



Tech Leadership Standing Panel: Solving the Data Problem for the Climate Crisis Part 2, Solving the Local Data Problem for Climate Action

Thursday, September 14, 2023. 1:00 - 2:30 pm (ET)

Government officials, community leaders, NGOs, business leaders, and scientists often don't have the accurate, usable local data they need for climate action. Many countries, provinces, and cities lack reliable data on healthcare, transportation, infrastructure, energy, agriculture, or other systems needed for adaptation and resilience planning. This panel will explore multidisciplinary approaches to solving this problem, including the use of official statistics and government data and other, newer sources. Panelists will explore the potential for new forms of collaboration between national statistics offices (NSOs), national ministries (eg meteorological or environmental), and the private sector; data collection by NGOs; community science data programs; meteorological and other sensors; AI-enabled analysis of non-official data and data sources; improved granular data from satellite observations; and other strategies for collecting, publishing, and using both global and local data for climate action.

Moderators:

- Theresa Pardo, Ph.D., Associate Vice President for Research and Economic Development, University at Albany, State University of New York
- Joel Gurin, President, Center for Open Data Enterprise (CODE)

Panelists:

- Ann Marie Chischilly, Vice President of the Office of Native American Initiatives, Northern Arizona University
- Johannes Friedrich, Director of Climate Data, World Resources Institute (WRI)

- Jorge Gonzalez-Cruz, Ph.D., professor, Atmospheric & Environmental Sciences, University at Albany
- Linet Kwamboka, Senior Program Manager, Data4Now

Transcript

Dr. Theresa Pardo: Hello. My name is Theresa Pardo. I am a Co-Chair of the Standing Panel on Technology Leadership at the National Academy of Public Administration. It's my pleasure to welcome you here today to our latest initiative focused on climate data and climate action. Slide please.

As I said, my name is Theresa Pardo. I am a Co-Chair of the Technology Leadership Panel for the National Academy. My co-chair is Dr. Alan Shark who has been a long-time co-chair of this panel and has really set the stage for technology leadership as a focus of area and emphasis within the academy.

As you can see in front of you, I serve as the Associate VP for Research and Economic Development at the University at Albany where I also fill another few roles but that's a conversation for another day. Slide please.

Before we get started, I wanted to tell you a little bit about the National Academy of Public Administration for those of you who might not be aware of this organization.

Essentially it is an organization that brings together independent thought leaders around public service, public policy, public administration and we work in concert with the US federal government, with state and local governments, the private sector, nonprofit organizations on issues of importance in public administration. So I'm going to tell you a little bit about what we do. Slide please.

One of the initiatives of NAPA has been identifying 12 grand challenges in public administration and you can see them listed here in front of you. Certainly making government AI-ready is an important topic for the Technology Leadership Panel in particular.

But for example, the Technology Leadership Panel really is a crosscutting topic among all of these grand challenges as are others as well. There are lots of interdependencies among these challenges and we come together in various working groups and panels to try to explore or advance insights and action around these grand challenges. Slide please.

One of the ways we organize our work is through these standing panels, the panel that this technology leadership panel is a part of. As you can see we also have other initiatives such as

the Center for Intergovernmental Partnerships, the Agile Government Center, various forums and events and then certainly the standing panels. Slide please.

So this particular series, today's session, is part two of a two-part series that my colleague Joel Gurin, who you will be hearing from shortly, and I came together to design and you can see that solving the data problem for the climate crisis is our focus. It's our interest. We recognize the need for such a conversation, the challenges associated with getting more and better data available to solve the climate crisis.

This two-part panel, we've been looking at - in the first session - the global questions about data for climate action knowledge and today our panel will focus more on the local data required for climate action challenges and opportunities associated with doing that.

So again this is part two of a two-part series and we are thrilled to have you all here with us. Slide please.

As I said, in a minute, you will hear from Joel but I wanted to just give a little bit of information about the kind of work that I do and we will talk a little bit about things that are going on at the University at Albany and then I will introduce Joel Gurin. Slide please.

I am part, as I said in my intro, of the University at Albany, which is the State University of New York University Center. One of the things that has been really defining the work of our university over the last year or so when it's going to be very much framing what we do going forward is an investment in Advanced AI Supercomputer Cluster that is coming together around the partnership depicted in front of you. Slide please.

A critical aspect of this new initiative was the \$200 million investment that's being made in the creation of a supercomputer cluster at the university. Why I bring this up here today is because it's so important to understand that while there are the tremendous compute capability available across industry, we find many fewer organizations, many fewer academic institutions who have access to this kind of compute capability.

The goal here in New York was to establish New York, one of the SUNY schools, Albany in particular, as a place for governments, nonprofit organizations to have access to this kind of compute capability going forward. So we're proud to be able to offer that up and I would love to talk with anyone about these ideas and these possibilities for working together through these kind of partnerships. Slide please.

So just briefly a little bit about – I won't go into all of this. But what is the most important message and I think it's an important message for our series is what we call "AI Plus" which is the integration of AI across the curriculum here at the University at Albany. An illustration of that is that we've just hired or just have the – secured the funding to hire 27 new faculty who are AI Plus, their primary discipline. So we have new faculty in public policy who specialize in AI,

public health, philosophy, political science, psychology, business, et cetera. So you can go right across the curriculum and see that we've got these 27 new hires specifically to begin to change the curriculum that allows us to have AI Plus. Slide please.

Just a couple of examples of the kinds of things that are happening as a consequence of these kinds of investments, right? We're not only looking at AI for climate, weather solutions in New York. We worry a lot about winter weather, right? And recently we have to worry about air quality for those of you who know about what has been happening in Canada and other places in terms of – that's having impact on our air quality.

But also here at Albany, I think reflective of this AI Plus perspective is tremendous investments in expertise in – from our philosophy department for example on making AI truly trustworthy. So this whole range of issues that we're playing out here at U Albany, playing out in other places as well, I think are critical to our conversation here today and I would love to have any chat with anyone who might want to hear more about it. Slide please.

So as I said, my co-organizer in this series *Solving the Data Problem for Climate Crisis* is my old friend Joel Gurin who is the President and Founder of the Center for Open Data Enterprise, a key organization carrying out work across the policy domains with respect to data but certainly in a context of climate crisis as a leading voice. Joel. You're on mute, Joel.

Joel Gurin: Thank you and now I'm off mute. Really, really delighted to be here, Theresa. Wonderful to be working with you and NAPA. I'm Joel Gurin. I'm the President of the Center for Open Data Enterprise or CODE. We've just shared our website URL in the chat and I hope you will have a chance to check it out.

We are an organization that was founded in 2015 with the mission to maximize the value of open and shared data for the public good and we do this in a number of ways. We hold roundtables. We hold different kinds of convenings. We publish white papers. We publish online resources. We've been fortunate to work with a number of international organizations as well as the White House and many federal agencies and a number of nonprofit and private sector partners in this mission.

Our major areas of focus right now are the use of data for improving equity, the use of data for improving healthcare and increasingly the use of data to address the climate crisis. We've been working in many ways on that topic with NOAA on the federal side. We've worked with organizations ranging from the Ocean Conservancy to Amazon Web Services to the Bezos Earth Fund and we're very focused really on this question that's the topic of today's panel which is what are the best ways to find data that is going to be really effective and useful for climate mitigation as well as adaptation, resilience and disaster preparedness.

The first panel talked a lot about the global data sources that are available, everything we know from earth observation data or the satellite data, ocean measurement data and other data that

has enabled us to get a picture of what's happening with climate change. Now we're really in a phase of moving from understanding to action and as we do that, it's more and more important to understand local conditions on the ground that impact resilience to climate change and the ability to adapt and to prepare for impact as well.

So I just want to take a minute to share with you a little bit of information, if I could have the slide please.

One thing I just want to let you know and we will be sharing a few links in chat as well is that CODE has just launched a tool that we're calling the Climate Adaptation and Resilience Typology or Climate DART. Just published an article about this in Apolitical which you can see a link to and we also just posted a link on a brief kind of brochure that describes this project.

This was done in collaboration with our friends at Open Data Watch and also PARIS21, the statistical group at the OECD and the idea here was to develop essentially a typology that could help any country or any city or provincial government in any country begin to hone in on the kinds of data that are going to be most valuable for them, particularly for climate risk assessment adaptation and resilience.

We hope it will act as a resource for national and subnational governments and really make it easier to understand the many complex systems that are out there now around this kind of data.

On the next slide, and you will see this all on the links that we shared, but this just gives you a sense of the focus areas that we've looked on, everything from energy and food security to weather and climate monitoring, heat and temperature, infrastructure, measurements and so forth.

The next slide shows you how you can view – a kind of view of a lot of these different kinds of data sets and data types all coded by their focus area quite visibly.

The next slide is just a summary of all the different groups that we hope this will help, ranging from national governments all the way down to local communities. So we're very eager for feedback on the Climate DART. We welcome your input and welcome any interest you have in collaboration. You can reach us very easily through our website or through the links in these various materials.

So now to begin today's panel, if we can talk a little bit about what we're here for today, this is about solving the local data problem for climate action. The basic sort of thinking behind this panel is that government officials, community leaders, NGOs, everybody involved in dealing with the climate crisis may be lacking accurate, usable local data particularly even more than global data that are needed for climate action. This includes data on healthcare, transportation, infrastructure, all these different systems that are needed for adaptation and resilience.

What we want to explore today are some multidisciplinary approaches to solving this problem ranging from the use of official government statistics to new data sources that might come from local weather centers, from crowdsourcing, from any number of sources.

On the next slide, this is a little bit about how we're going to run this today. As soon as I introduce the panelists, Theresa will be asking people individual questions and then we're going to actually ask – invite every panelist to comment on other panelists' answers. This is really meant to be very much a fluid conversation. We will have an opportunity at around two o'clock to switch to a Q and A format. So throughout this webinar, please use the Q and A option to post your questions for the panel, just with an understanding that we're going to hold questions until the end but we will address your questions as best we can.

Then the next slide, this shows you we're extremely fortunate to have four fantastic panelists today. Ann Marie Chischilly, Vice President of the Office of Native American Initiatives at Northern Arizona University. Johannes Friedrich from the World Resources Institute, Jorge Gonzalez-Cruz from University at Albany and Linet Kwamboka from Data4Now.

Then if we want to take that down, I will tell you a little bit more about each of these panelists in turn. So to begin, Ann Marie Chischilly is Vice President of the Office of Native American Initiatives at Northern Arizona University. She's also the former executive director of the Institute for Tribal Environmental Professionals or ITEP, an organization dedicated to strengthening tribal capacity and sovereignty in environmental and natural resource management.

She served for over 10 years as Senior Assistant General Counsel to the Gila River Indian Community where she focused on water rights and renewable energy. She has served on federal advisory committees for the EPA, the Department of the Interior at NOAA and co-authored the UN Guidelines for the Use of Traditional Knowledge in Climate Change Initiatives.

She has a JD degree from St. Mary's University School of Law and a master's in Environmental Law from Vermont Law School and she is an enrolled member of the Navajo Nation. So Ann Marie, thank you so much for joining us today and welcome.

Next, we have Johannes Friedrich who is Director of Climate Data at the World Resources Institute or WRI. He leads WRI's data strategy on climate energy and systems change and leads several WRI data platforms including the Systems Change Lab, Climate Watch and Power Explorer. His work is widely cited. It has been applied by over 250 government ministries as well as hundreds of large companies.

He has also launched data platforms in partnership with the governments of India, Indonesia and South Africa. He has a Bachelor's of Science Degree in Computer Science from Georg Simon Ohm University of Applied Sciences in Nuremberg and an interdisciplinary Master's Degree in

Science for Sustainable Development from Linkoping University in Sweden. So Johannes, it's wonderful to have you here today.

Next Jorge E. Gonzalez-Cruz is the SUNY Empire Innovation Professor of Atmospheric and Environmental Sciences and of the university's Atmospheric Sciences Research Center at the University of Albany.

Previously he was the Presidential Professor of Mechanical Engineering at the City College of New York where he was also Director of the Initiative to Promote Academic Success in STEM and where he still remains the lead scientist of the Coastal Urban Environmental Research Group.

He teaches and conducts research in urban energy sustainability, urban weather and climate, urban remote sensing and regional climate modeling and analysis.

He has several patents and he received the Career Award from the National Science Foundation. He earned his doctorate in mechanical engineering from the Georgia Institute of Technology and his bachelor's in the same discipline from the University of Puerto Rico at Mayaguez.

Then finally Linet Kwamboka is the Senior Program Manager for Data4Now at the Global Partnership for Sustainable Development Data. In that role, she supports African countries with data and technical skills to apply data to achieve the UN Sustainable Development Goals. She's also the founder of DataScience LTD, a company specializing in data engineering and enabling data-driven decision making and she serves as a board member at WeRobotics and B-Lab Africa.

She combines expertise in computer science, software engineering, data analysis and geographic information systems and she has been named one of the world's 100 Most Influential People in Digital Government and one of the Top 30 Women in Data.

She has a Bachelor's Degree in Computer Science from the University of Nairobi and was a Carnegie Mellon University fellow in software engineering.

Really an absolutely stellar panel. Thank you all so much for being here. We have a lot of questions for you and Theresa, I will turn it over to you to begin the conversation.

Dr. Theresa Pardo: Thank you very, very much Joel and thank you from me as well to the panelists for being here. What an amazing opportunity. Joel and I have certainly but all of our participants for having this conversation with you. So again thank you for being here with us.

I'm going to start our question first to Johannes. So Johannes, the role that you play at WRI. What an amazing opportunity to lead change. But in that role, you have an overview, a broad overview of how data for climate change is being collected and used. So our question today where we wanted to ask you to start is to talk a bit about some of your observations on the best

ways we can find and use data for mobile climate action and what are some of the gaps. What are some of the most important gaps that we need to fill as we think about global data and climate action specifically?

Johannes Friedrich: Yeah, thank you for having me. Obviously coming from a perspective of an organization that builds a lot of – like publishes data, builds a lot of these tools and I’m actually very curious to hear from the other panelists because one of the things that we’ve really learned over time is that you need to question these kind of tools and data quite a bit more. Like coming with a very critical perspective and a lot more local perspective and very curious from the other panelists to hear.

I just summarized this in a pretty diverse panel that we actually had [**with another organization - name unclear**] just now in kind of three areas on when you’re actually thinking about like how you can make data more impactful of your endeavor about like publishing data or producing something.

The first question would be, why do we actually need it? This kind of goes back to what’s really like asking the question, “Who’s going to use it. Who’s needing it most?” I can give an example for this question when we got a grand perfect foundation to build out a tool that helps adaptation planning, mapping out climate hazards, some assets that might be having some exposure and being vulnerable to these climate hazards.

We really said this is a very broad mandate and this is actually not quite useful. This is the typical thing. Who is it for, for policy makers or decision makers? Well, actually not real defined users if you really think about it.

So we actually said and worked with the funder to say let’s narrow this down. Let’s say OK, it’s about agriculture. Were there agricultural stakeholders that were actually underserved there? Like there’s a lot of stakeholders that already have a lot of good data. How can we actually serve the ones that actually need it the most?

So we narrow this down a lot and in this case for example built AgriAdapt. I’m going to share the links in the chat as well. We built AgriAdapt that we work with stakeholders for example in Colombia and India with farm organizations that are actually not usually having access to this kind of data, to really narrow down on who’s your user and then working really locally and that’s I think the direction that often goes to ask more critically and we say, “Why do we even need data?”

Then the second quick question is, are we the right ones to build it? Because there’s often so many efforts already happening out there that it’s not – that there’s a lot of redundancy kind of thing. People need to know about the efforts but you need to build upon something that is already – ideally that’s already there that people might be already going.

Going to put another link in the chat in a second but we got this inventory of – an overview of the climate data platforms that are already out there. Even just the major ones that probably did cost millions of dollars and we have like hundreds of them and most people just don't know about it – like what is already out there.

The last question was, “Is data actually sufficient?” What I usually say is data often is necessary but not sufficient. It's often like a starting point that you might need but it's really the question, “Is data the thing that actually drives the change? Is there like a capacity? Is there like a knowledge or is it just like other things that are outside of the pure data realm, like political will or other things?”

So critically assessing when you're trying to think about the data and being just like why do we actually want to build it and tools actually needing and who's the most in need of it. Like the people who do not usually have access to it.

Are we the right ones to build it? Are there already things out there, efforts, particularly efforts on the ground that might know the local stakeholders way better instead of sitting in another country?

And lastly, what was my last one now? And lastly, is data actually like – is data sufficient? Will data actually be the main things that drive the change? So this is kind of like a starting point. Looking forward to the other panelists.

Dr. Theresa Pardo: Well, that's really a great setup of areas that focus part of this conversation and I love reacting to all of it and lots of different ways. But one of the things that I like to teach my students and we like to help teams that are doing development is – and they say, “Oh, our system is to serve citizens.”

OK. So what exactly does that mean? Which citizens? What's their profile? What do they need? What are the capabilities? So I really love this kind of inquiry, this inquiry structure that you've created. So let me offer up the opportunity to our other panelists to jump in either to comment on the three areas that are shared with us by Johannes or share your own observations on how we can find and use data for climate action at the local level of gaps we might fill. Who would like to jump in? Ann Marie, Jorge, Linet?

Ann Marie Chischilly: I can join in. Well, good morning everyone. I'm Ann Marie and I just want to say thank you for the invitation to speak today. I think when you're looking for data especially I work with the tribes, the United States tribes. There are 574 but only around 100 state-recognized and about 50 seeking federal recognition.

So there's a lot of tribes in and around the United States primarily in Alaska. I mean there's a lot – almost half are up there. So when we're looking for data, I think when we're looking for data

in rural areas, in particular, tribes are primarily in areas that are not near municipalities and so finding data is probably one of the hardest things to do.

Then tribes don't have huge climate change programs. So there's probably one or two people at each tribe trying to do climate change on behalf of their nation. So there's not the expertise or the infrastructure to develop that type of data.

So those are two concerns that I would bring up. One report that came out from the Institute for Tribal Environmental Professionals, ITEP, I have their website. They have a great climate change program there and they put out what we call the Status of Tribes and Climate Change or the STACC report. This STACC report has been – I think because there's some lack of data, it has been – it's peer-reviewed so it was cited all the way to the IPCC and to the NCA4 at the time.

So there's lots of different – so I would go to that report because it was written by 100 different authors and 30 different tribes who wanted to put in their information about what is happening on the ground and it may not be, the data may not be in numerical form and that's another topic I would like to bring up is the inclusion of indigenous knowledge and indigenous methods of data and data sovereignty.

In 2022 in December, Biden put out the memo on the indigenous, traditional, ecological knowledges. I have a memo. I will put it in the chat as well about how the federal government is now recognizing and asking all the federal agencies to develop guidance on traditional knowledges and then the use of it.

So you will be seeing a lot more especially in the data world. Indigenous knowledge is considered intellectual property, so the protection of intellectual property is also very important as well. So I would just like to open up with these thoughts.

Dr. Theresa Pardo: See? Now we're even Joel. So Linet or Jorge, would you like to jump in on this question, comments before we move on to a new question for Linet?

Linet Kwamboka: Yeah, sure. I could go and specifically want to tackle the question of, "Is data enough?" and from my experience the answer is no. Many – not very many but a few years ago I actually worked with WRI, developing a platform for Kenya, you know, tracking and monitoring water towers. There was a lot of very good data that was put in this really nice platform but it was an effort by the administrator that was there during that time and as soon as the government changed, no one really cared about that platform anymore.

So for me, data is not enough if it's not in front of the people who are committed to making that change. We all know that you cannot change what you are not measuring but I also like to say you cannot measure what you're not tracking but you cannot track – and to track, you really have to do the tracking well, not just tracking.

But at the end of the day, data has to be put in front of the right people and for action to be done. So collecting a lot of data, putting it in nice platforms. Developing a lot of climate platforms is really not enough if the right people are not getting access to these platforms to be able to make the right decision.

Finally for me, the change on climate action has to start from the top to the bottom and like the conventional way of from the bottom to the top. It normally has to start with that problem. What are you trying to solve? And then walk backwards to really identify what's the very granular steps and things you have to do and at the end get down to the data. So it has to really move in that way for any kind of action or change to be done. Thanks.

Dr. Theresa Pardo: Great, thank you. Great comments. Jorge, do you want to weigh in on this topic before we move forward?

Dr. Jorge Gonzalez-Cruz: Yes, sure, Theresa. Yeah, just great to be here. Thank you for the invitation. Phenomenal panel and panelists and the organization. So thank you very much. Yes. So yeah, I think I echo everything that has been said in terms of the need for more data, perhaps adding the dimensions of the data. So I think we were doing a reasonably good job in collecting physical process data. We can always do better to anticipate events, potential risks. But we know very little about the human and social dimension data, how the committees are responding to climate stresses in particular.

What is the perception of the communities handling regards to potential risk or threats? So I think we – it's hard data because it's about also people. So I found it very needed and also will help them to tailor target our climate information if we know more about how the communities are responding, whether it's an extreme heat event in a different context, context of perhaps on daily living, on educational environments.

How we're responding to these information, how granular information from the physical domain can be delivered to them. It's difficult to indicate how we're going to collect this data. There are issues of privacy of course. That's one challenge but also transmitting the data in terms of responses in a way that is usable and how the committees respond to information by – that prompts some actions in that case.

So I find that it will be tremendously helpful if we dive in and advance human dimension data as a function of climate change responses.

Dr. Theresa Pardo: Wonderful. Thank you all of you for wonderful thoughts on this question, for kicking off this panel. I mean I think the three areas that Johannes outlined, I think that they're really important points about new kinds of data, right? The TEK, more data about the social and emotional aspects of climate, what's happening. How are people responding in this space and how does it impact the response efforts of our organizations?

Then Linet, as you said, one of the really important points, among the many that you made is this question of sustainability across administrations, right? So we do so much. We make so much progress. How do we think about administrative and organizational, institutional sustainability of these really keen innovations and strategies.

So actually that gives me unexpectedly a lead into your question, Linet. I wanted to talk to you a little bit about the Africa Climate Summit that you just attended that Joel mentioned as you were – as part of your introduction. This climate summit as I understand it, right, is a first ever conference on climate action across the African continent.

It begs the question, “How do you see African countries using data for climate change and what lessons from the experiences that you and your colleagues are having those, maybe who came together in the Africa Climate Summit, that can instruct, inform the rest of the world in a way that you are organizing and taking action?”

Linet Kwamboka: Yeah, thank you so much for that. I think with me, the biggest outcome out of these – really where the opportunity lies for African countries is the opportunity to innovate when it comes to climate action. The Global Partnership for Sustainable Development Data, working with our partners at NVIDIA, AWS, HP is now working on creating these data labs that can be used by governments. You could bring them with super computers but also doing the right kind of training for civil servants to be able to start innovating and start using data to do more.

So really there is an opportunity there to start seeing innovations coming out of African countries but this definitely has to come with a lot of commitment especially for the governments themselves and to be able to go in and start aggregating the data.

There is a lot of data. The government collects a lot and a lot of data. Just as the government but also there are private sets of partners. In GPSDD, we call it “privately held data”. These are coming out of other partners. All these data exist and there is a way that this data can be put together.

Then of course there are the challenges of capacity, to work in terms of skills. There is capacity in terms of infrastructure because when you’re thinking about climate data, it’s not mostly text as you would any other data. We’re talking about large sets like images. They’re thinking about having – using drones, robots, using satellites to capture real-time data.

So there’s really a really big need for African countries to come together and to do the right thing and an opportunity because at this point, climate action is really something that needs to happen for everyone.

A really great opportunity for Africa and African countries to really lead the pack in terms of thinking about this. One of the quotes that I really like which is a very unfortunate quote is

“While African countries are not responsible for the greatest emissions in the world, they are the greatest recipients of the negative impacts of this.” So there is really an opportunity to be able to adapt and mitigate these challenges. Yeah.

Dr. Theresa Pardo: Right. Thank you very much for that perspective. So the opportunity for meeting I think is really a – it’s very concise, very great statement to be organizing around and I’ve heard that quote before and I find it very unfortunate, a very unfortunate thing. So let me open up the panel. Would anyone else like to comment on this question, on this topic, talk with Linet about the Africa Climate Summit before we ...

Johannes Friedrich: Yeah. I’m happy to jump in to give a – also say to see a perspective because one repeated point that also came up in some discussions which I do think is quite important is the question around like equity in data in how like – those who have access to the data, who has the capacity to use the data, but I think what’s even like – I feel like a little bit underrepresented in the discussion is also we had the data even like created where the work is done kind of thing. This is like a lot of the work, like the – what we’ve seen in some of the maps about like analysis, I mean it’s just like...**[0:38:23] [Language Unclear]**...but generally it’s just like the most data gaps that they usually have are in like for example African countries and most of the work that’s being done on this type of data analysis which the focus is also, it’s just like in high income of the northern countries.

It's always like a little bit of a question to me if there’s like – there needs to be some more thinking or rethinking of not only who has access to the data but even like where do we put the centers. Where do we put the centers who are like creating the tools? It’s like the people who are actually in most need of the data or need to have access to the data nor is it like created in locations that actually know the local needs kind of thing. So something that I think would actually need quite a bit of rethinking, but also love to get your perspective on it.

Dr. Theresa Pardo: Great. Thank you Johannes and Ann Marie, did you want to jump in on this one? I think this reflects a conversation we had just yesterday.

Ann Marie Chischilly: Thank you. I think when it comes to – I love that whole issue around equity because I know for a lot of tribes in the United States or even in indigenous people throughout the world, one of the things is that our numbers are so small in population and size that we’re often non-existent. So we’re not even calculated when it comes to data or we’re pushed in a larger community right beside us so that we’re not accurately counted or the data is not counted on our behalf.

So that’s one of the concerns that I’ve always seen when we work with tribes that comes up. With regards to the opportunities, I think one of the things I see with tribes or indigenous people or groups is to stay indigenous – opportunity to share knowledge. You know, indigenous knowledge is pretty new and I think one way to say it’s different but it’s not less and it doesn’t need validation by other Western methodologies if you will because I think the knowledges that

come from indigenous people or tribes in the United States, there's a different type of knowledge and it doesn't fit nicely into data sets and it's very much like our – Dr. Gonzalez-Cruz said regarding holistic looking, looking at holistic communities.

When we're looking at climate change, one of the things I see as a huge barrier is that we tend to silo things. We tend to silo things into air, into water, into land issues whereas a holistic view of things and looking at data in that way that data can be more holistic would be something that I would recommend and as we're moving towards these types of conversations.

Dr. Theresa Pardo: Marvelous. Thank you very much for this idea. Opportunity for meeting, thinking more holistically, thinking about data in context. Not only data use in context but data creation, data capture and context as well. I think I hear you saying Johannes. Jorge, did you want to jump in on this at all before we move forward? That's the second time I will keep coming to you.

Dr. Jorge Gonzalez-Cruz: Yeah, thinking in terms of the African communities, so many questions pop in someone's head about how the communities are adapting to climate change. How is climate change making lives more stressful and the awareness of the climate is signal into the daily lives in thinking that perhaps there's a large portion of the communities that are low income. So I think it would be interesting to learn more about the perception of the communities about what climate change means to their daily lives and what additional burden it's adding into that and how to mitigate that burden so the data cancel out and perhaps becomes an opportunity.

So in recent days, having a conversation with a number of colleagues because of the existing heat across our continent including the Caribbean region and the questions about – they will say, a few communities say that it's time of the school year they actually walk out of the classrooms and there's a learning about why these guys, this has been happening for a long time, so much that it's hot.

That delta is making it even more challenging. We learned that in Puerto Rico USVI for example, there were about 30,000 classrooms without the capacity to deal with this air conditioning. So we opened the discussion even larger about other regions in the country, US. But thinking in terms of Africa.

So that brings issues about equity, why our communities, our children are so exposed. It's a disadvantage across high latitude communities, how they can learn or teach or learn in such a harsh environment. We're making the delta a little bit – so I think it would be interesting to see how it's responding, how the additional stress is and how the communities can deal with that and perhaps opportunities to even overcome some of the historical issues in terms of infrastructure and so because that awareness is bringing perhaps more action or at least the voices are more loud to bring more action, to mitigate the time and impact. So very curious about learning more about the communities in the continent of Africa.

Dr. Theresa Pardo: Great. Thank you very much. Joel, I see your hand up.

Joel Gurin: Yes, thanks Theresa. I sort of have a question for the panel as whole, whoever would want to jump in. I'm struck that all of you in different ways are really talking about the need for what we might almost call "community demand-driven data". That the model should not be put the data out there and hope somebody uses it and the model should not be put the data out there without consulting the people it's going to impact or the people who will put it to use, that there really needs to be a dialogue where data producers of all kinds, not only government data producers but private sector, NGO, academics as well, are really in conversation with people at a more local level to figure out what kinds of data are going to be most important and appropriate for solving those local problems.

So I'm very curious if any of you or all of you have seen examples where that has worked well. Have you seen projects, programs, situations where we've really been able to develop that kind of dialogue in a way that has led to more effective data collection and publication and use?

Dr. Theresa Pardo: Anyone like to jump in? Linet?

Linet Kwamboka: Yeah, I could go answering with Joel's question and Johannes. This is on what's called the "Universal Service Fund" in Kenya because Johannes you were asking there are lots of pockets of data gaps that exist especially in Africa.

When you think about how data is collected around the world and you mentioned rightfully that it happens with the richer countries first. There's always an economic incentive of if we collect the data for this kind of place, we can provide a solution. It's probably easier to provide a solution.

So most African countries are left behind and even when you look at Africa, just as you, you find a lot of data about Kenya, a lot of data about South Africa, a lot of data about Nigeria. But if you go to for example Francophone Africa, a lot of the countries are left behind. If you go the central parts, the DRC, Central African Republic. So I am wondering if – in Kenya the communications authority has something called the "Universal Service Fund" where all the telecommunications operators and from the levies, there are contributions that are made and this money goes into building infrastructure in places that otherwise do not have that economic incentive.

So that may ensure that there's a level of equity when it comes to this part of the infrastructure, when it comes to access to technology, access to communication infrastructure. So for me, it is a thought about – to come back to Joel's question, in places where you can work with communities. The incentive has to be there and for that incentive to be created, in most cases, the poor communities do not have the right kind of economic position for government or even private sector entities to engage.

This comes now again to Jorge's question on what is the impact of climate change for example. We are thinking about food security, the changing climate when it's changing seasons. When people are supposed to be planting, it's very dry. When they're supposed to be harvesting, it's very wet. So that really affects stability and food security. Think about flooding. That means there's forced migration of communities.

But engagement is really minimal when it comes to the communities that are most impacted because there isn't enough data that is collected about that. You will hear about flooding. You will hear about emergency response. But how do you do emergency response to places that do not have the right infrastructure? How do you send ambulances there? How do you send medicine and all that?

So connecting these three questions, for me, I think there is a need for a call for some sort of a Universal Service Fund that can then help governments or even private entities collect data about the most vulnerable communities that do not immediately present economic incentives for data about those communities to be collected because it's only – so we have this kind of data but we can engage with them effectively on the real problems that they have and on real solutions that can help them. Thank you.

Dr. Theresa Pardo: Wonderful, great. Thank you so much for those great ideas and this idea of a Universal Service Fund. It sounds like what you're talking about. Great, a Global Universal Service Fund. Ann Marie, you wanted to jump in here as well.

Ann Marie Chischilly: Really quick. I know we're at time but I wanted to just share an example of the Quinault nation which is in Washington State right on the sea level. One of the issues that they were having was they were constantly being flooded every year. So the data that they were able to collect and use. not only the scientific Western science data, but also a lot of their indigenous traditional knowledge was able to really advance their relocation, their managed relocation into higher lands and being able to pick and choose cultural sites that were sacred, and to protect those sites as well.

So I did put that example in the chat box as well. So just, I just wanted to give one example on, to answer your question.

Dr. Theresa Pardo: Really wonderful. Thank you very much for that example. I see head shaking, so really, really great conversation. Thank you, Joel, for taking us in that direction.

Jorge, I want to ask you a little bit about your work in urban environments. So in urban environments, and in Puerto Rico as well, right, which is, as we know, Puerto Rico has recently in the last several years, suffered from multiple extreme climate related disasters.

And, you know, you've worked on various aspects of these events. And also, in particular, you've worked on the use of new sensor technologies as an important part of the data ecosystem,

right, collecting real time data to deal with climate impacts. So maybe you could talk with us a little bit about, you've already sort of tipped her hat to the number of different kinds of data types that we need, how we think about those data types as we try to apply them to climate action.

So if you were to, you know, to think about what kinds of data, new kinds of data can we use to help deal with the impact of climate change in cities in particular? And what would that use look like?

Dr. Jorge Gonzales-Cruz: Yes, thank you, Theresa, for the question. When we think about cities, yeah, our team and other colleagues around the world, they, we tend to think about high resolution data and information. And I think we are on track to do a reasonably good job in describing the natural environment or the natural domain.

Those resolutions that the city will need was still some more science to do, but I can see signs in moving forward to provide information or the variety that the cities will potentially need. And we have new satellites that have emerged in the last few years. Our modeling capabilities are going into two-kilometer scales, and we're pushing to be at the neighborhood scale at some point, so we can provide that environmental information in short term or long term.

The big question that we are, you know, facing, we anticipate a major need, I think connects to the conversation here is about what that information means to the communities, to the people. And we need to be creative about gathering that information and responses.

So one particular example that we've been experiencing in a major metro area, in the New York City metro area is a fact how extreme heat manifests in the local level, or the human level, in that case. So we have launched experiments to quantify the perception of stress or air quality, for example, on people, what that means in reality.

So those more personalized data information at the personal level, and how the outdoor manifests into the indoor. And with that, connects to the fact about who are the most impacted in terms, vulnerable communities, who has the infrastructure to adapt or no?

So that's a major question, and there are some signs. I think, today, I just got an email from one of my colleagues from Rwanda where we ran an experiment this summer in the city where we were trying to chime the question whether, where we are observing a lore with our capabilities, a major mesonet and others were really a relevant to the community.

We designed a backpack that can measure, you know, conditions at the human level. That was our best indication of whether the ozone event really was being perceived at the pedestrian level, for example, and whether that really prompted. And we try to simulate a normal day, for example. This is one of the very first experiment that we have ever done on these, and that we're thinking about, can we scale this up? What kind of other sensors?

So, can we have, you know, cell phone information? Or, can we empower the mobile instrument that we carry every day, and then gather more information about that? So is that really – are we being effective in delivering that information for weather forecast, air quality, those kinds of things.

I think this will be a major trend in technology, also, the challenges about, you know, the, being private this is information. So what can we share that doesn't compromise the privacy of the other people, and whether, you know, that will lead to action in terms of behavior, whether institutional or personal.

I think that, this is a very interesting exercise. We were just awarded a major, a campaign for Baltimore in 2024, 2025, and we're going to try to then ask those questions, and then perhaps test some ideas to measure human perception on that. And this is in very modern cities, New York City, Baltimore. So, you know, we have to think also about those cities that do not have those capabilities in terms of providing the information in short or long term. All right, so that leads to the environmental equity aspect across our nation and across the world.

I think in terms of human environments, I think we'll see this trend, and that will help us to do our science better, too. So we do need that feedback. And I think we're getting to a consensus that information is needed and the agencies are more open to explore those options. And hopefully, we'll see more commercial products that are really credible and can be used by our people, and including us.

Now, in terms of the interests of the Caribbean, we have learned a lot or lessons that are also applicable into complex human systems. So our work has focused a lot on impacts on the infrastructure. And that has been quite challenging in terms of the readiness of the physical infrastructure to sustain stresses, and also understanding the interconnection between one piece on the other, and also the effectiveness of our adaptation, mitigation capabilities.

And if there's effectiveness, was it fair or no? And recently, we published an article in Nature Energy, where we explore that question on a limited region in western Puerto Rico, what will happen in terms of providing services to those communities that are more vulnerable?

So we combined the social vulnerability index with infrastructure analysis in terms of hardening, and whether it will be exposed to another hurricane Maria in the future? And what are the communities that will be – is it really doing a good, you know, a fair service if we do option A versus B? What are the most options that will lead to a more equal solution or resiliency of the system?

In doing so, literally, we don't have much information in terms of monitoring the capabilities or the readiness of the infrastructure, less so, an institutional level, how do we respond to – do we

monitor our readiness or no? How do we monitor the institutional readiness to respond, absorb the shock? And you know, we had a conversation a few days ago, and, as you recall.

So those are very complex monitors, institutional level. How do we know that the stress from one event is toward damage? How do we monitor? Can we monitor all the assets? It will be impossible to monitor all the power towers, for example, but we need to have a sense of the readiness on how much stress say the system, as a whole system occur.

I don't have the answer, you know. And so that's a big open question that we need to... And then we are trying to tackle n this. It's not an easy response to that, and it has global implications. I think the Caribbean is just a window that is just more exposed, and we may, we shall use that as a learning, a laboratory, we call that recurrence of events occur more often there, so we can learn quicker.

That's the point is, is sharing those experiences across the globe, so we can build also more knowledge, more savviness in how each event, how communities are responding to these climate extremes in those cases. So very, you know, interesting in terms of the data, this is coming over the top of the conversation, how do we monitor those very complex human social technical systems.

Dr. Theresa Pardo: Right. Thank you very much. I think that coming right back to the challenge of monitoring human social and technical systems. Really, really key. Who, would anyone like to jump in on this to comment on this question about where we started the use of sensor technology, collecting real time data, the challenges in using that data before we move to our last question for Anne Marie, before we open up the floor for questions?

I do want to point out, there are six questions in the Q&A. Thank you very much for those. If you have additional ones, keep them coming, and we'll try to get to you, we'll get to you shortly. Anyone would like to jump in on this topic that, and to add to or respond to any of the points that Jorge made?

Linnet Kwamboka: Yeah, I could quickly go in with a really good point that Jorge made, when it comes to, for example, devices, you know, that are in people's pockets. We really need to start thinking about, you know, the use of both alternative sources of data. And citizen generated data is one really, really good key source of good data that can be used, you know, and especially for climate action and climate response.

So there is, you know, an opportunity. I think what is really lacking is the capacity to be able to collect that, collected that skill, and to be able to use that and use it effectively. So, you know, helping, especially governments be able to come in and work with citizens to be able to collect that, this kind of information will really move, you know, things and the conversations forward, even as we push for, you know, other more robust infrastructure to be set up, you know, for governments to have, or to have access to satellite data and information to be able to continue

making, you know, good decisions when it comes to climate change and climate action. Yeah, thanks.

Dr. Theresa Pardo: Right. Thank you very much. So I'm going to move, I'm going to move us forward to our final question, so we're sure that we have a chance to get to the Q&A. And so our final question, of course, this is for you, Ann Marie. And you know, as we look back, we listened to your bio, and we hear about all the things you've done in your career, and now as the VP for Native American Initiatives at Arizona, Northern Arizona University, you have a particularly unique insight into the environmental climate issues that face tribal nations. You've shared already some of this with us. You've shared some great thoughts already on the issue you've seen and collecting, and using data for climate challenges facing tribal nations.

What would you highlight as maybe the top two or three issues from among those that you've already talked about, which have been great, but maybe other ones that you want to touch on? You know, you said a little bit about TEK, about Traditional Ecological Knowledge, and a little bit about the need for data for, excuse me, indigenous data sovereignty. Might – you want to share a little bit more about those topics before we open the floor for Q&A?

Ann Marie Chischilly: Thank you. Yes, I, you know, after your intro, I sound very old, which is, I have had a long career. So, you know, I think, for me, some of the top highlights that we're working on at NAU, we just won a huge NSF grant with all – many other nations, and it's called the Center for Braiding Indigenous Knowledges and Science. And it's, and then we have the Seventh Generation Indigenous Knowledge Center that we already...

So we had two major pushes into the indigenous knowledge world, and I think that's where a lot of the data, at least for indigenous peoples or tribal people will be looking at. Because, I think for so long, for so long, we've been not asked to the table to even discuss these things. And when we have been asked, we've been told, "Well, you're not giving us the right information, and in the right format."

And so, and in the past, I'm just going to be honest, there's been tribes that have been denied funding because they were not using Western technologies or methodologies. And to not be funding a tribe whose frontline on climate change is just, you know, something that we've been working on for the last 14, since 2014.

So the conversation really has to be around opening minds to understand that there is a new thought. There's always new thoughts coming in, but this one's actually been supported by the federal administration. I work with the Department of Interior's team, and they're developing guidance and a training document that is probably leading the rest of the federal agencies on how to educate on what traditional knowledge is, and then how to implement it.

So I think those are two things that are coming forward. You'll see them in the fall. I think a lot of people are going to be... And for me, I think the first request is just to have an open mind, to

learn about it, to understand why it's different than other methodologies. And again, I'm going to say it's different, but not less than it does not have to be validated.

So when you look at indigenous knowledges, I'll read the literal definition. There's no universal definition, but I like this definition. And it's a body of information that comes from indigenous peoples, or peoples who are living directly on the earth. The best way I can say is the knowledge that comes, and everyone has it. So you have, whoever's listening has this knowledge inside of you.

They're their songs, they're the lullabies, they're the teachings, they're the recipes, they're the herbs that maybe your grandparents use. There's all these things that are not by law, they're not set in stone. And so those are all things that I really love to encourage when we're looking at these things.

When we're looking at what Biden's administration is looking to do, they want to recognize ITEK as a form of knowledge that can and should inform the federal decisions. So in the future, we're now not going to be asked not to step off the table, so where it's appropriate and it commits to improve federal engagements with tribes. And then there's an international, there's an internal working group at the federal level that are also working on these things.

The other things that I think, for me, is this encouraging. And most states, there are tribes within your states, encouraging that collaboration with them and asking them to the table to say, what are your thoughts on how to conserve water? How, what are your thoughts are on the drought implications? What are your thoughts are... you know, just what are your thoughts.

And they may not come with, you know, 2.5, any of those things. It'll come in stories, it'll come in, best way, stories, but also just songs and prayers, and just when we're working with these types of information to be very careful about documenting them. Because that, in turn, becomes intellectual property that they're sharing with you. And just be careful of those guidelines with around using indigenous knowledges, because it is considered intellectual property as well.

So I'm going to keep rolling on it on and close this out, but those are some of my highlights. Thank you for asking.

Dr. Theresa Pardo: Oh, yeah. Thank you for sharing. I think, you know, this perspective that, you know, there are generational stories and songs and that carry with them insights about the environment, insights about the impact of change over time. It's a very exciting way of thinking about the world around us and how we tell the story, how we tell stories and capture that data going forward.

Would anyone like to step in on this before we transition the podium to Joel, to take us through the Q&A?

Right. Well, thank you, everyone, for your great responses and great conversation up to this point. I've got pages of notes when these just wonderful key phrases, universal, global universal service fund opportunity for leading this indigenous traditional ecological knowledge, data labs at three areas to make data more impactful. I think we could go on and on. But Joel, let me hand you the microphone, and thank you to the panel.

Joel Gurin: Great. Thank you, Theresa. And so, now, we're going to get into Q&A. Just before we do and we have some great questions that people have posted, just a few things that I know people have asked, I want to just share. We will be making both the recording of the panel available and also a transcript to everybody who has registered for this one.

I think Theresa and I will also be working to write some of this up into a published form a bit later on. And I think there was also a question, I think some people were having difficulty copying and saving some of the resources in chat. If that's the case, those will be included in what we send around as well.

So thank you for all your engagement up to this point, we are going to... Oh, sorry. I also forgot to introduce at the very beginning. Even though you can't see them, we have Jillian McGuffey, from NAPA, and Matt Rumsey from CODE. Matt has been diligently reposting things to the group. I want to thank both of you very much for everything you're doing to make this possible and coordinate, and keep us on track. So Jillian and Matt, thank you.

So let's go to the first question. I think we might start with, and this really builds on some of the discussion we had earlier about sort of using data as part of a dialogue with community.

The question here is, *Can any of the panelists talk about reconciling community data priorities with what decision makers, like government and investors care about?*

So this question is not just how do you make sure community voices are heard, but how do you actually reconcile where there may be an actual conflict? And the example, which I think is great one from this questioner is, for example, a community may care about frequency of flooding events in their neighborhood, but a planning department may only be able to use city-wide data at a different frequency of and format.

Any thoughts about... again, open to anyone. Any thoughts about how do we sort of adjudicate some of those conflicts to make sure that community needs are met in terms of data and are not sort of secondary to what somebody at a position of power might want to do with data?

Ann Marie Chischilly: I guess I can jump in. I think, all of us don't want to talk about politics, but that's basically the question, right? The politics of funding and how that gets sorted at different levels throughout different municipalities, state, and federal.

You know, when you, when I feel like we're not being heard, and I say we, and tribal folks or folks who are in rural areas or underserved areas, it's very easy to not listen to. And so one of the things that we have done is develop our own policy points. I think it's important to then gather our own data and develop points that, and policy papers that represent us from our viewpoint. And that's the stock report, the status of tribes.

In this next report, you know, the first one really concentrated on environmental issues. The second report, which we're developing now, will concentrate on economic issues and indigenous knowledge issues. So, really highlighting things that we want to be exposed in, from our own terms, from our own terms and our own recommendations.

So that's what the stock report does. So I would recommend, that's how I would mitigate is to then develop our own policies. elevate them. I mean, we went all the way to the Senate Select Committee and the IPCC. So then, so it's a lot of politics there too, as well. So, you know, it's all about exposing what you want from your perspective.

Joel Gurin: Great. Thank you. Terrific. Other thoughts? Yeah. Oh, Johannes. Yeah?

Johannes Friedrich: Yeah, I can jump in with an example. And I think, I mean, there isn't an easy solution to this, obviously. But one of the things that might be, that I think is good to push on, and this can be particular when it comes to like financing of these, like, what do you finance is really being serious about the question like, what, who is this data for, and what are you trying to solve, to then really come down and being just as like, are we actually creating the data that is actually like serving this ultimate purpose, and critically assessing like, what are you saying, is its ultimate purpose.

I can give you the example. I took the example about AgriAdapt earlier, and we actually saw quite a bit of risk with this data as well. Because we were saying we are trying to map climate hazards for agricultural areas, current and future. And the one thing that we said is our ultimate goal is to make these, like agricultural areas, ideally more resilient. My plan was crops, plan was like irrigation, and plan was changes.

If we just put the data out there and just say, here's the data and we build it, we think probably going to help them, what might happen is that the people that actually have already the most capacity and know about this type of data, and actually even like access to build this tools, which are the supply chain managers in this one might actually then say, "Well, this is great. Now we have a risk of the most, like vulnerable areas, we're just going to move away from them."

They're going to leave the people behind. And actually, this is like, which is not an actual, like resilience building, which is a just a risk shifting towards the people who don't have the information, basically. They do think like really critically asking, like just pushing on the things, means like, what do you achieve? And is that data actually going to achieve this?

Is there also... this goes in the other directions, there are risks that if you like, make certain information available, that it's going to just like, do the inherent power imbalance that you already have, and just like make that even stronger, because it's going to be the same people who are using this type of analysis that already have the power.

I think, can be at least like one potential remedy. Well, you need to, like, take it really seriously and not just like, do it as a quick checkbox, and so on, but really think through. Does it actually – will it actually lead there. Will it benefit the very local stakeholder and the people that kind of just as like the more disempowered people that you actually say you want to help? This is kind of like when one approach.

Joel Gurin: Yeah, huge point. No, thank you. And I think we're seeing that in a lot of issues around, you know, flood data and other kinds of data as well. We have another interesting question that kind of gets at the power dynamic around data from a different angle, but an interesting one.

So this person writes, Knowledge sharing processes can be hijacked for purposes of disinformation by disingenuous interests, subsequent misinformation can be propagated. This causes distrust around data. What can be done to help make the public better able to interpret data for themselves? And in particular, is there an opportunity for AI to aid users with data interpretation, or counter false data or improper explanations?

And I might actually want to broaden that a bit, and just ask for any thoughts about the use of AI in this kind of ecosystem of climate-related data, both as this person is asking to make it more accessible to the public, and also maybe for other ways in which AI can help in interpretation in use.

Linnet Kwamboka: Yeah, I could take, I could take that. And for me, I think it's very important to build skills for, you know, both data producers and the data users. When, a lot of times when you think about you know, start with open data projects, think about a lot of government's datasets, they're very abstract. And they make an assumption that the people who are reading the data have to be like research people and not necessarily regular citizens who can also use this kind of data to be able to make decisions that affect their daily lives.

I once listened to a journalist who said, you know, the problem with how we report on corruption, or at least the journalists reports on corruption, is they talk about these very big figures. They would say, you know, someone stole 30 billion shillings. There are citizens who've never had access to 2,000, you know, shillings, and you're talking about 30 billion shillings.

They're not able to really, you know, create that relationship. So when you're expecting citizens to revolt, they're like, "We don't know what that means." But if you say someone stole an

equivalent of 20 hospitals, or you know, 50 schools, or milk for all the children in the country for three months, then it starts to make sense.

So, one, there needs to be capacity development. But also, there needs to be, you know, reporting and communication of data in ways that are relatable and understandable by citizens. On the issue of AI, I'm a big, big fan of AI, and I listened to at least one podcast of AI a day. And interestingly, this week, I listened to a podcast that was making a case for, you know, AI as our second brain.

And I think, you know, there are some tasks and some things that do not require us to spend a lot of time to do or to think about, especially when AI is doing that for you. Think about your experience, you know, if you went to Google and search for climate action, you will get thousands and thousands of you know, records and reports. Versus, if you went to GPT and, you know, said give me five points about climate action, you will get exactly five points about climate action, right?

So I think there are, of course, the downs of, you know, AI and what that means for the future. But there's also the positives of how we can leverage AI and its potential in terms of, you know, giving us the kind of information that we need to be able to make decisions. Bringing AI to work to, you know, our meetings, to become, you know, that if, for example, the six of us here, to become that seventh participant who brings in another perspective that is thousands and thousands of people out there who have come up with that kind of perspective.

So I think, for me, AI is really useful in how we want to think about this, especially in giving us ideas. And there's, of course, you know, a question about the quality of the responses and the data, and, you know, is it all both generated information? And I know that there are also other companies and organizations out there that are working hard to make sure that it comes, it's as real as possible when it comes to the responses, because at that point, it's going to be used for very critical decision making. Yeah, thanks.

Joel Gurin: Fantastic. Thanks so much, Linet. Jorge, if you'd like to add to that? And then there are three questions I want to just get to very quickly to make sure we cover everybody's. But Jorge, on the AI topic?

Dr. Jorge Gonzalez-Cruz: Yeah, you know. Yeah, you know, Linet raised statements on data, availability of data and use of, potential use of AI machine learning methods. And that, connecting to the issue of trust, mistrust of the data. I think the transparency, at least to potential trusted data, and that transparency, enriches our records of events and potential consequences, which are, can be used for AI.

So one specific example is the case of the power infrastructure and in power outages. Just recently, the federal government passed a bill that all the power utilities need to report power outages. Prior to that, it was not available, because it was a potential source of information for

the service or, you know, lack of effective service. But in doing so, we can use that information to actually develop techniques to anticipate power outages.

And recently, and this is objective information, it happened, it needs to be reported. The same thing could happen with hospitalization, for example, when we have like heat events, and the ways to protect the information or the other patients. And that, having access to the information leads to AI machine learning depends on training. So the more data we have that is credible, the more effective our met – our tools will be in using that information to, for good, whether it's anticipating risk and, or anything else to mitigate the impact.

So yeah, 100% on these transparency, as much data that we can share with the agencies, the better for us to feed our models.

Joel Gurin: Fantastic. Thank you so much. So I'm going to do three kind of rapid fire questions just, again, to make sure we answer everybody's questions as best we can. So this first one, Ann Marie, is for you.

There's someone who says, Really interested in the potential of indigenous knowledge. It sounds like tribes could have run into trouble on getting quality assurance project plans, QAPPs approved by federal agencies, how are you building this into projects? This I think meaning indigenous knowledge. Do you have to treat it as supplemental and still provide all of the Western data, QA/QC expectations? Is there a relationship there?

Ann Marie Chischilly: Thank you for the question. So at the Institute for Tribal Environmental Professionals, if you go to us online, we have a whole course on QA/QC about developing data systems for most of the air monitoring right now.

So the air monitoring, that then triggers then what I call a UN principle called free and prior informed consent, where tribes, free being, free of any duress. Prior being, prior to the design. Informed, meaning that all folks involved, including indigenous knowledge holders, which are many times, not all the time, elders in the community. They understand the pros and cons, the requests being made. And then, consent. Consent being any time during the project, they are allowed to say yes or no to ongoing commitments of producing indigenous or indigenous knowledges or intellectual property.

So there's many different ways, but if you go to the website, I think I already put it in there, ITEP's website, they'll give you some great examples of Water and Environmental Programs (WEP).

Joel Gurin: Fantastic. Thank you so much, Anne Marie. Super helpful. Johannes, maybe you can answer this next one. So we have a question about the gaps in differences in how we're looking at emission estimates. So there's a gap in the CODEs used to collect data and available emissions calculation methodologies by industry, or process used in the US and Europe, and UN are not

the same, very difficult to find the crosswalk, which is really imperative to globally share emissions estimation methodologies and data globally.

So this is I think, emission inventories are necessary to determine where we are, direct reduction, to direct reduction efforts and measure the effectiveness of reduction methods. So I think this is maybe just sort of, could be a more general question about data is being collected, even data about global factors is being collected in different ways all over the world. *What are some of the ways you or WRI, or others approach bridging those gaps?*

Johannes Friedrich: Yeah, I'll try to keep my answers short. If you go onto one of our major projects, which is Climate Watch Data, or I can share the link, and you go to the emissions estimate, there's like a lot of different datasets on global greenhouse gas emissions, which we offer openly. And there's actually not one datasets, and this can be five.

So have we solved that problem that aligns all of these different data sets? No, we haven't, unfortunately. It is a challenge. There are different, it's – works on multiple levels. It's for multiple purposes as well, which is also one of the challenges. There might be always some limitations on how much you can align these different data.

We've always found, at least that's a step. It's often not – in my perspective, is often not about the existence of standards. It's about the adoption of standards. It's about not only having the same kind of sector categories. It's even about understanding. If you look at these different emissions datasets, they have different numbers, and it's kind of a question, why are they different? And both making this very transparent and open, so we explain everything, why they're different. And the methodology is very open, can be quite helpful.

And the other thing, that in this kind of standardization, which is, I think is not enough done is talking to each other. It's just socializing of certain standards. It's like, it's often that these tech problems are not pure tech problems, and get done the type, pure tech solutions. Essentially, being just like you need to make people talk to each other, that where we do a lot to this type of inventory.

So just make sure that we really even understand so that we can then explain it to others, basically. So it's just a general answer, but.

Joel Gurin: Great. No, thank you very much. And then this last question is on health care. And I might try a quick answer to this just in the interest of time. And Matt, maybe if you could post the link to CODE's report on cross-sectoral approaches to social determinants of health would be great. And I'll tell you why in a minute.

So this is someone who works on health data and says, and starting to think about environmental factors that impact health, we find a challenge, it's all of them. It's all the

environmental factors. First challenge seems to be identifying the key ones and integrating them together in a helpful way that healthcare can use.

For example, to know that a given patient is at high risk of extreme heat exposure or clean water disruptions, and thus do some intervention. Part of this is knowing what are the most important data for healthcare? And other is where are the data and what standards are they expressed in? Do you have any perspectives on how that might work, might happen? Or is it already happening internationally?

I'll just add, you know, one quick piece of that is, so our organization Center for Open Data Enterprise worked with Department of Health and Human Services a while ago. We've done a lot of work with them. Thank you. We've done a lot of work with them on social determinants of health. And as this report points out, the HHS perspective, I think, now is that climate change is a risk multiplier for all the social determinants of health. All the issues that we know impact health, which include income, include housing, include infrastructure, and so on are impacted negatively by climate change.

So I think we're seeing an emerging, and if you look at social determinants of health, it's a kind of similar sort of construct in a way to what we're seeing around climate in many ways that we're talking about the many different factors that can intersect to impact individuals and communities. I think we're probably going to see more and more of those areas coming together.

There is now an HHS Office of Climate Change and Health Equity. So I think at least in the US, there's some good work now on the federal level to try to see how those things might interact. And I'm sure internationally as well. And I I'm sure many of you on the panel would have more to add, but I think we're at time.

So, in the interest of, I think we could continue this conversation productively for quite a while. On behalf of CODE, I just want to thank all of you so much for, you know, just a tremendous conversation here. You know, Theresa and I will do our best to capture all of this, to share it back with everyone. And hopefully, this can lead to more and more great insights, and most importantly, to action. But Theresa, if you'd like to conclude?

Dr. Theresa Pardo: Good. Thank you very much, Joel. And as Joel said, Anne Marie, Johannes, Jorge, and Linet, this has been amazing, and it could go on forever. So thank you very much for being part of the part two of this important series. And I'd also, in absentia, maybe, maybe they're out there thank our panelists from our part one of this series, who presented about a month ago.

So thank you so much for coming together for expanding our thinking about these issues, and for setting the stage, I think, for what could be many, many more, very productive and very critically important conversation.

So on behalf of NAPA, we in Technology Leadership Panel, thank you very much. And thank you to our participants, and all your great questions. Have a wonderful rest of the day.

Panelist Biographies

- **Ann Marie Chischilly, Vice President, ONAI, Northern Arizona University:** Ann Marie Chischilly is Vice President of the Office of Native American Initiatives at Northern Arizona University. She is also the former Executive Director of the Institute for Tribal Environmental Professionals, an organization dedicated to strengthening tribal capacity and sovereignty in environmental and natural resource management. She served for over ten years as Senior Assistant General Counsel to the Gila River Indian Community, where she focused on water rights and renewable energy. She has served on federal advisory committees for the EPA, the Department of the Interior, and NOAA, and co-authored the UN “Guidelines for the Use of Traditional Knowledge in Climate Change Initiatives”. She has a JD degree from St. Mary's University School of Law and a Masters in Environmental Law from Vermont Law School, and is an enrolled member of the Navajo Nation.
- **Johannes Friedrich, Director of Climate Data, World Resources Institute:** Johannes Friedrich is the Director of Climate Data at the World Resources Institute (WRI). He leads WRI's data strategy on climate, energy, and systems change, and leads several WRI data platforms, including the Systems Change Lab, Climate Watch, and Power Explorer. His work is widely cited and has been applied by over 250 government ministries as well as hundreds of large companies. He has also launched data platforms in partnership with the governments of India, Indonesia, and South Africa. He has a Bachelor's of Science degree in computer science from Georg Simon Ohm University of Applied Sciences in Nuremberg, and an interdisciplinary Master's degree in science for sustainable development from Linkoping University in Sweden.
- **Dr. Jorge E. González-Cruz, SUNY Empire Innovation Professor of Atmospheric and Environmental Sciences, University at Albany:** Jorge E. González-Cruz is the SUNY Empire Innovation Professor of Atmospheric and Environmental Sciences and of the University's Atmospheric Sciences Research Center at the University at Albany. Previously, he was the Presidential Professor of Mechanical Engineering at the City College of New York, where he was also director of the Initiative to Promote Academic Success in STEM and still remains the lead scientist of the Coastal-Urban Environmental Research Group. He teaches and conducts research in urban energy sustainability, urban

weather and climate, urban remote sensing, and regional climate modeling and analysis; has several patents; and received the CAREER Award from the National Science Foundation. He earned his Doctorate in Mechanical Engineering from the Georgia Institute of Technology and his Bachelors in the same discipline from the University of Puerto Rico-Mayagüez.

- **Linnet Kwamboka, Senior Program Manager, Data4Now:** Linnet Kwamboka is the Senior Program Manager for Data4Now at the Global Partnership for Sustainable Development Data. In that role, she supports African countries with data and technical skills to apply data to achieve the UN Sustainable Development Goals. She is also the Founder of DataScience LTD, a company specializing in data engineering and enabling data-driven decision-making, and serves as a board member at WeRobotics and B-Lab Africa. She combines expertise in computer science, software engineering, data analysis, and geographic information systems, and has been named one of the World's 100 Most Influential People in Digital Government and one of the top 30 women in data. She has a Bachelor's degree in computer science from the University of Nairobi and was a Carnegie Mellon University Fellow in software engineering.

Links Shared in Chat

- <https://www.opendataenterprise.org/>
- <https://apolitical.co/solution-articles/en/climate-dart-a-new-tool-for-climate-adaptation-and-resilience>
- <http://reports.opendataenterprise.org/DART-2-pager-Final.pdf>
- <https://www.wri.org/initiatives/agriadapt>
- <https://www.climateworks.org/blog/how-to-find-relevant-climate-data/>
- <https://www.wri.org/applications/aqueduct/water-risk-atlas>
- <http://www7.nau.edu/itep/main/Home/>
- http://www7.nau.edu/itep/main/docs/publications/ITEP.STACC.Report_2021.pdf
- <https://www.whitehouse.gov/ceq/news-updates/2022/12/01/white-house-releases-first-of-a-kind-indigenous-knowledge-guidance-for-federal-agencies/>
- <https://toolkit.climate.gov/case-studies/quinault-indian-nation-plans-village-relocation>
- <http://reports.opendataenterprise.org/Cross-Sectoral-SDOH-Summary-Report-April-2022.pdf>
- <https://www.nytimes.com/2023/08/24/climate/air-quality-satellite-nasa-tempo.html>
- <https://acrobat.adobe.com/link/review?uri=urn:aaid:scds:US:99a11e97-c722-3a3c-9cee-d714846c8f47>