

USAID Podcast: Are We Ready for the Next Outbreak?

Episode 3: Fighting Outbreaks with Technology

Speaker 1: Infectious disease outbreaks cannot be tackled single-handedly. People with diverse skills must come together to develop solutions that allow us to effectively prepare and respond. That is why the U.S. Agency for International Development invests in and fosters partnerships between universities, NGOs and private sector companies to develop technological solutions that can be quickly scaled from a discovery in a lab to impact on the ground. This is the third episode in a three-part series on the topic: "Are We Ready for the Next Outbreak?" which aims to explore what we have learned from finding infectious disease epidemics like Ebola and Zika, and understand what USAID and its partners are doing to improve preparedness for the next outbreak. Let's now go to the moderator of this podcast, Dave Milestone.

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Dave Milestone: My name is Dave Milestone and I'm the acting Director for the Center for Accelerating Innovation and Impact or CII in the USAID Global Health Bureau. Today, we're super excited to be joined by three thought leaders and innovators: Sarah Tadlaoui from Premise Data, Leah McManus from IntraHealth and Meg Glancey from Johns Hopkins University. Welcome to all of you.

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Sarah Tadlaoui: Thank you.

Meg Glancey: Thank you.

Leah McManus: Thank you.

Dave Milestone: So, I'd like to hear from each of you about your specific innovation. Sarah, can we start with you?

Sarah Tadlaoui: Yeah, definitely.

Dave Milestone: Tell us a bit more about yourself and the Grand Challenge innovation that you're working on?

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Sarah Tadlaoui: Emerging disease threats are really hard to tackle, right? The problem that we're seeing is that viruses mutate really fast. Mosquitoes have fast-changing behaviors of migration and breeding and then you have rising temperature and changing rain patterns that also alter mosquitoes' distribution and the human risk exposure to those mosquitoes and then adding increasing population, human population density and increased world travel; this is really an unprecedented challenge and the point that's really important is that emerging diseases are changing. The patterns are constantly changing so you have to be adaptive for that.

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And so, a lot of the challenges that public health programs have are one around data darkness, chasing small bugs in really large-scale areas is a huge challenge. It's really a needle in a haystack problem. So, health programs really have to canvas really large-scale areas with the hope to find a pool of standing water that pops up after every rain shower. So as a result of this, they have a blanket approach and most of the interventions end up being shots in the dark and fail at really properly addressing that challenge.

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The second big issue is an issue of scale and reach. No vector control team is going to be large enough to cover a territory in both a really granular and exhaustive way and so, as a result, you have entire areas that are left off the map. So, to address this, what we provide a mobile and cloud-based solution that provides ground truth visibility by activating and managing dynamically networks of people on the ground so citizens, community leaders, workers that we send geo-targeted tasks to and that report in real time on their mobile.

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Dave Milestone: Can you describe for those for us, including me and others who are listening what geo-targeted ...

Sarah Tadlaoui: Absolutely.

Dave Milestone: ... data is?

Sarah Tadlaoui: Yeah. It means two things. In terms of reporting, it means that whenever we report something on your phone, we know exactly where you are, where you reported it from. And in terms of tasking, one important point about our platform is that we can send you to a specific place, and so just like when you call an Uber, your phone knows exactly where you are and the system smartly assigns you an Uber based on your location, based on the driver's location...

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Dave Milestone: They don't always right to that location, but... close enough. Usually a block or two away, but-

Sarah Tadloui: It's a great point actually. Uber has a lot of location challenges in a lot of emerging countries and that's why some of the locations and internationalization efforts are important so that you can adapt to the specific needs of a particular location, even in areas where connectivity is not as good or Google maps is not sort of as granular as it is in our cities.

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The two main benefits I think that we bring is what we set out to do first is provide this persistent but adaptive ground truth signal so visibility into what's going on on the ground in real time. This enables health programs to surface needs in real time. Where do we need to go? And also course correct operations when we need it and not after a program is over basically. And the second point is, going citizen first. Which is, to address this scalability and reach issue, tapping into the power of local communities to extend the reach of the health programs that work and really try to multiply the impact that you can have of those control and prevention actions.

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Dave Milestone: That's great, really exciting. We've been so impressed with your progress, even just so far. Meg, let's hear a little bit more about your background and your specific Grand Challenge innovation.

Meg Glancey: Right now, I'm working at John Hopkins University in the biomedical engineering department. Our innovation is a smart mosquito trap, and it's trying to address actually a similar problem with that's vector surveillance itself. So, vector surveillance is monitoring vector density and vectors are just really any animal or insects that carries a disease and transmits it. So, mosquitoes are vectors and specifically for Zika, we're focusing on the Aedes aegypti mosquito because they carry Zika as well as Dengue, Chikungunya, and Yellow Fever. So, they're actually a very important mosquito, and right now one of the main challenges with Aedes aegypti mosquitoes is that in their entire life, they only fly about 100 meters. So, it's very hard to do vector surveillance and it's important to do vector surveillance, but it's an extremely human resource intensive process, and it's expensive.

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It's highly varied between where you go, how much is done, how often it's done. In the best-case scenario, traps are set out on a weekly basis at known locations. So, they're set out, they're set for a week. People have to go back, collect the data, whether it be adult mosquitoes or larva or eggs. You go back and collect that data. Take it to the lab to be identified. The field staff, they really have to be a part of the community so that people let them in their houses, so they remember the locations of the traps. Even here in the U.S., a lot of times the traps aren't geo-tagged, the field staff just remember. Like oh, the trap was here when we set it last week.

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Dave Milestone: So what is VectorWeb's approach? Can it improve vector surveillance efforts?

Meg Glancey: Yeah, so what we're trying to do with the VectorWeb is make an existing mosquito trap smart. [00:07:00] Basically, we're adding an electronic component with sensor that captures the mosquito count and identity of mosquitoes caught in a trap, and then that data is sent through the Cloud to a software platform where it's mapped and given straight to the health system or whoever the end user is and that's where they can take actions, whether it be to send out vector control, send SMS alert to citizens.

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Dave Milestone: Great, thank you. Leah, let's turn to you. We know how critical communication is to effectively respond to outbreaks. That was so clear during Ebola and Zika. You're working on something called, the mHero Platform. Tell us a little bit more about that, and how did this advance during the Ebola outbreak in 2014.

Leah McManus: What we saw a lot of at the very beginning of the crisis was that there was no way for Ministries of Health to be able to communicate with those health workers that were really on the front lines.

Dave Milestone: And describe those health workers.

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Leah McManus: These are the people that are the doctors, nurses, midwives, lab techs, that are the ones that are in the facility. They are the ones that are in the Ebola Treatment Units, are in the community care centers. They're really the ones that were seeing the first cases of Ebola, having to diagnose, treat, or detect them and then get that information up the chain of command. What had happened is the technology really was spurred on by the Ebola crisis. We obviously knew there was a problem with communication between health workers, and the ministries so UNICEF, USAID, and IntraHealth came together and said, what do we know about information systems and interoperability and what can we do to fix this? [00:08:30]

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We found that Liberia was the most ready, they had the most mature information systems already, and so I went to Liberia in about November 2014 and sat down with the Ministry. There was a lot of times we were running in the hallway jotting notes, and like asking questions, and that sort of thing, to see how the technology could be best tailored to fit their context and how it could be used by them. And, this was everything from what information systems need to plug in, at what places, and with what, you know everything from the back-end technology, to what government structures do we need to put into place.

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And, with the reporting systems that were in place at the time during Ebola, there was really no mechanism by which for you to have rapid action. You see that in surveillance programs that are more paper based, and take time to get into databases and then sent up from the district, to the county, to the national level.

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So mHero came in as a two-way SMS communications platform for the Ministry of Health to be able to facilitate that communication between health workers and the Ministry. It is really a shared service of the Ministry of Health. It's not used for any one sort of communication type. What is also interesting about mHero is that because we developed it during the crisis, we really had to use existing pieces on the ground. We couldn't recreate a health worker information list. We couldn't re-create lists of facilities. We couldn't recreate other pieces of data, other information systems. We used what existed already, and added a technology component onto the various pieces so that

they could talk to each other, and this way the Ministry has access to contact at any given time all or some or part of their health workforce. And, when we say health work force, we mean those that are actually service providers and we also mean people that are the drivers, the janitors, all these other people that are really important in the chain of infection prevention control.

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So, it's not just ... We're looking at the whole totality of the health workforce versus one piece of it.

Dave Milestone: So, how did the Ebola Grand Challenge enable your company to advance progress and scale the mHero platform?

Leah McManus: I think that the Ebola Grand Challenge had really been able, it was catalyst by which the Ministry of Health, IntraHealth, USAID, all of our partners, were able to build the system, the platform as a shared service within the Ministry. Now we are using it as the SMS alert portion of the integrated disease surveillance and response system of the Ministry of Health. It's a very broad range by which it's been used, and it was really the Grand Challenge that was able to spur that on.

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The other thing is during the Grand Challenge, we were really able to focus on capacity building. And we don't mean just one off five day trainings or something like that, but really looking at the organizational capacity of the Ministry, and trying to figure out how it can be enhanced to be able to support some of these different sort of technologies as an institution. The other aspect we were able to build on, is insuring a strong interoperable health information system came along with mHero that weren't creating something in a vacuum, but in the end, I really think that the Grand Challenge allowed the healthcare workers to really have a voice with their Ministries.

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Dave Milestone: Well, thanks Leah for that. Sarah, we know you're based out in Silicon Valley and have a lot of access to super smart, cutting-edge people and technology there. So, talk a little bit about what the Zika and Future Threats team and experience brought to your work and how did your idea evolve through your participation in this Grand Challenge?

Sarah Tadlaoui: Absolutely, I think the most productive aspect of this collaboration for us has been how innovation focused and flexible and really sort of partnership oriented the USAID team has been with us. With the USAID team, we at Premise spent a lot of time on the ground in Cali, Columbia. It's a city of 2.4 million people that had the highest number of Zika and Dengue cases in these past two years. And we spent a lot of time there configuring our platform to local needs, running usability testing with front line health workers with citizens. The vector control program we're working with has been happening this way for 30 years. They run these operations in a very blanket approach where they go around the city without being able to target those high-risk areas.

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And so, implementing this technology has led to a lot of changes locally. They had to change workers contracts so that they're now using mobile. They have to deal with procurement processes like what happens if someone gets their phone stolen, so all of these issues are important. I think USAID has been an amazing partner for us to work through these issues on the ground and this is the second piece to the equation that together, with great Silicon Valley technology, make things work on the ground.

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The important idea is that we've managed to have the team run autonomously on the platform so now they've left paper and pen behind. They're using digital. They've moved to digital completely, and now they're able to go to those higher risk areas so that the resources that they have are targeted to those areas that need it most.

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- Dave Milestone: Leah, let's hear from you. What's your hope for mHero? Now that you do have the success under your belt, are you getting interest from other countries?
- Leah McManus: Under Grand Challenges, we were able to work in Sierra Leone and Guinea, and in Sierra Leone we got the platform developed and piloted. And then they were about to keep moving it forward with UNICEF, so that's great. In Guinea, their information systems were not quite as mature as Sierra Leone, and there was a lot of other areas that really needed to be focused on to be able to get to this next level. And as they go that way, I see that mHero is going to be able to be used for them. It is included in their National Strategic Information Systems plans and these areas.
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- Dave Milestone: That's great. Why, and I guess, do you think it's important for USAID to continue to support innovation in this way?
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- Sarah Tadlaoui: I think USAID does play a critical role to boost innovation in spaces in which collaboration between public entities and private companies are desperately needed. In this case, USAID really acts as a trust broker and a bridge builder to sort of help state-of-the-art Silicon Valley technology meet public health implementers on the ground. The Grand Challenge mechanism is a great combination of flexibility in the approach, focusing on iterating and learning, but also commitment to the problem, and commitment to finding the solution in the midterm and that's really how great innovation come to life. We got this grant a year ago, and we're now ready to scale with the support of USAID. So, we're extremely excited about this. This is amazing news to us. It means that we're now going to test and scale the next component of our program, which is more focused on civic engagement, working with citizens first, and working with community leaders. Also, an opportunity to test the product and the program in two different contexts, operating in different circumstances, in places where the public health departments' resources are very different.
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- Our hope is just to scale to the world.
- Dave Milestone: All right, well thanks. So, let's wrap this up with a rapid-fire question. Any advice from innovators with a great idea that want to get engaged in global health? Leah, let's go to you. Any advice for innovators out there?
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- Leah McManus: Yeah, absolutely, know your local context. You have to know what's on the ground. You have to know what they need. You have to know what they already have, and you have to build or adapt or tailor based on that information.
- Dave Milestone: Sarah, let's go back to you.
- Sarah Tadlaoui: Get out there. Get to the field, prototype fast, learn, and do it all again.
- Dave Milestone: Awesome, and Meg?
- Meg Glancey: I would say don't over complicate things. It's the little things that can make the biggest difference. So, you have to really be in the field to know what that need is, but once you identify it, it doesn't have to be complicated. A simple thing can make a world of difference.
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- Dave Milestone: Yeah. I want to thank all of you guys so much. You're an inspiration to us at USAID's Center for Innovation and Impact. You're an inspiration to a whole set of innovators out there, and you're

[00:17:30] helping us to really solve a really important problem that can also keep us safe here at home. Thanks so much for tuning in.

Speaker 1: This episode is part of a three-part podcast series on the topic, “Are We Ready for the Next Outbreak?” To listen to the rest of the series, and learn more about how USAID and its partners are working to prevent, detect, and respond to future infectious disease outbreaks, visit [USAID.gov](https://www.usaid.gov).