawn of the 21st century, internet-based conferencing (GoToMeeting, RingCentral, Teams, WebEx, Zoom, etc.) emerged as an option: first on personal computers and then mobile devices. For over 30 years, corporations have been driven by a need to reduce travel costs and increase collaboration, so they have embraced virtual conferencing technologies for internal meetings. The use of virtual technology for public conferences has been a more recent trend, accelerated by the pandemic's need for social distancing.

Two important questions have emerged:

- Will the growth of virtual/hybrid conferences continue post-pandemic, or will in-person conferences regain their primacy?
- What changes should we make to the design, curation, and staging of hybrid/virtual events to improve conference value for attendees?

Some people believe "moving all conferences to virtual" is an inevitable trend, but others disagree. Will disruption in conference models parallel what has occurred in the fields of transportation and publishing in the past century? In transportation, trains were supplanted by cars, ships by planes. In the field of publishing, printed materials (such as retail catalogues, newspapers, and journals) are being replaced by digital technologies. Most experts think the disruptions to transportation and publishing are irreversible. Maybe virtual technology has initiated a permanent disruption to conference "delivery."

To research and sense community trends and interests in conference preferences (in-person, hybrid, virtual), the authors devised a survey inspired by Crista Lopes (University of California-Irvine) and Moshe Vardi (Rice University).

Lopes [1, 2] has explained how sustainability and cost issues may make hybrid conferences more acceptable to attendees and sponsoring organizations. Moshe Vardi [3] explained his ideas about the research publication process in a short article in the January 2021 issue of *Communications of the ACM:* "Reboot the Computing-Research Publication Systems," noting that it may be time

to design new ways to review and publish research work, perhaps completely bypassing the need for a multiday in-person conference.

What motivates in-person attendance to technical conferences? Crista, Moshe, and others have postulated that we attend conferences for multiple reasons:

- **Sharing and receiving feedback:** experiences, research, and innovations
- **Learning:** new trends and best practices
- **Networking and socializing:** connecting (often serendipitously) with others
- **Marketing**: ideas and products
- **Recruiting**: talent from the attendee pool
- **Fun**: a "paid vacation" by employer/grant agency

Our survey was developed to sense preferences across a broad spectrum of the conference community including conference organizers, researchers, practitioners, executives, research administrators, and influencers (media). The survey was designed to gather data about experiences and attitudes for virtual, hybrid (a mix of virtual and in-person), and in-person conference formats. The data was collected using a Google form survey which inadvertently may have limited input from some geographies and organizations which prohibit access to google.com.

The survey's results focus on three main areas:

- What mode (or modes) of conferences will be most popular in the future?
- What are the principal challenges for conferences and opportunities about each style of conference?
- How can conferences be made more affordable and accessible?

The survey was widely distributed via the Agile Alliance monthly digital newsletter and via social networks (LinkedIn, Facebook, Twitter) in mid-February and March 2022. The survey closed in early May 2022. Over 300 survey responses were received from six continents.

Topic 1: Individual preferences for "modes" of conferences

➤ *Question:* In a post-pandemic world, how would you prefer to attend conferences?

The respondents were offered three choices, return to: **in-person** conferences, **hybrid** conferences (supporting both in-person and virtual online attendance), or **virtual** conferences (all online). Hybrid was the preferred conference mode for over half of the respondents:

- Prefer hybrid - 54%
- Prefer in-person - 36%
- Prefer virtual - 9%
- Not planning to attend future conferences - 1%

| 54% | 36% | 9% |
| Hybrid | In-Person | Virtual |

These ratios were consistent across geographies and job categories. The two extremes were:

- Researchers: 34% preferred in-person while 66% preferred hybrid or virtual
- Managers: 38% selected in-person and 61% chose hybrid or virtual

Will hybrid and virtual conference formats eventually displace in-person conference formats? Only time will tell. But today, a clear majority would like to at least have the option of virtual.
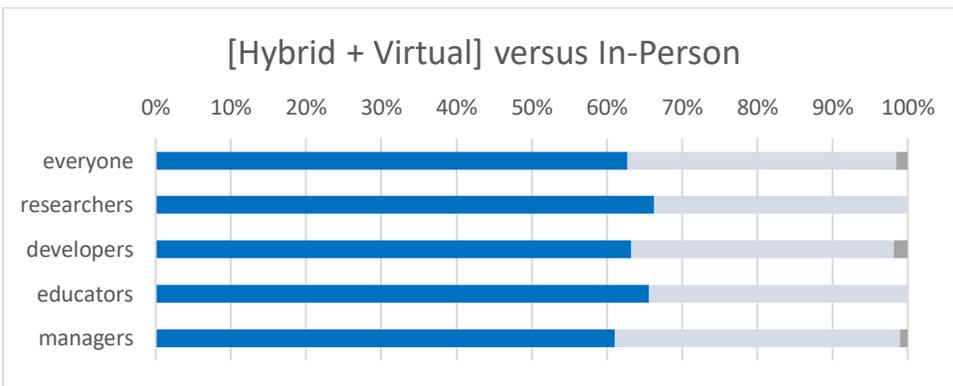
Another interpretation is that almost everyone is clamoring for at least some in-person interaction: 90% of the survey respondents would like in-person or hybrid – to at least have the choice of physical presence.
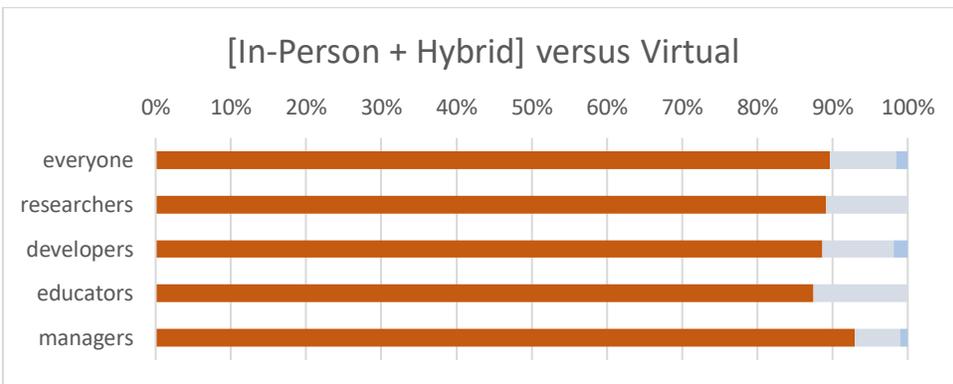
Topic 2: Conference challenges (for virtual and in-person) and useful technology

As described previously, virtual meetings are not new. There is a long history of companies and educational institutions using virtual meetings increase access and participation beyond a single physical site. Corporate virtual meetings (audio, video, internet-based technology) have been an essential collaboration mechanism for companies with global customers and product development teams. Educational institutions have offered remote learning options for decades:

leveraging a mix of public television, radio, audio conferencing, recorded lectures (audio tape, DVD, or Internet), and internet-based collaboration tools (GoToMeeting, Microsoft Teams, WebEx, or Zoom). Similarly, companies and universities have run conference-like "forums" to engage researchers and practitioners at multiple sites: for example, internal company conference forums and university consortium meetings facilitated by videoconferencing.

The pandemic, due to social distancing requirements, motivated many international conferences to go virtual in 2020 and 2021. The transition to virtual has not been easy, and many conference attendees and presenters have struggled with the new technology. However, a return to traditional in-person conferences might not always be the best solution since in-person and virtual meetings face different, but significant organizational challenges.

The survey posed a series of questions to probe for ideas and opinions about the obstacles and benefits for each conference mode – to learn what might be improved to increase attendee value.

The survey attempted to identify challenges to virtual meetings. Almost all respondents (over 85%) agreed with four items offered as potential challenges:

➢ **Question**: *What are the biggest challenges to your virtual conference experience?*

The survey polled respondents to select *major challenge*, *minor challenge*, or *not an issue* for each of eight different potential challenges. The following four items were rated as challenging (major and minor challenge responses) by almost everyone in the survey:

- Ineffective support for casual discussions - 93%
- Ineffective tools to support interactive discussions - 88%
- Inconvenient schedules due to global time zones - 88%
- Fatigue due to long virtual meetings - 85%
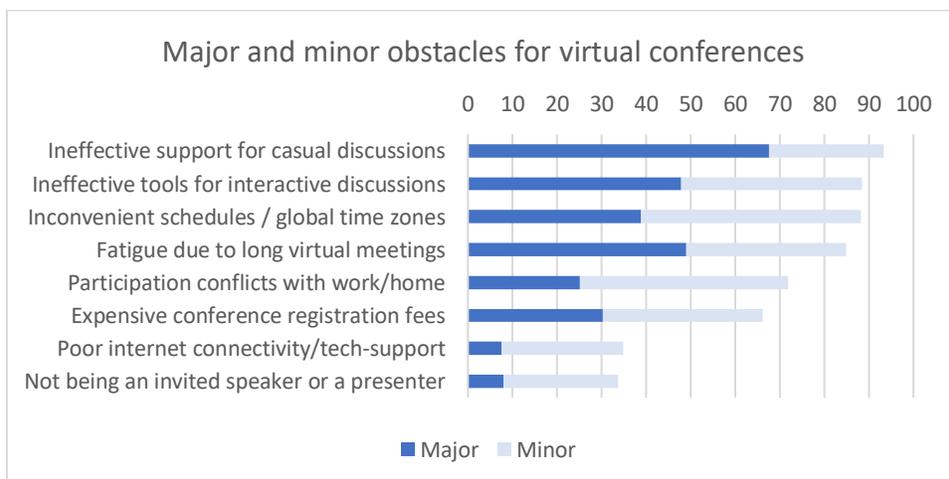
"Fatigue due to long virtual meetings" was rated as a "major obstacle" by 49% of respondents. It is a special problem for conferences: many of us have been using virtual technology for day-to-day work, but few of us have needed to concentrate on a small screen for six hours a day,

absorbing information from conference presentations, meeting new people, and reconnecting with friends from previous conferences.

This suggests that there is a potential benefit in running a virtual conference over multiple weeks rather than compressing a program into a short two-to-three-day conference. Extending a conference over time "breaks the mold" of an in-person event. It is feasible to do this for a virtual conference because "travel time" is no longer required – "virtual presence" is more flexible than "physical presence" at a physical conference location.

Today's virtual tools leave room for improvement. Most internet-based collaboration systems evolved to satisfy business meeting requirements, which differ from conference needs. For example, conferences generally have larger audiences that "watch and listen" rather than interact – and there is greater need to support many-to-many parallel "side" discussions. Business meetings generally feature a smaller group of attendees that interact to ideate, share, discuss, decide, or evangelize strategies. Regular business meetings generally do not include an interlocking set of activities featured in a typical conference (keynotes, peer-reviewed presentations, workshops, tutorials, poster sessions, open space, exhibits, social networking events, excursions, etc.)

After the identification of challenges, survey respondents were prompted to share some positive views of virtual conferences. The respondents were asked to select *very useful*, *useful, less useful*, or *not experienced* for each of six different potential benefits.

➢ **Question**: *In a world of virtual conferences, what have you found most useful?*

The respondents were asked to select *very useful*, *useful, less useful*, or *not experienced* for each of six different potential benefits. "Access" received top grades:

> - "Access worldwide content without expensive travel" – was rated "Useful" or "Very useful" by 92% of respondents.
> - "Live presentations, panels, keynotes, tutorials" was rated "Useful" or "Very useful" by 80% of respondents.
> - "Virtual social events" was rated only 19% "Useful" or "Very Useful"

Access is a big plus for virtual conferences, since attendance can be increased thanks to zero travel cost, lower conference fees, and less disruption to work and family schedules. A side benefit for conference presenters is a potentially larger more global audience and the ability for attendees to view recorded talks "on demand" post-conference provides.

When the pandemic began in 2020, conference presentations and tutorials were the easiest to transition to online formats in contrast to social events and networking sessions. However, the Q&A (question and answer) sessions following presentations were more challenging to facilitate. Collaboration mechanisms such as "chat," MentiMeter, Slack, Slido, etc., can be somewhat cumbersome for first time users – and don't achieve the fidelity or immediacy of face-to-face interactions. More work is required to improve "virtual social events." Looking back 30 years, it would have been difficult to imagine advances in internet (web) and mobile communication

(smart phones and tablets) platforms. Perhaps another generation of technology, such as AR (augmented reality) or VR (virtual reality) devices, will influence the design and staging of future conferences.

Topic 3: Affordability, access, and future conference attendance

Question: *What are the biggest challenges to your virtual conference experience?*

One of the obstacles proposed in the survey was "Expensive conference registration fees," which was identified as a major or minor obstacle by 66% of respondents, much fewer than the top four obstacles discussed in the previous section. It wasn't even a "major" issue in the opinion of most people: only 30% considered this obstacle to be major, 36% said minor, and 34% said "not an issue."

However, "developers" seemed to have a statistically different view.

Question 12a: Expensive conference registration fees			
	Major obstacle	Minor obstacle	Not an issue
Developers	41.5% ↑	32.1%	26.4%
Non-developers	25.3%	37.3%	37.3%

Developers rated expensive conference registration fees as a "major obstacle" more the non-developer survey population (42% rate as major obstacle in contrast to 25% of non-developers, a statistically significant difference, $Z=2.98$, 99% threshold=2.576).

There are several possible reasons. Developers rarely have decision-making authority over their own budgets. We postulate that for developers, attending conferences (either in-person or virtual) may be a personal expense – if corporate funding is limited. As an aside, one of the authors (Fraser) while employed by Nortel, Qualcomm, Cisco, and HP frequently self-funded conference travel and registration. Company support occasionally took the form of "time-off" without the need to use "*Personal Time Off*" (PTO) – more generally known as "vacation time." The second author (Mancl) had a similar experience at Bell Labs, self-funding conference travel and registration during a difficult financial period for the telecom industry in the early 2000s.

Conferences can be an economical way for corporate technical staff to engage in "lifelong learning," to expand and develop their skills in new technology. But it isn't always easy for many developers to find either time or money to attend a traditional in-person conference. One side benefit of the wave of virtual conferences in 2020 and 2021 is that a wider group of software professionals have been able to afford participation.

This expansion in conference accessibility may be responsible for one interesting statistic in this survey – the number of "conferences attended in 2021" and the number of "planned conferences in 2022."

➢ ***Question:*** *In 2021 how many conferences did you attend? (in-person, hybrid, virtual)*
➢ ***Question:*** *In 2022 how many conferences do you plan to attend? (in-person, hybrid, virtual)*

In the 2021 conference attendance questions, 86% of respondents reported attending at least one virtual or hybrid conference in 2021, but most of these conferences were completely virtual. Only 27% reported attending a hybrid conference.

- The average in 2021 was 2.07 virtual conferences attended per respondent
- The average developer in 2021 attended 1.84 virtual conferences

What about 2022 plans?

- 79% say they plan to attend at least one virtual or hybrid conference in 2022
- 77% say they will attend at least one hybrid or in-person conference in 2022
- 79% of the respondents who plan to attend an in-person conference in 2022 also say that they will attend at least one virtual or hybrid conference
- The average respondent plans to attend 3.5 conferences in 2022, and 41% of those will be virtual conferences
- The average developer plans to attend 3.13 conferences in 2022, and 45% of those will be virtual conferences
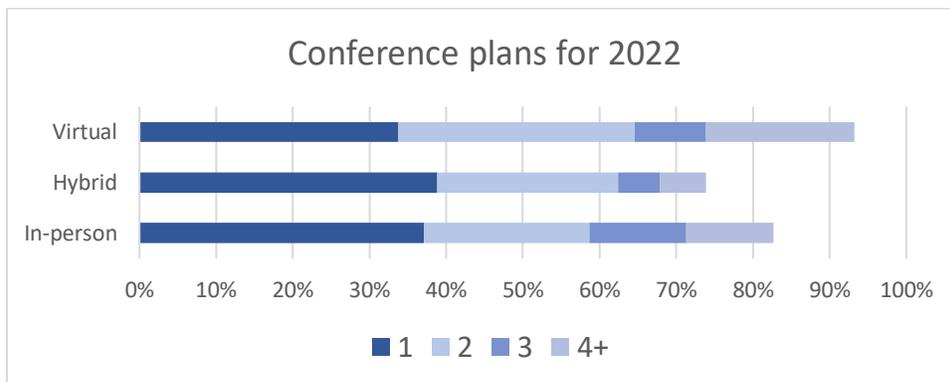
So all three conference models (in-person, hybrid, and virtual) are alive and well in 2022.

Comments from the survey respondents

The final survey question invited respondents to share their recommendations for improving conferences.

➢ *Question: Please suggest how post-pandemic Software/IT conferences might be made more valuable to you.*

Most respondents shared some constructive ideas and were enthusiastic about the future of hybrid conferences – having the choice of whether to attend in-person or online.

- *Hybrid mode conferences will offer flexibility that can meet the needs and constraints of diverse potential attendees and eventually lead to increased registrations and participation.*

- *Although I prefer to be onsite, hybrid conferences offer a good opportunity if, for any reason, I wouldn't be able to travel.*
- *I have enjoyed both in-person and virtual conferences and I especially value the global participation of virtual conferences. This democratizes technology development and sharing.*

But some people observed that hybrid conferences also carry some significant issues:

- *It [hybrid] may also bring uneven experience, specifically if dominated by many in-person participants. This would require strong moderation capabilities of the chairs and reliable well-tested technology.*
- *Ensure virtual participants are included as much as physical ones.*
- *The challenge in hybrid conferences is not to disadvantage either those attending in-person or those attending virtually.*

A few respondents pointed to problems of meeting people and having informal discussions in a virtual conference setting. They highlight a key question about whether conferences of the future will be a good place to "network" and meet new people.

- *A hybrid format is tricky as I attend conference for networking opportunities. Virtual networking was not effective so far - a better solution would make a difference."*
- *[At an in-person conference,] there are a lot of opportunities for random interactions that virtual conferences simply do not provide… [this] would be the best way for in-person events to showcase their value.*

Several respondents were particularly enthusiastic about the "expanded access" provided by virtual and hybrid conferences. But others really like the one-on-one networking that in-person conferences make possible.

- *Virtual meetings are overall a strong plus from my point of view! I was at 4 conferences last year and even without pandemic, given the many obligations, I would have done at most one last year, if it would have required international travel.*
- *Hybrid conferences make conference attendance more accessible to researchers who don't/aren't sure about receiving the necessary monetary support from their universities, or are in other ways hindered by attending live conferences. This opportunity creates value to everyone.*
- *I believe there is nothing today that can replace the human networking and high-intensity 1on1 networking that happens in an in-person conference.*

Based on a sample of the text responses, there will likely be a core set of people who strongly prefer in-person conferences. Conference sponsors need to be aware that attendees are opinionated and that by "going virtual," some loyal attendees may be unhappy:

- *Virtual is too much one-way broadcast…*
- *Virtual conferences are utterly abysmal experiences, perhaps slightly more tolerable than a colonoscopy.*

- *Most of the virtual ones I go to, I find it really difficult to pay attention…*
- *Keep it similar to pre-pandemic exactly, we want to forget Covid for good.*

But other respondents have been just as enthusiastic about the improved access provided by virtual and hybrid:

- *I wish all conferences will be hybrid in the future because that allows me to make the choice of how to attend*
- *Offer hybrid always*
- *Hybrid events! Reducing my carbon footprint by attending a conference in-person when it takes place in my region and attending remotely otherwise.*
- *Hybrid is the way of the future.*

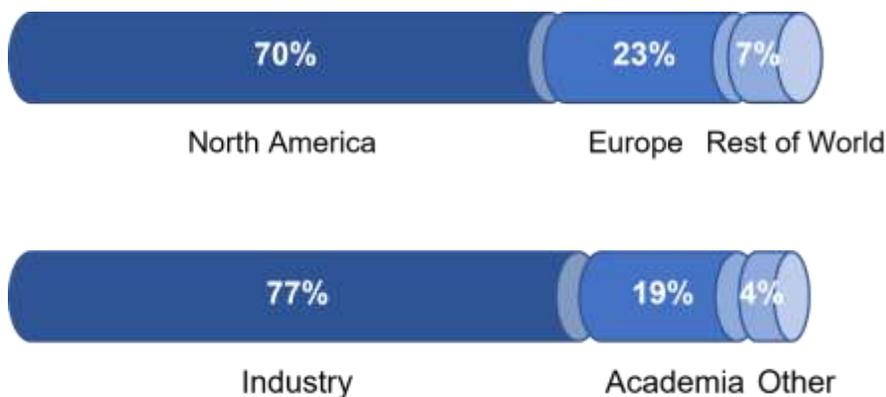This survey paints a conference picture that continues to evolve.

A few statistics about the survey population

The survey is a snapshot of opinions about the "Future of Conferences," and the survey population is ***not*** a random sample of the universe of all conference attendees.

The majority of respondents were industry affiliated and based in North America (60% of the total number responding to the survey).

Respondent demography:
- 77% were from industry
- 70% were from North America
- 23% were from Europe
- 19% were from academia.

70%	23%	7%
North America	Europe	Rest of World

77%	19%	4%
Industry	Academia	Other

There was a good mix of small-company and large-company respondents:

28%	26%	15%	14%	17%
Very Big (10,000+)	Big (1,000-9,999)	Medium (100-999)	Small (5-99)	Very Small (<5)

There were several roles represented in the survey responses:

32%	25%	31%	10%	5%
Developers	Researchers*	Managers*	Educators*	Other

[includes 2% Educator/Researchers, 1% Research/Managers]
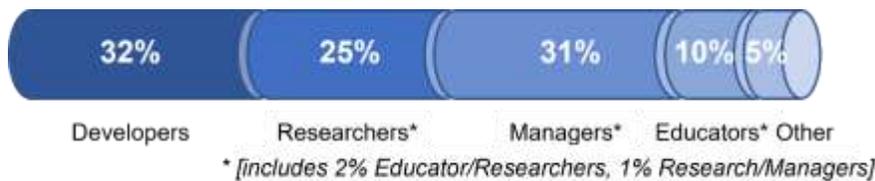
Most of the respondents attend conferences regularly, and they attend a wide range of meetings. To gauge the breadth of conference experience, the survey asked respondents about which conferences they liked to attend:

➢ **Question:** *Pre-pandemic (2015-2020) what conferences did you regularly attend?*

There was an amazing range of answers. Over 500 different conferences were mentioned in the responses, everything from AAAI to JavaOne to QCon to Zoomtopia.

The top conferences/topics/sponsors noted:
- ICSE, CES, IETF, UIDP
- Agile [North America], XP [Europe], and Scrum Alliance
- IEEE-sponsored conferences
- ACM's OOPSLA/SPLASH

Understanding conference obstacles and conference value

In the survey, respondents were asked to rate potential obstacles for different conference modes. The purpose of these questions was to suggest future improvements to conference program and logistics – to focus on the aspects of virtual and in-person conferences that might limit individuals from participating.

The list of potential obstacles for virtual conferences yielded some interesting data.

Major and minor obstacles for virtual conferences
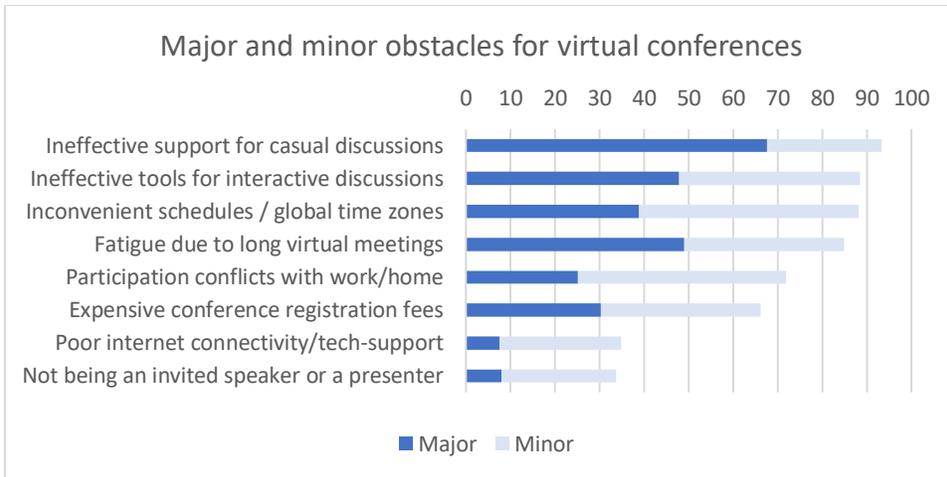
The top two issues are a known weak point for virtual conferences. Even if the conference organizers try to set up some software tools to facilitate interaction, the "learning curve" for tools will contribute to increased attendee dissatisfaction. Most conference participants have limited experience with online collaboration platforms, particularly when each conference seems to use a different toolset.

The fatigue issue may be the most serious problem for virtual conferences: 49% of respondents said that this was a "major obstacle." Some conferences have experimented with non-traditional session schedules – spreading out the conference over more days with shorter sessions, converting many short talks to on-demand video presentations, alternating between lecture presentations and group discussions to vary the presentation mode.

During the 2020-2021 pandemic, most conferences decided to reduce conference registration fees, hoping to recover the conference costs by increasing the number of people registered.

Major and minor obstacles for in-person conferences
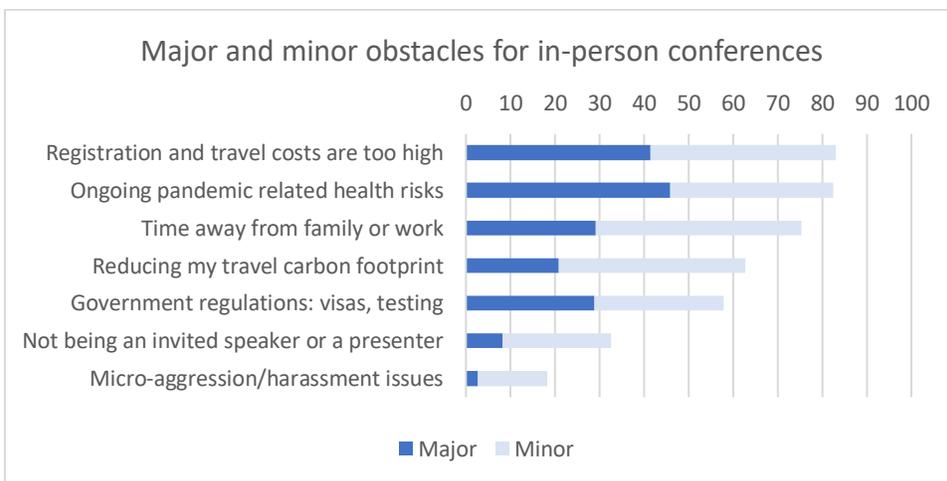
For in-person conferences, the top two obstacles should not be a surprise: the 2020-2021 pandemic is still lingering in parts of the world and the cost of travel in 2022 has been higher than normal. It is interesting to note that the impact of government regulations – e.g., unexpected

quarantines or testing requirements – was not as perceived as great an obstacle as cost or health risks.

The last item, micro-aggression/harassment, is an issue that needs to be seriously addressed by conference organizers and conference attendees. We cannot be complacent just because it is seen as "not an issue" by 82% of the survey respondents. We must not condone any degree of "bad behavior" at conferences, especially micro-aggressions and harassment directed at attendees with less "power" (especially students).
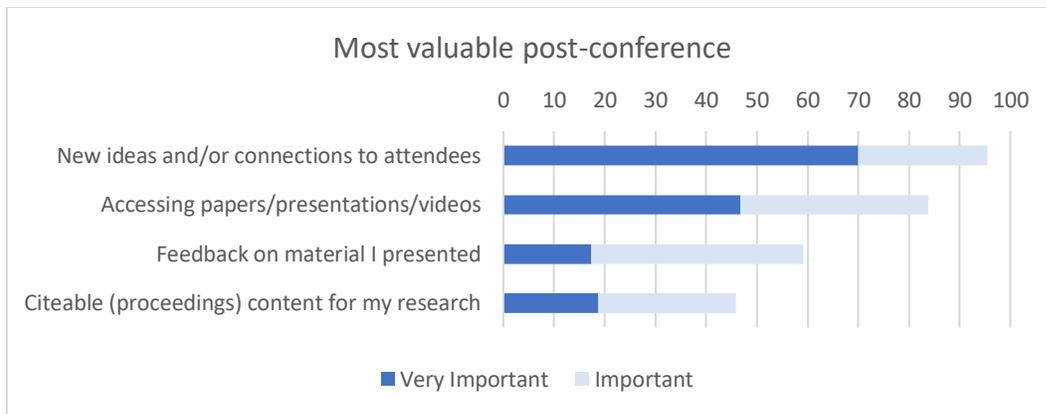
Observations about conference culture issues from a recent interview with Paula Brantner [4], a lawyer and expert on workplace culture and harassment issues, may prove enlightening:

> *Some individuals, when traveling to attend a professional conference, do not seem to think the usual standards of professional conduct apply. Or they may never have thought that the rules apply to them, due to their power and status. From catcalls and inappropriate comments made by speakers from the podium, to sexual comments and propositions between attendees, to stalking, groping and physical assault — many forms of unprofessional and illegal conduct can happen on site at conferences among individuals who rarely have the opportunity to interact otherwise. Social events involving alcohol can also play a significant role at some conferences as part of the organization's culture, especially at networking events where attendees looking to make connections and advance their career may feel compelled to tolerate behavior that makes them uncomfortable. The availability of private hotel rooms away from colleagues and family can increase the likelihood of sexual misconduct, up to and including sexual assault and rape.*
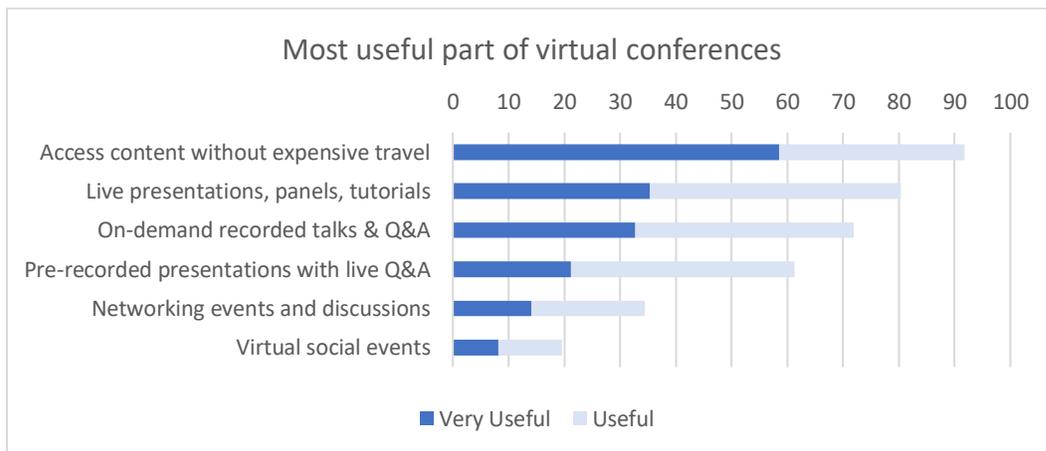
> *Academic conferences face a special risk due to the power imbalance among attendees, between tenured faculty engaged in high-profile research, and graduate students looking for work that will make or break their careers. There is a long history of senior faculty leveraging that power imbalance to their advantage, not just relating to sexual harassment, but other forms of bullying and abusive conduct. Those interactions at professional conferences are fraught with consequences which can have a lasting impact on the career path, reputation and morale of individuals who are targeted for that inappropriate conduct, making some attendees feel the conference is an unsafe environment in which to interact with other professionals and to build their professional network.*

The survey also posed two sets of questions about what is "valuable" to conference attendees, especially the long-lasting value of personal connections, shared ideas, feedback, and publications.

To increase the viability of virtual conferences, "sharing new ideas" and "making personal connections" will require organizers and participants to recognize that catalyzing casual discussions and interactive discussions requires effort (more-so than for an in-person event).

Most valuable post-conference

New ideas and/or connections to attendees
Accessing papers/presentations/videos
Feedback on material I presented
Citeable (proceedings) content for my research

■ Very Important ■ Important

The second set of questions about what is "valuable" are focused on virtual conferences, and the responses reinforce two ideas: virtual is more economical, but virtual networking and social events are still seen as weak.

Most useful part of virtual conferences

Access content without expensive travel
Live presentations, panels, tutorials
On-demand recorded talks & Q&A
Pre-recorded presentations with live Q&A
Networking events and discussions
Virtual social events

■ Very Useful ■ Useful

Addressing virtual conference obstacles

There will continue to be more innovation in the post-pandemic era. The authors' conference experiences and the data from this survey point to several ideas that conference organizers should consider in the short term.

Interactive Q&A (Question and Answer) sessions can be difficult in a virtual or hybrid conference. Here are some strategies the authors have used to facilitate two-way discussion:

- Encourage session attendees to type in questions during each presentation – either using the platform's "chat" window or using an external tool (such as Slack or Slido). In a hybrid session, alternate questions from the in-person attendees and the online tool.
- Some conferences schedule a separate question and answer session at the end of each session. One option is to hold a 30-minute "panel Q&A session" with the three or four speakers from a single paper session, another option is to use the "breakout rooms" feature of the event collaboration tool, which can enable attendees to pose questions to individual speakers. Some conferences have scheduled special online "ask me anything" sessions for keynote speakers and tutorial speakers to enable a broader discussion – this is

the kind of forum that comes closest to the "hallway conversations" in an in-person conference.

- Some speakers try to "poll the audience" – asking a few questions during the discussion that the attendees can respond to in an online tool (such as MentiMeter). This engages the virtual audience directly.
- Recorded presentations are not as good live talks where questions can be posed in real time, but a recorded presentation followed by a live Q&A will create some opportunity for discussion.
- A hybrid conference will generally require more volunteer staff than an in-person conference or a virtual conference. It is helpful have at least one volunteer logged in to the Q&A platform and dedicated to scanning and screening online questions during the session. This volunteer can then feed the best questions to the session moderator as needed.
- The session moderator should get questions from the presenters in advance – to be used to prime the Q&A session (in case the audience is initially silent).

Virtual social events are an enormous challenge, and while tools exist such as Gather and Gatherly, there is much room for improvement.

- Social events need to enable attendees with similar interests to meet and chat. However, Attendees sometimes feel that being assigned to a random breakout room and introducing themselves to strangers is a painful social experience.
- Volunteers can make a difference – by setting up a cluster of online discussions with one or two volunteer facilitators in each session, there will be someone in each session to explain the ground rules for the discussion and to prompt quiet people to speak.
- Whatever the conference organizers do for online social events, it is essential for them to plan out the session's goals and structure in advance. Don't just expect to "open up an online collaboration tool and see what happens."

Finally, as discussed in the previous section, conference organizers need to consider the fatigue of long virtual sessions, and perhaps establish non-traditional session schedules. The most effective technique the authors have discovered is to schedule virtual conferences over more days with shorter sessions. Fatigue is lessened with the mix of sessions such as alternating lecture style presentations and group discussions.

In addition to addressing virtual conference obstacles, there are several other things that conference organizers should include in their virtual conference planning checklist – these are lessons the authors learned from 25+ years of running virtual corporate forums:

- Try to group the program sessions to create "topic blocks" (because some conference attendees are focused on a single topic within the larger program, and it can be more convenient for them if all talks on that topic are grouped closely together).
- Consider the time-zones of the attendees when setting the schedule (for example in a North America centric virtual conference, schedule European/African or Central Asian talks early in the day and Australian/Japanese talks late in the day).

- Ensure that the virtual conference program is indexed and viewable by time-zone – many attendees forget to convert to their local time, which causes confusion.
- Stick to schedule – don't run early or late.
- Be prepared for speakers who don't appear on time or technical glitches – the main options are to have the speaker provide a pre-recorded presentation or for the conference organizers to have a backup speaker who can fill an empty talk slot.
- Network problems and server problems will occur – prepare a risk mitigation plan, e.g., to switch to a backup network or server.
- In a live virtual session, the session moderator must be prepared to fill silence if there is a delay or technical failure.
- In interactive sessions where multiple conference attendees might have the ability to "take the floor," the session moderator or another volunteer should be prepared to immediately mute or disconnect a participant who disrupts a session inappropriately.
- It is essential to have a "help line" or "chat" staffed by conference volunteers to advise speakers and attendees who have technical issues that need to be solved quickly

Some notes for the organizers of future conferences

Conference organizers need to "serve their conference communities." There needs to be a balance – many successful conferences attract many of the same attendees year after year, but also attempt some outreach out to expand the community. In some fields, the organizers of in-person conferences make an extra effort to promote attendance from people in the local region, especially by offering low-cost tutorials and training in some of the basics.

In order to anticipate conference attendee needs, conference organizers should orchestrate surveys, to collect more community-specific information about the attitudes of both "old-timers" and "newbies" and increase the conference's "value proposition" for perspective attendees. In such a survey, questions should ask conference attendees "what is working well?" and "what kinds of new things can we do to improve the conference?"

A conference with a significant "repeat business" might want to retain a more traditional conference structure – with a handful of experimental hybrid sessions to attract new non-local attendees. But a conference looking to expand its community of presenters and attendees may try to be more experimental, and more willing to try new community engagement strategies.
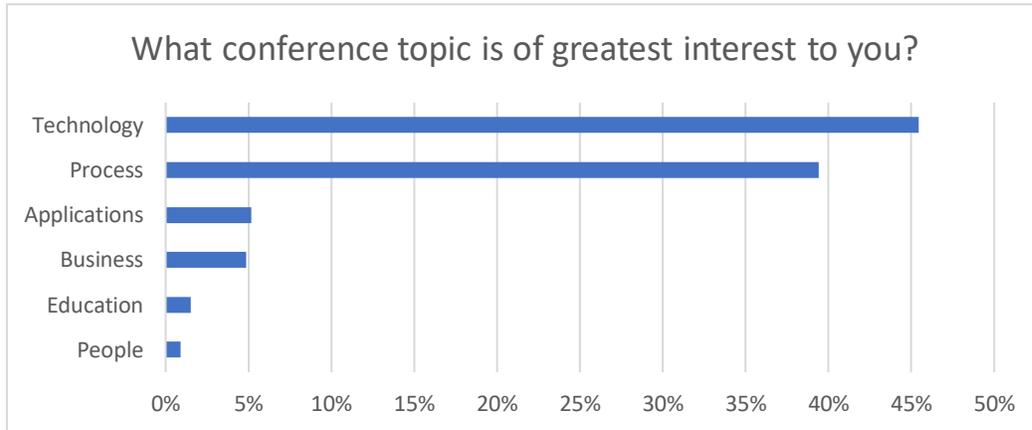
The authors have experience in orchestrating internal company conferences using virtual technology with presenters and audiences in multiple sites and time-zones, and we've learned that many people may choose to attend only a small fraction of a virtual conference. The sessions need to be organized in blocks attractive to the needs of different "sub-communities." The organization of the conference into smaller "chunks" – with related presentations grouped together, plus an awareness of which competing sessions might conflict with each other for audience share – is critical to give attendees a positive experience.

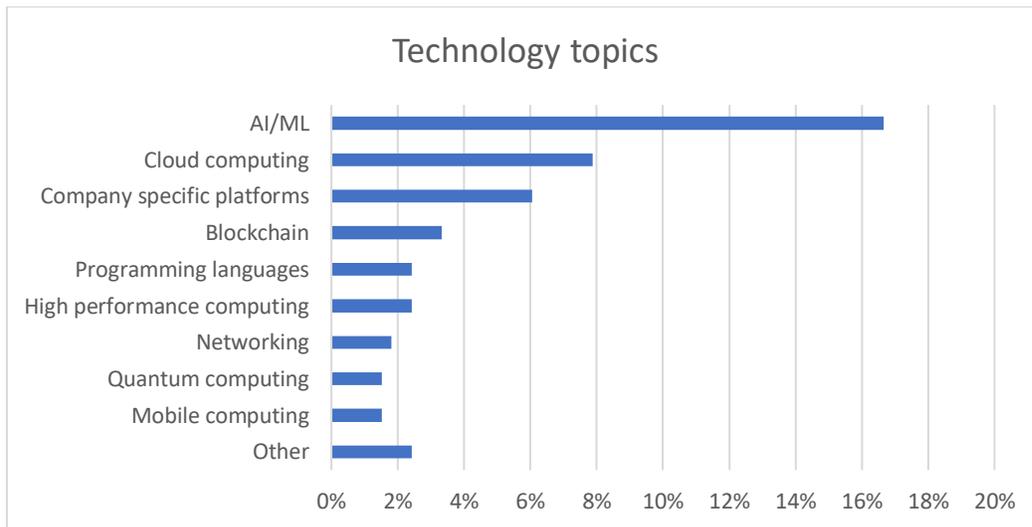## What will be the most popular conference topics?

The survey asked about future conference topics:

➢ **Question:** *What conference topic area is likely to be of greatest interest to you in 2023-24?*
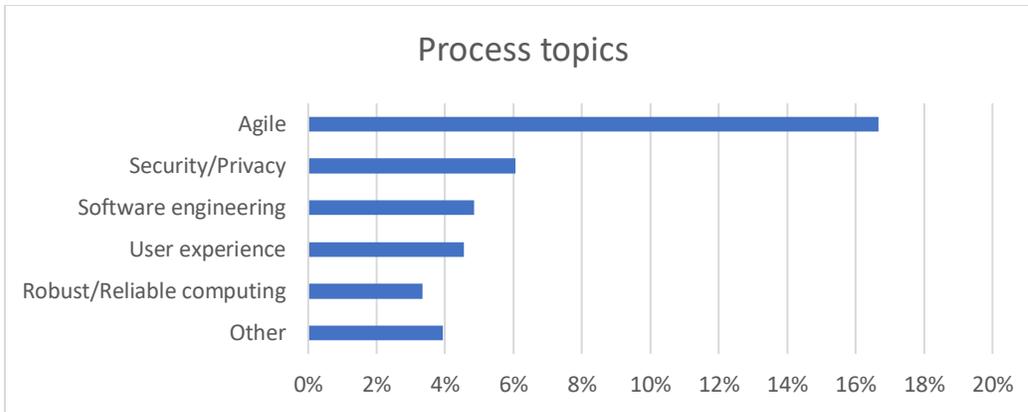
The respondents were offered a choice of several popular technology topics, or they could enter their own choices. It was not surprising to see that 45% of the respondents gravitated to topics the area of "technology" (everything from AI to programming languages to Bitcoin to quantum computing), and there were another 39% who mentioned "process" topics (engineering processes and software development processes).

What conference topic is of greatest interest to you?

Topic	Percentage
Technology	~45%
Process	~39%
Applications	~5%
Business	~5%
Education	~2%
People	~1%

Many of us expect that AI/ML will have an increasing impact on other technologies.

Technology topics

Topic	Percentage
AI/ML	~17%
Cloud computing	~8%
Company specific platforms	~6%
Blockchain	~3%
Programming languages	~2%
High performance computing	~2%
Networking	~2%
Quantum computing	~2%
Mobile computing	~2%
Other	~2%

Agile is likely at the top of the "process" list in this survey since the survey was included in Agile Alliance March 2022 Newsletter.

Process topics

(Bar chart showing percentages for process topics)

- Agile: ~16.5%
- Security/Privacy: ~6%
- Software engineering: ~5%
- User experience: ~4.5%
- Robust/Reliable computing: ~3.5%
- Other: ~4%

(X-axis: 0%, 2%, 4%, 6%, 8%, 10%, 12%, 14%, 16%, 18%, 20%)

Summary

There is much more to learn about the future of conferences. We expect to have more questions and more discussion later in 2022, as software community evaluates the impact of "virtualization" on both conference and work. Three areas stand out from the data in this survey:

- Innovation is imperative to improve virtual conference networking (1-on-1 to social)
- Virtual and hybrid conferences increase global access and reduce attendee cost
- In-person is a challenge for some (cost/access) while others view virtual as a waste of time

Conference organizers may also need to expand access to conference sessions while still watching out for economic issues. In-person conferences may suffer reduced attendance for the next few years. Hybrid conferences need to ensure that the hybrid experience delivers adequate value to the participants – even with a discounted registration fee, some attendees may not feel that they receive what they paid for.

The survey data is clear that while some love attending conferences without travel, others really desire direct personal interaction. Some of the obstacles to virtual meetings have been clearly delineated in the survey. It may take a combination of technology and conference re-design to make the future of conferences virtual while sustaining the high-touch interactions of the past.

A footnote to this report is to remind readers that survey respondents were from a pool of ~5000 individuals queried, with approximately 700+ individuals viewing the survey – but only 300+ completing. We also hypothesize that survey respondents are much more likely than the general population to attend conferences and use virtual technology. Data may be found in [5].

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