

## Going Virtual: What we Learned from the Ecological Forecasting Initiative Research Coordination Network Virtual Workshop

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The NSF-funded Ecological Forecasting Initiative (EFI) Research Coordination Network (RCN) hosted a virtual conference, “Ecological Forecasting Initiative 2020: Coordinating the NEON-enabled forecasting challenge” on 12–13 May 2020. The objectives of the workshop were to (1) give an introduction of the EFI-RCN, (2) provide an overview of the “supply side” of NEON data products that are available for use in ecological forecasting, (3) discuss the “demand side” of ecological forecasting and how organizations can use ecological forecasts, and (4) discuss topics and the need for an ecological forecast challenge (similar to a data science competition), which would bring the community together collaboratively and create forecasts using NEON data products. We finished the meeting by collectively brainstorming cyberinfrastructure, education, and software needs in order to empower individuals and groups to participate in an ecological forecasting challenge using NEON data.

The EFI-RCN virtual conference replaced a three-day in-person workshop that was scheduled at the same time but was canceled due to COVID-19. Shifting to a virtual format allowed us to increase our participation and diversity. We originally had a space limitation of 65 in-person participants, but 205 people were able to register and access the workshop materials for our virtual meeting. A hundred and fifty individuals consistently joined on day one and 110 individuals consistently participated on day two. We welcomed participants from around the globe, with almost 10% of participants calling in from outside the United States. Moreover, instead of being limited to 15 graduate student participants, we ended up with over 50 graduate and undergraduate students in the meeting.

While the EFI community has, from its inception, been video calling (i.e., Zoom) for small working groups, the conference was a considerably larger gathering than any of us had previously organized. Here, we reflect on the key elements that allowed our workshop logistics and technology to flow smoothly in order to help others who are developing conferences and workshops in a virtual format. Below, we include general suggestions for the structure and format that we found worked well for our meeting. We also provide suggestions for specific tools we ourselves used to bring our community together and facilitate a means of engagement; however, we acknowledge that there are alternative resources or that some of these resources may not be available to everyone. Finally, we note that Zoom and other software are continuously evolving; we used Zoom version 5.0.1 for our conference.

## Preparing for the Meeting

1. **Receive input from many perspectives.** To prepare for the virtual format, multiple leadership committee members took a free one-hour seminar on how to run virtual scientific meetings, which was hosted by Knowinnovation (see Rey 2020 below). Additionally, we talked to a number of colleagues and contacts (at our own institutions and elsewhere) who had experience hosting their own virtual workshops or were experts on the technological tools (e.g., Qualtrics for the meeting registration and final survey, closed captioning options, and Zoom, QUBES, and Poll Everywhere) used during the meeting. We also used a number of online resources, which we provide in an annotated list below.
2. **Scale your goals to the format and your objectives.** First, recognizing the challenge of virtually engaging attendees over long periods of time, we reduced the original three day in-person meeting to a two-day meeting with a schedule that was conducive to participants across multiple US time zones. Second, our original goal for the in-person meeting was to finalize rules for the NEON Ecological Forecast Challenge (<https://ecoforecast.org/efi-rcn-forecast-challenges/>). After deciding that it would be difficult to achieve this goal in a shorter virtual meeting, we shifted our goal to leveraging perspectives from our diverse set of attendees in order to have more input on the general design of the forecasting challenge. This allowed us to synthesize input from the group and get a better sense of the community's interest. To meet our original objective, a set of interested meeting attendees volunteered to be part of working groups that designed the specifics of the forecasting challenge during the months following the virtual meeting.
3. **Virtual meetings require as much or more prep than in-person meetings.** Be prepared for a lot of planning before the meeting, especially if it is your first meeting. A rough estimate is one month of preparation for one week of meeting time.

## General Meeting Setup

1. **Don't go all day.** Being in virtual meetings and keeping people's attention can be more difficult than in-person meetings, especially as many of us have a number of distractions or needs at home. Our first day was 6 hours and the second day was only 4.5 hours. Unfortunately, there is no good time for all global participants, but we were thrilled to see so many participants who woke up early or stayed up late to join us from outside the United States.
2. **Incorporate plenty of breaks.** Virtual meetings are more tiring than in-person meetings. We had two longer 30-minute breaks that corresponded to lunchtimes on the US east and west coasts as well as shorter 15-minute breaks spread throughout both days. In total, presentations were never any longer than 50 minutes; breakout rooms and more engaged interaction-time interspersed plenary talks and panels. Out of the 10.5 hours of the EFI-RCN meeting, 3.5 hours were plenary, 3.7 hours were in breakout rooms, 1.3 hours were open discussion/report-backs, and 2 hours were used for breaks.
3. **Have a production manager for the meeting.** The production manager focuses on setting up and running the technical side of the meeting. For example, the production manager (in our case, J.A.P.) stayed in the main Zoom room during breakouts to provide assistance and oversee the timing of activities. Having a production manager allowed the meeting lead (for us, the EFI-RCN

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project Principal Investigator, R.Q.T.) to be the MC of the meeting and do real-time synthesis of the ideas without having to worry about meeting logistics. Throughout the conference, the two of us were constantly touching base via text, phone, and Slack, as well as communicating with other meeting organizers behind the scenes.

4. **Create a minute-by-minute script for the entire meeting.** In addition to the public Agenda, we created a list of behind-the-scenes tasks and assigned specific individuals to each task. For example, we wrote out the messages that would be sent through Zoom Chat/breakout messaging with the specific time that each message would be sent. You should be able to articulate in writing what is going to happen at every moment of the meeting before the meeting starts and assign who is going to do each task. As described previously, only 12% (1.3 hours) of the entire conference was unscripted (during discussions and Q&A sessions).
5. **Pre-record talks.** We recommend pre-recording talks to prevent issues associated with live talks, such as bad microphones or internet connections. This also keeps the meeting on schedule and avoids the awkward need to cut someone off. We felt the talks were better because they were pre-recorded and, for the talks that presenters agreed to share, we now have an excellent resource, both for education purposes and for individuals that missed the meeting. The pre-recorded talks may require minor editing, so find someone with the resources and time to make edits prior to the meeting.
6. **Add edited closed captioning (CC) to all presentations.** Providing CC is important to ensure that all participants can be engaged in the meeting. If you use the automatically added CC available through Zoom or YouTube, be sure to closely check the captions for accuracy. There are also companies that will provide CC for videos for a fee. Closed captioning for the pre-recorded talks is important for individuals with hearing disabilities as well as those who find it easier to read the material due to distractions while watching the video. We made playlists of each plenary session available as unlisted videos on YouTube so any workshop participant could access them in real time.
7. **Be prepared to pay for a CC service so that the meeting is accessible.** In addition to providing CC for the pre-recorded videos, it is important to have CC available to participants during the meeting. In the registration form for the meeting, ask if anyone needs CC and if they do, hire a service. We were able to find a service that worked well through the Virginia Tech University vendor system (<https://www.acscaptions.com/>). The production manager moved the captioner into the same breakout room as the participant who requested the service. Closed captioning is also nice to have because you get the full record of text right after the meeting, instead of waiting for the Zoom transcript to come through; and the captioner's transcription is better than the automatic Zoom transcript.
8. **Use hardwired internet.** Our production manager and MC used a computer that was connected to the internet via a wire. This reduced the chance of the central organizers losing bandwidth or connection over wireless internet.
9. **Plan for leadership team meetings interspersed throughout the workshop.** The leadership committee met for one hour before and 30 minutes after the meeting each day to go over last-minute logistics and any adjustments that were needed. We recommend setting up a separate Zoom meeting for these calls to avoid having workshop participants join when you are not prepared for them.

## Meeting Platform

1. **Zoom worked well.** While there are other conferencing platforms that may have benefits for different situations (e.g., Google Meet, GoToMeeting, etc.), we used Zoom Meeting with a 300-person limit, hosted through the University of Notre Dame. We chose Zoom Meeting over Zoom Webinar because we wanted to give meeting participants the ability to interact during breakouts. Compared to Zoom Webinar, Zoom Meeting was provided free through the University and did not require additional setup. There were some individuals who attended the meeting from organizations that did not allow Zoom. Therefore, we also streamed the workshop from Zoom to YouTube and shared the YouTube live link with these individuals so they could view the plenary workshop sessions. Unfortunately, the YouTube stream did not allow any of the breakout rooms to be viewed.
2. **Zoom can break communication lines between the host and leadership committee.** Individuals in Zoom breakout rooms cannot communicate to the production manager, who is in the main Zoom room, or to other individuals in other rooms through the Zoom Chat. It is important to turn off notifications on the host/co-host's computer due to screen sharing and sounds, but that can leave the production manager or leadership team flying blind unless there is an alternative way to communicate. Therefore, we suggest having a non-Zoom, non-computer method of communicating throughout the meeting (e.g., text messaging).
3. **Assign leadership committee members as co-hosts.** Assign all leadership members as co-hosts. This gives multiple people the ability to mute any workshop participants with distracting background noises or who are talking out of turn. Leadership members can also help with spotlighting the speakers and can, if needed, move from breakout room to breakout room to check on how things are going. Ideally, it would not be needed, but if it is, co-hosts can also remove workshop participants with inappropriate behavior.
4. **Give a brief overview of the video conferencing platform at the beginning of the meeting.** At the beginning of the workshop, use a slide deck (and a written-out script to go with it) to introduce all the features of your video conference platform that you want people to use. While many of us use Zoom regularly, not everyone is on Zoom all the time, and it is important that everyone feels comfortable so they can fully participate.
5. **Play videos directly from the production manager/meeting host's computer.** Make sure the videos are downloaded onto your computer hard drive and play them from there. For panel presentations, we used a playlist that automatically advanced to the next video. In Zoom's screen share settings, make sure to click both the "share computer sound" and "optimize screen sharing for video clip" options. Do not play videos in Zoom from YouTube to avoid having the video played over multiple web services.

## Breakout Rooms

1. **Keep breakout rooms small.** To make the meeting feel smaller, we kept our breakout rooms to a maximum of nine people. Depending on how big your conference is, you can split your group into a maximum of 50 separate breakout rooms in Zoom. We randomly sorted participants into breakout rooms on day one. This was a great way for the group to begin meeting other workshop participants. We included time for introductions during the breakouts because one of our goals was community building.

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2. **Clear and easy-to-find instructions for breakout rooms.** Have specific and easy-to-find instructions for tasks to accomplish within each breakout session. If possible, try to spread the leadership team out among different breakout rooms. In practice, this can be a little tricky because the production manager has to find the leadership team in the list of random breakout rooms and reassign them (but see point four below and have the leadership members rename themselves). In reality, specific instructions that aren't too complex will allow breakout rooms to work fine without a member of the leadership team. Our instructions were located in an easy-to-find place on the meeting website.
  3. **Provide assistance to participants as they move into breakout rooms.** Some people may not see their notification to join a breakout room, so the production manager will need to walk them through that. Include a screenshot in the introductory Zoom instructions of what the breakout room assignment notification looks like so people know where to look.
  4. **If using manually assigned (non-random) breakout rooms, include time in the Agenda so the production manager can sort the workshop participants.** It is now possible to pre-assign breakout rooms of up to 200 participants by uploading a CSV in the meeting settings with the room name and a meeting participant's email that is associated with their Zoom account. However, if meeting participants join using the Zoom link without having a Zoom account, you can manually sort these individuals into the breakout rooms. This takes longer to organize, so be sure to include the sorting time in your meeting plans and note that the host is the only person able to create the breakout room assignments. Fortunately, the assigning and sorting can be done at any time during a plenary session and does not need to happen right before the breakout rooms open. We highly recommend the use of Zoom's renaming feature to rename participants for ease of sorting. For example, if all of the participants change their Zoom name (under the Participants tab) to start with their group name or number (e.g., Aquatics Jody, Terrestrial Quinn), it is much easier for the production manager to sort
  5. **Create extra breakout rooms.** When setting up the breakout rooms, create additional rooms so that some initial groups can breakout further. If you do not create the extra rooms when you set up breakout rooms, these additional rooms cannot be added after the rooms are opened.
  6. **Character limits for messages sent to breakout rooms.** The messages that can be sent to the breakout rooms have a character limit, so keep them short (one to two-sentence messages).

### Communication Throughout the Workshop

1. **Create multiple mechanisms for participant engagement.** It is important for attendees to feel like they are involved so that the workshop isn't a one-way delivery of information. We used an educational account of Poll Everywhere to help promote participation throughout the workshop in multiple ways, including brainstorming ideas with word clouds, submitting questions and up-voting on priority questions for panel members, and brainstorming priorities that also could be voted on. The educational version of Poll Everywhere worked well for us, but there is also a free Poll Everywhere version. However, be aware that the free version is currently limited to 40 responses.
2. **Define use of communication tools a priori, and remind participants of these guidelines throughout the meeting.** We used the Zoom Chat for logistics and supplemental information and Poll Everywhere for Q&A to ensure that scientific questions did not get lost in questions about where to find links/videos, etc. With Poll Everywhere, we were able to download all the questions

and get the panelists' feedback on any question we did not have time for during the Q&A sessions. We were also able to share the additional feedback with the workshop participants following the meeting.

3. **Centralize meeting materials.** We used QUBES as a platform to easily organize and share materials in a centralized location. The EFI-RCN QUBES site (<https://qubeshub.org/community/groups/efircn>) worked well because it was free (due to support from NSF and the Hewlett Foundation), easy to set up, and we were able to include links to videos, surveys, Zoom login, Google documents, papers, etc. all in one place, which only registered workshop participants could access.

### Summary

While we look forward to when we can again have in-person meetings, we found moving to the virtual meeting was beneficial and allowed for broader participation and community engagement. We recommend planning plenty of time to prepare for virtual meetings, reach out for advice, and find ways to use the platforms and tools you have available to effectively engage your participants and accomplish meeting goals. To find additional suggestions, please see the annotated list below of the resources we used as we prepared for our meeting.

### Annotated Resources

Achakulvisut et al. (2020).

- Lessons learned from organizing a virtual neuroscience conference with 3,000 participants.

ACM Presidential Task Force on What Conferences Can Do to Replace Face-to-Face Meetings, "Virtual Conferences, A Guide to Best Practices," 2020.

- See the report "A Guide to Best Practices: A community resource from the ACM Presidential Task Force on What Conferences Can Do to Replace Face-to-Face Meetings. Version 1.2 -- May 24, 2020." The report provides suggestions for high-level planning, technology options, specific issues related to different parts of a conference, ways to foster social interactions, etc.

Arnal et al. (2020).

- Lessons learned from the Avances en Tecnologías, Innovación y Desafíos de la Educación Superior virtual conference.

Burgess et al. (2017).

- Suggestions for schedule and setup, technology tools, engaging with speakers, and other tips for virtual meetings.

- Chautard (2020).

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- Blog post following a REACH: Improving water security for the poor workshop. It includes an “Inclusive Conference Guide” for promoting diversity of attendance and inclusivity of participation in six areas: event logistics, speaker diversity, inclusive participation, communicating diversity and inclusivity, preventing and dealing with discrimination and harassment, and supporting attendees with caring responsibilities.

#### Virtual Conferences & Event Resources

- List of links to multiple resources for webinars, guidance for successful virtual events, virtual event examples, virtual event technology, service providers, etc.

“Diversity, Equity, and Inclusion: Learnings & next steps.” An OpenCon Report on Conference Planning. Version 1. Released July 10, 2017.

- Report that provides both lessons learned on planning an inclusive conference and a conference checklist of actions conference organizers can take.

#### Gichora et al. (2010).

- Lessons learned from the First African Virtual Conference on Bioinformatics 2009 (AFBIX09) virtual conference, particularly for resource-constrained communities.

“How to Run a Free Online Academic Conference: A workbook” (version 0.2).

- Google doc with a list of questions to think about when organizing different components of your workshop, including the format and content, technology choices, inclusivity/accessibility, and tasks before, during, and after the workshop.

#### Lauer et al. (2020).

- Suggestions for ways conference organizers can intentionally increase access to attendance and participation, as well as implement inclusive practices at scientific meetings.

#### Pendergrass et al. (2019).

- Recommendations for incorporating inclusion and equity practices into scientific meetings and covers planning and assessing the meeting.

#### Rey (2020).

- Blog post providing overview of a Knowinnovation webinar EFI-RCN leadership committee members attended as we began to brainstorm ways to transition from in-person to virtual. This post includes a video of the webinar.

#### Spinks (2020).

- Suggestions for canceling an in-person meeting, tips for virtual meetings, comparison of technology that can be used for different situations, and examples of virtual events.

“Ways to Use Zoom Breakout Rooms to Increase Meeting Engagement.”

- Suggestions for different Zoom breakout room activities.

### Acknowledgments

We thank all the participants of the 12-13 May 2020 virtual meeting. The EFI-RCN leadership committee members provided critical input to planning and executing the workshop. Committee members include Carl Boettiger (University of California, Berkeley), Michael Dietze (Boston University), Andrew Fox (NCAR), Leah Johnson (Virginia Tech), Melissa Kenney (University of Minnesota), Christine Laney (NEON), Jason McLachlan (University of Notre Dame), Jake Weltzin (USGS), Whitney Woelmer (Virginia Tech), and Cayelan Carey (Virginia Tech). Cayelan also provided support as we transitioned this text from a blog post to a manuscript. Alycia Crall (NEON) was instrumental in introducing us to the QUBES and Poll Everywhere resources and for setting up the Qualtrics post-meeting survey. Alycia and Kaitlin Stack Whitney (Rochester Institute of Technology) provided suggestions and resources to make the meeting more inclusive for individuals with disabilities. Lauren Swanson from Poll Everywhere provided a tutorial on how to use the different program features and helped us test the polls before the workshop. Martin Klubeck (University of Notre Dame) assisted us as we developed the meeting registration form in Qualtrics. Julie Vecchio from the Navari Family Center for Digital Scholarship at the Hesburgh Libraries (University of Notre Dame), shared an example slide deck and script for sharing virtual logistics at the beginning of a workshop. The Research Coordination Network and workshop are supported by the National Science Foundation (DEB-1926388).

### Literature Cited

- Achakulvisut, T., T. Ruangrong, I. Bilgin, S. Van Den Bossche, B. Wyble, D. F. M. Goodman, and K. P. Kording. 2020. Point of View: Improving on legacy conferences by moving online. *eLife* 9:e57892.
- ACM Presidential Task Force on What Conferences Can Do to Replace Face-to-Face Meetings, “Virtual Conferences, A Guide to Best Practices”, 2020. <https://www.acm.org/virtual-conferences>. Accessed November 2, 2020.
- Arnal, A., I. Epifanio, P. Gregori, and V. Martínez. 2020. Ten Simple Rules for organizing a non-real-time web conference. *PLoS Computational Biology* 16:e1007667.
- Burgess, M., E. Raley, and R. L. Read. 2017. Lessons Learned from Hosting a Virtual Conference. <https://medium.com/agile-government-leadership/lessons-learned-from-hosting-a-virtual-conference-18a1a73d10b8>. Accessed November 2, 2020.
- Chautard, A. 2020. Inclusive Conferences? We can and must do better — here’s how. <https://blogs.lse.ac.uk/impactofsocialsciences/2019/06/06/inclusive-conferences-we-can-and-must-do-better-heres-how/>. Accessed June 12, 2020 .
- Diversity, Equity, and Inclusion. Learning & Next Steps. An OpenCon Report on Conference Planning. Version 1. Released July 10, 2017. <https://sparcopen.org/wp-content/uploads/2017/07/Diversity-Equity-and-Inclusion-Report-July-10-V1-Release.pdf>

- 
- Gichora, N. N., et al. 2010. Ten simple rules for organizing a virtual Conference—Anywhere. *PLoS Computational Biology* 6:e1000650.
- How To Run A Free Online Academic Conference: A Workbook (version 0.2). [https://docs.google.com/document/d/1EABkSzEdJk5cmMLETpSbXaeDXmFwcTz7SUXP\\_C3dN9k/edit?usp=drivesdk](https://docs.google.com/document/d/1EABkSzEdJk5cmMLETpSbXaeDXmFwcTz7SUXP_C3dN9k/edit?usp=drivesdk). Accessed November 2, 2020.
- Lauer, A. J., W. Gram, A. Crall, C. Diaz Eaton, R. Haacker, E. Jack-Scott, A. Pendergrass, and K. Stack Whitney. 2020. Scientific meetings for all. *Eos* 101:2020.
- Pendergrass, A., et al. 2019. Inclusive Scientific Meetings. Where to Start. <https://static1.squarespace.com/static/582cce42bebafbf47a82b04/t/5ca0fe7d9b747a3d7dc7a71f/1554054781756/Formatted+Inclusive+Meeting+Guide-v5.pdf>. Accessed June 12, 2020.
- Rey, C. M. 2020. Rescue Your Scientific Meeting by Going Virtual Webinar by Know Innovation. <https://knowinnovation.com/you-too-can-go-virtual/>. Accessed November 3, 2020.
- Spinks, D. 2020. A Comprehensive List of Tips, Tools, and Examples for Event Organizers During the Coronavirus Outbreak. <https://cmxhub.com/a-comprehensive-list-of-tips-tools-and-examples-for-event-organizers-during-the-coronavirus-outbreak/>. Accessed November 2, 2020.
- Virtual Conferences & Event Resources. <https://www.leadinglearning.com/resources/virtual-events/>. Accessed November 2, 2020.
- Ways to Use Zoom Breakout Rooms to Increase Meeting Engagement. [http://www.bethkanter.org/zoom-breakout-tips/?utm\\_campaign=coschedule&utm\\_source=twitter&utm\\_medium=kanter&utm\\_content=Ways%20To%20Use%20Zoom%20Breakout%20Rooms%20To%20Increase%20Meeting%20Engagement](http://www.bethkanter.org/zoom-breakout-tips/?utm_campaign=coschedule&utm_source=twitter&utm_medium=kanter&utm_content=Ways%20To%20Use%20Zoom%20Breakout%20Rooms%20To%20Increase%20Meeting%20Engagement). Accessed October 30, 2020.