Center for Strategic and International Studies

TRANSCRIPT

Event

AI for Food Security Forum

Plenary Panel I: Enhancing Global Food Systems with AI

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FEATURING

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Franck Gbaguidi: Thank you so, so much. Can you all hear me OK? Awesome. Very excited about today's day-long event on AI for Food Security. It's quite rare that we have a full day on it. You may have a panel or a session here and there, but a full day is quite impressive. So I'm really excited.

And I'm even more excited to moderate the first panel, which will focus on enhancing food security, food systems with AI. I have a great, great, great panel with me, four experts that are kind of, like, covering the full AI for food security stack. The first expert is actually online. It's Dr. Catherine Nakalembe. I don't know if we can connect her. But she will be joining us remotely today. Oh, my mic is now on. She will be joining us remotely today. We see you, Catherine. Hi. How are you doing?

Catherine Nakalembe: I'm doing OK. How are you?

Mr. Gbaguidi: Perfect. We can hear and see you OK. Thank you so much for joining us. You are a geospatial AI expert affiliated with the University of Maryland and also the Africa lead for NASA Harvest. Thank you so much.

Also very happy to welcome to the stage Eric Firnhaber. Please welcome. Join me to the stage. You work with Digital Green. Many of you guys know Digital Green. I'm particularly excited about your work with FarmerChat, which is now available in many, many, many countries across the Global South, in Africa, in Latin America, also in Asia. Thank you so much for joining us today.

Erin Firnhaber: Happy to be here.

Mr. Gbaguidi: Yanyan, would you please join us? Senior researcher fellow with IFPRI. Really excited to have a development economist point of view to the conversation, to focus not so much on the tools that are being built but also on how they're being assessed, how they're being evaluated. So thank you so much, Yanyan, for joining us today.

Yanyan Liu: Yeah, thank you for inviting me.

Mr. Gbaguidi: Last but not least, David. David Hughes. Many of you guys know him. From Penn State University. Also the founder of PlantVillage. Kind of, like, incredible how it has now been deployed in, like, more than 60 countries, I think it's 65 the latest numbers through FAO. Lots of promise. Excited about the future also of PlantVillage, but also about talking very candidly about some of the difficulties and the roadblocks and bottlenecks that we have.

We have decided to frame the conversation and to title the panel Enhancing Food Systems with AI, and not fixing or solving it with AI. That's very intentional, because words mean things. We don't want to overhype anything today. We want to focus on what is genuinely transformative and then build upon it, where it is and what it is that we should invest in. And when I mean investing, I'm not just talking about money. I'm also talking about time. I'm talking about resources, skills, or reskilling, or upskilling. So it's really investing in all of the senses of the word.

I am also very excited to welcome our online audience, because we have many virtual participants. Which is a reminder to all of you that this is not a D.C. conversation. (Laughter.) This is not a U.S. conversation either. This is very much a global conversation. As Caitlin mentioned, I came from Paris, right before I was in Kenya, also hosting an event on food security – actually, with one of your colleagues from Digital Green. And so we really want to make sure that we are keeping a global lens. Not just the Global North, not just the Global South, all of it. And so keep that in mind also for your questions, because we will have a dedicated time for Q&A after the conversation with the panelists.

I want to get started with you, Catherine, because one of the reasons why we wanted to make sure you're part of this panel is that I had been – kind of been watching your TED Talks. And some of the stuff that you've mentioned in there were focused on Earth observation and how the build-up in Africa, and across the Global South, is extremely uneven. What does it take to really have AI-powered tools that make sense, from a Global South perspective, particularly in Africa? And how can we bridge that gap that we can see from one country to another?

Dr. Nakalembe: Thank you so much, Franck. And thanks for having me. It's unfortunate, I work in Maryland and should be there, but I'm away this week. And I really like this question because I think sometimes – especially how you frame that when you began, with AI is not a solution but it is a tool in our toolbox. And the reason for this, why I like this framing, is for a lot of the things that need to be done the technology already exists. So if you think about – if you were to compare, let's say, why agriculture might function, you know, a little bit more profitable or a little bit more sustainable, let's say, in Germany or the Netherlands, and why it doesn't, for example, maybe in Malawi or other places, the difference is not that, you know, there's not been AI applied in Malawi. It is that potentially, the investments that are required to move the needle to make it profitable or sustainable or resilient is what is missing.

So there's already, you know, some very basic things around mechanization, around improved seeds, around irrigation, around

infrastructure to move food from where it's produced, or early warning to provide farmers with information so that they can prepare or respond accordingly. All of those things exist. All those ingredients exist. And so fundamentally the investments in the infrastructure, the people, and the things that need to be in place is what's missing. And AI, obviously, you know, tools, like we develop with earth observations, allow us to, for example, understand where in Malawi, or Senegal, Ghana, et cetera, farmers might be growing rice. What infrastructure might be missing in those places. You can combine, you know, all sorts of datasets to be able to get a much better insight about what is happening in a particular place, where there might be yield gaps, where, you know, investments in fertilizer, et cetera, could make a difference.

But in reality, the investments that need to be made is what would make a difference. So whether I know so well how poorly crops might perform in a particular region, and how early I can predict that a flood will affect an area, and how well I can assess how severe the flood might be, has nothing to do with the response and action that needs to be taken in order for a farmer to succeed, in order for food to be available, in order for tools for resilience to be accessible. So that's kind of what I think is missing in the broad scheme of things. And we are getting better and better at understanding – or, getting faster and better at predicting, forecasting, estimating, et cetera. But in terms of delivering those things that make a difference, this is where we're kind of falling short.

So that's how I sort of want to frame this, that whether or not we have become so much faster at understanding what is growing where, how well it's doing, where we could import from, does not actually deliver the stuff that is needed for a farmer to actually make progress and produce much better, or more efficient, or more sustainably. I don't know if I did a good job answering your question.

Mr. Gbaguidi: No, you absolutely did. Thank you so much for this very comprehensive overview to get started with the conversation. It's actually a great segue to my question to you, Eric, regarding FarmerChat. I'm trying to understand from your perspective, now that you have managed to reach over a million smallholder farmers across the Global South, what is the main bottleneck that you see in your work to take it to the next level? And so to get to the next million, and the next million, and the one after that?

Mr. Firnhaber: Yeah, even building on a lot of themes that Catherine brought up around kind of delivery, uneven nature of that infrastructure. I'll speak to some of those points. But sort of an underlying piece of it is trust. In this case, we're talking about AI today, so trust in AI, which is wildly across the board around the world. So for farmers in particular, how do you help

build that trust in AI? Or, you know, through the history of farming, in any kind of tool or delivery mechanism that provides information that might be beneficial for them to act on? I think what we've found is that it's not necessarily the model or the AI tool. It's the context and even, as Catherine was saying, the actual delivery.

So we've seen that an AI can deliver a 99 percent accurate answer to a farmer, but it won't be as well trusted or adopted as a 60 percent answer given by an extension agent, a human, that they've known for 10 years, they've seen monthly for the past 10 years. So there's two big things that we think about in terms of building that trust, in addition to kind of the wraparound human support to it. One is language, which I'll get into, and then also localization, kind of that context and delivery.

So on language, if we're thinking about the large AI LLMs, the majority, if not all of them, are trained exclusively on English, Western languages, Western information datasets, things like that. They don't always apply to Global South or elsewhere outside of those training sets. So thinking about that from a spoken language standpoint, obviously where we work in – across Asia and Africa – hundreds if not thousands of languages in India alone, getting into regional tribal dialects in places like Kenya, Ethiopia. So it's really a verbal language thing. And you think about what that translation looks like.

In our stack of delivering an AI advisor to farmers, the very first thing we have to do when they ask a question is actually translate it to English because the rest of the stack, in terms of what we found that produces the highest quality results, are all English processing. So if it's in Iromi in English or Hausa, Nigeria, English first. And it runs down the whole stack, all the way to the – to the response. And goes back up. And the very last thing we have to do is translate it back into whatever local language.

And it sounds somewhat simple, but there's a lot of context that can easily be lost if that translation doesn't happen well, which it doesn't always do, just kind of given the nuances of where languages are recorded, how they're written down or digitized. But each time you have to translate, you lose some of that nuance. To be very candid, the best way we've found to do that is actually Google Translate, given the wide breadth of languages that we work in. We've worked with governments in India, Kenya, otherwise, to pull from their localized language translation databases. But Google Translate has been the best one for that.

The other piece on language, I would say, is agricultural vernacular. So it's not just about the spoken language. It's about specific wording that

might be local to a community, local to a particular value chain in a country otherwise. We have a good example in Ethiopia, where in three neighboring woredas there's three different words for the exact same crop, even if it means the same thing. And so how do you get the AI to know, OK, for this farmer, even if they're in the same value chain in this particular region, if you use the wrong word, it's the wrong advice, the farmer won't trust it. You maybe get two shots at a response for a farmer to say, OK, this doesn't work for me. I'm not going to trust it.

That kind of dovetails into the localization piece as well, which very much matters as well. We all know farmers around the world, regardless of location, value chain, things like that, they're not a monolith. Every farmer has their own unique needs. Even if you're in rice paddies in India, the farmer slightly up the hill has a slightly different agroecological zone and set up than the farmer down the hill from them. How do you make sure that that device meets them where they are with data that is truly hyperlocal, localized, and drawing upon the best global research for those purposes?

So, I mean, even thinking some of the remarks that Caitlin made around fertilizer right now. The other piece is that you recommend a fertilizer because it's the time to do that in a given cropping season, that either happens to be not available depending on kind of global supply chain situation, or it's just not available at all, then it's a completely unusual piece of advice for them. So, yeah, just those two small things there. (Laughter.)

Mr. Gbaguidi: Thank you so much, Eric.

Yanyan, a couple of reactions from you based on what you heard from Catherine and Eric, particularly related to your recent work which focuses on leveraging machine learning to predict crises, food crises, a year ahead. Sometimes I think some of the numbers that you've been sharing with us are quite promising. You're talking about correctly flagging up to 94 percent of crisis areas using exclusively public data. What can AI really do to help kind of see hunger coming?

Dr. Liu: So, first of all, I want to thank Google.org for supporting this work. And basically, our model is trying to predict – to use the IPC assessment, and actually the categories and percentage population falling into food crisis as ground truth. So use all secondary data, passively collected data, to predict your machine learning method to predict this – to provide nowcasting and forecasting of IPC categories outcomes. The result is actually pretty good, but only good – very good in the data-rich locations. So data is still very important, especially the ground truth data.

And so that's – about the question about the AI, we want to address that AI can be used to improve in three aspects. First, to improve timeliness of humanitarian targeting, right? Because IPC, for example, is considered a great approach for monitoring food insecurity and humanitarian targeting, but it's only conducted usually – well, twice each year, and only in limited location, because such assessment is so expensive and also time consuming. So what we do is we develop this model which kind of fill the gaps geographically and temporally. And so that's one aspect of its main use.

And another is it can be used to predict – monitor and predict and forecast food insecurity in fragile and conflict-affected settings. In those cases, data collection become very difficult. And certainly it can facilitate data collection. For example, like your data, like arbitrating data from Digital Green, those can be used. Those are user interaction data, which can be used as one feature to feed into our model. And also, like PlantVillage data can be used as price and disease surveillance.

Also, for example, one colleague of mine, and with David, you produced – you developed an AI tool to take pictures of food to be consumed, so to capture food consumption. So those data also use – can use as ground truthing, right? And also, our model can predict in which area additional field-based data collection and assessment would be most useful. So, for example, we can forecast under different conditions, like El Nino situation, so which are the locations more likely to be subject to a food crisis? So the future IPC assessment, maybe it's more valuable to be conducted in those areas.

Mr. Gbaguidi: Thank you so much, Yanyan. I like the fact that you built silos between your work and the work of Eric and of David. That's a great segue to my question to you, David. I've always been very, very impressed with the work that you're doing with PlantVillage, particularly the high accuracy of the benchmark. Sometimes, and you've talked about it very openly, performance can drop in real fields. How can we close that gap?

David Hughes: So I think it goes to Yanyan's point. What we have to do is have the forecasted model. In our case, that may be an offline convolutional neural network inside the phone. Or it may be the kind of large language model that Digital Green are doing. So it's sending it to cloud and coming back. And then you have to have a ground truthing on how accurate that is. And then the question is, by which metric? Is it accurate by increasing the profitability on the farm, for example, which should be a really critical metric because you – like, in Kenya, for example, we're seeing massive production of tomatoes at the moment, but the market price is very, very down and so people can't sell them. Or we're also

finding a lot of roads are hampered in terms of transport so you can't get it to market.

So you have to look at this. And the way in which we're trying to do that is bring in through AI the farmer voice. So we actually have this new project as part of PlantVillage+, which is our corporate spinout – and I say corporate not private sector because it's a worker cooperative. So we have this model whereby we'll be collecting data as a byproduct of commerce, asking the question: To what extent are farmers adapting to the challenges of climate change based upon these models? So how accurate are those models? And how can we provide to IFPRI NASA Harvest at University of Maryland, et cetera, data in real time? So you may have seen I just used my phone there. So I've just used that as part of our tracking system. And so you're all here on the tracking system. So then we could have a global community of scientists contributing to that.

But I think we can improve the model, but we have to make sure we have a human in the loop AI. That's something we're building at Penn State through something called Tilva, which uses Penn State Extension System, which is one of the best extension systems in the U.S. And we can learn from these approaches at other land-grant universities, the way in which they've historically engaged domain experts, educators, and faculty in the process. And that's critically important. And I think it's important to point out that this shouldn't be a private sector solution. Because when private sector is in charge of diagnostics, there's no incentive to share the underlying principle by which we do these diagnostics.

So I was just complimenting Eric on Digital Green. They release everything. And that's critically important, so we could understand why they say X versus Y. And that's not necessarily in all sectors, but it's fundamentally important in agriculture because 2024 was the hottest year in 125,000 years. We only invented agriculture during the – you know, the Holocene, you know, 10-12,000 years ago. And everything going forward is new. So as I was saying to Chris from Maryland earlier, we have to engage the global community and scientists improving our models. Those scientists are not going to work for free for ChatGPT. But they would for Digital Green with its mission, and hopefully IFPRI, and PlantVillage, and other people in that space.

Mr. Gbaguidi: I have a follow up – two follow-up questions, actually. Number one is, what was the motivation behind Plant Village+?

Dr. Hughes: PlantVillage was – (laughs) – I formed about two years ago because I didn't trust government. I saw Sweden stopping funding to a CGIAR

partner we had at the time because of the Ukraine crisis. It was 23 percent decline. I had not expected my distrust in government will be so manifested on January 24th, 2025, when we lost immediately $9 million. I was the director of USAID Innovation Lab at Penn State. And so it turned out to have been a good move. It's also a move that I think donors really like. So we're getting a lot of support from the Gates Foundation in that space.

But critically – so PlantVillage has done rather well in the public sector from a variety of sources. And I don't believe all those public investments should lead to private gains. And that's why, when we have made a corporate structure, we've structured it as a worker cooperative so the members of PlantVillage have one vote. I've got one vote. And democratically, we can figure out the best solution going forward, and we don't have private gains from public investments.

Mr. Gbaguidi: OK. That's very helpful. I want to – Catherine, I want you to kind of, like, react to this point, specifically trust in governments, in the context of the work that you do. And to what extent we need to involve public officials in this effort that you are all trying to lead in your own way?

Dr. Nakalembe: Thanks. Thanks for this question. I think there's sort of – when I think about, you know, the public sector in the context of delivering the things that are needed – so I think there's a lot of things that we take for granted, particularly, for example, if you live in the U.S., you know, there's guarantee that, you know, trash will be removed, or you get the early warning on your phone because there's no infrastructure, et cetera. So we take that for granted. But I think with a good framing and backing it is a pathway for delivering things to communities that would otherwise be excluded, who cannot afford to pay, you know, for – let's say you had – if you had to pay for your, you know, weather app, for example, and it was only accessible to people who are able to pay for it.

So this applies even in the context – I think it might even apply more in the context of agriculture, because in a lot of the countries where production is really high and food security is set, there are lots and lots of subsidies that are provided by government in order for farmers to succeed. This is true in the U.S., this is true in Germany, where you know the backbone of being able to deliver the food that is required when it's required in order to have food stored for, you know, months, et cetera, it requires that there is a clear public investment and interest in this. And so in the context – if you think about in the context of the African continent, I strongly believe that ministries of agriculture, for whom it is their mandate to monitor, track, understand, and inform their ministers and decision makers about food availability, food decisions – they need to have the agency, the power, and the capabilities to use the tools that,

you know, we are all developing, in a way that allows them to be proactive.

So it shouldn't require that, you know, they have to wait, I don't know, two weeks, 24 hours, or 48 hours for when the person with the expertise, let's say Catherine, has time to do some analysis. This analysis should be able to be run within a ministry, because in the grand scheme of things, you know, it is their responsibility to deliver. I've had, you know, real-time experience with, for example, the Ministry of Agriculture in Kenya trying to really get information from extension agents, and inform the minister, and have things delivered in time. So when a flood happens, it happens so quickly. And so if they have the tools and the means to be able to assess the situation, they're able to act on that information, deliver it to the minister, and then, you know, things fall in place.

The other thing is the infrastructure that is required. So David just talked about, you know, extension work. This is a huge network of individuals who are on the ground. And so enabling or supporting the ministry that works with extension agents so the extension agents can do their job really well I think is a win-win in the grand scheme of things. And so in order to have or build this public trust, the other dimension, going back to my initial point, is around investments. Which is if a ministry is well resourced and has a team of people to do the analysis, deliver the assessments, collect data on the ground, bring the resources or the things that farmers need in order to be able to respond, they're best placed than any other organization, I would say.

So we're talking, you know, millions of extension agents. We're talking a lot of expertise and knowledge. An initial point around the local context and trust. So sort of supporting that pathway from government level all the way to the farmer is absolutely critical. And I think I don't know anybody – I've never met anybody in the ministry who, you know, is not interested in supporting and seeing farmers succeed. And so the challenge is do they have the tools, the means, and the agency in order to be able to deliver those things that are required? So I think trust is sort of a two way – it's two way, in the sense that when people are on the front lines, they need to have the agency in order to act. And so if they're able to act, they will build more trust. However, them being able to know what is going on and not being able to deliver it is where distrust kind of arrives. So a farmer cannot rely on the ministry because the ministry doesn't have the resources or the tools to be able to respond accordingly. So it's kind of, like, a double-edged sword, in this case. Yeah.

Mr. Gbaguidi: A vicious cycle. Well, thank you so much for this, Catherine. This is actually a great lead to my question that I actually want to ask the three of you on data and infrastructure. That's kind of a paradox at the heart of this conversation, because we're seeing AI models getting cheaper by the day, getting also more advanced by the day, and at the same time a lot of the data that's out there tends to be very much so contracted and not necessarily readily available. How can we bridge that gap so that both are moving in the same direction and we don't have one side of the conversation moving much faster than the other? Going to start with you, Eric.

Mr. Firnhaber: Yeah. I think from our perspective we actually see the AI models, obviously, are much better resource than a lot of the data infrastructure, both in terms of types of data, how it's collected, how it's measured, stored, and then shared. That is certainly lagging behind in terms of resources and capabilities from where the AI models are. From our tech stack, we're kind of LLM agnostic. And so we kind of swap in and out what makes the most sense, given where that localization happens or needs to happen, and then internal benchmarks to deliver that.

But what the big challenge is, is making sure that we have that update localized data infrastructure there. And it's a – it's still very much a piecemeal, patchwork, very uneven, as Catherine was saying earlier, about kind of satellite data as well. OK, there's an API over here. There's, like, a spreadsheet on this one computer over here, and we're literally kind of pulling these pieces together in the back end. Or, even like you were saying, as well, you know, we have accurate data but it's only updated every six months. I love what you were saying about the models to forecast that.

Even if it's not the actual ground truth, it's way closer than something that's three, four, five months old, or the day before the update is tomorrow coming out. So thinking about how all that data comes together, I think that's where the critical point is right now. But also knowing that that's a massive number of much smaller investments, as opposed to, you know, one, two, three big AI companies building out a massive LLM. That's a big mandate that they are very well executing on, but having all these very disparate, very useful in the aggregate datasets, how do you pull all those together?

Mr. Gbaguidi: Awesome. Yanyan, your take on this.

Dr. Liu: So under the current situation, because our data collection support is getting smaller, and so in this case I think it's – for our AI models we rely on data. Data is super important, especially ground truth data. We use the data to train, to validate, and improve our model. So I hope donors,

even if public funders has withdrawn, hopefully, like private funders, like Google can – or has already, actually, stepped in to fill the gap.

Another thing is I think we should make better use, make a full use of limited funding to maximize, you know, the – to make good use of it. So for example, like I just mentioned, the data we have never used before, like the user interaction data for food insecurity. It has been used, but not in this area. And like from PlantVillage, from, like Plantix, et cetera.

And also for ground truth data, actually, I think it's different organizations also collected their own data, like WFP and World Bank and also government. For example, Kenya government has collected monthly consumption data, et cetera, but most of – some of data do not have public access. So if we could try to encourage them, those organizations, to release their data so we can make better use of them.

Mr. Gbaguidi: Appreciate it. David.

Dr. Hughes: Well, there's a lot of good news here, in the sense that this ongoing war on AI development, the beneficiaries will be farmers globally. You know, Google, Amazon, Meta released figures a couple of months ago. They're spending about $2 billion a day on this. It's just extraordinary. And that doesn't count China versus USA, UAE versus, et cetera, et cetera, France with Mistral, and so on. And so AI will just be electricity. It'll just be everywhere all the time.

And it's also great that we have, especially with China releasing so many open models which have forced Google into releasing Gemma, for example, which is extremely good. So we can now have Gemma, a baby-sized version of Gemini, running on a phone and doing most of what you want, most of what Digital Green needs. During our innovation lab what we did with Gates funding was set up these servers inside the Ministry for Agriculture in Malawi, in the Department of Agricultural Extension Services. So we did a whole package. So we put the screen on the wall. We got the computer. We put it in. We get the server, and so on. And then we enabled all of that.

Now that's great because, exactly as Catherine says, you need to have something local. But what we also do is go then to LUANAR or other universities, Ghana, Kenya, Uganda, elsewhere, and then we train young people to do that. I mean, if you see Google, they have an office in Accra. That's not the solution. We need to be training young engineers in annotation as well as model development, and then model testing, so we can have a very small loop locally. And this is critically important because, as Catherine says, we need to empower governments in the Global South. They need sovereignty.

And this is not just a Global South issue. So we have built a tool called PlantVillage Food for school meal programs, and we're trying to we're bringing that to Denmark. Denmark doesn't want the servers in the United States because of the CLOUD Act. So any U.S. company has to give to the U.S. government the data because of the CLOUD Act. So they want local servers. And we're just going to see sovereignty again and again and again in this case. But the good news is, because of this war between the tech giants, it's like electricity now at this stage. And it's just going to become – and the AI we have today is the worst AI we'll ever have. It's just going to get better.

Mr. Gbaguidi: Do you have a timeframe for when we think AI will be actually just like electricity?

Dr. Hughes: I think it already is. You can download Qwen or Gemma and run it locally for everything. If you have the right stimulus, but you can run that. And then you could have a library, a corpus. It could be gray literature, could be national literature. And then you can do RAG system, retrieval-augmented generation system, locally. I think it's now. I mean, we certainly have examples of that.

Mr. Gbaguidi: I'm going to ask one final question to Catherine before we take some Q&A's. So make sure that you think about your questions, both in person and virtually. Catherine, that's a direct follow up to David's comments. If AI becomes what electricity now is, we know what the electricity access rates are in some parts of the Global South. (Laughter.) So how can we make sure that we don't have a two speed, kind of, like, landscape when it comes to AI access, particularly for food systems?

Dr. Nakalembe: I think we're already too late in this. But one of the things – I wanted to comment a little bit the point that Eric brought up, and I think David just talked about as well. Is there's an overinvestment in, you know, in the cool tools infrastructure, you know, what you end up working within the computer side, rather than on the fundamental data that are required in order for us to build better models. So from a remote sensing perspective, I want – if I want to do a crop type map of a yield map, et cetera, right now you could do a preliminary forecast of anything, but whether that is true or not, you know, requires ground truth. And I think Eric talked about this a little bit. There's very little investment in collecting ground truth data.

And this is sort of falling on the sidelines because, you know, there are statements, like, you know, AI can do that. Can, you know, forecast yield, et cetera. Which is true. However, whether it is true or not requires actual ground data. And I think this is where the missing piece – one of

the critical missing pieces, are. So we're falling behind in terms of getting ground truth that will be required to validate, once we have this electricity in place.

But around the divide, I think, obviously there's an opportunity space for more people to learn and utilize tools because, you know, skills like programming can be – you can learn much faster now if you're really keenly interested in learning. But it also goes back to my initial point around investment, which is when this electricity becomes electricity, just like we know electricity has been around forever, if there is no investment in the electric poles, in the generation of it, in the delivery of it, it just becomes something that happens in other places but doesn't happen for the people who actually need it the most, so will make a huge, huge difference in their lives.

And I think on the other side of it, obviously there is the cost, you know, in terms of electricity and water. We've seen in the U.S., for example, in Virginia as an example, you know, electricity prices going through the roof, you know, to power datacenters, et cetera. This, you know, adds the other – another dimension. So in countries where electricity access is already limited, now add power generation for datacenters. Basically means that the electricity that could be needed for lighting, heating, schools, et cetera, you know, is being used for more datacenters. So there's a – you know, it just kind of adds to this huge divide about access and doesn't really – I think it creates other problems that, you know, might become even more serious than what we already are experiencing.

So there's a – you know, there's a upside and a downside to everything. So regulation and, you know, intentional thinking about what direction things would be driven from a local – from a country-level perspective, having policies that think much broader, is going to become even much, much more important, I'd say. Yeah.

Mr. Gbaguidi: Appreciate it. And we had promised that we would have a conversation that is very candid. You're getting just that today. I'm going to see if there are any questions. Folks could raise their hand. We have – OK, we have one question here and then another question here. So are there mics? We have one question. And we're going to take the questions in back, so second one here. Thank you so much. Perfect. Can you just state your name, maybe your organization, and then ask your question.

Audience Member: Yes. My name is Zawadi Wira (ph). I'm from Kenya. I'm from – we work at Carnegie. We're, like, junior fellows, like, research assistants. Yes.

My question, thank you so much for your time. And I heard Kenya. I wanted to – like, if I got a million dollars each time I heard Kenya I think I'd be a millionaire be now. (Laughter.) I'm joking. But I really appreciate the fact that – I don't know, that that's the locality that I am from. So as a young person in the continent I hear a lot about skilling, green skilling. I need your advice. I need your advice in terms of what skills would actually be adequate to ensure that we can ensure that people have a dignified life, access to quality food?

And I agree with you in terms of sovereign chips, but, you know, in terms of – like, for instance, Kenya, our grid is like 90 percent renewable, yet in terms of the stability of the grid, meaning that often off and on, off and on. And we're thinking about datacenters and data infrastructure, that's not something that can be together. Like, you can have that together. So my question is, when we're looking at that kind of, like, space, as a young person, what skills, apart from programming, would help ensure that Africans and Global South, as in everyone in the world, but specifically young Africans, are better equipped?

Mr. Gbaguidi: Thank you so much. Can I take the second question over here from a familiar face, Nick?

Audience Member: Well, thank you all for being here. My name is Nick Kraft. I'm a senior analyst for agriculture and water at Eurasia Group. So I get to talk to Franck a lot and some of our other colleagues about this very topic. And I just wanted to quickly say thank you Eric, Yanyan, David, Catherine for being here. This has been really, really interesting.

The question I had was more so kind of a reflectionary question. It feels like we're in a pretty interesting moment right now at all things AI, talking about the sort of proliferation moment that we're in, to look back for example at the last 10 years or so at where and how AI has been infiltrating food systems and ag generally. I'd love to hear just some thoughts on how you see that having been rolled out over the last 10 years, to where we're at now? And to kind of how you see it rolling out over the next, say, two or three years. And if you think the speed of which it will start to change, things will be faster, slower, or the same than it has been over the last few years? Thanks so much.

Mr. Gbaguidi: Thanks, Nick. I think there was a third question. I saw another hand in the back, on that side. Great.

Audience Member: Good morning, everyone. My name is Alejandro Lara. My badge is with Georgetown University, but that's went to grad school. I'm between jobs right now. (Laughter.)

But when we're sitting here, there are somewhere else there are being built very large datacenters that utilizing, guess what? Water. So the question is, you know, I want to see your views on how that water supply that we have in place right now is going to be affecting the food chain system, and how – you know, like we're talking about here, food security is going to be somehow affected. Thank you.

Mr. Gbaguidi: Thank you so much. Let's start with these three questions. It's kind of like the three S's. You have a question on skill, a question on speed, and a question on supply. I'm going to flip the order. Let's start with you, David.

Dr. Hughes: So on the question of young people in Africa, I think a lot of what we do, I personally do, is talk about power asymmetries and history. I talk about Patrice Lumumba. I talk about Ibrahim Traoré today. I talk about these great leaders that we have had, and the reason we don't have them. And I talk about sort of colonial, neocolonial structures. As an Irishman, that's a really important topic for us. I talk about great successes you've historically had. And then I point – as you may have seen on LinkedIn – I point to why do we have, you know, hoes being used all over Africa when we have tractors everywhere else, despite Jehiel and Hello Tractor doing a great job.

Which comes to the second question of advancement. We won't advance unless we actually have an awakened population of young people on the continent understanding what's happening. And particularly, you know, post-DOGE, USAID, the consultant class and the great misfortune they have visited upon food security – and the consultants have been doing this for a very long time. There was a chap called Lyon Playfair who was a consultant for Lord Peel in 1846 in the Irish potato famine. And an Irish farmer came with a solution to the potato famine. And if you know plant pathology, it was about 30 years before the Bordeaux mixture about using copper sulfate. It was ignored by the consultant because the consultant had an entrenched interest. So as Sinclair said – Upton Sinclair, it's hard to get a man to change his opinion when his salary depends upon him not changing it. So that's a fundamental. And this is where you educate young people about that. And AI enables those tools.

And I guess the last question was water and data. I just drove from Pennsylvania to here through a sea of photosynthesis. But we haven't had photosynthesis in this neck of the woods since, what, August, September. And 83 percent of the continent is inside the tropics. My background was as a tropical rainforest ecologist. So we can absolutely do that. But not only that, we have wind. Lake Turkana in Kenya is one of the largest wind farms in the world. So we can do on prem AI, but we can also have renewable energy. And what a fantastic way to create jobs

for so many people on the continent. There's 1.3 billion people in Africa. By the time you're my age, there'll be 2.3 billion, and 1 billion will be children. And they need jobs. So this is why we have to think about this framework to maximize job creation, not maximize privatization of the gains.

Mr. Gbaguidi: Awesome. Yanyan, any reaction?

Dr. Liu: I want to specifically talk about the second question about the history of AI's application in food security forecasting and predicting. So I think it started in 2016, a science paper done by James Ito from Stanford University. It's basically using complicated deep learning method and transfer learning to predict consumption using LSMS data. So that work, when we look at it, really fancy and really seminal. So I was – I thought it's just based mainly on my experience. (Laugher.) Because I saw the paper, I feel like this method is so cool, but however when – that method is cool, but the model is far from being operational in practice.

So as economists, I feel like we can go a different way to bring in more data that track the risk factors beneath food insecurity, such as weather shocks, like NDVI to capture agriculture production, conflict, et cetera. Those models are not incorporated in the original, seminal paper. And then so we write – I write a proposal, together with professors at Cornell – Chris Barrett, Han Jung Soo. So it got funded by USAID. And we started using a different approach by incorporating a lot of data-related food insecurity, and also using simple method, because our technical level is not that – (laughs) – so using random queries to boost those. And then it's turned out to be – work pretty good. But still, it's not good enough for practical use. And especially for child malnutrition, it's really bad, actually in the negative. (Laughs.) So we realized that later on, because more researchers are in this area, we cannot – like, over time know under what conditions it can do well and what conditions that can do relatively less well.

And so for child malnutrition – and we later have published one paper in PNAS. So that paper, we use monthly data instead of datas they have previously used, which is collected every three, five years. And the monthly data from Kenya government – collected by Kenya government. It turned out the performance is much better and can be used in practice. So my takeaway of that paper that it's not the model is not advanced enough, but it's because we need to use suitable data. OK, I'll stop here. (Laughs.)

Mr. Firnhaber: I was enthralled. I guess it's on me to try and follow that then. I think I'll try and speak to the speed and the kind of supply questions there. On the sort of technology cycle that we look at, at least for Digital Green,

we've always taken this approach of this approach of bringing whatever is the latest and greatest technology in the world and applying it – or, bringing it to smallholder farmers, increasing that access, so that they can benefit from that in the ways that – you know, even out the access for that. For us, when we first started 20 years ago, the latest and greatest technology was mobile video, which was – this was pre-iPhone, pre-YouTube, and it was still the little cassette recorders, projectors that were size of this table, things like that. So that, at the time, was the technology. Now farmers are taking videos on their own, sharing them on YouTube on their own, without any other – any of us being involved in that, which is incredible for sharing that knowledge, kind of building that trust in new practices and things like that.

So when I think about the – what AI is doing in terms of that speed, I think about it in terms of those kinds of bigger 10-, 15-, maybe 20-year technology cycles. And my kind of framework right now is with the dot-com, and then shortly after following the kind of social media technology boom, is it sped up certain aspects of what all of our daily kind of human lives were. And the dot-com bubble – or, dot-com situation back then, as well as the social media, it hyperexpanded what our network looked like faster than we could comprehend, right? It was – your network was who you could call up on your landline phone, who is your neighbor, who you saw at school or work with things like that. And suddenly you could connect with anybody around the world. Maybe you had no idea their context, their situation. And so our brains took – we're still trying to wrap our heads around, actually, what that means in terms of trying to relate to each other. And there's good and bad consequences of that happening.

So I think AI is doing the same thing in terms of accelerating that beyond our current kind of mental capacity, but for access to just pure knowledge. So I see a lot of people say, oh, AI is so creative, and it's so new, and incredible in its thinking, it's smarter than us. And my take on it is, it's not smarter than us. It's as smart as all of us, because it's pulling together – it's all trained on usually publicly available data and the internet, which is the best and worst of us. But it is the sum of kind of human information that's available right now, at least in that sense.

And so when you get something back from it and it says a new idea, you're like, oh, that's so creative. And it's like, well, actually somebody over there, across the world thought of that. You just didn't happen to know it. So it's that speed of access to information, knowledge, and ideas is what's kind of causing our brains to go, what do we do with that right now? And so we're trying to apply that to farmers, in this case, and saying, instead of that information on, you know, how to better time your fertilizer application being locked up in some government data

vault or in a private sector company or otherwise, how can we bring that summation of world's agricultural knowledge to every single farmer so they can make the best decision they can?

I realize we're running short on time. Just a quick note on the climate piece that I love to talk about with people afterwards is that when we think about the kind of climate implications of all the energy and water and resource use going into it, it's from our standpoint, obviously, agriculture is also a significant contributor to climate change, to greenhouse gas emissions and things like that. So how do we then help farmers be more measured with their water application, fertilizer application, and adopt more climate-smart practices on the input side? And then, as we're seeing more and more increasingly dynamic climate and weather changes, how do we help them be resilient through that, through better timed, more localized practices, if there is a flood or famine coming up? And so produce the same level of food output to meet food security requirements, even as it gets harder and harder to do that through those shocks.

Mr. Gbaguidi: Awesome. I want to see if we have any questions online. We have one. Can take one. And I'll give it to Caitlin.

Caitlin Welsh: Yeah. Thank you, Franck, and thank you to all of our panelists. We do have one question online.

And it is: Where do you see the biggest mismatch today between what AI can do technically and what food systems actors are actually prepared or incentivized to adopt?

Mr. Gbaguidi: Hmm. Catherine, you have a challenge. You have to be extremely brief. (Laughter.)

Dr. Nakalembe: Yeah. I'd say the mismatch is also maybe potentially related to, you know, the question around where AI is. I think there's a – there's a huge conflation of, you know, the different kinds of AI domain. So, language, machine learning, computer vision. These might be in different places, so – and some of them might apply. So for farmer information access, language becomes really, really important. For early warning, machine learning becomes really, really important. And so trying to kind of just disintegrate these things, where if a language model is pulling information from a very poor machine learning model forecasting yield, it doesn't matter how well the text is framed or how great the map looks, it's basically garbage.

So that understanding, like, there has to be an input in order for you to get this very nice, beautiful-looking report. There's, like, that – I think

there is that – there's that disconnect, for sure. And the other is going – if you strip down what is required to have a well-functioning food system, like, what is the bare bones of an MVP of this? It is absolutely important to kind of recognize that without all the fancy, great looking things, all of that doesn't matter. So you need a tractor, you need a field. You need seeds, et cetera. Those things need to be in place for any of that to kind of make sense. I hope that helps.

I wanted to also comment about the – you know, the point around –

Mr. Gbaguidi: I should stop you there, but I'll let you make a final point. (Laughter.)

Dr. Nakalembe: Yeah. But I want to make, you know, the comment about, you know, a young African, what do you want to learn? You know, me having been a young African, I think this it's an important point. And I talk about this a lot with my students. You know, programming, et cetera, is becoming easier and easier. I think one of the most critical things is having domain knowledge about a particular subject. So do you understand ecosystems? Do you understand agroforestry? Do you understand water management? Do you understand – so those are a scientific ones, but it could be, you know, philosophy, et cetera.

Then all these other tools allow you to expand that knowledge and share it. And so if you don't have domain basic understanding of the functioning of an agricultural system, it doesn't matter how great your programming skills are because you will not be able to interpret or understand when your model is wrong, or you would not actually know and understand what the inputs are in order for you to have a really good prediction for something. That's what I wanted to add. Thank you.

Mr. Gbaguidi: A great note to end the panel with. Thank you so much, Catherine. Thank you so much, Eric, Yanyan, David. Really appreciate your time.

Final kind of, like, closing remark on this panel. Three things, three big takeaways. The first one is obviously on trust. The second one is on localization. And the third one is on synergies. There is no need to reinvent the wheel. A lot of the work that you guys are all doing can be collated and aggregated to something that is much bigger and much greater. And don't forget that it's more so about application than AI, per se, because we have seen here the optimism around AI is very high. Where we have reservations and where the bottlenecks is very much so the ecosystem around it, and all of the AI-and, and that question mark that we are struggling to fill. Thank you all for your time today. And I wish you a great rest of your forum. (Applause.)

Ms. Welsh: Thank you so much to Franck and panel one, I know that we will be pulling on threads from this conversation in panel two, three, and four, which is exactly where we wanted to be. So thanks to all of you. Following this panel we will have a demonstration, our first AI demonstration. And then our second panel, and then our second AI demonstration. But before all of that, we're going to break for coffee. And we'll reconvene here and start again at 11:05. So we'll see you back here soon.

(END.)