PLEA Conference Footprint:
Alternative Conference Formats

30/11/2020
Cecilia Consalvo
Wageningen University & Research

Content is what gets people through the door, engagement is what keeps them there and makes them come back for more.”

Huffmann, 2020

Index

List of figures

1. Summary

The international scientific community widely agrees on the urgency to take steps towards stronger action to tackle a changing climate. This means that a radical shift to more sustainable practices is essential. In this report, the case of scientific conferences is taken into consideration. In fact, what we know about climate change comes from scientists who generally meets at international forums or conferences to share their findings and research. Scientists - of any kind - meet at conferences regularly and these kinds of meetings are far from being sustainable (Guimares, 2020). Hence, conference in the conventional form is a demanding process with considerable environmental impacts (Hischier, 2002). The sustainability aspect of a conference goes from the actual organisation, the conference materials and the participants' activity (Cobena, 2020). These activities all come with an environmental impact and the Cercedilla Manifesto group twelve sustainability decisions for organisers and attendee of research meetings (Guimaraes,2020). Specifically, there may be opportunities for specialists who study topics related to sustainability and climate change to reduce their emission from general travel while maintaining productive careers and while still being able to share a networking experience with colleagues when they meet (Weynes,2020). However, it is acknowledged that scientist need to have intensive international exchange of knowledge to promote -and activate- scientific knowledge. Networking is therefore crucial for scientists who seek to share their studies, results, and objections.

1.2 Researching a more sustainable scientific conferences approach

As PLEA conference focus is on passive and low emission architecture and design, it is important to detect new ways in which the impact of this conference can be lowered. This can be done by exploring ways to reduce travel emissions and lowering conference frequency without compromising its effectiveness nor the networking experience. That is why this report investigate possible ways forward in order to decrease the environmental impact of the PLEA conference. This can be done by answering the question "*What is the best format PLEA can implement to lower emission at its minimum?*". The typical average emissions related to PLEA travel activities is researched in Maria Oliani's Report which was conducted simultaneously with this document. From this starting point future carbon reduction strategies for the PLEA network will be developed.

1.3 Methodology

This qualitative research is mostly based on literature review and real-life virtual conferences examples. This report draws on academic and grey literature, including scientific research by different institutes and research bodies. In specific, examples of past virtual conferences have been reviewed and

compared. These conferences state current challenges, needs, ideas, and progress related to the implementation of a more sustainable way of leading a scientific conference as PLEA. Reviewing these documents has enabled the identification and synthesis of several overarching challenges, needs and proposals for improvement. Furthermore, the critical study of conferences, together with academic literature, have provided a solid grounding for the identification of main leverage points which have to be considered when organising conferences of this kind. The development of the three scenarios in this Report are supported by the strategies developed in MariaClara Oliani Report on "Participant Travel Carbon Footprint". These strategies are carbon reduction strategies to lower the carbon footprint.

1.4 Covid-19 and the (forced) digitalization

As the COVID-19 pandemic outbreak is still an extremely relevant governmental priority, many things have been challenged by the security measures we all have to adhere to. Social distancing has shaped the way we attend and follow big events such as conferences of all kinds. Virtual events present new opportunities for many organisers especially for overstepping the hurdles of social distancing and engaging audiences around the world (Bizzabo,2020). Especially, it is interesting to note how the scientific community is taking the opportunity to connect people in spite of it all(Price, 2020). Based on this unexpected situation PLEA 2020, originally planned to be held in Spain, was changed into a fully digital event. Unfortunately, by the time this report was finished, data and feedbacks from Digital PLEA Conference experience were not available to the author.

2. Analysis of conference formats

2.1 On site, hybrid, fully digital

As mentioned before, scientific meetings should be organised in the spirit of responsible managing, consumption and production, including the prioritization of plant-based meals for reduced nitrogen loss (Sanz-Cobena,2020). The Cercedilla Manifesto gives a clear hint on the leverage point which organizers can work on when considering a more sustainable way to run conferences. Most importantly, the first question the study asks is whether a physical meeting is necessary (Guimaraes,2020). Indeed, this is the focus of this research. If the answer is yes, the question to pose is whether each single participant really needs to physically be present at the conference. Here is where remote participation can be a valid support tool which does not undermine the performance of the event. Figure 1 highlights twelve points to enhance sustainability of research meetings which are inspired by the Sustainable Development Goal 12 and come from the Cercedilla Manifesto study conducted by Professor Sanz-Cobena and colleagues published in Nature Foods in 2020.

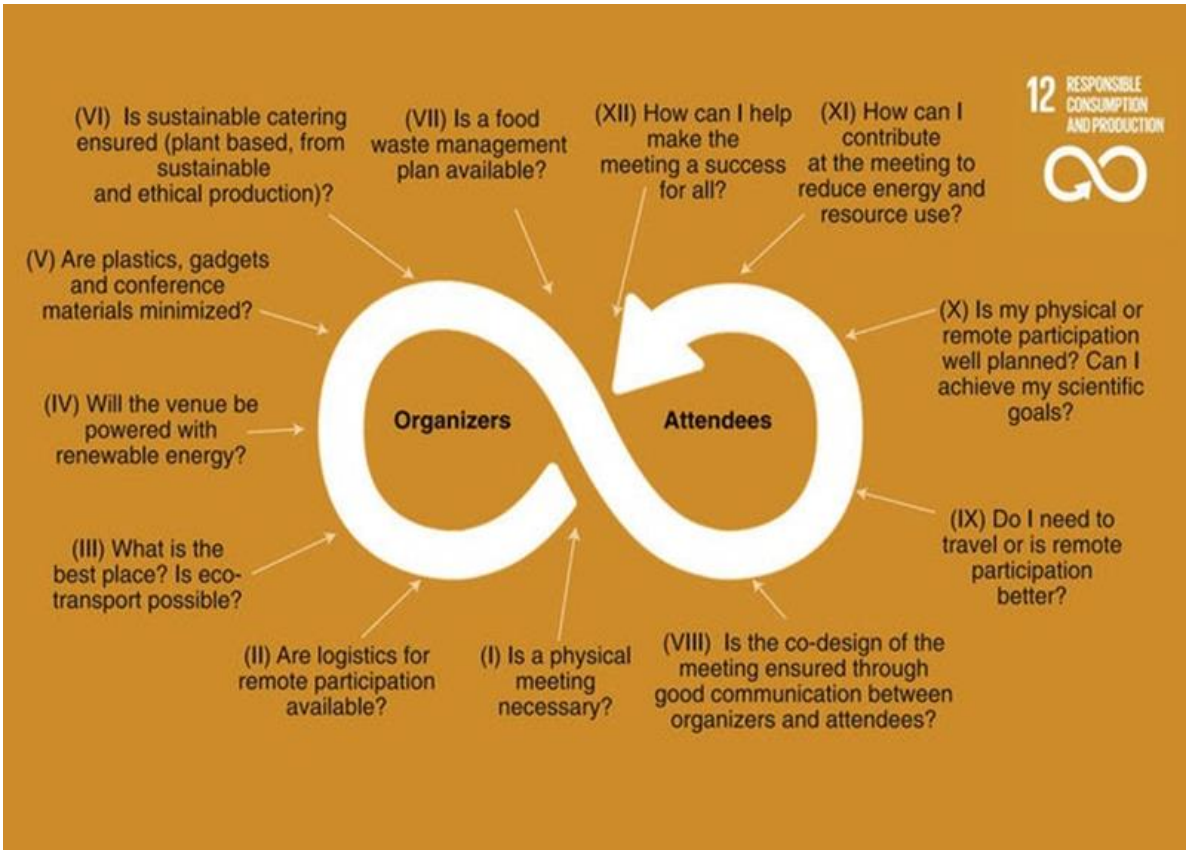

Figure 1. Twelve questions towards a more sustainable scientific conference format (Sanz-Cobena, 2020).

In the current situation more than ever, we can discover formats of possible meetings and possibly find new ways and best practices to implement in the future so as to speed up the process of sustainability and at the same time more accessible to more people. Outlined and described here are three main conference formats.

On site

This section explores the possibility to reduce emission by keeping the conference format onsite.

Prior to COVID-19, there have been concerns regarding the negative consequences arising from greenhouse gas emissions resulting from traveling to conferences and meetings (Rubinger, 2020). This Environmental impact of conventional (on site) conferences have been analysed by multiple scholars. The Swiss Federal Laboratories for Materials Testing and Research (EMPA) elaborated the Life Cycle Assessment (LSA) which is an example of assessing the environmental impact of certain conferences. The assessment is based on three measures which can be applied to make on site conferences "environmentally friendly". These measures were applied during the 15th International Environmental Informatics Symposium, held in Zurich on October 10 –12, 2001. The three point of actions (the organization, materials and participants activity) were ranging from the reduction to conference materials produced (gadgets, handouts..) to giving participants USBs instead of the book form to

minimizing the travel of the participants. At that time, fully virtualize a conference was not an option because the organization was not in the position to do so (Hischier, 2002). This study demonstrates that the positive outcome of the conference such as scientific progress and personal contacts can happen with less environmental impact. As the organizer can influence the amount of materials handed out, he or she will also influence the amount of influence and engagement resulting from a reduction or augmentation of the abovementioned materials. A printed version of the call for papers plus the printed program of the brochure it is still inevitable in order to motivate enough people to submit papers to the conferences and participate (Hischier, 2002). However, the organizer can reduce these materials to minimum and to a more environmentally friendly choice. For example, choosing basic cotton bags with no printed personalization over nylon-based ones and a downloadable (through website or shared Drive) version of the proceedings over the book form. The access to a share drive in which the attendee find proceedings is a technique already used with PLEA in the past, which is the most impactful in terms reducing emissions.

However, the discussion on reducing conference materials results reasonless if compared to the emissions resulting from travel activities. Figure 2 show it clearly:

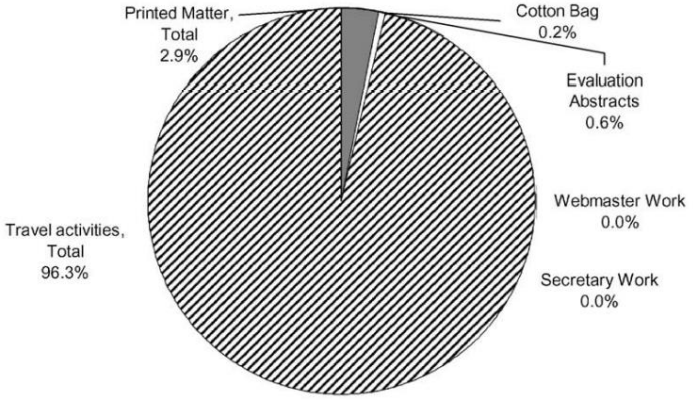

Figure 2. Environmental impact (expressed in eco-indicator points, EIP) of the materials compared with the organization and the participants' travel activities (Hishier, 2020).

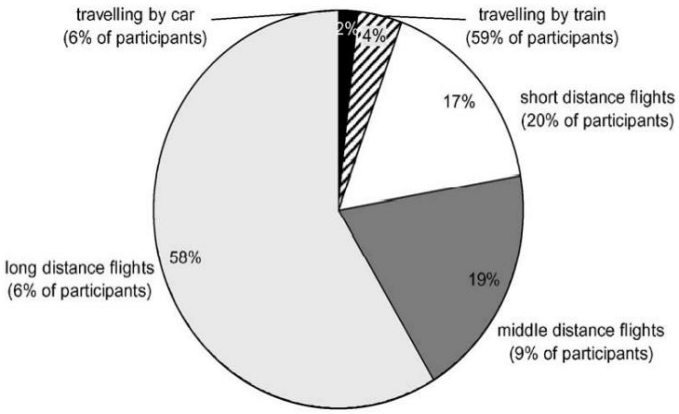

Figure 3. Environmental impact (expressed in eco-indicator points EIP) of the participants' travel activities split into different modes of travel (Hishier, 2020).

More specifically, it is interesting to note that within total participants travel activities, the long-distance flights are those which weight the most on total emissions, as shown in Figure 3. Minimizing air travel is, thus, the only way to reduce the environmental load of a conference significantly (Hishier, 2002). In the case of the IEI Symposium, the conference could have taken place in Zurich, Dallas and Tokyo at the same time, reducing significantly total emission.

Finally, onsite centralised scientific conference seems to be the least environmentally friendly option although it makes possible direct contact and networking with other participants, something that technology still have not be able to replace. Combining regional and international conferences so to make long range air travel less likely, is a solution to offset emissions. This can only be done by

selecting pivotal regional spots in well-connected cities, easy to reach. However, the scientific community especially, may reach very different outcomes based on the location and the people involved in each event, so technological connecting tool should support these meetings.

Key advantages: personal connection, networking experience, cohesion and motivation within the scientific community

Key disadvantages: high Co2 emission, access limited to who can afford it, long travel distance and time spent, incoherency in the outcome depending on the location and participants

Hybrid

Nothing will be the same as before or during the pandemic. It is now the time to re-adapt and to develop tailor-made solutions. Hybrid events combine the traditional events and the innovative technologies (Pakarinen, 2018) and it is a perfect example of tailor-made solution. Thus, in this section onsite conferences are taken into consideration as green solution combined with technological tools to facilitate communication, connection, and the development of an effective conference experience. Organizers of academic and other international meetings have begun experimenting with ways to offset or cut down on carbon emissions.

On the 18th of November one of the first experiment was led to testify the feasibility of making scientific meetings virtual, in a bid to cut the heavy carbon footprints created by attendees' air travel (Abbott, 2019). On that day The *European Biological Rhythms Society (EBRS)* tried to assess the feasibility of organizational techniques combined with technology in aiding interaction and networking. The EBRS conference was held in Munich, where most of the expertise on the circadian rhythm on metabolism was based (Abbott, 2019). One-fifth of the total participants was sitting in the lecture hall in Munich, Germany while the rest was watching the broadcasted video to five virtual hubs through high-quality, two-way video systems at universities in Tel Aviv, Israel; Zurich, Switzerland; Boston, Massachusetts; Tokyo; and Porto Alegre in Brazil (Abbott, 2019). Other virtual hubs (69) enabled other groups of researchers to watch the broadcasted event across 18 time zones and send questions or comments through Twitter. Nearly 60% of the participants utilized Twitter as an interactive hub. The main annual conference of EBRS was still organized in August in Lyon, France. This is a perfect example of a hybrid and centralized scientific conference format. The main annual conference was held in one place, and the hybrid character came from support of technology in broadcasting the event, reaching everyone who had internet connection who was interested in the event. Many participants reported the advantageous side of this format: no waste of time, money and energy travelling, student being able to participate for free, innovative way to scientific discussions. Interestingly though, the organizer still emphasizes the importance of "*one big annual conference to forge personal connections and collaborations"* (Abbott, 2020). Through this format, the experience of direct contact to a smaller group would be available, global dialog would still be possible and wider accessibility would still happen.

Furthermore, findings show that the alternation of large national meetings and small regionals one is up to three times more effective than other proposal (Ponette-Gonzalez, 2011) such as fully onsite format and the virtual one. Additionally, the inclusion of the geographical criteria in the site selection process is an additional mean to reduce the carbon footprint of mega meetings (Ponette-Gonzalez,2011). The geographical criteria is also mentioned by Oliani, 2020 through Strategy 2 (optimize conference location). The proposal advanced by Ponette-Gonzalez et al. is particularly interesting because do not need substantial financial investment to be implemented and have the advantage to maintain the motivation

and intellectual benefit of an in-person meeting while giving the opportunity to many others to attend and participate. The opportunity of regional meetings of smaller scale include fostering local partnership and collaboration and inclusion of students interested in the topics. Scientists themselves, have the opportunity at international or regional events to network with distant or international colleagues. A further analysis coming from this study add an additional level to the organization of hybrid decentralized conferences. This means that for this format to be hybrid the live streaming of the international event is presumed. Thus, this format base its root on a onsite decentralised (because happening in different regions) format with the aid of the technology when the international event occur.

Key advantages: interpersonal experience, focused networking, easy accessibility, less resources needed, less travel needed, local partnership, student inclusion

Key disadvantages: organizational challenges, technical challenges, difficulties in engaging the attendees, international travel

Fully digital

Hosting a virtual conference can be a natural way to reach even more people (Cobb, 2020). Virtual conferences can offer more than an alternative to conventional face-to-face events (Rubinger, 2020). Recently, we all have been facing the online meeting format through seminars, conferences, lessons and meetings of any kind. The planning and the outcome of a scientific virtual event have been studied by many, because of its numerous technical and organizational challenges (Price, 2020). Reaching wider audience, significantly reduce the carbon footprint in respect to conventional conferences, increasing diversity and equality are only some of the possible advantages of conference digitalization. The scientific community have started to digitalize their big international meeting from quite some time when considering the accessibility aspect.

The first African virtual conference on Bioinformatics in 2009 is an example of how the international scientific community started considering students involvement more seriously and to achieve that, virtual conferencing was contemplated. The aim was to provide students and scientists in the bioinformatics and computational biology fields a chance to network through a unique platform conceptualized as "hubs" (Gichora, 2010). The virtual conferencing format proved to be an effective low-cost strategy for connecting bioinformatics and computational biology education to African scientists who otherwise would have been deprived of the opportunity (Gichora, 2010). Giving the opportunity to greater number of participants, spending less time travelling, less funds given to accommodation or travel organization and spent for other activities. Minimizing the requirement to travel also means that the availability of invited speakers is greatly increased, improving the chances of attracting highly relevant and high-impact presenters (Gichora, 2010).

As the current situation force most of the movements not to happen, the scientific community is making "lemonade out of lemons" (Price, 2020). Combining the awareness on the limitation of travel we all ought to follow, many scientific international meetings have been efficiently shifted to fully virtual formats. The case of the Global Immuno Talks and the transforming vaccinology Keystone are two of the many successful examples which have been challenged by Covid-19 pandemic. Rino Rappuoli - organizer of the vaccinology keystone event- mentions "Since vaccines have become even more urgent in the meantime, we decided to do a virtual meeting to keep the vaccinology people connected in such a difficult time"(Houston, 2020). Most of the organizers found an incredible gratification from the

online format. In both the example abovementioned, the organizers were strike by the feasibility to reach every angle of the world if people have an internet connection. The recorded talks enable a big flexibility on when the people would listen to those rendering this type of events more egalitarian, inclusive and environmentally friendly as well as giving people more time to digest the load of scientific information(Houston, 2020). In particular, the online format gives more access to junior scientists and researchers. Moreover, top experts' availability to present their work increased dramatically as they did not have to decline due to other commitments. Also, virtual format reduces time commitments and logistical requirements by having shorter sessions over the span of several weeks rather than everything packed in single week (Houston, 2020). Rino Rappuoli found that the digital hub as supports to virtual conference made the process of Q&A more democratic. His belief was that normally at meetings, few people dominate while on online platforms everybody have a voice. Although the many positive outcomes, many challenges were faced: the limited opportunity for dialogue between speaker and audience and less opportunity for junior trainees to present work (because there is no posters session or short talks).

Key advantages: inclusion, democratisation, less resources needed, drop in emission, less time spent travelling, accessible anytime and everywhere

Key disadvantages: no personal interaction, possible lack of motivation, possible technical problems

2.2 Key Findings

Conventional conferences can be more sustainable. New engagements strategies are being developed to contrast the environmental impact of onsite conferences. With the digitalised reality we live, it would be odd not to include virtual supports if they are meant to facilitate interaction or to make far away people closer to each other. That is why, the world of scientific conferencing and by far, the most interesting format which considerably reduce carbon emission is the alternation between international and regional events. The online mean is still a resourceful option, but the analysis shows that the willingness to participate in conferences remotely or to attend fewer conferences is far from universal (Ponette-Gonzalez,2011). In fact, while online conferencing is seen as more inclusive, democratic and accessible these values are still weighted with the face-to-face interaction experience and extremely important feeling. Many scientists also find online conferencing something that cannot fully replace the real-world experience of scientific conferences and value this option as optimal only if combined

Scenario	Maximum CO_2 reduction	Drawback
Business-as-usual	0%	↑ CO_2 emissions
Alternating schedule[a]	49-74%	Additional infrastructure and planning, decreased funds during "off" years
Use of geography in the selection process[b]	6-30%	Additional planning
Reduced international participation[c]	25-56%	Reduced international collaboration
Carbon offsets[d]	23-44%	Uncertainty regarding effectiveness
Reduction in meeting frequency to biennial conferences[e]	~50%	Fewer face-to-face interactions
Virtual- and video-conferencing[f]	52%	Fewer face-to-face interactions, additional financial investment required

Figure 4. Benefits and drawbacks of alternative proposals to reduce the carbon footprint of scientific society meetings (Ponette-Gonzalez, 2011).

with some sort of onsite meetings. Figure 4 shows the environmental impact of the options considered in the previous sections, this Report's finding. Specifically, a. the alternating schedule refers the Co2 reduction of regional meetings compared with large international annual conference the use of geography in the selection process Co2. Holding biennial conferences would reduce the carbon cost of scientific meetings by ~50% compared to annual. The last percentage is based on a poll in which participants consented to participate to an annual meeting remotely (Ponette-Gonzalez, 2011).

3.Future scenario for PLEA

Considering the international feature, the scientific conference PLEA is characterized by this study is important in order to highlight possible and realistic environmentally friendly international meetings alternatives and solutions. The times of uncertainty we live in, gives a widow of opportunity to shift to greener choices and to analyse how scientific conferences can change paradigm for future events.

These scenarios are based on the seven strategies outlined in MariaClara Oliani's Report on "Participant Travel Carbon Footprint". These strategies are fundamental to achieve these future scenarios with the least Co2 emission possible. Figure 5, 6 and 7 makes the overview of these scenarios clear thanks to a developed timeline.

3.1 Scenario 1: Think local, act global

To drastically decrease emissions regionalisation of conferences can be a valuable option. This means, alternating regional smaller conference to international events, as shown in Figure 5.

We base this format on two premises from Ponette-Gonzalez study which are:

- the alternation of large national meetings that require significant air travels with smaller regional meetings that do not do so;
- the incorporation in PLEA Conferences of the geographical aspect into meeting location selection process.

The region with the greatest proportion of participants is always the region in which the conference is held. However, the proportion of participants coming from within the conference region ranges from 39.3 to 61.9%. The proportion of participants coming from outside the conference region ranges from 38.1 to 60.7% (Oliani, 2020). The greatest proportion of attendees is always represented by Europe for abroad conferences and Asia for European conferences. The percentage with the lowest proportion of participants is always either Africa or South America. Thus, it is undoubtful that participants coming from outside the conference region are those who will travel the most either by train or by long range planes. This means that alternation between national (regional) and international meetings will

drastically decrease emissions. Figure 5 shows how this combination between annual regional meetings and three-annual international conference take place over the years.

Figure 5. Scenario 1 Timeline. This is how the Think Local, Act Global Scenario timeline can look up until 2026.

The careful selection process of choosing the location represents a potentially simple and cost-effective way to reduce CO2 emissions (Ponette-Gonzalez,2020). The organization of PLEA can imply a decreased frequency of meeting requiring coast-to-coast travel (from one yearly conference to one every two years) while holding the international conferences in cities which are easier to travel to.

Holding one international conference every two years by strategically choose the location can be a solid solution for the challenge of the networking aspect. While holding annual regional meetings and therefore developing scientific outcomes, participants still can meet with international actors at bigger international meetings.

Annual Regional Meetings (each year)

Alternating between national and international bigger meeting would impact Co2 emission by lowering it by 49-74% (Ponette-Gonzalez,2020). However, one downside is the further planning to carefully organize national meetings. This formula paired with carbon-minimizing location selection process benefit scientific process. These regional meetings are based on PLEA conventional format, but in smaller version. The location is chosen by utilizing strategy 2 (Selecting the conference location after accepting participants) from Oliani's study and by selecting the conference location after accepting participants registrations (Oliani, 2020). The optimum location will be then selected in the most convenient and linked place to most applicants. The ICAO's Green Meetings Calculator (ICAO, 2020)

will be used to make this selection easy (Oliani, 2020). The tool selected will be efficient because the meeting is not of a large scale but will be of a small to medium size and participants won't be from more than 30 locations. Strategy 3 serves as incentive to reach the selected location by train or bus. This strategy has a high-level impact in reducing average PLEA emissions, but it depends on the number of participants that then attend.

For the regional onsite meetings, a 3 days conference is set. In fact, the draft agenda for this format is based on PLEA Conference supposed to happen in Coruna, Spain but then happened online. The three-day length is chosen because of the regional characteristic which make the reach of the location from participants easier (using trains or buses) while cutting emissions.

The regional onsite conference starts with a total of 11 hours of conference. This include 1,30 hours of welcoming phase, 90min of coffee breaks, 60 minutes of lunch break, 60min roundtable and 120minutes of keynotes session. On the first day 4 topics hub are organized such as "extreme and resilient design", "resources", "sustainable buildings" and "sustainable communities", which will run simultaneously form 11 till 12.35. Each session will have presentation of papers, researchers and findings each lasting 10 minutes each. Each session will have 6 presentations. After the lunch break 8-9 presentations are set, within the same topic hubs. Another round of presentation will showcase 4 presentations for each topic hub.

The second day is the same format as the first day, but the topic hubs will be instead "Analysis and methods", "resilient and extreme design", "sustainable buildings", "sustainable communities". The meeting takes 10,30 hours and starts at 10,30 am and ends at 9 pm. This includes 30 minutes of openings, 90 minutes of lunch break, 120 minutes of keynote session, 60 minutes of roundtable, 60 minutes of coffee breaks, and 60 minutes of SBSE meetings and wrap up meeting. The total timeframe for presenting research, papers and findings is form 11 until 12.35, from 5.30pm until 6.35pm and from 7.05pm until 7.55pm.

The last day follow the same format as the two previous day. Different topic hubs(categories) are developed such as "Analysis and Methods", "Education", "Sustainable Buildings" and "sustainable communities". The timing schedule and frame is the same as day two differing from the last "presenting" session which is replaced by "poster" presentation taking place right after a closing speech of 60 minutes.

This program is based on the Agenda from PLEA 2020 planned in Coruna, Spain between the first and the third September 2020.

At the end of regional meetings, many researchers will attend the international conference as well. The regional on-site meetings serve to prepare for International conferences. Appendix 1 explain the timetable of the alternation between regional and international meetings.

International Meetings (one every three years)

International Conference might take up to two years to fully organize. That is why, in this scenario International Conferences are with the intervals of two years.

Large meetings are ideal spaces for scientists to showcase their most important and timely research findings and to communicate with the press (Ponette-Gonzalez). To avoid big audiences and therefore large emission of greenhouse gases, the access to this international meeting is reserved to scientists and experts who are directly showcasing their findings and have been able to register well in advanced (Oliani,2020). Also, societies, faculties, academia and nearby industry are welcomed, based on their

expertise or involvement and relevance to the research topics covered by the conference (Gichora, 2011). Within this scenario, the international conference will have a limit of participants and is live streamed so that people who want (and have participated in the regional conferences) to participate will be able to do so. The use of inexpensive "commodity off-the-shelf" (COTS) technologies permit anyone with an Internet connection, Web cam, and headset to attend a presentation (Gichora, 2011). Similarly, to regional meeting above described the possible agenda for this International PLEA Conference follow an on-site organization held over two days instead of three. This is effective because the two years before this International Conference have been spent to prepare to this event. In this way, the weight on the environment resulting from organization-related emissions will be offset (Hishier, 2002).

In this scenario, International PLEA Conferences are only happening after regional meetings. This makes international meetings more concise and effective, since only elected representatives have access to this bigger event. The election process is done throughout the regional meeting happened the year before this International Conference. The event is bigger not because of its number of participants rather because, contrary to regional meetings, of its virtual and live-streamed outreach. The actual of speakers are 15 and 3 of them are be facilitators[1] divided between two 2 days. There are invited speakers and a limited oral presentation of selected from submitted and accepted abstract. The rest of the abstracts are presented as posters during break sessions, while livestreamed. There are tutorials, relevant discussions from senior faculties, as well as welcome and closing statements main organizers, which take place in one bigger hub at the beginning and at the end of the day of the conference.

The conference is held within 10 hours each day. On the first day, this is inclusive of 100 minutes of break time divided between two 20-minute coffee sessions concurrently spent on paper, findings and scientific research developments presentations, with an hour on a lunch break and 20-minute welcome speech (Gichora, 2011). On the first day the categories that structure the presentations are "extreme and resilient design", "resources", "sustainable buildings" and "sustainable communities. The second day consists of a10-hour program including 10 minutes of general session of introduction and showcasing the program of the day, one 20-minute coffee and poster session, 40-minute lunch break, and 30-minute closing remarks (Gichora, 2011). On this day the categories highlighted are instead "Analysis and Methods", "Education", "Sustainable Buildings" and "sustainable communities". All the meetings in the topic hub are livestreamed and presentations should be pre-recorded to gear-up if streaming video fails for any reason (Gichora, 2011).

Online hubs(Twitter, IdeaFlip, Noteapp, Bloomfire etc.) help students, young researchers, academics, junior analyst or simply people who were not able to join the onsite conference foster relevant interaction, collaboration or simply talks, irrespective of geographical location. In social networks, the hashtag #plea2020 enable whoever is interested into the developments of the conference, enriching the experience of who is at home and who is at the conference.

The creation of a website - as done up until now- for each international conference is essential for leading participants and motivate the audience. This innovative way to lead an International onsite conference can be extremely fruitful for its interactive, inclusive, environmentally- and young-friendly layout. Furthermore, all the conference livestreamed are found there, with the conference program, speakers, Agendas, FAQ section, Contact us section, registration for online format, and overview of the event.

In general, participant feedback from regional and international meetings are well suggested, so to testify the effectiveness of the format.

[1] Attendees range from 300 in the 2015 Bologna conference to nearly 1000 in the 2014 Ahmedabad conference (Oliani, 2020), therefore this number must be approaved by organizational committee.

Strategies to implement to develop this scenario: Strategy 1, Strategy 2, Strategy 3, Strategy 5, Strategy 7

3.2 Scenario 2: At last, a quick on-site gathering

As happened this September 2020 for Virtual PLEA Conference, this Scenario is developed on the basis of conventional PLEA layouts. However, this format entails the devotion of one full day to networks, which will take place on-site and within two days(in order to give time to the registered participants to reach the chosen location) from the end of the virtual conference. This is to enable researchers and professionals to meet up after their virtual meeting. The two days indication is the time suggested so that personal meeting could be most fruitful and not to lose the enthusiasm resulting from the virtual meeting. The two days are approximately the time to easily reach a selected location. Figure 6 shows the timeline for this scenario. The online followed by the "Networking Day" happens every two years, so to reduce conference frequency. If this do not happen, the scenario does not shows its promised effectiveness.

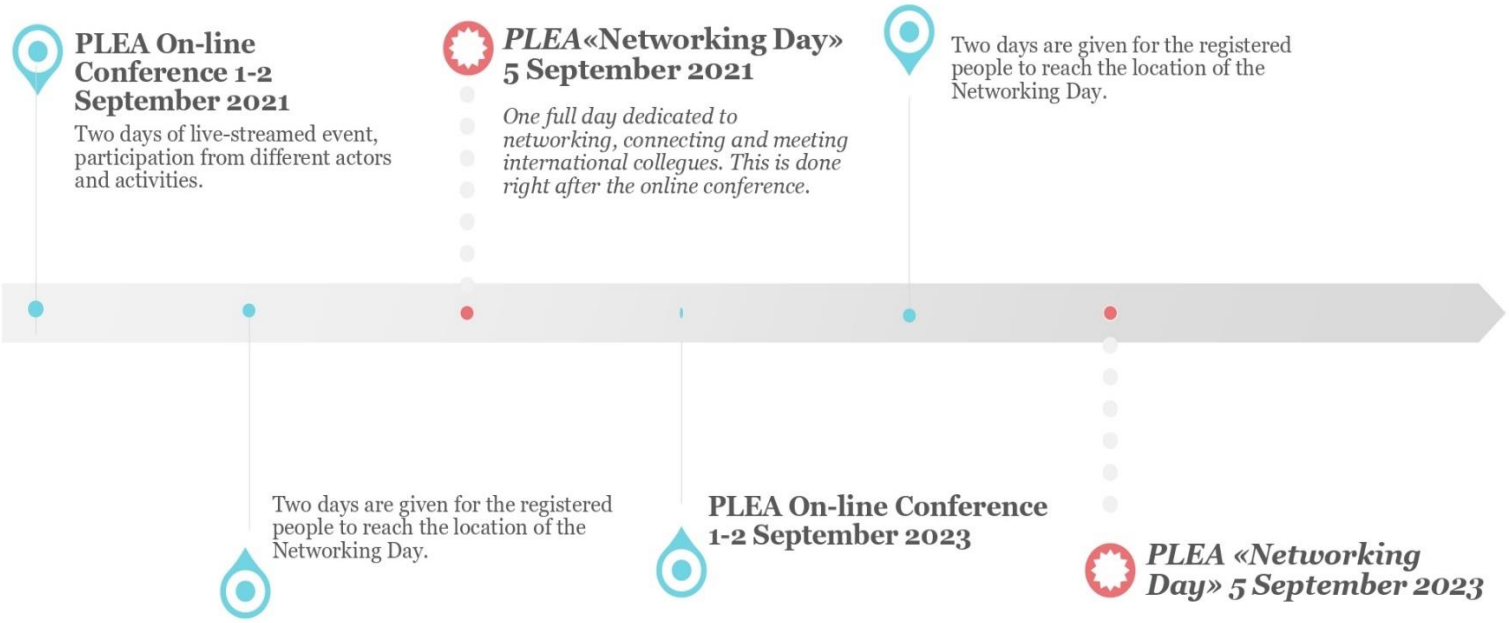

Figure 6. Scenario 2. This is how the At Last, a Quick On-Site Meeting timeline can look up until 2023, only due to the limited amount of graphical space. Therefore, being the pattern the same every two years, this timeline can be expanded up until 2026 or the years to come.

In this scenario, the scientific conference is fully held in virtual form except for the networking day which will take place on-site. The two days are held online – following the agenda for Scenario 1 for national meetings and applying topic hubs from Scenario 3-. The participants and the attendees to the

online conference are those who would attend the big international event of PLEA in the international settings, so whoever scientist or architect or designer who is directly involved with the conference. The innovative feature is coming from the possibility of personal and on-site connection. In fact, after two days "locked" behind a screen, people who have shown their intention (through a registration form) to participate in the networking day will have the chance to meet international colleagues and make new connections. This format combines elements of the virtual and of the onsite conferencing giving a strong importance to the networking aspect, fundamental for PLEA. The so called "networking day" is framed within a team building based activities which will enhance connection and develop relationship between attendees, researchers, analysts and overall participants. Of course, this will imply a cap on the participants (Strategy 1) and a detailed selection process location after accepting and registering the actual participants (Strategy 2) according to s ICAO's Green Meetings Calculator (ICAO, 2020).

In general, participant feedback from this kind of hybrid meetings are well suggested, so to testify the effectiveness and participant enthusiasm for the format.

Strategies to implement to develop this scenario: Strategy 1, Strategy 2, Strategy 3, Strategy 6, Strategy 7

a3. Scenario 3: A virtual sight, a virtual mind

As outlined in the study before, the online virtual means are a great opportunity and definitely the highest impact one in terms of saved Co2 emission (Oliani, 2020). The complete cancellation of travel emission makes this scenario the most impactful concerning saved emissions. Indeed, an online conference every other year would mean a 50% reduction in the overall footprint, simply because of that cancelling out of the second year's footprint (Oliani, 2020). Attachment 3 shows how this scenario is deployed over the years.

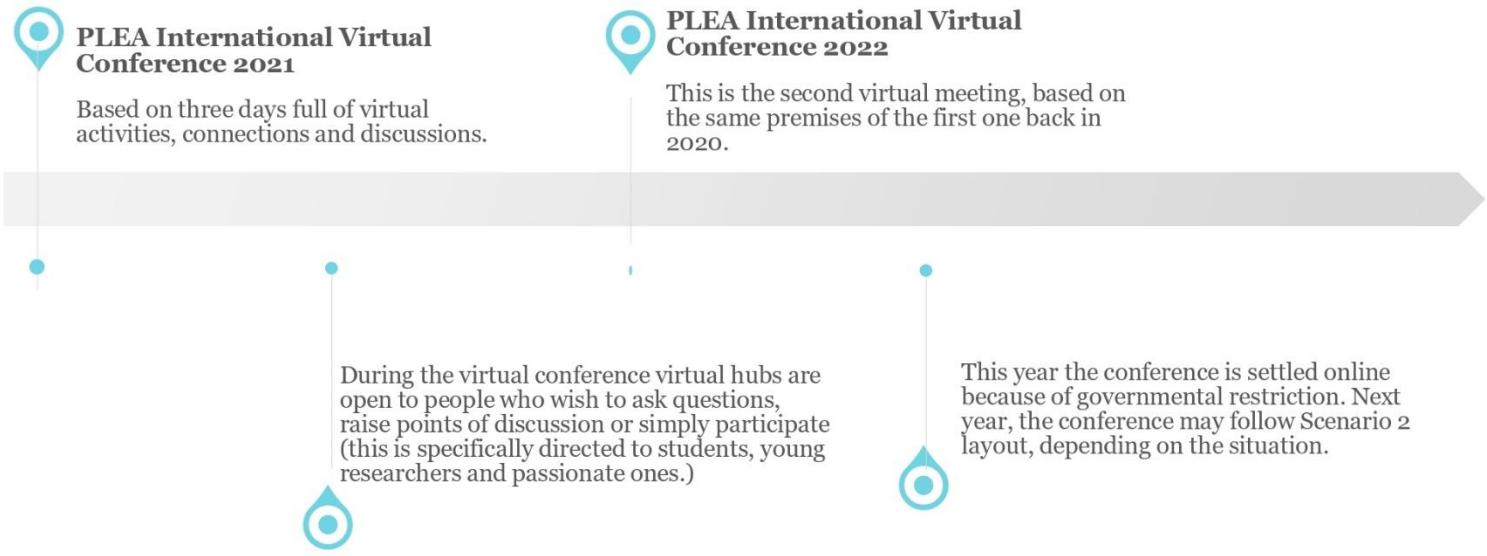

Figure 7. Scenario 3. This is how the A Virtual Sight, a Virtual Mind timeline can look up until 2022, this is only due to graphic limitation. Being the pattern of this virtual conference the same each year, this timeline can be expanded up until 2026 or the years to come.

This scenario takes as an example the Global Immuno Talks, a scientific based conference which had to switch, as PLEA this year, to online format. The idea is to devolve three days to the virtual meetings, with similar format used in Coruna for PLEA but with some customized ideas from the Global Immuno Talks. The conference is presented in live and interactive form. The topic hubs PLEA cover are sustainable buildings, resources, resilient and extreme design, sustainable communities, analysis and methods, education, awareness and dissemination.

Based on author's study of example of online scientific conferences, this scenario develops the conference through 9 hours each day. This includes 30 minutes of introduction talks, 60 minutes of virtual coffee breaks, 30 minutes of lunch break, 7 and half hours of presentations of studies, research, or scientific developments. The virtual meeting will be starting at 7.55 am and will be closing around 16.30 pm. As for the national meetings in Scenario 1, each day there are four topic hubs - virtual hubs – which will be run simultaneously in each of which 6 or 7 pre-recorded presentations will be showcased. These amounts of presentations will take 10 minutes each, allowing around 15 presentations for each topic hubs to happen. After the second coffee break it is suggested to cut time to have a roundtable in order to update and keep everybody on track. During this process, discussion online tools such as social medias, IdeaFlip or Noteapp allows asynchronous questions and answers, which benefits attendees from different time zones or those with conflicting schedules, and provides a public and permanent record of the scientific exchange for anyone who wishes to learn from it at a later time(Houston, 2020). With the hashtag #plea2020 for example, one can follow the development and highlights of the international virtual meeting. On breaks it is possible to get access to an extra virtual room called "Breaks" developed for break times and to give possibility of chit-chatting and networking with colleagues. By the end of the day, the virtual room of the conference will be held open until one hour after the actual closing speech for the day, so to increase the possibility of contact and exchange between participants. The second day the amount of time, presentations and breaks is the same. What change are the topic hubs. If on the first day there were "Resilient and extreme design, resources, sustainable buildings and sustainable communities", on the second day there is "analysis and methods, education, sustainable communities" also depending on the amount of papers and findings from each topic hub. The third and last day follow the previous days agenda however, time will be devolved to two finishing round tables one concerning analysis and methods, resilient and extreme design, sustainable buildings and the other one to sustainable communities, education and resources. After the lunch break there is a stakeholder, actors, industries, societies involved with the conference itself talk. This takes most of the afternoon as the last thing is the showcasing of posters. Each poster is sorted by the title so that one could decide which one to see. In order to reach a higher level of virtual interaction the authors are asked to prerecord their voice and organizations will upload the combined file (poster and voice recorded) on the conference website as done in the previous editions of PLEA (example can be retrieved from PLEA website[2]). At the end of this session, the participants are then asked to enter the final virtual room to listen to closing keynotes which highlights the final remarks and close the conference.

For this kind of meeting a practical and detailed guideline is represented by the study from Luc Rubinger et al. called "*Maximizing virtual meetings and conferences: a review of best practices*".

In general, participant feedback from online meetings are well suggested, so to testify the effectiveness of the format.

Strategies to implement to develop this scenario: Strategy 1, Strategy 6

[2]Example of PLEA Poster Section based on past layouts. PLEA website https://www.plea2020.org/posters

3.4 An overview

For the three scenarios, Registration Guidelines, Cancellation Policy, General Guidelines for Submission such as Formats, Templates, Submit, guidelines on recording presentation will generally apply as in the past. The different scenarios bring different technical guidelines which can be further discuss with technical competence.

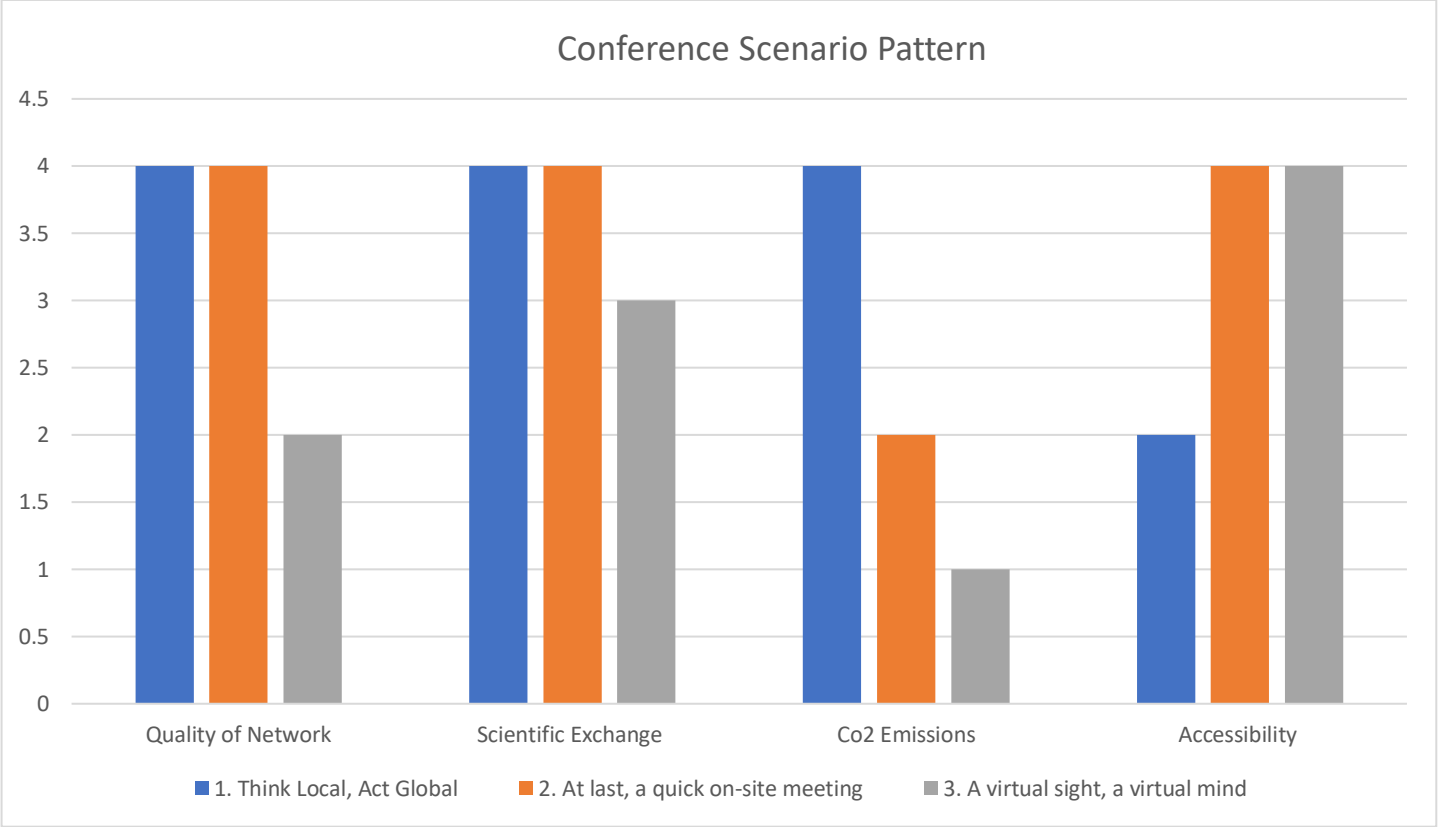

Figure 8. Conference Scenario Pattern with four main PLEA features to consider when choosing a conference format.

As shown in the graph, here is the pattern of the three scenarios outlines. The bars are the result of evaluation on a scale to 1(very low) to 4(high) of four main features when considering PLEA (Quality of Network, Scientific Exchange, Co2 Emissions, Accessibility). These scenarios have been scanned through four main features which characterize PLEA Conference such as the quality of the network, the scientific exchange, the Co2 emission and the engagement of the selected tool. The three scenarios are compared. Th second scenario “At last, a quick on-site meeting” is found to offer both a very high value of quality of network and at the same time a rather low impact of Co2 emissions, compared to the other two. Hence, the trade-off between quality of the network and the Co2 emission is relevant when choosing one scenario over another. The scale from 1 (very low) to 4 (high) measure the intensity of each feature.

4. Recommendations

As shown in the graph above, a trade-off between Co2 emissions and network quality is always to be considered. This does not mean that it is either one or the other but that as far as it concerns this research, there is still no tool available which assure both zero emission and the best networking quality possible. Virtual means are great to diminish emissions, however scientific conferences still weight on the networking part which virtual conferences cannot address fully.

When the format is chosen, it remains important to follow simple best practices to enhance the productivity, quality, and overall experience of the on-site or virtual meeting. These are mostly addressed to hybrid and virtual events, as they are on the spotlight for future conferencing approach. Here is seven of them, collected throughout the shaping of this report:

1. Address the time zone differences. Allow 6 to 9 months to finalize decision on timeslots and for the IT department to check and provide the necessary support for each event time. All attendees should be able to participate to the live session of the event. If this is not made possible, the chance to watch live-streamed event should be available. When a proposed conference program (for all participating groups in their local time zones) is established, it is crucial to conduct tests of the proposed times precisely as scheduled, weeks before the actual event, to ensure the reliability of the conference program and to identify problems that could arise (Gichora, 2010).
2. Test technology ahead of time. Testing and familiarizing with the technology in use is essential for the invited presenters to get acquainted with the software. One month in advance is the ideal time for presenters and facilitators to get familiar with the supporting IT tools in use.
3. Minimize presentation length. Engagement is the key. Hours long presentations are uneasy to follow and scientific knowledge sharing can be undermined by ineffective communication. Presenters must have a limitation in presentation time and a dedicated time for question, answers or doubts from the audience.
4. Engage with people and content. Especially when on-line, attendees often interpret virtual meetings as a license to multi-task (Frisch and Greene, 2020). Nowadays, the many online platforms available to ask questions, get cumulative answers on the screen, analysed audience preference are many. Weather the event is a hybrid, on-line or on-site one these tools can keep the attendees engaged and focused on the topic at hand.
5. Test bandwidth usage against conference interruption. Conference interruption can be easily overcome by pre-recording presentations so to ensure the presentation fluency. Also, establish a specific hub or virtual room or contact number in case of technology deficiency.
6. Make participation, registration, and document submission easy. Weather is an on-site or an on-line conference format allow cumulative registration fee cost discount across participants. In this way participants start to gather themselves while getting to know each other so to all receive a discount. This can be done with on-line and with on-site meetings and for hybrids too. Document submission can be done by macro-topic with specific deadlines.
7. Establish spaces or (virtual) rooms dedicated to specific moment of the event. These are (virtual) coffee or short break rooms, (virtual) lunch break rooms, (virtual) discussion rooms, (virtual) participant support service room. In this way participants have informal meeting moments and support if anything is needed.
8. Collect participants feedbacks and suggestions for useful future conferences.

Overall, the key to success both if the scientific conference is an on-site or an on-line one, is to engage your attendees, to set adequate time management, properly organize discussion hubs (Ghichora, 2010), communication (social networks, virtual hubs) and content sharing tools

(GoogleDrive, Slack, Yammer) and most of all involve people which are inspired, willing and passionate about organizing the chosen format conference.

Literature

Abbott, A. (December 20th, 2019). "*Low-carbon, virtual science conference tries to recreate social buzz".* Nature Research Journal. Retrieved from: https://www.nature.com/articles/d41586-019-03899-1 Accessed on November 20th 2020

Bizzabo Blog Staff. (April 3rd 2020). *The most authoritative list of 2020 virtual events and conferences on the internet*. The Bizzabo Blog. New York. Retrieved from https://blog.bizzabo.com/

Cobb, J. (August 21st 2020). *How to Host a Virtual Conference – 10 Tips for Success*. Learning Revolution. Carborro, NC. Retrived from https://www.learningrevolution.net/

Frisch B. and Greene C.(March 5th 2020). *What It Takes to Run a Great Virtual Meeting.* Managing People. Harvard Business School. Usa. Retrieved from https://hbr.org/

Gichora NN, Fatumo SA, Ngara MV, Chelbat N, Ramdayal K, Opap KB, et al. (2010) Ten Simple Rules for Organizing a Virtual Conference—Anywhere. PLoS Comput Biol 6(2). Retrieved from https://doi.org/10.1371/journal.pcbi.1000650

Guimares, R. (May 14th 2020). *The Cercedilla Manifesto: Advocating for more environmentally and socially sustainable research meetings.* The research Blog of IIASA Nexus. Austria. Retrieved from https://blog.iiasa.ac.at/

Hischier R., and Hilty L. (2002). *Environmental Impacts of An International Conference.* Environmental Impact Assessment Review. Swiss Federal Laboratories for Materials Testing and Research (EMPA). Switzerland

Hoods, J. (Spring 2018). *From hybrid events to the next generation - interactive virtual events* .Master Thesis. Lahti University of Applied Sciences. Finland. Retrieved from http://urn.fi/URN:NBN:fi:amk-201805046564

Houston, S. (July 31st 2020). *Lessons of COVID-19: Virtual conferences*. Journal of Experimental Medicine. Rockfeller University Press. New York. Retrieved from 10.1084/jem.20201467

https://www-sciencedirect-com.ezproxy.library.wur.nl/science/article/pii/S0959652619311862

Huffman, M. K. and Amireault S. T . (July 5th 2020). "*What Keeps Them Going, and What Gets Them Back? Older Adults' Beliefs About Physical Activity Maintenance*" - The Gerontologist - Oxford University Press. Retrieved from http://dx.doi.org/10.1093/geront/gnaa087

Plea Coruña(2020) . *Conference Program.* Retrieved from https://www.plea2020.org/programme-1. Accessed on November 9th, 2020.

Price, M. (April 28th 2020). *As COVID-19 forces conferences online, scientists discover upsides of virtual format*. Science ISSN 1095-9203. Science. Usa. Retrieved from https://science.sciencemag.org/

Rubinger, L., Gazendam, A., Ekhtiari, S. et al. *Maximizing virtual meetings and conferences: a review of best practices*. International Orthopaedics (SICOT) 44, 1461–1466 (2020). https://doi.org/10.1007/s00264-020-04615-9

Sanz-Cobena, A. et al., (April 2020). *Research meetings must be more sustainable.* Nature Food. Vol 1. 187-189. Retrive from https://www.nature.com/natfood/

The European Portal for Energy Efficiency in Buildings. (2020) . *News and Events* Retrieved from https://www.buildup.eu/en/node/59215. Accessed on November 10th , 2020.