Scientific collaboration in the era of COVID-19

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We're in a crisis

We are in the midst of an unprecedented global crisis. Just weeks since its outbreak, the Coronavirus pandemic (COVID-19) has already affected, and will continue to affect, our daily lives, around the globe, for the foreseeable future. The answers and the solutions to this crisis will come from science. But the crisis affects science, too.

It affects students, educators, and researchers; not just their day-to-day lives, social ties, and work routines, but also their ability to actively collaborate, convene in face-to-face meetings, attend academic conferences, teach and learn in an open university setting, pay a visit to the library, work overnight at the laboratory, and so on.

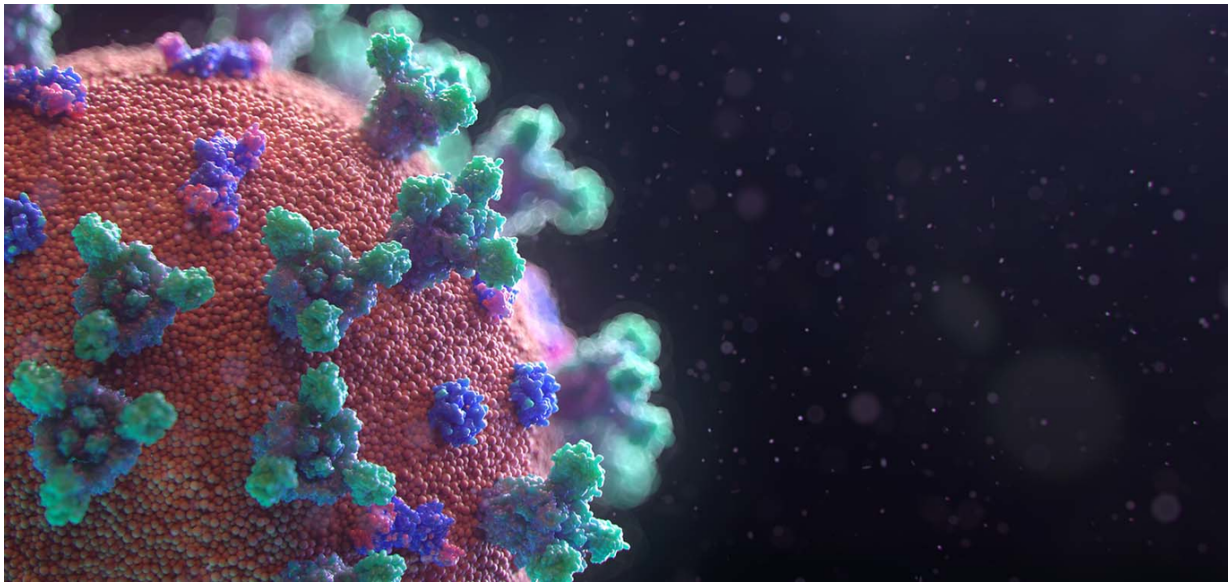
But the thing is: **science cannot stop**. Scientific progress must go on. For each one of the challenges that scientists face in this time of crisis, there is, or there will be, a solution. We believe that the solution is not to be found in a single technological tool, product, framework, institution, funding agency, or company. It is the global cyber-infrastructure of scientific collaboration, built on scientific rigor, intellectual curiosity, and cooperation, that will enable science to advance in such difficult times.

The power of scientific collaboration

As scientists, publishers, science communicators and technologists, we believe that:

a. Science is the solution to the ongoing crisis. Now more than ever, reliance on the scientific method, rigor and clarity of scientific communication, transparency, reproducibility, and seamless sharing of all research data (including negative results), are fundamental to solving this health crisis and advancing human progress.

b. Global collaboration and cooperation, beyond and above national and economic interests, is necessary not only at the scientific level, but also at the political and societal level. We're more interconnected and interdependent today than ever. And such interconnectedness extends to the ecological ecosystem in which we live. A crisis of such scale requires global solidarity, bipartisan political action, civic participation, and long-term thinking.



Solutions

Under the umbrella of Wiley Open Research, Authorea is joining Wiley and Atypon colleagues, as well as researchers across the globe and across disciplines to propose and build effective and beneficial ways to boost scientific progress in this time of crisis. We are scientists, publishers, graduate students, research assistants, funders, and technologists.

This is a **live** document. Over the next few weeks, we will propose a number of challenges and solutions, and list them below. **We welcome new contributors and new ideas**. Feel free to participate by commenting on this document or any of the documents linked below.

1. Writing scientific manuscripts together, remotely

Times like these provide a great opportunity to get some scientific writing done. We mention below some tools that allow collaborative composition of research documents.

Manuscripts.io is a powerful and simple authoring tool for complex documents. Manuscripts.io features very advanced science-specific features such as inline execution of computational notebooks, direct submission to journals, project management features, and complex citation styles. Manuscripts.io is free to use and Open Source. The Manuscripts.io editor is being integrated into Authorea in the next few months.

Overleaf is a very popular and powerful editor for LaTeX. It enables simultaneous collaboration on LaTeX documents and is specifically suited to collaboratively produce PDF documents with mathematical notation and advanced formatting. In response to the Covid pandemic, Overleaf is temporarily giving Professional Accounts, free of charge, to any person in need of a collaborative, online authoring tool for their work (more here).

Authorea was built exactly to accelerate scientific discovery by boosting remote online collaboration. The mission and importance of research tools like Authorea is clearer than ever, in times like these, when most

researchers are working from home. Authorea features a word processor (with Rich Text, LaTeX and Markdown support) that enables multiple authors to work together on the preparation of scientific manuscripts, blog posts, white papers, posters, code, data, and computational notebooks. The blog post you are reading was written in and is hosted on Authorea. Authorea is entirely free to use for individuals who use it for academic purposes (students, as well as educators). Find out here how to get a free account.

Rich media available at `https://twitter.com/edc206/status/1239618978072289285`

2. Preprints: immediate sharing of preliminary results

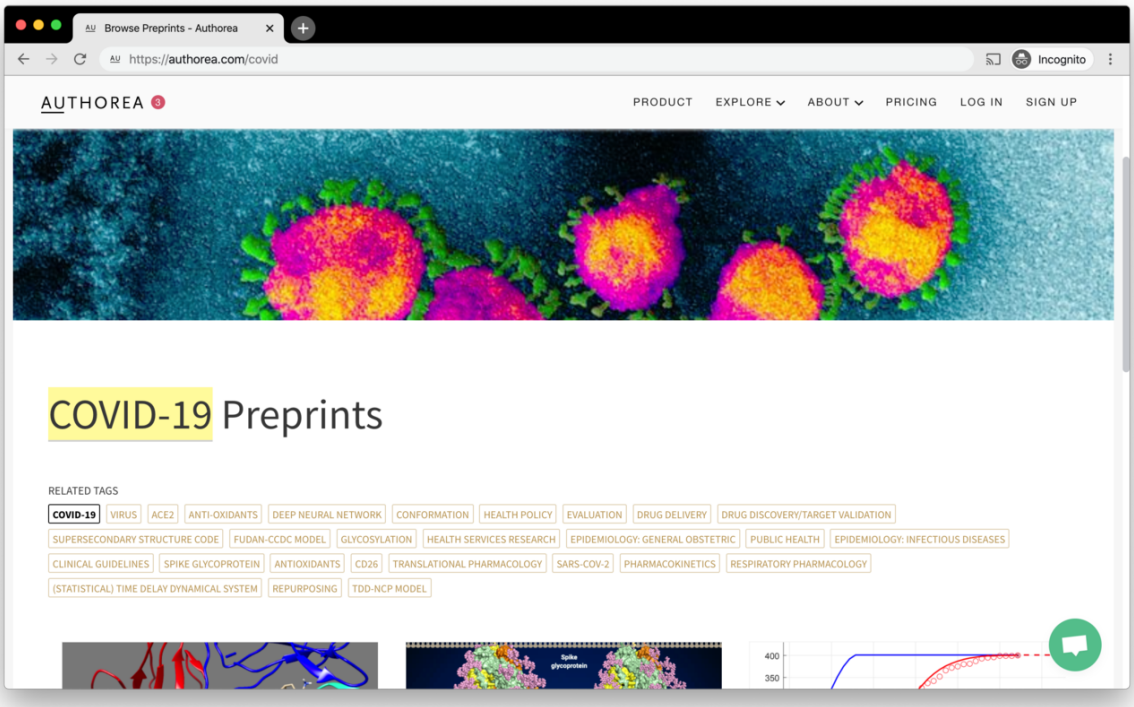
Preprints are early versions of manuscripts, shared with the scientific community and the public ahead of peer review and ahead of publication in a refereed journal. Preprints accelerate the dissemination and visibility of research content. Preprints are not peer reviewed and data is oftentimes preliminary, but the rapid sharing of information is crucial, especially during an evolving global situation.

The first preprint server (and still the most popular) is the arχiv (pronounced "archive") at arxiv.org. It serves the physical and computational sciences. We wrote extensively about the arXiv, its importance and its need to modernize its services, here. However, for the purpose of the present crisis, it is more appropriate to focus on preprint servers that focus on the biological and medical disciplines and that are more likely to contain key information on the coronavirus, its development and solutions.

BioRxiv and **MedRxiv** (pronounced bio-archive and med-archive) are shaping up to become the most prominent preprint servers in the biological and medical sciences, respectively. Some researchers are already using these servers as the most efficient and instantaneous avenue for disseminating cutting edge results.

A new platform - Outbreak Science Rapid PREreview (OSrPRE) - is an open source and free platform for the crowdsourcing of rapid reviews of outbreak-related preprints. Rapid reviews are open (but with the option of being anonymous) and structured high-level reviews designed to capture the importance and quality of the research. Rapid reviews by different reviewers are aggregated and visualized across many reviews. If you are a researcher or healthcare practitioner with the relevant expertise, please consider reviewing 3 COVID-19 preprints on OSrPRE. On the website, you can copy/paste the DOI of the preprint of choice and either request or review it on OSrPRE. Additionally you can use the available browser extensions and add preprints and reviews as you browse.

Authorea also has a preprint repository for preliminary research findings; it is integrated with Wiley Open Research titles: authors submitting to these journals can opt to make their submission publicly available as a preprint. The repository is not domain-specific: it ranges from quantum chemistry to ecology, and from artificial intelligence to obstetrics and gynaecology. In the last few weeks, a number of preprints about the coronavirus have appeared (browse all #covid-19 preprints here) and we are posting one Covid-19 preprint per day on Twitter. Important benefits of Authorea as a preprint server are: (1) preprints are in HTML format, (2) preprints can host data and code, (3) there is a public commentary feature, increasing community-wide collaboration and promoting discourse.



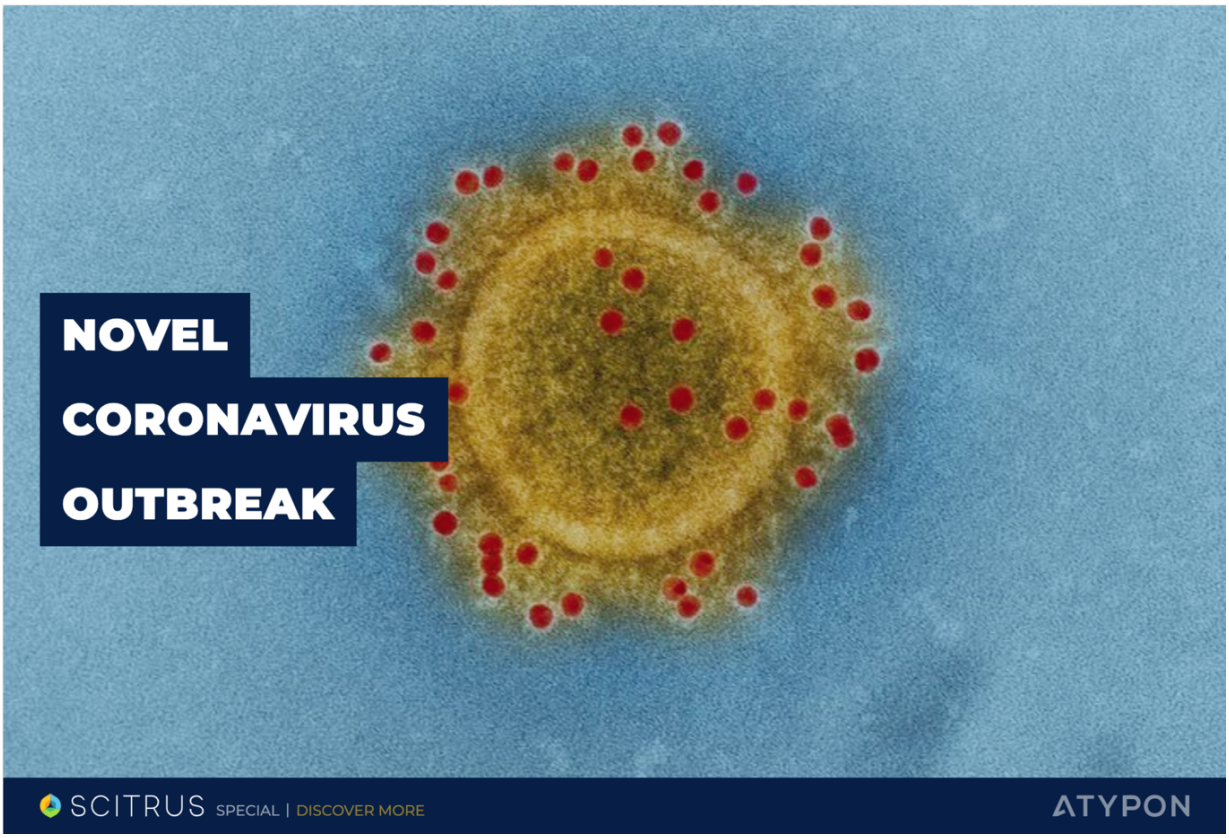
3. Remote access to peer reviewed scholarly resources

Working from home may mean losing access to scholarly resources, since a lot of students, academics, and researchers normally get access through their institution. Accessing via your insitution's VPN, when available, is one option. We will be sharing here more solutions in the next few days.

In the meantime, all major publishers are also making collections of peer-reviewed journal articles and book chapters on coronavirus research **freely available** to the global scientific community:

- Novel Coronavirus page on **Wiley** Online Library (link)
- SARS-CoV-2 and COVID-19 page on **Springer Nature** (link)
- Novel Coronavirus Information Center on **Elsevier** (link)

Want to follow all latest coronavirus publications? Our colleagues at **Scitrus** have been busy with creating an open Special Edition on Coronavirus which aggregates published articles, preprints, white papers, tweets and trusted news sources on the subject.



4. Virtual poster sessions and online conferences

A lot of academic conferences planned for 2020 were cancelled due to the outbreak. These cancellations have the potential to harm the pace of scientific advancement this year. Pace that is usually accelerated by the cross-pollination of ideas coming from face to face interactions at large events. While the benefits of a physical, offline face-to-face meeting cannot be fully replaced by most online forums, there are ways to convene in an online fashion.

Here's some ideas to complement and replace conference attendance:

1. A **Reddit-style AMA** (Ask Me Anything) for specific time periods to concentrate interaction with and questions to poster presenters. (e.g. Bill Gates recent AMA on covid-19, or Alan Aspuru-Guzik's AMA on disrupting chemistry with AI)
2. Setting up conferences, or rather, "unconferences" with **Github issues**, and allow participants to self-organize online. Two recent unconferences that used Github for this purpose: NCEAS Code-Fest and rOpenSci Unconference 2017.
3. For those unfamiliar with GitHub, "Unconferences" can be organized on other platforms. Most notably, the American Chemical Society has recently partnered with **Morressier** to create "SciMeetings". At the moment SciMeetings is offered complimentary to researchers, and the use of the platform for the posting of research is solely at the discretion of the presenter.

And here's some more resources containing tips and tool recommendations for remote meeting organization:

- How to run a remote workshop, Openscapes/Open Leaders-style + Resources

- How to Run a Great Virtual Meeting
- A few simple tips for better online meetings (COVID-19 edition)

Authorea is also making available some of its features, free of charge, to conference organizers and attendees, to capture, host, and present conference content. By the time many conferences were cancelled, conference attendees had already prepared their talks, slides, posters and proceedings. How can we best leverage this content and disseminate it widely in an online forum?

1. A Collection page can be created to showcase all the content related to, for example, a conference poster hall and conference proceedings. Here is an example collection for a fictitious conference called Your **Virtual Meeting 2020**: https://yvm2020.authorea.com/ (Note the custom URL and white-labeled page, with conference logo)
2. Any of the conference attendees can submit to the collection. The conference administrator can also invite attendees to become "members".
3. The submitted content can include a poster (e.g. in PDF), image, data, conference proceedings, slides, and even a video in which the attendee presents the content of the submission - browse some of the content to see posters, proceedings, and video presentations.
4. The submitted content can be reviewed and screened by the Collection editors (conference organizers or conference panel/board) and even have peer reviewers
5. Upon acceptance, content is assigned a Digital Object Identifier (DOI) and becomes part of the Conference Collection

A video showcasing this workflow for submission and review is below.

Rich media available at https://www.youtube.com/watch?v=YQO0FDk4BDE

5. Classroom teaching

Teachers and students all over the world are forced to make many fast changes to the way they communicate, moving from face-to-face classes to online environments. This crisis hits right in the middle of academic semesters for most of the Northern Hemisphere, and, regardless of how good your internet connection is at home, most students had to quickly adapt and be ready to give classes and presentations from their bedroom.

Further, one should consider that presentations are only one of many ways to interact within a real classroom. Just think about how difficult it has become for Theater, Performing Arts and Fine Arts students to showcase their ongoing work that often relies on physical contact and the senses. In what follows, we summarize some of the tips to consider for online classroom teaching for lecturers and learning for students. (Work in progress)

- Accessibility: for teachers and students using platforms like **Canvas** - or other online course managers - it is good to practice to add image descriptions and alt-text to all videos, images, captions as well as transcripts of videos; check for screen reader availability.
- Synchronous learning: if your course is lecture-based then you may want use **Zoom** conferencing, with the option of recording your lecture and interactions with students as well as integrating apps to generate transcripts. Both can be uploaded on the online course manager or to a **Google Drive** folder that you share with all students. Discussion-based courses can also benefit from a conferencing environment, although this may require a stricter code of conduct (e.g. use the raise hand button; repeating your name every time you get a chance to speak). Keeping a flow in the conversation may be challenging but as in a real class, moments of silence are also moments for individual reflection and formulation of thoughts.
- Asynchronous learning: in both lecture-based and discussion-based courses it is possible to have non real time moments, where students can work in groups using **Google docs** while perhaps having

break out discussions that they could coordinate on **Slack**. Some teachers may want to pre-record a presentation with a transcript of the narration while students can use tools like **Voice Thread** for final project presentations.

- Consider the type of assignment: with Canvas, it is possible to set up Discussions where short response papers can be posted in threads. Within Assignment one can set up deadlines for submissions of quizzes, tests, final papers and presentations. Quizzes and tests may be set up with tools like **Typeform**. Moving online can also offer opportunities for students to submit projects in digital format, such as maps in **QGis**, podcasts or perhaps get an extra credit for making meme TikToks.
- Giving feedback: for a student it can be highly rewarding to receive a well structured and specific feedback on what is done well, what is missing, what can be improved and how. The usual rubrics (online scoring guides with descriptions of how course learning outcomes are evaluated) and document annotations and comments, can be complemented with sound files of your voice narrating the feedback, videos and even some peer review among students (perhaps for discussion papers).
- Storing course materials: this can be on platforms like Canvas and Google Drive, but make life easy for your student and label articles, presentations or notes with the authors' surname and date, so they can find them.

For the students reading:

- Be patient, it is going to take some trial and error using platforms and digital tools on a daily basis with peers and professors with differing digital skills. Be supportive.
- For sometime we may not have other choice than to embrace online technology, and this may be an opportunity for all to learn new skills. For Theater and Performance Art Majors and Graduates this may be the time to experiment with the boundaries between theater and cinema, and make-do with the confined spaces of a home shared with others or your room until self-isolation is necessary.
- Communication will happen on a variety of platforms and if you're doing research for a project with other people you may have to touch base in the morning to streamline the day, or you may risk duplicating work, or not understanding when an output is due from you, delaying the work of somebody else. Speak out, instead of grumbling at the screen.
- Don't give up when you have a technical problem, ask your peers, FAQs and online trouble-shooting fora, think of workarounds and if nothing works pause, make a note of the issue, and move on. Something or someone along the way will unlock the solution.
- Quiet space for work in a flat-share or at home with your family or partner may be hard to come by. Discuss with your house members some quiet hours, a lower tone of voice over the phone, use ear/headphones. Perhaps invite them to join the class. Try to keep other online media and phone distraction away for the time you set to work and follow an online class.

And this last point is for all:

- Slow down: this is important in this historical moment as ever. Leave sometime for all to express how they feel, what they are going through and acknowledge that the trauma of social isolation may be adding up onto other people's preexisting anxieties, trauma and processing of grief.

6. Virtual coffee breaks

Academia is a human endeavor, a social activity. The image of the solitary lab-rat scientist is nothing more than a dated stereotype and it is well known that the academic international environment facilitates creativity.

In the home-office, fewer interruptions are great, more work done! But we still all need mindless breaks, and it helps breaking the isolation if you spend some of them with your team. Enter the virtual coffee break. At

Gitlab, they are part of the company strategy to create "a more comfortable, well-rounded environment" to work in.

Virtual coffee break can be done by setting up specific times during the week in which lab members can take a break, call in and chat (great for groups with coffee break at mandated hours), or via a single, permanent chat room to goof around, discuss news, sharing funny pictures and breaking the work routine with the team. The wonderful thing about the **#random** channel is that it does not require constant attention, it is something that one looks at (if they want) during natural breaks. You are in control of your social interactions, of course, when it happens and how much of it.

Many companies, like Revelry and Groove, dedicate a specific chat channel (in whatever platform they use for it) to virtual **#watercooler** conversations, and so does Wiley's own Physics and Materials Science editorial group. For research groups suddenly separated by necessary social distancing practices, a virtual coffee break is part of new reality:

Rich media available at https://t.co/ozfvVsJuj1

Rich media available at https://twitter.com/CH_Eide/status/1242008666620002304

Rich media available at https://twitter.com/RockDefTUD/status/1242043463618756608

What else?