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Suggested Practices for Effective Interdisciplinary Science Communication

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One of the biggest obstacles to formal interdisciplinary research is successfully communicating complex ideas to an audience of varying scientific backgrounds. As scientists, we are immersed in jargon, fundamental ideas, and modes of thinking, that are not well-known outside of our individual fields, and while this knowledge is mandatory for an individual researcher, it can also be an impediment to new collaborations. Fortunately, these problems can be overcome through active community effort and a focus on a shared common goal. Recognizing that each scientist has a different level of comfort and practice with science communication, I have developed a list of guidelines so that we all may have the same basic framework. These are techniques that I personally have found to be very effective since I started doing science communication work seven years ago, though I admit that these are anecdotes rather than quantified data. Note that these tips, while useful in many cases outside of interdisciplinary research, apply mainly to communicating science to other scientists and not to a non-scientific audience.

1. **Tell a story with your work.** The best way to get someone to listen to you is to tell a compelling story. In interdisciplinary research, this is especially important, as the inherent value of your work may not be immediately apparent to someone who isn't in your field. They will listen to you more closely if you can show the "plotline" of your research by being open about what inspired this particular project, where the struggles were, the resolutions (if any), and where the story goes next.
2. **Avoid acronyms**, but if you need to use some, make sure you explain them well. A classic example of acronyms gone wrong is CMB. To astronomers it is the Cosmic Microwave Background, but to a petrologist or seismologist, it is the Core-Mantle Boundary. Avoid using acronyms where possible to minimize confusion. When in doubt, write the words out.
3. **Be careful with equations.** This may be controversial, but I think equations can be helpful if used effectively and sparingly (no more than one complicated equation or two simple ones per presentation). For interdisciplinary presentations, especially oral presentations, there is no need to explain every single term in an equation, and it may be overwhelming to someone who has never seen it before to do so. Explaining the equation in large pieces (e.g., "This part of the equation handles the angular momentum of a system") can still convey the necessary information without being overly-detailed.
4. **Remove jargon from your work** or make time to explain what it means. Jargon is the set of words that are specific to a field or a technique [3]. Some examples are

things like “adiabatic,” “collisional family,” and “photoevaporation.” These words are important, but require an extra level of definition or background in the audience before they can be used in a presentation. It is the speaker’s job to provide that. There will be times when jargon is necessary, but if it is well-defined, then there will be minimal confusion for the audience. Take care not to have too many of those words, and if you can explain a concept using words that most everyone knows, do that instead.

5. **Remember who your audience is.** The people in the audience are people who are knowledgeable and experienced, but not necessarily in the same things as you. Geologists do not have the same scientific instincts as astrophysicists and vice versa, but giving by examples of what typically happens in a particular scenario and why, we can help each other develop that sense. When speaking, avoid simply showing a figure or equation and then saying phrases like “this is simple/easy/straightforward to understand”. When I hear these words, I am less inclined to ask questions that might help me understand the work more, and it also makes me less interested in listening. Take care to use inclusive language as well [6-8]. Your job as a speaker is to bring your audience along with you to the conclusion. Don’t push anyone away.
6. **Be explicit about the significance of your work.** It is worth spending more time on the question of “why” you did this work rather than “how” in a presentation because “The Why” is the key to connecting your work to everyone else’s. This will open up the space for further discussion from people outside of your field. You can do this by asking a very general question (e.g., “Is there life on exoplanets?”) and explaining how the questions become more and more specific until it reaches the question(s) that your project addresses. This is a beneficial technique for a researcher in general, as this practice can remind you of how your work connects back to a “big picture” question and provide necessary perspective in moments of doubt.
7. **Spend time explaining figures,** even if you think they’ve heard it before. Hearing the same thing multiple times or hearing a concept explained in different ways can help the audience understand something better [9]. I will never get tired of hearing the ternary diagram explained, for instance, because I understand it better each time. One technique for figure explanation is to make sample figures of idealized situations to illustrate expectations of your work and “train” the audience in how to look at a figure type. That way, they can follow the relationships more easily when you show them the plots of the real data and will listen to you instead of focusing on the figure.

8. **Be yourself.** A presentation is just a small piece of a larger conversation, and all you're doing is inviting more people to join in with your new piece of information. If you are someone who naturally uses humor in their speech, then include it in your talk. If you frequently use analogies, use them here! We are building a strong community through open communication. How will we do that if you don't show who you are?

This is by no means an exhaustive list, but I hope that these suggestions give our teams a place to start talking to each other, especially as we consider the challenges of a virtual conference. A fundamental part of the Habitable Worlds 2 conference is that we are here to learn from people to whom we might not otherwise talk. We will only accomplish that by making concentrated efforts to be clearer, more engaging communicators. By being proactive in expanding our communications, we will work more effectively with those with whom we do not share similar scientific backgrounds, and create the foundation for future interdisciplinary collaborations.

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