NASA TOPS Community Panel June...23 - Day 2 2023-06-15-12-02-41

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SPEAKERS

Malcolm Glover, Steve Crawford, Qiusheng Wu, Amanda Adams, Logan Kilpatrick, SherAaron Hurt, Malvika Sharan, Brian Nosek, Fernando Perez, Pen-Yuan Hsing, Holly Norton, Jim Colliander, Justin Ballenger, Kylie Wang, Paul Bremner, George Churchwell, Ilona Serrao, Monica Granados, Chelle L. Gentemann, Diana Ly

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H Holly Norton 00:00

First, there we go. All right. So just to take us through the agenda for today, we are going to be discussing our theme of today to discuss is the training of 20,000 scientists. But to start off, I'm going to take you through a brief introduction and review of the Code of Conduct. Then I'm going to turn it over to address for intro to the honoraria q&a in case our panelists have any questions on that. And then I'm going to turn it over to Steve Crawford to give us a tops to update. After that, we're gonna go into the open science 101 badging instructor training. And it's going to then go to the rollout of our curriculum for the 101 over to Paul, and for this year and beyond. After that, we're going to have a break. And then we're going to go into our community forum, where we're going to have a question and answer session for our panelists. So people using our IO tool, our attendees can ask questions, and our panelists can discuss those questions. And after that, we will then move over to a more general discussion. And then we will close out for today. Just as a reminder, if you are interested in sharing with the social media, we ask you to use the hashtags here. So to open science and I heart open science. And if you are interested in introducing any questions for that q&a session, or submitting any feedback, you We encourage you to use our QR code. Hopefully my closed captioning is not covering that. Let me turn that off just for a second. But Malcolm will also be sharing that throughout the day within the chat. So if you have any, if you miss this or unable to scan it from here, you'll have the opportunity to access that in the chat.

Chelle L. Gentemann 01:56

I think if we turn off closed captions, if you go to the lower left hand corner. And on the right hand side, there's three dots that you can't see. Yeah, down there.

S Steve Crawford 02:08

I wonder if I can get? Can I do it here?

 Chelle L. Gentemann 02:12

So it's there. It's that part? There we go get let me there and then do captions preferences.

H Holly Norton 02:18

And then, yes, we didn't see him yesterday, but they are there. That's why I said now hopefully, they'll show up there. Okay, so we'll do that. So we're not blocking the screen for everybody. And next up, I'm going to take you through that code of conduct and introduction. As a reminder, I'm Holly Norton, you're a content coordinator for today. And we are joined here by our community panelists, which we'll get to in a second. But as I said, just a brief reminder, we ask everybody to be respectful both in comments online, as well as in discussion. If you have any issues or questions or think anyone is breaking that code of conduct or being disrespectful, please let us know. You can contact shell through the Slack channel. And I'm going to turn it over to shell to do a brief introduction of our panelists, as Shell knows our panelists better than I do for now. So we can have our panelists be introduced

 Chelle L. Gentemann 03:13

is this thing they want.

M Monica Granados 03:16

This was what was in the slides.

 Chelle L. Gentemann 03:19

Hi, everyone, especially to those online. So I see a there's about 40 people who have joined the meeting. So this is a list of our top community panelists. Many, most of them are here today. And you'll hear them speaking throughout the day. And we just wanted to quickly show their images and give a call out to them. So thanks for them providing all of this valuable feedback to us every six months, and fairly soon, we'll actually have another opportunity for people to join the panel. So stay on the lookout for that. Next slide, please.

H Holly Norton 03:55

So that's back to me. So for the code of conduct as I mentioned, please respect each other. everyone's opinions. Communicate with respect and openness with one another. Be mindful of your virtual surroundings and any unacceptable behavior includes harassment, intimidation,

abuse, verbal abuse, and things related to gender or sexual orientation, things of that nature. And as a reminder, if you have any issues or you notice any code of conduct violations please contact show via her email there shall get then@nasa.gov Okay, and with that, I'm going to turn it over to Kylie she is our n RAS representative for today. Kylie, are you able to unmute you should be in the panelist section. Can you hear me now? I can. Great. Thank you. Hello everyone, my

K Kylie Wang 05:00

name is Kylie I am the meeting planner for this panel, which means I am the person you go to if you have any questions regarding on the beryllium, I will be sending out the other webinar emails next week after the panel ends. So I will have time to talk to Holly regarding participations in all that. And there will be two emails. One is coming from me with the expense report. The second email is the emails with the portal link, you will submit your documents like science Expense Report, there'll be an AI your banking information into the portal. If you have any question throughout the process, filling out the form, please feel free to send me an email. Even if you're going to decline on the road, you will still have to click on the link to decline it. So that we have a record of it. That's it so far. Any questions? Okay, that's it. Thank you. Yes, it's helpful.

H Holly Norton 06:14

No worries, I just didn't know what slide you're on my apologies.

06:20

This is the more detailed information I you know if they have not submitted a portal before, or if they have not a participant and receive on the room before. So this is like a more detailed PowerPoint information. Great, thank you.

S Steve Crawford 06:39

Just gonna click through here.

H Holly Norton 06:44

And I'll give you a chance to think of any questions. I'm gonna double check to make sure. We have Steve. Steve there.

M Monica Granados 06:54

So we are good

M Malcolm Glover 06:56

if there are no additional questions. There's one question who received the honorary our panelists see the honorary.

H Holly Norton 07:07

Okay, it's just a reminder of our agenda. Next up is going to be Steve Crawford. And, Steve, whenever you're ready.

S Steve Crawford 07:18

All right. Thank you, Holly. And thanks everyone, and for participating in the panel and here to provide an update on tops T, which was our solicitation on transform to open science training. And so if you go to the next slide all right. Our objectives this was solicited under roses, our research opportunities for space and earth sciences, and it was solicited as part of roses 22 as the F 14 element. Its objectives are to advance open science literacy for all who do research relevant to NASA's SMD through training and workshops targeting audiences from undergraduate students to establish scientists and managers. The activities support under this our elements are expected to form key parts of the 2023 year of open science. And the programs were for up to three years, with about 6.5 million in total funding. If we get to the next slide. The elements listed for three key elements and the for the first one is the development of science core, a discipline specific scientific use cases Kirk curriculum, science core extends the Open Science 101 into either particular areas, or disciplines as well as different topics, our implementation of summer schools to teach open core and so these would be typically activities during the North American Summer happening usually typically in person, implementation of virtual cohorts to help complete open core. And the training material as well as the design of learning activities should be targeted audiences from undergraduate students to establish scientists and managers from all the scientific disciplines supported by SMD. to If you go to the next slide. And so going into a little bit more detail what we're kind of searching for hear or or had solicited for. The science core focus is specifically looking at how to access and analyze NASA scientific data including cloud based data, core open source data analysis and visualization libraries both general and discipline specific libraries, and creation, management and sharing of reproducible science workflows and results. modules may extend the open core concepts or cover SMD fundamental foundational discipline specific themes leveraging where possible existing NASA cloud based data, integrate into the tops, Open edX platform so that we do actually have in the future, a smooth transition for those who are interested between the OS 101 to the science core modules. And that modules will align with open core is learning style and format. And so really looking at building on the accessibility, having these built openly and collaboratively, we also encourage multilingual development of the science core curriculum and that these are interactive. And so if we go to the next slide, we have our summer schools. And so, we did want to actually make sure that there are methods and ways for people to actually gain training with the open core or os 101. curriculum. And so the summer schools should be designed to train NASA SMD science teams in open science, and increase our opportunities for participation in science teams, by diverse communities. Within this call, we did give priority placed on activities or involvement of non Arwen historically black universities, and colleges, Hispanic Serving Institute's and tribal colleges and universities, or have previously held similar activities that have documented participation by underrepresented

communities. And if we go to the next slide, we have our virtual schools. And so we also know that, you know, or know that especially doing training, whether it's in any case, these can be significantly helped by having cohorts of activity cohorts of groups that are actually doing training at the same time. And so we did also solicit for virtual cohorts, groups of participants completing tops, os 101, training together online over specific periods of time. And so we know this helps to encourage completion, facilitate questions, and also help build community. And that these will be our suggestions were activities that would be throughout the year with 25 to 40 participants per activity. And the next slide we have some details of the proposals that were submitted. We had in total 34 proposals submitted to the call and 16 were selected. The proposals were reviewed under our dual anonymous proposal review process. And the summer schools and virtual courts also included an equal access plan that were reviewed as part of the proposal. proposals were due on March were due on December 8, and the PI's were informed in March with selections announced on April 11. And we do have a press release to the selections that were made that are linked to the slide. And after I might talk, I can also post the that link into the chat for everyone have access for it. One of the really great things in the process was we also put out a call for volunteers for the review panel and received over 160 expressions of interest. We ended up having three review panels, that we're covering a diverse range of expertise and experiences. And it was really exciting both to see the interest in submitting to the solicitation, along with the interest in reviewing them. And I if we go to the next slide. And just to give some more detail of what we ended up selecting, we had a total budget of 6.5 million. Our science core projects, we did actually expect to be only two years in length, we ended up selecting 10 projects, with a total cost of about 2.7 million. Our summer schools, we were expecting to select three to four with a max length of three years. And we did three projects at a total cost of 2 million and our virtual cohorts, we were expecting to select two to three. And we ended up selecting three projects for 1.8 million. If we go to the next slide, I think the next one includes some further information about the selections and the distribution of groups. So we did actually have a range across the 16 projects selected from different institutions. Both included educational or academic institutions, which made up just about half. But we also had selections from commercial, nonprofit and NASA centers. We had selections across the country. So you can see the distribution here at the very top of the panel with things both from the Northeast from the Midwest and from the West Coast. and upper midwest, being selected. And so we did have a range of proposals across the country, we did actually have a few that were selected from MSI, along with a few that were selected from non our ones. And we did actually have a really good mix between early career and mid career PI's who are selected for the proposals. And so it's a really exciting group, with many of the proposals actually being the first time that they had actually submitted to NASA as well. And so it's a really nice, diverse group of, of institutions, and a range of career stages. In our estimate, based on what the proposals thought they'd be able to accomplish, we we estimate that over the summer schools and virtual cohorts that likely around 3000, participants would be trained in open science 101, which is getting us a good chunk along the way of training our expected number of 20,000 scientist. And if we go to the next two slides, I think they just include the projects that were selected. The top three, here are our summer schools that were selected. And I'm not going to talk through all these. But you know, they're they're in the slide decks, and they're available. They're also with the link provided in the press release, there's a little bit more detail about what the schools are doing. I believe we're very close to getting everyone with the grants distributed, I've been really impressed with the NSC, getting the money out and the processing. And so everyone should be just about underway, and starting to get on boarded. And within the next two weeks, hopefully, we'll have access to all of the training material. And here are the the science core, you can see, there's a range of different ones from focusing on exoplanets, planetary science, and Helio physics, along with ones focusing on general training and things like AI and and open science. And then along with also a set, which

is focused on earth science and developing further capabilities there. And so we do have a range of different activities which are going on. And we. And as always, we are really excited to see the full range of proposals, and really impressed with how many great proposals that we did get in. That's the end of my slides. So I'm happy to take any questions. And really excited. And I'll just really mention, I'm really excited for all these teams to get started. And really looking forward to working together with them over the next year. We are also planning a kind of kickoff symposium, that to actually bring all the teams together. So they can also talk together and collaborate. And so we'll be releasing more details on that once that is prepared. So I'll stop there.

H Holly Norton 18:42

Great. Thanks, Steve. Any questions from our panelists? Should

S Steve Crawford 18:53

I see your question? And I don't know if you want to come off mute or if you want me to just read the question.

Q Qiusheng Wu 19:03

When will, when will the next year? The Colbys release?

S Steve Crawford 19:08

Yeah. So we're currently we're not planning to release it in roses. 23. So the next earliest time we'd be soliciting, it would be part of roses. 24. Okay. We're going to kind of assess how things go and get started out. And then also, depending on budget, budget availability, that would be the earliest that we would do the solicitation again, whether or not it's for a full solicitation, or it's just science core, or it's a Next, we'll have we'll actually have to determine that in the future. So just a quick follow up question. So was wondering if there's so many, like project open for open science here and would there be any some kind of central reporting We did have document or products coming from this projects, line and also related to the tops GitHub page or something like that. And so that's, that was one of our hopes, what and kind of requirements in the project is that as the groups develop the material, that it is contributed as part of our Open edX platform, and our GitHub. And so hopefully, you know, I think the exact details of that are still going to be worked out a little bit as we, you know, as we all learn to work together and how things work, it will, it will take some time, by notice is one of the things that the project office and the curriculum group at Ames will also be kind of working together with a group, but hopefully, we will make it all available from a, from a central location so that it is easy to find, and also easy to move from one area to the next as you you know, pick up different skills.

Q Qiusheng Wu 21:01

Sounds great, thank you.

S Steve Crawford 21:03

Thanks for the question. question in the chat, just along the lines of other people working on projects, who would like to be included in join this work? How do they do it? If they want to collaborate more? Yeah, I think we're still setting up some of the governance practices. But we would actually love to collaborate with other groups who are interested in doing this. And so I think this is where reaching out to the, the tops, on the current tops GitHub website, there is information about signing up. And expressing your interest in collaborating with tops are the year of open science. And I'd suggest signing up there, and then we can connect with you as we actually build out these different processes. But yeah, I mean, I think, you know, more groups following and building on our areas, is a great open development practice. And so that is something that we we would like to actually see other groups to, to collaborate with.

M Malcolm Glover 22:57

Then you, Steven, I think this time we do have Fernando.

S Steve Crawford 23:02

I think pen pen was next. Okay. Yeah. And what's next?

P Pen-Yuan Hsing 23:07

Oh, yes, thank you, Steven. Again, I'm really excited to hear about all this progress. And I'm looking at the list right now. And there's a few that I'm particularly interested in. But anyway, I just have a bit of a general question, which is, I think, right now, you know, you're probably really focused on helping these projects get started. But over the coming months and years, have there been any kind of initial discussion with plans on how to kind of follow along as these projects go? And as they bump up, you know, to, to identify any challenges, that they come across? How they were solved? And, you know, just learning through that process? From from these projects as the captain, if that makes sense.

S Steve Crawford 23:52

Thank you. Yeah, that's a great question. And I think, you know, already in this process, we've already learned a lot. I think that also came up in some of the discussions yesterday, and I'm sure we're gonna actually continue to learn a lot, especially with a lot of these projects, which are, you know, even with our initial contact with some of the group's they've been adding great ideas that we haven't even been thinking about. And so I think, you know, that is one of the things where we do want to actually generate more of that discussion in the open so that we are sharing these different great ideas and, and developing them. And so this is actually a great one forum for actually reporting back on some of those. And but I think, you know, that's

also one of the reasons we do want to have this kind of kickoff tops T symposium. Because, you know, I think bringing together these different groups will be a great way to generate even more ideas, but also would always love to hear your ideas about how to further advance this

F Fernando Perez 25:06

Fernando Thank you, Steve. This is this is super exciting. And I have a very kind of small and fairly practical question. I imagine you obviously want to give your your grantees and your teams all the freedom they want and how they present and produce their materials and how they conduct them. But I'm wondering if you've considered offering kind of some templates or guidelines or even in the open source world, there's this model of cookie cutters, which are repositories. Often, sometimes people legitimately have a reason or a desire to do something in a very particular way. But often, we find there's a kind of diversity of approaches to some problems, where it's just because people did different things, but there's no particular reason why they want to do something different. And if they're given a template, or a cookie cutter, that semi automates a certain process, people are like, Fine, that's not where I want to spend my time. If you give me that, I'll just do it. And I'll spend my time on something else. And what that can enable is perhaps easier interoperability, consistency and metadata, having everything plugged into the same workflow more easily. So offering a bit of that scaffolding without imposing it. But for projects for potentially follow in a similar or somewhat consistent process that enables other things downstream, it's easier to later integrate, we make consume, there's lots of things that open up, you think there's somewhat standardized, if at least, the accidental differences are erased, and you only leave the substantive ones. So just just a small font.

S Steve Crawford 26:39

I'm smiling just because of how much I love the Python cookie cutter package. And I fully agree that this is a really good idea, which is something that, you know, we should be considering. And especially once we get that first versions of the curriculum out there, to actually make sure that like the, the, the templates, and, you know, I also think like some things like a style guide for Jupyter Notebooks, you know, is is also something that's just really useful of like, not that you have to do this, but like, here are some best practices. And, you know, also if it can be collaborative, and how we actually get those out there. Because I sure the our group of participants here and also in the wider community have a lot of great ideas about how to do it.

M Malcolm Glover 27:41

Jim,

J Jim Colliander 27:43

I just wanted to build on what Fernando just said, I found the NGO gallery to be really inspirational. And I wonder if there might be a similar open science curriculum, open education resources gallery, there are such a diversity of contributors in this direction. And so if NASA or partners of NASA could set up some sort of a curatorial process, or a reviews process, maybe

with a style guide, this could lead to a diversification of sharing, and may really help advance the goals towards the 20,000. But keep in mind that achieving 20,000 badged people is just a proxy for what we really want to achieve. And to create this culture of open sharing of best practices around open science might be really helpful.

S Steve Crawford 28:38

Yeah, and I that Jimmy or your comment reminds me I've also just saw a great gallery of Earth Science notebooks, how much see if I can actually remember the the link to throw in the chat. And but yeah, I think it's a great point and definitely something to to think about and consider the best way to do it.

H Holly Norton 29:07

It's actually time to move on to our next speaker. The next section of our agenda is going to go to the Open Science 101 badging process and I'm going to turn it over to Diana Lee to discuss this further. All right,

D Diana Ly 29:23

hello, again, everyone. I have two more sections today to expand on the Open Science one one, my first one here is badging. If I tell take the full time allotment we also have Ilona back on ready to give a preview another preview of the MOOC, so we can go to my next slide. We talked a little bit about badging yesterday. And just to remind folks that learners will receive a micro batch after completing each of the five modules. And once they've completed all five modules, they'll receive the NASA tops open science badge, And, you know, we looked at different badging companies, we evaluated the vendors based on their credibility, compatibility with other vendors that we're working with customization and then as well as costs. And in the end, we decided to go with credibly. And we started the conversations with them. And they are working with our move developers, Raccoon gang for the NASA tops, open science badging. The great thing is that these two vendors have worked before, worked together before. And so they're, they have the API's ready to go. And we just need to make sure that it's customized where our tops open science 101 curriculum. And so next slide. I've added a few bullet points here for us to discuss whether you take an instructor led training, whether that be in person or virtual, these learners will log into the LMS to obtain their micro badge for each of the modules that they've taken with an instructor. And this is where you want to make sure that we have just one way of tracking all our learners, whether it is an IoT workshop, or through the MOOC itself. So this is our way of doing that. And we would love to hear your feedback on that. And once learner receives their micro badge, and then their overall badge, now they have the option to display their badges on their social and professional media accounts. So we want them to really promote that they receive these badges. And then lastly, working with our MOOC developers, they are utilizing RG Analytics to track the progress. And if we see that some learners are stuck in a particular area, we could work on deploying some incentives to encourage the learners to complete all five modules. Because in the end, our goal is to reach 20,000 learners. But as Jim mentioned, this is not just a precursor, we want this to just be instilled, and everyone's everyday life. And this is just the normal practice of science. And so that's my part for badging. We can move on to the next part for training. Right, next slide. Yes.

And so this is the introductory training. And we talked a little bit about this yesterday as well. But I wanted to remind everyone that for a NASA funded instructors, we've asked that people go through the carpentries. And these five bullet points are from the carpentries website. And really, it is the carpentries when they when you take an introductory workshop, it introduces you to evidence based teaching practices, it teaches you how to create a positive environment for learners at your workshops. And it provides you the opportunity to practice and build your teaching skills. The last few here are specific for folks that want to become carpentries instructors. And we have not put this requirement on our open science 101 instructors. And so it will be up to the individuals whether they want to go through, there's a few additional steps to become a part of the carpentries community. And many of you may already be a part of the carpentries community. And so once instructor takes the instructor training, you follow up with an OS 101 content training workshop. And then you would be a certified instructor for the Open Science 101 curriculum. And so next slide. We've held a couple of workshops specifically for the NASA instructors. And we initially purchased ad slots. And so we've utilized about 30 slots for our headquarters team, the Open Science 101 team, our leads and champions across the five NASA centers, as well as a couple of our tops T instructors. Once all the tops T instructors are brought in to the fold, then they'll also have an opportunity to be part of one of these carpentries instructor training workshops. And many institutions may already have a membership with the carpentries. So please check with your institution to see if this instructor workshop is available through your institution. And then following up on the content training side. These will be held monthly for the first year through the carpentries and this is once the curriculum is finalized and so we have the June July it for our modules. And so then these content training workshops would be available in the July August timeframe. And these come intent training workshops. The purpose will be to provide the teaching guides for the five modules that the instructor will be teaching. And lastly, just want to comment that we are still working with the carpentries to scale the instructor and content training for all interested instructors. We're still working out what that plan will look like. And so that's all I have. For my section, I would like to turn it over to Ilona.

I Ilona Serrao 35:39

Hi, everybody, my camera there? Yes. All right.

H Holly Norton 35:43

Do you need to share your screen?

I Ilona Serrao 35:47

I may need to share my screen. I'm gonna get guidance from Michelle and Diana on where would they would like me to start? Is this where I talked about the ideas for the content?

D Diana Ly 35:58

Yes, please. Okay, great.

Ilona Serrao 36:02

All right. So let me share. So let me give you guys some context. My role in in the program is to one of the Ask Diana, and shell asked me to do is look at the five modules from a comparative perspective and a relationship perspective. How do all these five modules compare to each other with the content development process? It's been relatively siloed. Right? So we have authors that are an expert, that are assigned to module one, module two, and so on. So the question became, hey, when we see these together, it still needs to, even though they're standalone modules, they still need to have continuity across them. So the question that I've been trying to answer is, how do we bring that continuity together? Where, whether we're talking about open data, open software, open results, open tools, how do we tie them together to show the relationship. And what I did is, I came up with trying to leverage fair, and the elements that allow fair to happen in an open environment to apply that to some sort of process slash framework. So what I'm going to share is some ideas on how we bring the relationship together between open science fair, and the US make sure constructs that are that drive the flow for modules, three, four, and five. Okay. So let me share my slides. And the ask from you guys is to really just give us your feedback on if this kind of model is going to work. The intent is twofold. One is to tie the modules together. So when you're in module three, you know how Module Three fits in the context of modules 124, and five, but also showing that relationship between use, make and share. If the if you're familiar with Module outlines for Module Three, four, and five, I call them the application modules. Because Module three is on open open data, then open software, and then open results. If you look at the outlines for those application modules, it starts with an introduction. And then it goes into using open data, software results, making open data and then sharing open data. So to tie all that together, what I wanted to present to you is this idea of can we say that when we apply fair and when we apply making data, making the research product, sharing it or using it? Can we kind of look at it as an ecosystem. Meaning I start you can start by either making it sharing it or using it that's why those are in colors. But depending on where you start, to me, it's an ecosystem. If you make it, you then can share it, then other people can use it and those people will fight you and then you get recognized the project's accelerate and holistically if you keep repeating that cycle Science Advances any thoughts on that idea?

Jim Colliander 39:51

I'll react i i love this ecosystem concept in in many ways, the ecosystem that inspires a lot of openness in science is the internet, we have the capacity to share in ways that don't necessarily require setting up a bunch of movable type the way that we did in the 70s and 80s. I worry that being prescriptive on defining the pathways for the ecosystem may lead it to be less effective in achieving fair outcomes. So things like GitHub and sharing things through repositories has turned out to be successful around a lot of knowledge, creation activities. But after the knowledge is all built, we then rely on the publishing ecosystem, which I think is less open, given all of the open access challenges. So I'm not exactly sure how to describe the criteria around an effective open science ecosystem. I feel like that's what we're struggling to do. But you know, the feedback in the JPL panel where we asked for a federated approach for delivering this kind of open science training, to complement an Open edX MOOC, I think is a way of diversifying the ecosystem to support these open science goals.

Ilona Serrao 41:17

Can I play that back to you because I want to make sure I grab the right takeaways. So the, at a high level, the concept of eco sign ecosystem kind of makes sense. But it looks like even though it's circular hair, you're saying is it's too linear, we would need to if we use it have some outbound, other ecosystems that we tie into. Right, for example, with sharing, maybe going out to publishing? Is that what I'm hearing as least as one point, I know, you have like two or three points in there? Oh

J Jim Colliander 41:53

yes, I think that's one point, I guess, at a high level, I completely agree with the slide in the vision. Tactically, I feel like the ecosystem involves a collection of technological and social innovations that aren't yet in place. In many ways, I think the year of open science is catalyzing the conversations that aim to create this ecosystem. But I feel like we don't have the ecosystem for open science built. And so this is like an aspirational target, rather than something that can be implemented, immediately.

I Ilona Serrao 42:33

Understood. And for me, right now is more less about implementation and more about showing relationships and showing, because there's an ethos, that ethos, corpse, there's a lot of time spent on, you know, what the benefits been to you and to society and so on. And those benefits, the least, the way I interpreted some of that lecture was a driver for creating momentum. And so that's what I was trying to show here is that that in some, you know, when you do the work, then you have the momentum comes by in part, the citations, the recognition and so on, not to say that it's exclusive, right? I mean, we still have hurdles with, you know, the pay for reading kind of publications, and so on. So this was more connect conceptual to connect some dots, which is why they're dots.

J Jim Colliander 43:21

So one, maybe other observations. So in like the startup world, there's this build, measure learn loop that people talk about a lot. So you build something, you make a hypothesis that this thing is going to be effective, then you measure whether or not it was effective. And if it was great, if it wasn't, you learned something, and then you build something new. But that loop, that iterate that innovation loop, is kind of conveyed in the dots. But after you go around this loop three or four times, you want to be climbing up some kind of a ramp. So in the startup world, you know, it's like you want to build a successful business or you want to grow revenue. Here, I think the societal benefits and the impacts of science in changing the future, making the future a better place than the present. I think that's the sort of larger goal of science. And as we iterate around this open in open science innovation ecosystem, we want to keep in mind that we're trying to always climb up this other objective function. So I guess that would be my only comment on the slide here is that we're not yet conveying sort of that background activity of elevating scientific outcomes while going through this cycle.

I Ilona Serrao 44:35

So it might be more of a swirl. Okay, I'll work on that might be more of a swirl that you start here and you go through one revolution and then it swirls out and it swirled out. Maybe, Okay, any other feedback, I have two other slides. I want to go through that kind of take these this concept to the next deeper lower level. But I wanted to get other feedback before I move to the next one. Any other comments? I mean, am I totally off base? I guess? Or does it have some legs? If we refine? That could work too. So relationships? Okay, let me move on I know we are time sensitive and Diana,

F Fernando Perez 45:24

very common, perhaps I think the only thing that jumps at me is, is the I make it, I share it. And then me and others use it. Because in my world, I never make anything, I rarely make anything I typically very, very quickly, it's we make it and it's we make it because when I take one step, I take that step out on GitHub, and that step immediately, somebody else is giving me feedback. And almost any type of the process ends up being a collective collaborative process. And so the I make it and then I share it, and then eventually I give it to other people to use it, in my mind reflects a lot, kind of the traditional mindset of the, the scientist hero needs to get credit for their genius. And then, and I think we're trying to move a little bit into a different culture.

I Ilona Serrao 46:18

Fair enough. Yeah, that's a good call out. It's a we, you're right, I need to have it reflect more collaboration. So it'll be we, yeah, we are, I can rephrase it to say it's made, I was trying to bring the personal into it. So maybe I'll stick with we, you know, we make it we share it. And you know, we and others use it. Okay. And then we get recognized. Okay, I can do that. Alright, let me go to the next slide. So then, once you see the, the ecosystem, so this this is kind of ecosystem on the flow, then it becomes on how do we make what's the practical side of open science look like? And I think, Jim, at least I'm hoping that this was one of your comments, like, how do we bring all that technology that makes open science possible to bear in the conversation, and for me, that's considered the practice of open. So I apologize, by the way for the slides not being imaged, you know, pretty well, if you do that caveat, this is my rough cuts. And I don't like to spend time making something cosmetically nice if I'm not going to use it. So bear with me with the weird fonts and whatnot here. But the practice of open in what I based it on on the fair concept and care is in there, but care is not. It's a subset of the practice that comes into play, but and what I did is I said, Okay, if things need to be findable. What are the tools and techniques that are used to make things findable? The most notables are metadata, tagging, persistent identifiers, and having hosting sites that make finding easy? Right? Then under accessible, can it be retrieved what is the practice of retrieval, so at a high level, those repositories have to use standard access protocols. And the content itself product itself has to be understandable by humans and machines. Then under interoperability, this one I'm still sussing out what that truly means. But the products or the techniques, and the the technology has to be around standard using standard formats for data sets, using standard or open code bases for your source code source code, documenting the heck out of all of it. Right, readme files, metadata, tagging, version control, commenting were appropriate. Those are all techniques and tools that are needed to fulfill the practice of interoperability. And then lastly, the practice of reusability and reproducibility what does that look like from a tools and technique perspective? Again, that's documenting the heck out of it. But now we have the whole idea of compliance, licensing, export control, intellectual property, all of these things that

you have to assess before you can even decide if it's reusable, not necessarily reproducible, but reusable. And then lastly, bringing in the ever so famous citation file to make sure that that is fulfilled and completed in detail in order for you to get not only cited appropriately, but so that people have the detail they need in order to assess the usability and reproducibility. I'll have you stuck on that for a minute? Go for them.

J Jim Colliander 50:01

So I, I feel like the open in open science is more than fair, which is the way we describe sort of strategies throughout data. You know, in many ways where we're struggling, I think with this slide, and maybe the preceding one around sort of mission, vision values type questions at the core of the tops initiative. And for me, the, the real change in science that we are trying to create is that every person has a right to participate in data intensive, or scientific scholarly conversations, not just the PI's at r1 universities. But everyone has a right to participate. And somehow centering the tactical steps that have to be put in place to enable participation in science at larger scale. That's what I think we're struggling with in the ecosystem. And what fair partly captures around data components of the whole thing. So I guess I feel like the emphasis on fair here is under it's not fully capturing the larger challenges around open as the adjective describing the change in science. But I might be missing the prompt with the way that you're seeking our feedback.

I Ilona Serrao 51:38

No, no, this is all good. When we talk about the practice of open science, tell me what that means is what I'm trying to get to is the practice of it. So I'm I don't, I'm not in your world. And I'm new to it. So I'm leveraging what I pulled out of the material. So what's your guidance on if we wanted to talk about practice, because this stuff, like if I'm, if I'm early in career, this was overwhelming to me. And I haven't response to that, at the end of this, one of the authors on the team has this really great idea of, you know, when you're doing open signs, here's what MVP, here's what the minimal viable, right? Like, this is the minimum to get you started to get you in the game, just do this, he calls it the good, this is good open science, then he has better open science, and then he has best open science. So the idea here was to look at things at a macro level and say, Look, these are all the components that make up, you know, the big picture practice of open science and the techniques and technologies. But then I have another site says, but if you're getting started, here's where you start, you know, here's this to get going today, here's what you can do to keep people to get people started, is that where you're headed with that conversation? Or you're thinking something else in terms of the right to participate?

J Jim Colliander 53:17

So I Can we zoom out slightly, I want to understand the what you're trying to achieve with the exchange. So if I, if I understand the way that this section of our conversation has been structured, you're looking for guidance from the panel to kind of understand what we think Topps should achieve through the open core or open science 101. And in particular, what we

think we want to train these 20,000 students or 20,000 learners, how we want to train them to change their behavior to become more open in their science practice. Is that a conversation that you want to be having? Or is it different? I'm just trying to understand the prompt?

I **Ilona Serrao** 54:12

No, that's a good Yep. So I'll present more context. With the modules, open data, open software and open results that are constructed to say, less than one is the introduction. Lesson Two is use open data, software results. Lesson three is make open data software results. Lesson Four is share Open Data software results. Right now, in each of those lessons on news, make share. They they include techniques to do those things. Post every pot, you know, you got to select the repository if you're going to use data, you gotta go search repository. You gotta go do this, I'm going to do that, what I'm trying to do is bring a pattern to that conversation. So that it's not random. Because right now, when you look at the elements of how repositories are referenced in the US module, or excuse me in the US lesson for data, and then you look at repositories, again, in like the share lessons data, it looks redundant, because we don't have any content, any context presented on why we're talking about, you know, repositories, in the use lesson in the make lesson and in the share lesson. So it's just trying to present a pattern on how to organize the tools and techniques in a way that brings meaning to the students. Rather than just having a new topic.

J **Jim Colliander** 55:55

So I feel like I'm participating too much in this conversation. So I'm going to try to say something that reacts to the discussion we just had, and then I want to step back for others to participate more. So a lot of the learners that I have in mind that we want to change behavior on of legacy ways of thinking about science. If I don't share what I'm working on right now, until I get my breakthrough, I will have a competitive advantage over the others that are trying to get the tenure track job that I want when I'm a postdoc. So there are incentives at all stages of the career that are causing us to be closed, less sharing. There's also a kind of embedded arrogance in science. You know, if I'm at an r1 institution, and you're at an R three institution, there is a tendency to look down upon or to disrespect the people at the R three institutions, they're not worthy of the attention of the r1 person. It's these values that are really misguided, that I think we're trying to eliminate and transform I find in Shell and others this like inspirational call to action to change the way that we see each other as contributors to this global enterprise of science. So I like to imagine this core speaking to those values and changes changing the way that we think about each other as contributors to knowledge development and understanding nature. Then there's the tactics. How do we do this today, using the technology that's available to us right now. And then we get caught up in GitHub or repositories, or Jupiter, or what's going on with our code datasets. And all of that stuff is very topical and present today. But some of that's going to change as technology evolves, whereas these changes in the relationship that we have between people, I think, are permanent. And so I'm trying to separate some of the aspirational values based answers to the question, what is it mean to be an open scientist? Versus how do we do it today? How do we make our practices better today, and I might be confusing some aspects of the curriculum in seeing it those two different scales.

I

I Ilona Serrao 58:28

This part I'm talking about is definitely around the practice, not how we see each other. And open science. I don't have slides on that for today. But this is more than option B, the practice of it, the the technical side of it and trying to bring to your point, the resources will change. denodo may go away, and it'll be replaced by something else. So that's why I wanted a pattern of you need to go look, for example, you need to go look for a repository that has this criteria. Today's example is de novo or GitHub. But right now, some of the content focuses a little bit too much on what the exact tools are today, you know, GitHub and odo all these things, and trying to uplevel it but give a pattern so the students when they leave have when it comes to the practice, not the values of other people and how they relate to other people, but the aspect on practice, they come out with, you know, honestly a process, you know, best practices on how you approach open science when you're going to use it for data, how you approach open science when you're going to use it for software, but that's all I was trying to do today. But I captured your discussion point on the relationship that people relationship part. And I will definitely research that and then figure out how we address that. Other feedback I saw some comments go through about fair limiting and fair is not always open. I'm happy to use any other kind of construct. It was just a matter of trying to categorize and create some some patterns around the practice of how open science happens today, regardless of the research product that you're working on.

M Malcolm Glover 1:00:22

Yes, we have, Monica that Malvika.

M Monica Granados 1:00:26

Thanks for helping with the hands. stuff there. I'm just I think I'm reiterating a lot of what are the comments that are coming in the chat that this is and that Jim also mentioned? Like, for example, I don't see exactly where Open Access fits in this framework. This is very heavy on like data and code. So I don't think this is as high this isn't does not encompass the entire practice of the research cycle. And I encourage you to either think about, is there a framework that could capture the research cycle? Or think about specific frameworks for each aspect of the research cycle? Because there's no, you know, there's some like elements here about like, publications. But it would be a difficult fit to try to fit this framework in, in the context. shins? Yeah. And that's because like, as Jim said, fair is often referred to as for data, it's like FAIR data. Yeah. Okay.

M Malvika Sharan 1:01:53

I think one thing we're really missing about the Open Science Teaching is that open science is contextual. We can't really teach it people absolute truth, that each of us as a teacher would have very different way of saying what open means. And I think most of the open science training should be and what else, right like, because you would always get people saying, oh, but this didn't fit there. And it didn't fit there. And I think that's the conversation you want to have in the classroom or in the MOOC, or getting people to think critically about what is missing from your own context, what doesn't fit here, because as you're saying, these are all construct and some construct are actually useful and fair is actually useful. And it's actually useful in

making all the components of research process open in a way that can be then published with open access, but then providing that user pathway is very important. And the reason I'm saying anything, sorry, I haven't seen the slides, because they weren't in the scenario. So I'm seeing it for the first time. And I wasn't really sure what has been done before it because I joined a bit late, um, but some of the organization who will be delivering these open, open core modules have actually those kinds of frameworks, where learners are given initial pieces of information to get them to start thinking, then reflect that in the context of their own work. So I think it's really important that all of the streaming material, with the caveat, this is one version of millions of version that exists out there, and are made up. So I think the conversation that we're seeing in the chat and also from from all of us that you would hear, there would not be any agreement. And that's a good thing. And that's a good thing that Open Sans allows that people can actually manipulate it in a way, not saying manipulation or wrong way, but like manipulated to fit their reality. And I think that's, that's what I feel like is missing, if you give them an absolute truth of circle, or absolute lifecycle of a research data or research process, or try to fit everything in some places it would not work. And just to be sure all the people who will be coming into the classrooms, or as learners are really accomplished researchers, they all have a lot of backgrounds, it's we need to treat them like one that they are experts from their field. And we are coming as collaborators from the oilless sorry, open open constellation. Yeah, I would, I would definitely encourage to have and what else? What do you think is missing here?

I Ilona Serrao 1:04:26

Oh, yeah, yeah, for sure. And while we go, one of the things is what returning what what I normally tell people is like, there might be between my house and the grocery store, there might be five different ways to get there. What we're going to do is show you one way, we're just going to show you one so you have some framework to work off of. And then you can go and experiment and adjust and tune it and you know, create your own habits based on your needs, your experience and your goals. So yeah, so I'm sorry, that's not that's not obvious here. But it is not. This is not intended to say this is, you know, in fact, maybe the title needs to change. This is a practice, like not the practice of open, this is one, just a way to get you going. And all that to will make that clear for sure that you're going to do it however you want. This is just getting you started on the framework, using the framework

M Malvika Sharan 1:05:26

I just wanted to raise, I think you would always have disagreement, always. That's the nature of open science that we need to allow the disagreement and differences to occur. But if we don't tell the learner from the very big name, that this is the intention, then take this as an absolute truth and struggle with it just the way people in the chat are struggling. And yeah, I'm sure that you know that. It's just that it needs to be made explicit for the first time learners.

I Ilona Serrao 1:05:53

Yep, that's a good call out. Okay, I can't read the chat right now. So I will read it later. Any other comments? And, Holly, I don't know where we are on time. We're doing okay, we have Fernando. Thank you.

Fernando Perez 1:06:10

I kind of riffing off a little bit on this conversation, I think. And I'm trying to read a little bit off of what Jim was saying. And shell will forgive me if I am butchering some of what are about to say big things. I'm kind of paraphrasing things I've heard shell say in public settings, about kind of her path into open science. And I think one of the points that I heard in in Jim's discussion was that we're, this is not fair. And these, the content of these slides is a level, which is extremely important to kind of around operationalizing and tactical approaches to data access, etc. And that's absolutely critical. But one element perhaps that is on an on another layer. But that's as a concrete operational component, which I think is missing here is what the practices and culture of a specific open science working community looked like and how that changes. But how that's fairly specific. I mean, it can change over time, but it is specific. And I'm reminded of how shall describe kind of her entry into this world through finding the NGO community where yes, there was technology. But it was also a specific way of working a set of principles that the NGO team had made explicit, an offering of cloud hosted infrastructure, which she could dip her feet, find the tools ready to go find people in her domain, who were using those tools, and who had the right culture of wanting to help of collaborating of sharing. And that kind of triggered ologies, which it is, it's kind of high level. And it's a little bit loosey goosey. But it has a lot of very specific and concrete aspects of it, that make it something that in my mind represents a way into open science, the tools existed. At the time, when shell entered this world, you could install Jupiter, you could install X ray, you could install all of those things. But it was the combination of the tools presented by a community that was offering the communication channels that was offering, the attitude of being welcoming, and working with you that had an installation in the cloud, where you could just log in and get going. It's all of that together, that creates a different change. And that is a change. And that's a change in culture that then survives that one technology is replaced by another that one specific way of doing things changes over time that this package is better than that package. That change of culture is I believe, a little bit I'm trying to paraphrase kind of what Jim was saying, in but in a way that makes it operational, right. It's not only talking about abstract things, it's very concrete. It leads people to change their habits to enter a community and to change how they work. And then to build a multimillion dollar program at a federal agency. And apologies for like, shell you can correct me if I butchered some of what I've heard you describe of your connection to the NGO community. But I think that record in my mind that captures very well how that transition is a combination of technology, practices and community.

Chelle L. Gentemann 1:09:22

Yeah, Fernando, I think that that's really key. And that's something that we do that has been emphasized in the some of the versions of the ethos modules is that it really is, I mean, part of the attraction of Oakland science is that we start to really do it together and really ensure that we're all recognized and and that changes the power dynamics of science and it changes the ecosystem. So that it creates a space for more belonging which is what I that you know, you and I have talked about this that was what was so inspirational when I started doing open science was that that that sense of belonging that I really hadn't felt for most of my career?

Ilona Serrao 1:10:06

So with the, with the concepts here, then is the, like, how would you order it? Do you talk have to? Do we try to from a speaking to the student do you start with, hey, as an individual, you

to? Do we try to from a speaking to the student do you start with, hey, as an individual, you know, this is the, you know, the thought processes and the culture of open for you as an individual, you have to be, I'm making this up now, you know, you have to be, you know, open yourself, you have to be open to having differences of opinion, like, so we try to have the individual be open and the characteristics and qualities of what goes into that as an individual. And then here's when you have a collection of individuals that have that, like mindedness, that for the community and these open communities have these kinds of qualities? Or do you start with the community and say, Look, you know, the starting of open science is really looking at things from the community perspective and finding communities that have these qualities, like, where would you take it? Where would you start that conversation?

M Monica Granados 1:11:30

I'll jump in. And I would love to hear what Malpica might say about this, because, you know, we're both and there's several panelists have been involved in next kind of community development. A lot of it is about a sense of belonging. And I know that's hard to feel like it's tangible. But it's a sense of belonging that you're like with your people. And if we're to dig down into that, it's people who have like shared ideas of the way that science should be done. Particularly because there's such a contrast in the way that science is traditionally done, and how you are taught to do the science, or at least for many of us who have gone through graduate training, I think it's changed in probably in many institutions, but it's such a contrast. And so when you find a community of people who believe like it's, it's, it's, it's a passion, who believe in the way that science should transform that is that you know, that you become, you know, attached to these other people, these other humans, because you, you have a sense of belonging and kinship, because you're such an outsider compared to how science is being conducted outside of these, these communities. And these, like small communities, you know, that will grow into into bigger ones, you feel safe there, and you can see you feel safe, and then you want to contribute, you know, a lot of the work that has been spoken about today, a lot of the work that Francisco has done, has been done on his like free time, because he believes so passionately about the work. And the way that science should change. Share.

S SherAaron Hurt 1:13:26

Hey, so yes, I actually am share I'm with the carpentries. And I want to say that that was to align with what Monica said, It's so true. For us in the carpentry is one of our our motto was, you know, kind of you don't teach alone, and also when I'm encouraging people to come to the carpentry is we encourage them to come to a workshop with someone else to help them build that community. Particularly, when we think about you know, this is if we're, you know, this is new to someone trying to get them to have that, that connection to you know, what's being taught. And I know for myself, when I think back to, you know, my earlier days, my very first one, I went by myself, and I was like, Oh my gosh, what is this? But when I went to my second one, I went with a colleague. And so now, you know, I'm able to see how this information or this content is going to play out. You know, we could talk about, Oh, I see how I can use this in my day to day type thing. And so I really do think that trying to you know, make it so that it is community driven for participants to get involved would be the best route to go and I'd say I might be biased but that's definitely the way we do it at the carpentries and so far, it definitely seems to work from both, you know, both perspectives from the instructors standpoint, as well as from the learners.

S Steve Crawford 1:14:57

Okay, thank you Now

M Malvika Sharan 1:15:03

Yeah, deeply resonate with what Monica and Shearer are saying. And I would actually plus what what they're saying, because I'm part of the corporate VC community, and there's a deep sense of belonging, mostly because the training materials, they exist everywhere. What carpentries does differently is to teach people literally hold their hand through the problems, help them debug it. And I think that process also what Charles said, the sense of belonging, materials are probably not sufficient for that there are lots of books exist, and you all are also building on existing material. So it's not the lack of material that we're trying to fill. It's the lack of engagement that people need. So I know that there are some are schools planned for delivery of these, which will hopefully be building that kind of momentum. I know it will lessen whether the senses are involved, which are doing four months long cohort. And the reason for four months is exactly that, to build that sense of belonging, to get them to understand through each other's lenses. So I think Mulk needs to actually think about what is Moke doing in terms of building, building that sense of that you're being cared for? And the reason why I was saying, my earlier comment, when I get comments about, oh, my thing doesn't fit here, I get really excited. I'm like, great, tell me, because they don't they care about it so much that they get to think about it, and I am there to listen to them. What would happen if they are taking chords online? And they have ideas and nobody's there to listen to them? How are we replacing that? I think one of the replacement is the kind of exercises that are coming along with it. It's not really just the content. It's just what happens as a result of it. So I think we really need to build on that. Sorry, Luna.

I Ilona Serrao 1:16:53

Oh, no, I'm just echoing the student experience, the overall student experience is what you're talking about.

M Malvika Sharan 1:16:59

Yeah, yeah, absolutely. I think in open science, particularly, materials are largely secondary, because open science movement keeps evolving. And these materials will be outdated very, very soon. And not to say like, you know, these work are not important. These are important. But I think we need to evolve these materials along with people and points that Monica and her were making, and we engage community in understanding and owning the responsibility to push forward their own community. And, yeah, that is really important.

I Ilona Serrao 1:17:33

Okay, thank you.

D Diana Ly 1:17:42

Give me alone. I think you had one more slide if you want it to go through that.

I Ilona Serrao 1:17:46

You know what I think we've I think we're good here. Because it's just going to keep going and dive in on the practice part. And what my takeaway from everybody is, the practical side of this is, it's not really the gap, the gap is the culture part. It sounds like trying to bring in and talk to people about the sense of belonging, really trying to identify their tribe, that sort of thing. And so I think it's just going to is that correct, guys, like I'm a big takeaways is, you know, the practical needs expansion, no question like, you know, I got that, that it doesn't there might need to be the practice of open for results, like these things may have to stand alone. I'll talk to the authors about that. But my most, you know, this last takeaway in capturing is around. And really, Jim, what you started is around the culture of open science, and at the individual level, and at the community level, and really trying to enhance and focus on that culture, the sense of belonging, and the community, the best practices, Fernando, that you mentioned, that shell had gone through already. It sounds like those are the big things that you want to see training around more so than the implementation of the task of deciding which repository to use. Is that a fair takeaway? Or did I oversimplify that?

F Fernando Perez 1:19:20

I see some nods and thumbs up. So I think it's both right. People do need that people do need guidance on how to do the practical things about where to put my data and whatnot, because otherwise they're left like well, okay, great. I want to do this. And now what, so people do need to know those things. But it needs to be framed in the context that you can do all that and if you have a toxic environment, and a place where nobody wants to come, it'll be for nothing, right? So in a sense, it's not an either or it's both. Both are needed, right? The car doesn't go anywhere with the right hand wheels only or the left hand wheels only. You need wheels on both sides.

I Ilona Serrao 1:19:59

Okay, Thank you, Fernando. Okay. Any other parting thoughts? I don't know if there's any other hands up any other parting thoughts, big takeaway. Also any references of things that you want me to go look at? Definitely put them in the chat. But any other final thoughts before I hand it back over? Okay, hey, thanks for your time, everybody and your input, it's been really useful. No, we'll see what we can do to make it happen.

D Diana Ly 1:20:35

Thank you a little note for coming back on this morning to talk more about, really appreciate your time and doing that. Yeah. All right. Did anyone have any questions on the badging and training portions? Before I turn it back over to Holly?

M Monica Granados 1:20:55

I have a quick question. What? Oh, sorry, she put her hand up first.

1:21:01

S SherAaron Hurt 1:21:01

So I'll go right here. Monica, you were going?

M Monica Granados 1:21:04

Okay. Thanks. Real quick, um, do you have plans for like tracking the like, reach of people who, who like teach it as part of getting trained through the carpentries. And those that may just like take the material and teach it sort of outside of this framework? I wonder if, you know, it just would be, I think, pretty powerful to see how far reaching this this could be for, you know, for future years future funding, etc?

D Diana Ly 1:21:38

Yeah, we would love to be able to track that. And their only way of tracking right now is if the learners go back through the MOOC and take the assessments for the badging. Otherwise, we won't have a way to track unless, you know, someone is knowledgeable and knows this better than I do, and can give us some feedback on that. But that is our proposed route right now.

M Monica Granados 1:22:02

Yeah, it's worth, it's worth at least thinking about, like, is there some self reporting that people could do? You know, like, I like, like, I took the, you know, I took the training or, or I, you know, I taught the course here, or I taught the course there, of course, that's going to be, you know, biased, but having opportunities for people to report that so that you could have some numbers to Yes, we

D Diana Ly 1:22:24

have sorry, I'm sorry, we do have a post workshop survey. And so that is what another way, folks could, you know, give us feedback and another way to track but it's not the official, I mean, we'll we will have it, but it then, I guess maybe that's like a different tracking system, then, for our learners, you know, to get their badges. And I guess that is one other way with the post workshop survey.

G George Churchwell 1:22:49

But then also, just I'll just add to, to add into your comment there, Monica, that if a person taught this class IoT path in the MOOC, where they don't have to take the MOOC itself, they would take the assessment, or their students would take the assessment, we pick the data up there, I would hope that anyone teaching would be one that passed the assessment, that would be the best example to present. So so they would be in the system already. Yeah. They could schedule events with us.

M Monica Granados 1:23:30

I think that's a really good idea. That's a way that you could kind of capture that because for example, you know, I could go in and say, Hey, I really like module two, there's an opportunity for me to go teach it a way for you to capture that. And you could then advertise that, you know, it's being it would be beneficial to me, because maybe I'll do more registrations, but it's a way for you to capture who is using that material. And let me tell you from Creative Commons perspective, that's really hard to do. We've been trying to get an idea of like, you know, how are people using our licenses, and that's, it's really hard to track without privacy, infringement, infringing infringement. So I do recognize it's hard to do, but to think about getting those numbers and thinking about it ahead of time, so that you can report back out and show your success really.

G George Churchwell 1:24:13

And the the learning management system will have the most up to date content for anybody that wanted to teach. So it'd be the best place to come because other things might be generations back. It's nice, I'm telling, but definitely the LMS will have it, whether you're Moog or Lt.

 Chelle L. Gentemann 1:24:33

Monica, I wanted to follow up on your question and actually asked Cher, since she's here, you know, I think the carpentries in some ways, has a really good example of how they do this. And I like to ask her sort of what are some of the some of how they do this and what they find works and doesn't work and what they're, you know, their approach to sort of figuring out how the content is getting out there and who's using it. Oh,

S SherAaron Hurt 1:25:02

thank you this kind of aligns with what I was wanting to inquire about. So generally with our, with our material, especially for in the instructor training site, so you know, the instructors, they go through the two day or four day intensive curriculum. And so then from there, they're then qualified to teach our carpentries workshops. And so from there with the carpentries workshops, they have the curriculum, and we allow them to self identify. So once they become a carpentries, instructor, they've gone through the instructor training, they've done the additional steps to officially be certified, they now are able, you know, under the carpentries,

umbrella to go and teach whatever material so we allow them to, again to self identify, and say, Hey, I'm skilled in this. So I then want to go and teach that. And so that's kind of how, for the most part, how we allow our community to, you know, use our information, particularly for our centrally organized workshops. And those are workshops that we put on that the carpentries are responsible for, we do have workshops that the local communities put on. And with those the local communities, they're able to kind of do whatever they will or mix and match the curriculum. However, for our centrally organized workshops, those that people are coming to us to put on those workshops, we do have a standard curriculum, in which we require the instructors to teach certain portions of that curriculum. And I think, and I wanted to know show, did that answer the question or is there anything else that you want me to explain?

Chelle L. Gentemann 1:26:57

So share? I know that as part of the workshops, even I think the ones that are not the carpenters organized ones, but the volume, you know, the other ones, is that where, because I know that you often have the pre and post surveys, is that where you get, you know, some of that tracking information from other groups.

S

SherAaron Hurt 1:27:19

Yes, so all of our so for every one of our workshops, that we know about it, because there are several some that people do that we don't know about. But when they use our workshop website, the, the pre and post surveys are embedded in that. So that's where we get our data. And we encourage our instructors on regularly to encourage the participants to you know, complete those surveys, because it is definitely important for us to see how the programming is going but also for those instructors to get that professional development. Perfect. And I think my question, or along the lines of what Monica was, was stating was, you know, with the badging, like cross badging, if you will, is there opportunity for that or just thinking about, you know, within the carpet trees, if they I know for centrally again, for certain workshops for us, you know, there are certain things that have to happen. However, you know, as people go through, as tops, the tops community go through our instructor training, they may be going through just with the intent of, hey, I'm really only doing this to do tops, I'm not necessarily doing this to be a part of the carpentry community. But being able to showcase that, hey, you know, even in tops, I'm, I'm carpentry certified, or I've, you know, I've have some, you know, I've gone through carpentries to kind of help spread that, you know, to spread the work that we're doing here at the Carthaginians. Just curious, is there. Is there talk or any opportunities there for that?

D

Diana Ly 1:29:09

Yes, definitely. Those are the discussions I'm having with Alicia at the carpentries. And she and I we need to go through those details that our instructors may not be carpentries certified as in part of the carpentries instructor community, but that they will be tops open science 101 certified so that they can start teaching the open science curriculum. Yeah, we just need to figure out those final details on what that actually looks like. All right. Turn it back to Holly.

Holly Norton 1:29:46

Thanks, Diana. I'm going to have everybody take our break now. This was a really great discussion, everybody and I really appreciate everyone weighing in. We are going to take our break till 145 Eastern so just Under 15 minutes and we're going to come back at 145 Eastern for our community forum. So everyone have a great break and we will see you then?

Chelle L. Gentemann 1:32:06

So, we just started the recording. So I'll start again. Hello, everyone and welcome back. Amanda Adams from the tops Project Office is now leading a one hour community forum. And we wanted to ask Amanda, we had an IO tool going, we can put a link to the IO tool in the chat. And the I O tool is a way for anybody from the public to so anyone on any of the participants who aren't the panelists to submit questions. And Amanda, would you since we've had it going for the rest of the forum, would you like us to reset that for the start? Since we've had that going for the rest of the panel? Would you like us to reset the questions for the forum right now so that as people add them up both, we can get that in real time.

A

Amanda Adams 1:33:02

I don't think it's a surgery said it Jacqueline on our comms team. Because we've not met Jacqueline, she has been monitoring the IO till the whole time and pulling them into a document for me that I can live read live from to you guys. So I think we have a system worked out or to take care of that. That's okay.

Chelle L. Gentemann 1:33:22

That sounds great. So that so there's really not going to be any interaction unless somebody is able to get it up vote because I have been worried that the questions might have been old but okay. Do you want to put the questions in the chat also, because sometimes people have an easier time reading the questions than hearing them?

A

Amanda Adams 1:33:40

Yes, we can. We can do that. We can put it in the chat as we pull them up. And there. There are not many in the our tool right now. So I'm not I'm not concerned about losing any.

Chelle L. Gentemann 1:33:52

Okay. Perfect. I'll hand it over to you. Thank you.

A

Amanda Adams 1:33:56

Sure. Thank you. So to start out with we have someone asked me, the NSF proposals come with a periodic review component during and after the proposal period. Can this be used to add

checks for progress of compliance? This can be used to add checks for progress and compliance with a selection of open science standards appropriate for that project? Is NASA looking into something similar for its proposal calls? Amanda, Jacqueline has posted that note taking

Chelle L. Gentemann 1:34:26

a moment to introduce yourself and then who were the questions directed at and are you going to be asking the panelists to answer them? Are you asking our team to answer them? Can you just take a minute to sort of situate us please?

M

Monica Granados 1:34:40

Sure no problem.

A

Amanda Adams 1:34:41

So my name is Amanda Adams and I work on the top project team at Marshall Space Flight Center and I am the Communications lead. So I along with Jacqueline stars, who is on the call. We work doing communications for for tops citizen communications strategy, running the newsletter and having the presence at different conferences and you'll be hearing more from me tomorrow when I present the comms plan. And when I co present with Paul, our comm strategy for 2020. For the as far as who these are directed to anyone on the panel that is willing to participate and answer, as well as anybody on the tops team, there's I don't think this specific to a specific person for these questions. So with that will open back up, and I think maybe Steve, our shell might be the best person to answer about is NASA looking into similar process? As NSF for proposals?

Chelle L. Gentemann 1:35:53

I so this is shall so the question, again, is about whether there's a periodic review component sort of, during an after the proposal period that can be used to add checks for progress on compliance with the selection of open science standards. So what NASA does, and I'm not I'm sorry, I'm not as familiar with the NSF process. So Steve, do you want to pop in here? Yeah, sure.

S

Steve Crawford 1:36:19

Well, I think I can take this question. And so NASA does have a check on their proposals, which is the annual progress. That is actually when people should actually submit what you know what progress they are making and, and what products they are producing during the the process of their scientific work. There's also a final closeout report. However, on the overall specific act of compliance with open science, we're still investigating and looking into what that means for NASA and how best to implement that. That there are different groups, which are specifically looking at certain specific activities. I'm thinking particularly like BPS with Gene lab

and Task Book, which provides kind of a machine readable or actionable way to track the production of scientific products. But we're still in the process of of actually kind of taking a look at and what might be meaningful to implement there. Especially as we look across the full SMD. And across our different directories. Right now, at least with the implementation of SPD for you and a or scientific information policy, will you we probably won't have any further guidance on specific compliance checks or other activities like that before 2025. So we do want to make sure that we consult with the community, and also take a look at what the different options and best practices are.

Chelle L. Gentemann 1:38:02

Thank you, Steve. I also want to add that so NSF has the review performance progress report, the RPP are. And there are several other agencies that use this as well. And my understanding is that this is one of the ways that, you know, they find out what people have done, and that this is going to be updated in the next few years. There's a certain schedule that it's updated in. And this has been a topic of discussion in the subcommittee for open science is that maybe there'll be some agency coordination around? What might be asked in some of those in future iterations of the RPPR?

A

Amanda Adams 1:38:50

Right, thank you. Our next question from the IO tool. It feels like there is a very active debate around large language models and open versus closed, is NASA engaging here? Say, would you be able to click that one as well?

S

Steve Crawford 1:39:06

Yeah, large language models and things like general AI are really timely topics right now. One of the things that I will point out too is we recently funded the agency to conduct workshops and meetings on ethical use of AI. And they recently produced their report on that. Which, if I can find it quickly, I will add two links in the in the chats. And so that's something to look at. We're also internally looking on and experimenting with the use of different types of generative AI. But within that context of looking at what is the ethical use and appropriate use within NASA and so there There's actually several different projects that we have going on including Space Act Agreement with IBM, that are actually going to be looking at these and taking a look at where and when, and how to actually appropriate use use them. Obviously, we have a very big need in terms of information that NASA produces needs to be of, of the highest quality, and if and we have an incredibly important aspect of trust in, in, in NASA and provide. And so before we actually make use of of things like ln M's or other tools that we do actually want to make sure that we're using them in responsible ways that do not diminish that that need for a high level of accurate information from NASA and the Science Mission Directorate. Thank you save

A

Amanda Adams 1:41:04

any follow up questions on that, please submit to the I O tool as well. I will go ahead and move forward with our next question. Are there any emerging trends or innovations within the field of open science that you find particularly exciting or promising?

open science that you find particularly exciting or promising?

Chelle L. Gentemann 1:41:21

I would like to open that up to our panelists. And I can't see hands. Malcolm, do you see any hands?

M

Malcolm Glover 1:41:46

Yes, we have Qiusheng

Q

Qiusheng Wu 1:41:51

showing, yeah, I can provide more like on the Python side. So there are definitely some new exciting projects is the one that makes Fernando mentioned yesterday, the Jupiter light that makes it really easy to develop to be the novel and deploy on the web, they may use scalable, because you can deploy as basically a static website, and anyone can use it. So they will make to anybody on how to grow is as long as they have internet access. And they also some other new development in the Jupiter lab, and also, more recently, package called Solara. So I've used it, it's basically a package that allow you to develop interactive web pages using Python. So it's more like a better integration into the Python ecosystem. And then you can create wetlands makes, it really makes it accessible. So you can develop novel and deploy on the web. And then other people can try all those intelligent web, you can also embed on the website, so potentially introducer for the tops curriculum, right? If they have any of those, we can also do some notes wherever they allow people to utilize them without having to install anything on your computer. So those are some of the things that I'm aware of some of the ipython project that I personally feel quite excited about. And other penalties may have other things to it. Thank you. Thank you, shushing, we also have monitoring. I'm

M

Monica Granados 1:43:25

sure we're all going to speak to our particular areas of expertise or love. So I'll speak to the Open Access side. Creative Commons actually just published and I and cable Korean just published a blog posted in the chat about all these calls for open access in a way that we have never seen before. On the heels of the White House announcement, the Nelson memo that NASA is very intimately aware of and, and active in. But it's not just happening in the United States, there's been, you know, calls from the European Council as well. And not just it's not just for open access, but it's for immediate open access. And the other thing that's like, really exciting, is really pushing for support for community owned and publicly owned infrastructure. And that's something that we haven't seen before. It's like the messaging is finally getting through to decision makers. And I think that is really exciting from the Open Access side. And so you can see a little bit of what we talked about. And it just seems like there's more and more announcements every day. So that's my, that's my contribution to that question.

M

Malcolm Glover 1:44:40

Thanks, Monica Malvika.

M Malvika Sharan 1:44:45

Yeah, yeah, absolutely agree with that. And I'll bring my community hat and say I'm really really excited. Very similar to what Monica said that open science isn't really open science that it used to be it is now which the people and They are reimagining it in different contexts, different parts of the world. Maybe I'm a bit biased, but I see that people are using it in their own power to dismantle hierarchy and dismantle different power dynamics that they operate. I think research system, a culture, we're seeing open science as a huge, huge tool for shift in how people demand better access, demand better assessment for their contribution. Also ask for better reward and incentive system, people are building new career pathway because of open science, too, there wasn't any opportunity before for people to enable that process, because we assume that researchers are unicorn and they will do everything. And we become a lot more creative in the ways that we collaborate. So the collaboration beyond border, is there something that I'm very excited by, I think we all would be talking about different things that we are doing. And the program that I'm part of OLS, where we have seen about 200 projects from six continents with over 80 countries, where people have taken open science and build their own communities, and they are educating their own members own teams, and lots of people from different levels of hierarchy are becoming open leaders. And that's really exciting. We also see that funders have now decided to fund infrastructure in the global south owned and led by the Global South, bringing equitable collaboration with existing experts from all around the world. And that that is really encouraging to see how we are really dismantling the barriers that used to access.

M Malcolm Glover 1:46:42

Thanks so much. We have Jim. Jim, you're on mute.

J Jim Colliander 1:46:52

June 17 1948, just about 75 years ago, next week, was the first patent for the transistor. The second patent for the transistor was on June 26. Because Shockley was ticked off at Brett Chang and bread Dean for going ahead and patenting. And then the month thereafter, the invention of information theory, and the chronicling of the notion of a bid with Claude Shannon's work in July of 1948. So we're at the 75th anniversary of the digital era. And I think it set the stage for a lot of what we're talking about, because the digital era has changed the way that we can share information, following you know, the invention of Gutenberg Long, long ago. And so the highlight that I want to talk about next for something I mentioned yesterday, I am perceiving a pattern that Fernando and shell and many of us have talked about before, as these kinds of digital villages that gather around a data lake and collaborate on science in new ways. This pattern is happening across many different communities. And one emerging pattern that I mentioned yesterday that was really exciting is that the communities are becoming more multi stakeholder and less just academics. So the ideas that take place on data driven research can propagate much more quickly into societal benefits than what was happening previously. I think knowledge through the PDF era and the paper era before that propagates through the diffusion process. But the era of open science is creating convection, possibilities for knowledge

to move from the inventor, creator team quickly to the area where those ideas can apply more rapidly. And given the challenges we're facing. I think open science has the potential to unleash the benefits of science much more quickly than what we've seen in the prior eras. So I think aligning this open science future of rapid changes to society with kind of the Artemis generation that's kicking off at NASA right now is also a strategic opportunity for for Topps by getting the kids that are going to be really excited about the upcoming Moon and Mars mission to also see the benefits of science that are taking place. You know, I was a kid of the Apollo generation and I was inspired in my career because of that, but I think open science and Artemis is also a tremendous opportunity with this era of convected knowledge

M Malcolm Glover 1:49:35

thanks so much we have Logan

L Logan Kilpatrick 1:49:41

Yeah, for folks who who don't know me, my my day to day life has changed over the last eight months. I basically spent all my time thinking about large language models and I've been fortunate to talk to a lot of people recently about the impact of large language models on research and specifically how Like, the movement of open science, intersecting with large language models is like the perfect opportunity to actually deliver on like the idea of like, just because something is like, openly accessible doesn't mean it's like actually possible for someone to like, take it in that knowledge and like take action on it. And now you can sort of have all these layers on top of all of the open research that's out there and be able to, like ask really simple questions and have large language models, like do that analysis of all the papers that are out there for you. And I've seen so many cool use cases. And I've been playing around with a bunch of the stuff that people are building. And I'm so excited about this. So if, if anyone else is seeing cool tools or wants to chat about it, we'd love to, we'd love to talk more.

M Malcolm Glover 1:50:49

Thank you so much, Logan, I think we have Brian next.

B Brian Nosek 1:50:55

There are two things I'm particularly excited about in the open science space. The first is the expansion and innovation in peer review across the research lifecycle. So projects like pre review that Monica is a part of and PCI peer community in the registered reports of publishing model, these are all looking at ways that we can make evaluation of research part of the actual research lifecycle rather than just something that occurs as a gatekeeper at the end of the process when it's too late to correct some of the challenges that occurred during in the planning and execution of the work. So that's super exciting. To see that innovation happening. The second is CO Ara, and a earlier movement. earlier stage movement Helios in the US. I think these were mentioned yesterday, but really to try to attack one of the fundamental challenges for getting open science to scale and be sustainable, which is adjusting the reward system. And so Cora is worth looking at, because it is as concrete commitments. It's mostly EU but not

entirely EU based here, I'll just put in the chat a link for rate for institutions to change. They're an update their assessment models, what do we value? How do we assess researchers to execute on what we value rather than on easy to count metrics that are not very functional. So that the maturation of that movement is critical for any of the things that we're talking about to become part of ordinary practice for research.

M Malcolm Glover 1:52:45

Thank you so much. Up next is Fernando. Fernando, I think you're on mute still. Okay. Still, still on mute, we'll come back to you. And we'll do Pen next. Okay,

P Pen-Yuan Hsing 1:53:13

thank you. Yeah, it's really cool to see all of the things that people are excited about. So I think the thing I like to share is the stems from one of the many things that stayed with me after our previous gathering lectus, which is a conversation, I think it was started by James on the concept of intellectual generosity. And I was reflecting on the flip side of that, which can be called intellectual humility, in that, if you really think about the scientific contributions that you have made, it's only possible as a tiny bit on top of, you know, your entire life's experience learning from what other people have done and shared. And this stayed with me, and it's kind of been brewing until it culminated in a recent conference that I was very lucky to speak at. And it's a, it's a holiday Open Research Conference, which I thought was really interesting because they kind of broaden the beyond open science, right? It's not just scientists in a lab doing science, but it's about doing research. And then one of the talks was given by a professor, I believe, at the University of Edinburgh, in Scotland, William Coltrane, and he was, you know, reflecting on him being a scientist, doing science and creating, you know, scientific outputs and how, you know, he wants to do in an open way, but on a higher level, right. He thought he's actually just, you know, a reader Switching to research producing outputs. And an even higher level is actually, and this sounds a little pretentious. But in this sense, I think it's true in that he thinks he's actually a thinker, doing lots of thinking and producing knowledge. And what was interesting was that this talk was also among some sessions, where, at this open research conference, they invited people from the social sciences, the arts and humanities, including Active artists who do a lot of creative work. And I thought it was fantastic having this interdisciplinary conversation, who I realized that, you know, beneath everything we're talking about, creativity and knowledge, is actually related to, I think, the original root of the word science, which is about creating knowledge itself. And knowledge is always build on what came before. That's why it's not just science. Now, this sounds very abstract, you know, and, and I suppose a question would be, you know, okay, if I'm from the physicist, if I may, astronomer, if I'm a chemist, you know, why do I care about, you know, this kind of level? And I think the reason to care is actually reflected in a lot of the conversations we have today, which, you know, we're so much of it is now based on, you know, the purely scientific outputs itself, whether it's data or code or whatever, right? It's about all the learnings that we're doing together, and how do we document and share that as well, you know, whether it's how do we govern? A lot of contributors to the curriculum that we're building together? What are we learning from, you know, organizing meetings like this, or the processes that we want to enact, to help us do more open knowledge? together? I think this realisation, at least reminds me that, even if I'm doing science, you know, if, if I do it, not just as open science, but open knowledge, then it broadens my imagination in terms of, you know, what kinds of knowledge should I

consider when I think about what to share? So I think there are practical inspirations here, as well. And I guess, coming back to your original question, I'm really excited to see a recognition in this in kind of open science circles, because you know, in the past, I've been to science meetings, and then there were open science meetings. And now so meetings are called Open Research meetings. And I think those kind of, you know, development, and broader recognition of open knowledge is something that I find really important and inspiring to me. Thank you.

M Malcolm Glover 1:57:47

Thank you so much pin. And I think we have Fernando.

F Fernando Perez 1:57:51

Trying to get Yeah. My audio does weird things. Sometimes I wasn't muted, but what are you getting, like a weird audio loop like that? Some weird I don't know. Just mute. Okay. Anyway, everybody audio. So to two things that I wanted to mention. The first is kind of a trend where we're not there yet. But I am beginning to get excited and optimistic about the fact that from many, many places in the community, there's a lot of really good progress being made on the tooling, the standards, the approaches for accessing data from the cloud, connecting it to local workflows. I mean, shell and Jim and others famous paper on science stone to the cloud can lead a vision for that. And it's the data side of that is, as we all know, super messy, super complicated. Many of you are involved with building some of those tools, building. I mean, it's huge and messy. And with geospatial data. There's a lot of complications. But I am I'm very excited that I'm seeing from various angles in the community that the tooling for that is starting to come together. We're not there yet. But it is starting to come together. And I think anyone who is working on that, I would say now's the time to jump in. If you have some spare cycles, learn about what's happening. I would say if tops of this program of this community can help organize a little bit of that conversation help us get our bearings, because sometimes it is overwhelming. Also, so much is happening. The pressure is so big. Everyone is excited about building pools. So there's we're kind of in that early phase of just explosive growth. The underlying machinery is good enough that everybody can try something. So there's duplication. It's messy, but but I am I am excited. I think the promise of having access to that of connecting the physical datasets to human and social datasets through semantic layers Is it is it fair group has done a lot of work in getting that community who works more around semantic data, connecting to schema.org so that in Paris pay It is very messy, very complicated. But I see a lot of really encouraging things I'm behind on learning, I can't quite keep up. But it's something that at least I want to flag in the sense of big picture trends that I think are important. And then on a narrower sense, a tool that I'm marginally involved with, but I feel it's fair to mention it because I'm only playing a sidewall that people doing the hard work or others, it's the the mist ecosystem. This is kind of derived from the Jupiter world. But it is being led by people in a to a to see people from curve, note row and kocot and Chris whole graph and Andreas Hollen and others. And it's basically years ago, for a long time, we kind of waited in the Jupiter world, that markdown would kind of land where we wanted it to be. And that conversation never quite coalesce the conversation of accurate around economic markdown, and eventually missed is a bit of an acronym around between markdown it's play a word between Markdown and restructured text. And the idea was, can we get the usability of markdown, the extensibility of restructured text, and a modern ecosystem, that is JavaScript in TypeScript and TypeScript based where web interactive publishing is a first class citizen, but which can produce static

artifacts, whether it's static HTML or static PDF, this ecosystem has maturing really rapidly. It's super exciting. This team is working with the AGU team on the notebooks now project to ensure that all of this produces the kinds of things that the formal, large scale industrial publishing community needs, the Jets outputs and all that, but also that we can use it alive in a notebook to do inline rendering with widgets. And like all of the toys that we want, that we geeky scientists wants for a future ecosystem of publishing that feels like it comes from the 21st century and not from 1985. Right, and yet, at the same time, then it can plug into the legacy in archival tool chains. And so I am a big advocate, I'm a big fan, I think they're doing amazing work. I'm kind of it's one of the things that I stay up late testing, opening issues, opening PRs, chatting with the devs. Because I feel like it is getting there. And I think it will be useful for many people here, we have a vision of replacing some of the legacy tools in Python with the ecosystem from here for publishing for API documentation. So Sphinx, Doc, utils, all of that. And it's even getting to the point where it can almost replace logic for many things. There is still logic engines under the hood in some places. But for the end user, it's getting really, really good. So we'd love feedback. I'd love to see what people do with it, where it doesn't meet your needs, so that we can work with the devs to make it insurance. Thank you.

M Malcolm Glover 2:02:57

Thank you for Nando and shell for those helpful links in the chat. A minute, we'll turn things back over to you. I had one

 Chelle L. Gentemann 2:03:04

question comment. I just wanted to follow up and sort of round out this conversation to bring it back to it a number of the panelists talked about before. I get a lot of questions from people about what is going on, like, how come it's this magical moment right now where we have 15 federal agencies that we have this a year of open science and all of these exciting things happen in open science right now. And I really think part of it is and what's been most exciting for me is the connection between not just open science, but equitable, open science, and this connection between and this recognition of the power dynamics that exist in the ecosystems and in the infrastructure that we do science in. And then how open science changes those dynamics change the power in the room changes and empowers more people to participate in science. And that what we've, I think, overwhelmingly, what I found is we are engaging with this more diverse community that people are incredibly passionate when they see themselves, like we talked about earlier with some of the panelists the sense of belonging that many of them have lacked throughout their career, and being recognized and having a voice and having a platform to speak from and to do science and being able to participate and seeing that you can participate. And that people are working to make it even more easier, even easier to participate. I think it's just resonated with me so much more than just a new tool, which I mean, all of the open science stuff is just wonderful, and I'm passionate about it. But it's that tie to equity that has really, I think been a transformation as sort of our ideas and our concept about what open science is and what it does and how it impacts science has, you know, really evolved in the past couple of years to include that equitable component.

A Amanda Adams 2:05:11

Thank you shall and thank you to all panelists for sharing useful tools. Our next question is

there are four priorities and NASA's open sets policy, including grants for research using open science tools. However, grants to support building open science tools have not been mentioned. Are there any plans to support such initiatives?

Chelle L. Gentemann 2:05:32

So I answered that in the chat yesterday, and I will find the links and put them back in the chat. But there are two in Steve slides, there were two separate calls that I put links to and descriptions up and I'll find that text and put it into the chat again. But yes, you know, NASA. And if Steve still on, he can probably talk more in depth about these projects. Steve, are you still there? And then I'll look for the links.

S

Steve Crawford 2:06:00

Yeah, especially the one to support open science projects, we actually have a solicitation which is open right now. It is a rolling deadline, or no due date, proposal call. And so it is always open. It's called high priority open science. It is a grant for one year to actually support kind of and seed innovative funding funding for innovative projects, which help advance open science. And so I'll just looking at the link for that now. But that is one to actually go ahead. And yeah, we'd love to see your proposals for innovative projects that would help advance open science under that call.

A

Amanda Adams 2:06:50

Thank you, Steve. Our next question, as various agencies move toward checking for alignment with open science, are they developing those standards with a range of compliance levels?

Chelle L. Gentemann 2:07:12

I'm sorry, can you put the questions in the chat as well? Amanda?

A

Amanda Adams 2:07:16

I'm sorry, I was working on that I was able to do it the same time once I have no problem. Okay, it's back in the chat. I'll repeat it again, as various agencies move towards checking for alignment with open science, are they developing those standards with a range of compliance levels?

S

Steve Crawford 2:07:49

Yeah, I'll take this one. Again. It's kind of similar to our previous conversation. We're still investigating ways to do compliance. And what are the best ways one of the things though we are very interested in is building on the existing open sights infrastructure. And so for example,

one of the things we are hoping to work toward is, for example, providing DUIs for our, our accepted award, so that they become sizable objects, this would hopefully then make it easier to actually track the data products which are being produced, the papers and the software that's being produced from it, by actually having the proposals as a site of objects, it's also then easier also to give credit to people who have written proposals. You know, we are limited in our resources in some aspects. And so this is where we do want to actually reuse existing tools and infrastructure. And certainly following existing standards, rather than inventing or reinventing new wheels to kind of solve this issue of, of how we actually track and develop different standards. There's also a lot of great things which are actually already tracking metrics and open science as well. And so making use of those, and and further developing them is part of our process of of how we assess how we're doing.

Chelle L. Gentemann 2:09:23

And I want to reference Jamaica's wonderful talk yesterday. So if, if the person who asked this question didn't see yesterday's presentations, I encourage you, we should have the recordings up within a day or so and some transcripts up. And once we have those up to review her presentation on how federal agencies work together through OSTP Subcommittee on open science and a year of open science. That's where because the question was sort of as various agencies move towards this, are there going to be a range of compliance and often So as things are new, there is a range of how they're approached from different agencies. And there is this effort within the Subcommittee on open science to align those, as agencies can, you know, as best practices, but you know, there will be fit for each agency, and then the alignment may be the next, you know, down the road. But they're always these conversations going on.

A

Amanda Adams 2:10:28

Thank you. And I think Jim has his hand up, Kim. Thank you.

J

Jim Colliander 2:10:35

I wanted to just connect this question to technology readiness levels. I think that the TRL provided a collection of milestones or stages that allow one to see how a research advanced moves towards something that has operational impact. And the TRL, therefore provided a structure that allowed for researchers to understand technology readiness. And if we think about the conversation that we had previously about the open sights, core, and conversations yesterday, wherein, you know, leading scientists are trying to figure out how to make their science open, they may appreciate the values, but how do I actually implement it? So I think embedded in this question is a really good call to action. For NASA tops and the federal agencies. Can you identify a collection of milestones analogous to the TRL levels, that will allow instructors to batch their practices around different projects, as you know, open at level yellow or Open Level green. And if you can qualify what it means to be open with a series of gradations? I think it will help everyone then figure out how to provide the appropriate training and the appropriate structures and mechanisms to push people forward towards this equitable vision of science.

S Steve Crawford 2:12:07

Thank you. Thank you.

Chelle L. Gentemann 2:12:08

I see Monica put a great link to a great paper in the chat.

A Amanda Adams 2:12:17

Thank you. Anyone else before move to the next question? I don't see any other hands up? I don't think. Yes. Okay. Our next question is, what is the procedure? If I want to collaborate with NASA open science for research? Is there any documentation on this?

S Steve Crawford 2:12:42

I know, we had mentioned this one, earlier today as well. But it's worthwhile to repeat it. As we especially under the tops, development of additional curriculum areas and pathways. You know, this is something you know, we are trying to adopt open development, best practices and enable more collaboration on the the tops GitHub site, there is a kind of forum for contacting us, and expressing your interest in getting involved. And so that's the along with the GitHub discussions on the top site, as a way to actually start further discussions. And those are both ways to actually get in touch with us further. And, and we are still in the process of setting up some of these aspects. And so, you know, please do be patient, but we do hope to actually provide more ways to collaborate with us in the future.

A Amanda Adams 2:13:56

Thank you, Steve. Our next question is for all panelists, how can open science facilitate interdisciplinary research and encourage the integration of different scientific fields? And I'm posting that in the chat as well? Sure,

S SherAaron Hurt 2:14:17

yeah, I think with the carpentries you know, with our curriculum, we are always looking to update and keep it up to date with what's happening, and, you know, industry and so finding a way to ensure that, you know, if there are new, you know, new things that are happening, you know, with with our curriculum, being able to have some type of platform to share and say, Hey, these are the things that are that's happening and, you know, for us to be able to update our curriculum accordingly, to ensure that we are up to date with what's happening in industry. So for us, ensuring, you know, curriculum update for us and ensuring that what is the you know, the conversations and things that are being taught in industry is what aligns with what we're teaching our learners. Thank you. Sure, Monica?

A

M Monica Granados 2:15:10

Yeah, what a question. What a question I like, I think that's the that's the promise of open science, that we believe in it, because it's going to let us do science better and help us collaborate. Both. Because if we, if we make our science easier to find and to use, it's just more likely that people will build on on our science. I'll pop another paper in the chat from Aaron McKiernan, who is a professor it went on and also works with the open research funders group, who was kind of looked at these questions, looked at how, and unfortunately, most of this is like kind of anecdotal at this point, that, you know, when people post preprints, when people post their data, there is evidence to suggest that other researchers who are interested in your work will approach you to collaborate, will add to your data, I certainly can also speak from my experience on propri review, it's really neat to see when we are collaboratively reviewing a preprint about a model organism or model system, and seeing the different labs that also work on that system, come to the discussion, and infuse their expertise into this preprint to make the manuscript better, even though it's not their publication, but it's their model system. And so they'll come and help this manuscript be better. And now they've also made a connection with the authors of that preprint because they're they you know, they've they've collaborated on making this preprint and then ultimately manuscript better, but also connected, because they're both working now on the same model system. So there's a lot of anecdotes on how just by simply opening up your research, it can help with with collaborations.

M Malcolm Glover 2:17:13

Thanks, Monica, Brian.

B Brian Nosek 2:17:16

Two examples of how open science can help with this. The first is the data, to the extent that it's shared can be reused for purposes that the original researchers would never even have thought of, which really can accelerate translation across disciplines. For example, before I was at Center for Open Science, I started an organization called Project Implicit that has a website where you can measure your implicit biases. And millions of people visit the site every year. And we've put all of the data up on the Open Science Framework. And now there are many hundreds of publications not just by people who study implicit bias, but now who can apply it to lots of different problems, political scientists, and economists and others, that just never would have happened without sharing that data publicly. And they're asking questions that our team would never have thought of ourselves, because it's not in our disciplinary expertise. Second thing that open science can really do to facilitate interdisciplinary work is to break silos that are a function of language differences. And of course, language of actual different types of languages is an important barrier. But there's also just the style of language for talking about similar concepts that occurs within scholarly disciplines. And it just takes a little bit of openness for people to start to have a conversation and realize, oh, what you call treatment conditions is what we call arms is what they call experimental manipulations. Okay, we're talking about the same idea. We just didn't know how to talk to each other. So open science is really making it a lot easier to start to create some of those translations so that people can recognize where there are points of connection so that they can start to build new ideas together. Now

M Malvika Sharan 2:19:19

Yeah, I'm gonna build on previous answers, because I definitely agree, I think the biggest motto of open science is to really break down sector specific silos and country specific silos. I'm going to send some links in the chat. So I am part of my senior researcher at the Alan Turing Institute, which is, which is the National Institute for data science. We have existed for about seven or eight years now. And we have received millions and millions of public money. And one of the promises that we're making is that we are holding our space as a convening power and open science is a way for us to do that. Listen Clean. We published a report from five years program called AI for Science and Government under environment and sustainability really featuring all the technology that are building on each other. I would also share some exemplar. But I think one of the examples that I would share that I really, really love, there's a project called sai vision, which was built initially to analyze satellite data. This particular research group adopted molecular biologists who was doing microscopic study, and deployed the technology in studying microscopic data. They also worked with phytoplankton researchers to deploy technology, which was initially built for satellite underwater in the sea vessel to understand how do we build a study where we can understand underwater environment, which are ideal forever underwater rent. But then someone took this technology from PhD program and deployed it to understand the in habitat for founders and polar bears in different parts of the world. So it's really like it's really mind blowing, what open source could do if we could just allow people to build generalizable tools, how much money we can save, first of all, but also thinking about people deploying them in different parts of the world where it was not developed, because they didn't have the capacity to because of resource limitation, or the kind of question we are asking, we just really open up the technology to absolutely different things. I can share a lot of detail about the second example that I'm going to give but I have been involved in funding proposals, where stakeholders from different parts of the world, especially lead led through the Global South context where people are studying a lot of infection, different kinds of infection, where they're deploying algorithm developed in different parts of the world, for different purposes altogether to understand infection and how to mitigate challenges that appears due to outbreaks or to make and I think we need to really appreciate how not open source and open science are allowing these transfer from one sector to other. So interdisciplinarity is amazing. There are lots of examples that exist. And I know shells team have been doing a lot of curation, curation of examples from within NASA, where people have taken same technology and applied somewhere else. And I really love the story Fernando had told us in the last panel, about matplotlib, matplotlib was probably not developed for satellite data analysis. So I am really, I would love for this conversation to go on for the entire week, because these stories are really inspiring. And if we can tell these stories, we can really get a lot of people to work with us. And of course, we heard about language barrier that open science can dismantle and where people are localizing all these materials and documentation and practices in their own context. And we couldn't do it if someone hadn't in the first place. Put that up in the internet. Thank you so much.

M Malcolm Glover 2:23:10

And I think you're still muted.

P Pen-Yuan Hsing 2:23:14

Sorry, my bad. Can you hear me now? Okay, yeah, thank you. Malika, very comments, I can really relate to that, especially when it comes to sharing the stories. I'm going to live a little bit off of Brian's comments just now about, you know, when you do open science, other people can

on of Brian's comments just now about, you know, when you do open science, other people can imagine uses of what you share in ways that you have never imagined before. For example, I shared a link earlier today in the NASA top slack workspace about and this is completely random, I stumbled upon this New York Times article from 1990. And it chronicles a lot of interesting, non open science failures within NASA over the past couple of decades up to that point. And I mean this in a really positive way. In that, wow, you know, if those people had more, you know, open science practices in mind, a lot of their work can be made so much more available for you to build on. And one quote from that article is, again, this is decades ago. So the wording I think, is not as inclusive as it should be. But it says, you know, one man's noise is another man's signal. And I think that's a really interesting point about, you know, very imaginative, creative uses of work that your original originator might not have thought of. And I just like to try to zoom in to what they will love to see when we start to recognize this kind of interdisciplinary outcomes on one level. I love that. Topps is collecting open science stories, because these are opportunities for us to highlight and lift up You know, amazing stories of interdisciplinary work that happens, even outside, you know, of the sciences. But even more specifically, what I would really love to see are for the people in power, whether that's people doing assessments, where people giving out funding, to recognize the importance of interdisciplinary work, and give that space and support. Because, you know, one of the hats I wear allows me to interview a lot of researchers for the word about the work they do. And as I hear so often from them, that they may have a really cool, you know, interdisciplinary idea that will make use of open science practices. But when they talk to funders, those funders who say, Oh, you know, your thing doesn't fall under the remit of what we fund, because we find it very discipline specific thing. So your interdisciplinary thing, you know, we can't fund it, and they just go to so many funders, and they can't find support for the work that they want to do. So I think the specific thing I would love to see as for, you know, the people in power to recognize the important interdisciplinary outcomes that can come from doing open science. Thank you.

M Malcolm Glover 2:26:16

Thank you pen, and we have Fernando.

F Fernando Perez 2:26:20

Thank you, I want to read a little bit on on comments that Brian made about the disciplinary language barriers and how it breaks them down. And it made me realize that this doesn't address the point Penn was just raising now, which is absolutely valid and critical. But it's going to be at least the other side of the problem is a big one. And not every thing has the same solution. It made me realize that one of the ways in which I think open science, the availability of both materials, but also of tools, makes this really critical difference in breaking down silos is that it allows me if I am interested today, if I am interested in a method that I find in a different community, and they've made their code and their tools available, and I can just click on, say the binder or download the code and the data for a paper that sounds like that method might be interested. And I can run their stuff, even if I don't know, specifically the domain. And then I can play with it a little bit. And I can copy it over and see if I can tweak my data into working with that. At some point, maybe I will then email those people and say, Hey, maybe Can we talk? Or can I ask you some questions? Can we collaborate? But the barrier to do that is so dramatically lower than what it would have been? If Well, first of all, I probably wouldn't have seen that paper published in a journal that I would have never read if it wasn't available through these more generic common channels. And second, there is no way I'm going to simply

call the email or research in a completely random different field, right to ask, do you think you're thinking it can be useful for what I do out of the blue? And no, of course not. You don't do that, right? You simply don't nobody does that. Because you probably want to give it to get an answer. And we're all too embarrassed to do something like that. But the existence of this open foundation that we can just grab, pay, play with test and begin to tweak and modify, opens that door. And then you can engage that conversation. First of all, if it makes sense, because it might not make sense. And then you're like, Okay, I'm done. This didn't work out. And if it does make sense, you come to the table with something we're now talking and perhaps collaborating and working together is realistic and viable. And it was I hadn't seen that. I mean, I guess I've lived it, but I hadn't really seen it crystallized like that. And so thank you, Brian for like making the kind of see that. That connection. And I think it's an important aspect of how open science is the practice of making the tools of it's the combination. It's the reproducible the open reproducibility, part of open science that has that interdisciplinary it like language and social barrier breakdown effect that I hadn't quite seen like this. So anyway, that's it. Thank you.

A Amanda Adams 2:29:03

Thank you, Fernando. And thank you to all of our panelists today for answering questions. And thank you for those in the audience for submitting questions as well. That is brings us to the end of our time for a live q&a session today. I do want to acknowledge that I see a question about diversity and inclusion in the IOE tool. And I would invite you all to return with us tomorrow as well. Our Malcolm will be presenting on our diversity inclusion efforts. So we'd love to have you come tomorrow back for that session. And Holly, I will send it back to you. Thank you all.

H Holly Norton 2:29:38

Thanks, Amanda. So we are up against another break. So everybody who has contributed thank you so much for your questions and our panelists and our tax team. Thank you so much for engaging and sharing your incitement there. So we will be back in 15 minutes. That's three o'clock Eastern Time. And we will then go to Paul, who is going to be giving us our open science 101 rollout for year one and beyond. So we will see everybody back here in 15 minutes. Thank you Okay, it is three o'clock. So we're going to move on to our next segment. But before we do, I just want to make sure we have Paul back. So Paul, are you back online?

P Paul Bremner 2:30:48

I am, I'm getting my video cued up right now.

H Holly Norton 2:30:51

Great. Thank you. And whenever you are ready, we can move into your open science one on one rollout you're wanting beyond.

Paul Bremner 2:31:03

Hey, thank you.

Chelle L. Gentemann 2:31:05

Thank you for being flexible Paul, like he was before the coffee break. But then we decided that this conversation with Diana and Ilona was so great that we wanted to let it go on. So we popped him back and he was really flexible. So that's why it's a little bit different than the agenda. But thank you so much for being flexible Paul.

Paul Bremner 2:31:24

No worries. Thanks. Next slide, please. Great. Yeah, so thank you, everybody. I guess I didn't fully introduce myself. So I'm I'm Paul Bremner, I'm Project Scientist over at the project office at Marshall Space Flight Center. And what what my team is responsible for is really the logistics and the rollout of curriculum, and really the implementation of of trying to make trying to get all of this out into the community. So Diana's team over at Ames is responsible for the curriculum development, and we're responsible for, for getting it out to the public. And so there are two, two different, two different pieces to this. And I'm going to split it up into our year one, which is calendar year 2023, is our first year of open science. And then there are our goals that we have for beyond 2023. So 2024 and beyond. So for for year one. There's there's a couple of a couple of goals that we've got in some of this gets down to specific numbers, but I don't want the numbers to to cloud the the overall vision the overall goal of creating a normalized practice of open science and all that it that it brings. But our year one goals are really can we get 1500 of open science one on one badges are first badges issued, can we get 1500 Open Science 101 badges completed, and that includes all five of the Open Science 101 modules. Another another key thing for this first year of open science is to really spread the word to advertise build momentum for the curriculum, and really build up excitement for open science in general. And there are three different strategies that that we've outlined in order to reach these goals. And I'm going to break down each one of these. So we have attending society meetings during during this year. We have the online curriculum, and we have tops T activities. Next slide, please. Great. So here's the first one. So during this year, we have been attending and will continue to be attending quite a few society meetings. And the real purpose is to get get the ball rolling. We are advertising a lot and the discussion yesterday really hinted at the success of that so far. A lot of the tops brand recognition has been getting out into the public and that is fantastic. And the things that we want to advertise are, what Topps is about and what Open Science is about And we're doing that through talks and posters, town halls, keynotes, we have sessions dedicated to different aspects of open science and diversity, equity, inclusion and accessibility. Another thing that we want to do is build a community of practice around open science. And, you know, really, that that statement has more than one thing rolled up into it, of course, we want to bring new people in, but also bring communities that have already been doing this together. And so that's, that's part of this year. And we'll continue to do that and beyond as well. So we, of course, have a curriculum that's being developed, and we want to advertise that heavily and get people excited that it is that it is upcoming and, and get them ready to be able to take it. So something that we have been doing is we've been presenting the first module ethos of that curriculum, through in person training workshops. And we project that greater than 1000 people have earned their badge this way by the year's end. And this, this is important, because it elicits community feedback immediately. We also have post

workshop surveys. And we found this to be incredibly useful. The curriculum has evolved as, as we've been teaching it, just based off that, that reaction that we get from the audience. So we, we see this as as an incredibly important piece to all of this. And I didn't mention, but the picture that you saw on that first slide, was actually the rollout. That was our first time teaching the ethos module at American Meteorological Society. We had a packed house, so people were very excited. And we've we've been we've been doing it ever since. And so by the end of 2023, we anticipate that all for all five modules 500 badges for the grand badge, so to speak. And and so that's 1/3 of the way to our 1500 badge goal. Next slide, please. Right, so the the MOOC that serves a few different purposes. So that is being developed through this year, along with the curriculum itself, the curriculum content itself. So we've been talking about it and but we haven't necessarily dive down into the purpose behind it. Why did we choose this this direction. And so the MOOC does a few different things for us. The MOOC provides pathways for people who have done an in person module one workshop, and they need to complete the four remaining courses. So they can, they can do that. Or people on their own time want to take all five of them because they're not able to attend an in person workshop, or a top C summer school or virtual cohort. It also provides a way for people that for commercial entities for nonprofit groups, associated with NASA science, but perhaps we don't have the resources to go and have an in person workshop, where they are. So this provides a way for them to be able to still complete those courses and get the Open Science material in front of them. For students, not all students have ability to go to where these work in person workshops are being held. So it provides a path for them. An important thing. This has been touched on a little bit already, but an important thing is that MOOC provides a centralized place, or curriculum. Of course, the the MOOC material is based off of the in person training material that is held in the carpentries. But everybody who registers to take the course will register through the MOOC. And so it provides a centralized place for you the assessment questions and learning outcomes, and a centralized place for tracking people who get better

S Steve Crawford 2:40:00

Each through credit and credibly.

P Paul Bremner 2:40:03

And for 2023 alone, we're, we're anticipating 500 or more people that complete the MOOC, separate from the people who are completing the curriculum, after taking an in person, module one workshop. Next slide please. tops T is another piece of this. And their purpose is to reach large and diverse audiences. And excuse me. So Steve is has already detailed a lot of this. But once again, there are summer schools or virtual cohorts. There's also the ability to build on that material through science core. And so the summer schools, they begin this summer, they're we're working with them already, to help get them prepared. They need material. So we're working with them on that. And they have already been identifying some of the people that will be joining their summer schools, we are also helping to identify helping with recruitment. The virtual cohorts, they began late this summer, also early this fall, both summer schools and virtual cohorts, they're going to be teaching all five modules. And once again, this gives the ability to sort of beta test the material. So we are being careful with who who gets this material first. Because we naturally, we want to have the highest quality product. And so the the idea is, we have a very compressed timeline to develop this curriculum, but a long stretch for beta testing. And this is part of that. So during 2023, Topps T combined activities could could reach,

you know, or exceed 500 people for badges. So this is the third, the last third of that 1500. So combined, this is how we anticipate being able to get to 1500 badges by year end calendar year end of 2023. Next slide, please. Right. So once we've once we've completed 2023, we begin 2024. And now we're ready to scale up to our grand vision of 20,000 badges. So, of course, we're going to continue offering in person workshops and select society meetings. And this will this will be important because it provides another pathway for people to get the curriculum. It also it is an incredible source of community feedback and discussion. discussions that we have at these workshops are are really, in, in my view, as somebody that has gone out and been an instructor, it is highlights of, of the workshops is the discussion that we have based around around the material that we're that we're presenting. So it also is a time when we'll go ahead and really engage with different NASA centers and research groups. The tops champions right now have been very focused on curriculum development. They are subject matter experts. They come from diverse disciplines within NASA science. And they have been extremely key, very instrumental into helping to develop this curriculum, and really get it to a point of where we can have beta testing. For 2024, they would have transitioned from that curriculum development, and they can now engage with their local NASA centers. There are a lot of recent law a lot of researchers at NASA centers and we want to be able to reach them as well. And so, this is this is a time for them to be able to do that. They will also be come they will also be contributing to training sessions at different society meeting workshops and so forth. But, but they are they are really the ones that reach out to the NASA Center. yours. It also, once we've once we have this beta testing period done, we now have the bandwidth to really have very intentional in engagement with underrepresented communities. And I've listed a few examples here. And we're going to touch on this a little bit more tomorrow. But the part that I just want to highlight today is this is this is the time when we're able to really start that we're going to continue promoting the MOOC because the internet as as the discussions highlighted earlier, the internet, the technology of the internet, it's how we're able to reach large masses of people. And so this is, this is something that we want to promote, we have the curriculum going to the Moog, and we want to be able to promote that. And of course, we have tops T activities that will carry on. So we want to continue developing and rolling out the tops T activities. So this is the last slide that I have for here. Again, this was really about the sort of nuts and bolts of what are we going to be doing in order to meet our first goal of 1500 people badge this year? And then beyond that, for the length of the project? How do we get to 20,000 people? And how do we ensure that that's a diverse population? So I, I am happy to open it up to the floor. I also have one question that occurred in the chat earlier than I would like to go ahead and address and trying to, there was a lot of discussion in the chat. And so I'm scrolling through and having trouble finding it. So maybe I'll just go off memory. So the question was about, hey, I would like to teach this curriculum at my institution. How do I get that? That how do I get that curriculum? And how do I ensure people are badged? How do I ensure that it's always one on one. And so I just want to address that real quick. So the structure is basically this, the and I'm going to use GitHub terminology for a second. So the development version of the curriculum that lives on GitHub, in terms of its content, or will live on GitHub, in terms of its content, the discussions and, and issue tracking, and version history that can all be kept through GitHub. And I'm open to hear if you have other suggestions for that. But that's, that's our plan. The carpentries material is based off of releases from GitHub. That beta testing period is where we anticipate having more rapid change. And it's yet to be seen exactly what that looks like, of course. But after that beta testing period, it should stabilize quite a bit. But the releases from GitHub that makes up the carpentries material for the in person trainings. And the MOOC is developed based off of that. And so the, you know, the, the structure goes GitHub carpentries MOOC. And so if somebody wanted to take the material, and tailor it to their own particular needs, they can do that through the GitHub, that's an open forum. And they can take that curriculum and they can modify it to their own particular needs. If they still want it to count as os 101, through tops,

then the things that they need to meet are the the assessment questions that have been developed, and the learning outcomes. And that is all hosted again, through that central, that central area, the MOOC. Anybody who is going for Oh, as one on one specifically, logs into the MOOC, they take the assessment questions, they meet the learning outcomes. And then their badge is then connected through Gridley. And so again, once again, that's that's our way of being able to track it. So one question that is that is sort of been out there is whether or not if the curriculum is modified beyond a certain point, does that still meet the same thing? And really it comes down to these assessment questions and the learning outcomes. Does it meet that that's our metric? And there certainly there are a lot of ways to to get there. And so I think, I think having that central location is, is key. So with that, I'll go ahead and open it up to the floor. Thank you.

H Holly Norton 2:50:28

Great, thanks, Paul, I think it would be a great opportunity to have our panelists weigh in on their thoughts regarding the plan and and the goal for scaling to 20,000. So if you want to take a chance to raise your hand and weigh in on on the plan here, I would encourage you to do so no. Qiusheng?

Q Qiusheng Wu 2:51:00

Yeah. Thank you for the presentation. And I was wondering. So right now, in the university, I'm teachings, is there any plan that I know that we can direct people to take the course. But would there be any like, for example, in the undergraduate and also graduate teaching, most likely, sometimes we have the schedule that we can invite external speaker or we have some kind of one lecture. So is there some kind of discount material that we can directly utilize, for example, have this and then based on that if students are more interested, then they might may take a full course. But it'd be great to have some like, so materials, or promotional videos that we can send to people and to advocate for the program?

P Paul Bremner 2:51:48

Yeah, absolutely. Yeah. Thank you for that. So, of course, you know, again, the material would be available on GitHub. But, you know, certainly, anybody can reach out to us. And we can we can work with people, we we will have material. And as resources allow, if, if one of us is needed to, you know, one of us in in the larger tops team is needed or desire to to go somewhere. If the resources allow it, we would be happy to, and, and, if not, we'll certainly be able to work with you to make sure that, that you have the material that you need. So if it's not already available through through the GitHub, the carpentries, or the MOOC, and if the students are not attending one of the summer schools or virtual cohorts, then there there is still opportunity for them to to have that material. Thank you. No problem. Thank you.

H Holly Norton 2:52:56

And just to add on there, I think it would be great if we could have maybe share or somebody else who hasn't had a chance to weigh in as much, who has experience with outreach and scaling up curriculum in the life if you'd like to weigh in and give your opinions on the plan, that

scaling up curriculum in the life if you'd like to weigh in and give your opinions on the plan, that would be great.

S SherAaron Hurt 2:53:23

Yeah, so for us, I definitely like the plan, and it does seem scalable. From the carpentries perspective. In our, in our community, with our curriculum, again, for us, a lot of it is people are coming in similar here, but you know, people are coming to us to say, hey, we want this and then we have to, you know, we're kind of trying to figure it out as we go or, you know, make the, to figure out the demand. And so now I do like that. With this, they have multiple outlets, to be able to get this information. And it's not all a one stop shop, which is what you know, can be difficult, especially for a new program. You know, we are known to be a culture of Yes, and meaning, you know, we're trying to be everything to everyone. And that's not always the case. But here we have various opportunities for our communities to you know, for the community at large and get involved. So I love the idea that, you know, there are multiple opportunities, and it's not just the carpentries.

 Chelle L. Gentemann 2:54:36

Great, thank you. And I've also just, I will just say real quick, I've also put the QR code back up. I've I've wrote this into our open discussion as well so that we can also invite attendees if they have any direct recommendations or suggestions to our QR code. So

2:54:59

I'm just on the Just to go either the versioning will be critical for the best experience for the student. Because if they credibly exam gets out of sync with either of the other two delivery methods, or three delivery methods discussed, that a student could become challenged, where they didn't expect it, and try to answer questions that don't match the curriculum. So we just have to keep in mind, you know, that's to stabilize for a little periods to keep it so people have something they can flow through.

P Paul Bremner 2:55:34

Yeah, yeah. Thank you, thank you for that. And it's an excellent point. And, you know, that is that is something that we're definitely cognizant of the, you know, the, the most rapid change and, and I, I don't necessarily mean, it will be rapid, but you know, just relative term, the most rapid changes will be during that beta testing period. But after that, we expect new releases to be either every six months annually. And there would be, there would need to be a process and this, this is not in place as of yet. But there would need to be a process to ensure that everything is in sync. So that everybody, everybody is getting the same assessments, the same learning outcomes, no matter which method they're they're getting, they're getting material through. Yeah, thank you. Excellent point.

S Steve Crawford 2:56:35

Next up, we have Qiusheng

Q Qiusheng Wu 2:56:41

Yeah, I was thinking that. So the material will be on GitHub, and I was wondering if there is any, like long term plan, I really like right now the momentum, and then also NASA have all the resources to put into this. But for this funding, it is the plane that we continue to fund these activities, or, I mean, the first couple years, and then use them more like save sustain. So for example, we don't have funding Well, I mean, is there any plan in place that we can continue to, to collaborate with the community and and to maintain and debug the materials?

P Paul Bremner 2:57:17

Yeah, thank you. So I have a partial answer for this. So, of course, this is this is your one of the mission. And so the the end of the mission is something that we've certainly talked about, but haven't settled on, as that's five years away, but the you know, at the end of five years, the true goal at the end of five years, is that this is community norm. And we would we would love for the curriculum to take on a life of its own, and move beyond our borders. And, and, and be be something that people can can build on into the future. Exactly what that looks like. We, we have to see as we get closer to it. That's that's the goal. And I would love to hear feedback ideas, if you if you have thoughts on how we might ensure that this is sustained into the future.

Q Qiusheng Wu 2:58:27

Yeah, once it is that more and more example, more and more universities or organizations like adopt the practices more likely are going to, I mean, recommend the materials and more people use that more people in your company to contribute. So once we have a large user base, I think it will be safe sustain, just like Lowe's open source packages, people like to contribute people like see the variance in there. And also, especially if some of the international journals, I mean, push towards like open science, open code reproducible resource and then you can consult so a some kind of central place that people can come to, to learn how to do open science and how to learn some of the best practices in there. So yeah, so at least, I mean, five years is a good starting point to put a lot of resources into there. And then hopefully, you will be self sustained after that. Thank you very much for being here. Thank you.

S Steve Crawford 2:59:27

Thanks. So next up we have Jim. Thanks.

J Jim Colliander 2:59:33

So one way that startups try to achieve rapid scale is through a channel partnership. And it strikes me that we have an incredible channel to try to transform sides through the system of universities and colleges that we already have. So I wonder if you've explored the idea to connect with maybe the deans of science It's networks. I know that in Canada, I'll put paste a

link, there is a group of Dean's that meet annually. And if you could invite the deans to somehow engage with, say, junior faculty, to go through the badging process, or if each school of science trained up one colleague to do the instructor training, and then roll out the badging at the various universities, in this way, you may diversify the delivery of instruction to complement the work that you're doing with the carpentries. But you would take advantage of, you know, the trillion dollars of investment that has already gone into the university system. This overlaps nicely, I think, with Shanks suggestion that there might be a way to use some visiting speakers to catalyze that conversation with the deans. But finding a way to integrate this into VPR, that are going to be looking for the right type of training for future grants. And new colleagues figuring out how to collaborate best and mentor new faculty members. Anyway, just I'm suggesting that you lean into the Dean's maybe as a group of people that can help you.

P Paul Bremner 3:01:13

Yeah, that that's really interesting. So no, we haven't specifically thought about about that we have to we have been engaging with groups that, that do work with universities. And I can't speak to whether or not they've they've looked at this specific aspect that you've just brought up. But but it is an interesting one. You know, the reality, of course, is that, you know, there, a lot of research gets done at universities. And at the end of the day, those researchers, of course, care about their work, and they care about science, they also care about having a career. And so the, you know, the conversation we had earlier about incentives. But in this case, the incentives for universities to support this kind of activity, I think that that would absolutely go towards that. So thank you.

H Holly Norton 3:02:16

Great, thank you. Next up, we have Justin.

J Justin Ballenger 3:02:26

Okay, I was having a little bit of problem with unmuting. But I was also thinking one of the areas that would be useful for diversifying participation would be to tap into the includes network. And also, we recently funded for the National Data Science Alliance, which connects all of the HBCUs in the nation. And one of our goals is actually to support 20,000 Data Science credentials for African Americans over the next five years. So we really love to be engaged in pushing out this MOOC. As part of our work with the National Data Science Alliance. It's also share that with the includes Alliance.

P Paul Bremner 3:03:12

That's fantastic. Thank you. Do you have a they have a link for that, that you can put in the chat? We are

J Justin Ballenger 3:03:20

we are finishing applications for that now. But I will share that as soon as our applications are

we are finishing applications for that now. But I will share that as soon as our applications are up.

P Paul Bremner 3:03:28

Okay. Great. Thank you.

J Justin Ballenger 3:03:31

I will share also the LinkedIn in the website for National Data Science Alliance. Okay. Thank you, Jim.

 Chelle L. Gentemann 3:03:46

Not right now. Oh, I see. George. Thank you. Thank you, Justin. That's fantastic. We're going to move on to George.

G George Churchwell 3:03:57

Yeah, I just wanted to also, I'm gonna throw this out there. I haven't really brought this up. But listening to everybody. You know, the MOOC itself can have other content adjacent to the content that's produced as the five modules, they could be linked into something else that was supporting other concepts and other science, other features, and maybe be seven modules or three modules. Because the the Open edX system itself can generate multiple course curriculums. So just as thought, if we set it up that way, you can create other authors.

P Paul Bremner 3:04:40

Yeah, and something that that we haven't talked about is, for example, the science core material. If then, if that's something that that makes sense to have on the MOOC later on as well.

M Malvika Sharan 3:05:02

I think Paul, you mentioned briefly that it's a five years program, we haven't really talked about closing the mission, because we're very early on. But working with some of the programs where we are doing research on the impact transformational impact and investment over a period of time beyond the pre and post workshop survey, are there researchers involved who are doing pedagogical study and comprehensive assessment of the whole program? Are there people involved who would be kind of not ethnographer, but would be applying ethnographic expertise in recording what it looks like to conduct a five years mission of the scale.

P Paul Bremner 3:05:49

To my knowledge that is not in place right now. Shell or Steve, do you? Do you know anything about that for Topps?

Chelle L. Gentemann 3:06:04

At this time, we don't have that in place. We've we've been thinking about this. But we don't have any concrete plans at this time for that. It's sort of one of those things that we wish for. But we haven't had time to wrap our brains around yet. But now they give you would like to work with me more on that I'd be happy to work more with you on that it's a bandwidth versus desire issue, which I think everyone on this call probably understands, including Paul right now. Yes.

M

Malvika Sharan 3:06:43

Yeah, I think shall I'll keep you in the loop of one of the studies we're doing. But there are a few more research in plan. Right now we are in the fourth year of some of these projects. And as you said, these don't become really apparent from the very beginning, the only thing that I would suggest is that have a really good way to collect data, as in have confirmation that you are able to use that data, at least in European context, I can't use any of our survey data from previous three years because we said, we never asked for explicit permission from our learners that this would be going into a study. So have those in place when you're collecting pre and post workshop survey, when you're bringing these people in to provide testimonial that they have some sort of speaker and contributor release form, how you're going to attribute them if they are included. So that's the I'm happy to work on that with you, because it does not require you to have those research in researchers in place. But when a researcher comes in, they would have enough data to work with.

Chelle L. Gentemann 3:07:43

I think that's a fin tastic offer. And thank you so much. Paul is actually you know, the project office is sort of leading that implementation of the workshops, projects, where those surveys would be part of that. And so I think Paul will be able to, it's either going to be Paul or someone from his office who would be developing those surveys, because there's a lot of US federal laws that have to be followed even to start asking a lot of those questions. And so Paul's team is going to be developing those I believe so. But I'm happy to just be in the loop a little bit. So that because I think it'll benefit other projects that we're working on as well. So thank you.

P

Paul Bremner 3:08:28

Yeah, and yeah, please. Let's get together and, and work on this. And we have been, we have been, of course, very been very careful about the survey questions that we have and what we ask. But in terms of explicit permission for in the context that you're talking about, so for example, for European participants. That's, that's not something that has been a part of our planning as of yet. So it is an excellent point. So yes, please. We can work on that.

S Steve Crawford 3:09:14

Thank you. Next up, we have Jim.

J Jim Colliander 3:09:17

So I recall the hype of the MOOC era in 2012 2013 2014. And it sure was exciting, wasn't it? But I think historically, we've learned that there are a lot of people that start MOOCs that don't end up finishing them. And so I'm cautious about the hope that an Open edX platform delivery system is going to be as impactful and successful as we would like. So in the previous panel, I pushed hard for the federated approach where the GitHub based content is available, and we should separate the assessment from clicking through the MOOC. If it turns out that I'm wrong, and that the MOOC is successful. That's great. But if it turns out that there is a problem with the MOOC delivery, then we should probably see that signal by, say, mid 24, in which case, there's some time to reboot. And it makes me wonder, you mentioned Jupiter light a few times. And I'm aware of a project that NASA has funded called Cosmic data stories. That's using a glue version of delivering education content, similar to what a MOOC experience does, on top of Jupiter. And I'm also reminded of this remarkable rollout in France of copy Tao, which has a Jupiter lifestyle delivery of data science education to high school students, that has something like 70,000 students per week, accessing this resource. So there might be some other delivery methods besides Open edX, that could be closer to the data science tools, and interactive computing tools that are used by a lot of open scientists to explore. I don't recommend you change tack now. But I recommend that you consider alternate paths besides the MOOC and Open edX platform. If it turns out, you're not achieving the scale that you want, using that delivery method.

P Paul Bremner 3:11:22

And Georgia has his hand eagerly up. And so

G George Churchwell 3:11:27

yeah, so I do agree, there's definitely has been have been issues with Moog type operations and the ones that I've operated within and programs that I've done. program success are in when you're selling, it's customer success is key, we have analytics running on the backside. But I'm going to ask also, all of you to help us identify the stakeholders that are connected to these, these particular students that will be in the system, because we need to reach out to both them the stakeholders and the students by there's many different ways to do it. But essentially, we would identify students who have stalled, and then alert the student plus their stakeholder that the student has stalled, ideally, also, it's best to have the higher level stakeholders have the tops back badge. Because lower level people aren't going to care as much and higher level people won't care as much if they don't have their badge. So we got to get the people up top to buy into this. And that will make it move forward. And then the last part, Jim, we you also you can take the badging without going through the move on the platform. You could just take the assessment.

P Paul Bremner 3:12:54

Yep. And I do I do want to highlight a logistical point of it is that the, you know, the assessments being a part of the MCC program, you know, whether or not you need to go through the entire course, is up to the user. But the but having that centralized platform, that all the badging goes through and all the assessment goes through is from a logistics standpoint, very important. And so without the move that would that would leave that would leave us to figure out another another way of doing that. So, you know, there's there's definitely the, the the outcome side, but also the, the logistics side. I,

 Chelle L. Gentemann 3:13:45

Paul, thank you. This is Shall I just want to jump in really quick and say, you know, I think we know the MOOC is not going anywhere for five years. But I really appreciate Jim's comment, which is saying, let's set up a timeline. And to revisit whether or not this initial strategy is working, and start thinking about exploring alternative strategies. It's worth starting to think about those alternative strategies, even if the MOOC is working as a way to expand the curriculum. You know, there may be, you know, we started this all we had some initial ideas. And I think what Jim is pointing out is like, let's set a timeframe to just recheck how those initial ideas are working, and start to explore that space, because we've all know, hasn't our world changed a lot and even the last two years for open science and what tools and technologies and how people are using them, and I just think it's a great suggestion to try and do that revisit and reassessment, you know, and have that as part of our strategy.

S Steve Crawford 3:14:56

And I'll just follow up actually, with what Chelsea said, just to If you with what we started with today with, you know, we also have not only the MOOC, but the summer school, the virtual co sports. Also part partly our tops champions are going to be teaching this at different places, we're going to learn a lot over the next six months to a year. And it's going to be, you know, it's gonna be great the next time, I'm really excited for the next time we have this conversation, because of how much we are going to learn. And I know one thing that Paul and their team have been really focused on that we haven't talked about is assessing and metrics on looking at to actually, you know, do that next step of keeping track of, you know, are the things that we're doing working? I know, we've already made some shifts in what we're doing based on some of the things that they've thought about and looked at in terms of responses to our our enrollments and other activities. And so it'll be a really great future conversation as well.

P Paul Bremner 3:16:04

Yeah, if I could just build on that for for a moment. You know, especially the metrics part, you know, this is something that that has very much been a part of our conversations, is how to ensure that the metrics we're collecting are meaningful, and in that it guides us if we need to pivot in the future for any reason. And the B being able to start off with appropriate information that you're looking at appropriate data that you're looking at, to tell you how, how successful or not something is going, Really, you need to as close as you can get that right at the beginning. So that you can not have to alter your, your data that you're looking at as you go along.

Because it it makes it harder to interpret and make appropriate appropriate pivots were needed. So that's something that that has definitely been a large part of our conversations in the project office.

Chelle L. Gentemann 3:17:19

Thank you. Does anyone else have any thing to add any questions or feedback? They'd like to share it this time?

P

Paul Bremner 3:17:30

I see the link that you added in the chat and thank you very much, Jim. Hey,

H

Holly Norton 3:17:38

Logan, I see Logan Sanda go ahead Logan.

Chelle L. Gentemann 3:17:45

Logon ask chat GBT the question

M

Malcolm Glover 3:17:55

below, then

Chelle L. Gentemann 3:17:56

we can't hear you to be muted.

S

Steve Crawford 3:17:58

I saw him on mute. But then

Chelle L. Gentemann 3:18:01

the AI took over.

L

Logan Kilpatrick 3:18:06

About now Oh, three here. Yeah. Awesome. Yeah, the AI did indeed take over my computer loves to like switch to all these virtual microphones or something like that. On the machine, I

loves to like switch to all these virtual microphones or something like that. Oh the machine, I was. I was just making the quick comment that it would be really awesome to think about from, from a badging perspective, meeting people where they are like, I like, I think I made this suggestion before, but I really do want to see badges on GitHub, like I think there's so much happening, like so many people are a part of, you know, that ecosystem that it'd be awesome to be able to showcase those things and like, be a part of a NASA tops, GitHub organization or something like that as like a sort of badge of honor. And I think there's a bunch of other like, peripheral ways of, of us doing this for, like domain specific communities. But yeah, it would be awesome to have that as part of this because like, it's kind of hard to imagine what the value is for different groups if you don't have the the badging actually in the places that they care about and what's important for them.

P Paul Bremner 3:19:14

Thank you. That is an excellent point. And, you know, certainly the curriculum badge you know, that's That's true credibly, but I guess we haven't we haven't talked about if there are any other badges, for example, that would be able to to be where people are and such as GitHub.

S Steve Crawford 3:19:47

Great, thank you.

H Holly Norton 3:19:49

Any other final questions? As always, remember Are we have our IO tool. So if something pops up after we end today, feel free to put that in our IO tool, and we will review it. And we can include that in our discussions tomorrow as well.

P Paul Bremner 3:20:13

Oh, okay, well, did you. Alright, I will sign up. Thank you very much, everyone.

H Holly Norton 3:20:18

Thank you, Paul. With that, I will turn it back over to his shelf for closing remarks.

 Chelle L. Gentemann 3:20:25

Again, thanks for a wonderful day of discussion today. I think it went really well. And I really appreciate all of you showing up and participating and giving us lots of great comments and feedback and ideas. The chat is filled with links that we're going to be clicking on for the next month or two. And we're already starting sort of to write some of the synthesis report. And I can see clear recommendations coming out of it that are really concrete and actionable. And I want to thank you for, you know, really helping us giving us specific suggestions on how to

improve and things that we can look at doing and improving to really try and improve our project moves forward. So thank you, and we will see you tomorrow at 12 o'clock of whatever local time that is for you.

H Holly Norton 3:21:18

To I'll be starting. And just one word, if I may. Between now and tomorrow, I'd like our panelists and our attendees to just start thinking of the strengths, the opportunities, the threats, the SWOT analysis that we're going to discuss tomorrow, if you could just keep that in the back of your mind, because we're going to go through a more in depth discussion, so that we can create a really solid report by the end of our panel for recommendations to move forward. So I just want to keep that in the back of your mind to come ready with analysis in question. So

 Chelle L. Gentemann 3:21:53

we have a new NASA mission named Swat. So I found out yesterday that several Earth scientists were eager to join our SWAT discussion. And I had to tell them, it wasn't about the mission. But they were still welcome to July. So to give

H Holly Norton 3:22:07

you a brief introduction for tomorrow, its strengths, weaknesses, opportunities and threats. And I will go through that more in detail tomorrow. But if you can keep that in the back, your mind will be ready to go. All right. And that's all we have for today. We will see you tomorrow.

 Chelle L. Gentemann 3:22:23

Thank you everyone. Thank you