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SAUL/ZILKHA ROOM

MOBILE TECHNOLOGY AND mHEALTH: THE NEWEST FRONT LINE IN HEALTH CARE INNOVATION IN AFRICA

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P R O C E E D I N G S

MR. WEST: Good morning. I am Darrell West, Vice President of Governance Studies and Director of the Center for Technology Innovation at The Brookings Institution. I would like to welcome you to this event on mobile innovation in Africa.

We are webcasting this event live, so we would like to welcome our viewers from around the country and around the world, and we will be archiving this video, so anyone who would like to watch this after today will have an opportunity to do so. It will be archived at the Brookings.edu website.

We would also welcome any comments or questions that you have on line. We have set up a Twitter feed at #mhealthafrica, so feel free to post any comments or questions that you have during the forum, and during our Q&A, we will take questions both from our virtual as well as our live audience here in the auditorium.

In recent weeks, I have been reading a number of newspaper stories about kind of trumpeting the success of the fight against Ebola. There have been a number of stories kind of noting the fact that we are actually down to very few cases of Ebola, even in Africa. We all remember last fall the situation where we all were panicked and there were a rising number of cases, and it looked like this really was reaching epidemic proportions.

Virtually none of the newspaper articles have talked about the role that mobile technology played in dealing with Ebola and contributing to health care in general in some of these African countries.

This puzzles me because yesterday we put out a paper reporting on some of the research that we have done on the topic, and we found that mobile devices actually played a major role in fighting Ebola and improving outcomes in maternal care as

well as in other areas in Africa.

In the paper, we talk about some of the mobile applications that help to train front line health workers, that help to reduce the gap between rural and urban areas, and then also brought critical information regarding both diagnosis and treatment.

Some of these innovations in mHealth improved the efficiency and the effectiveness of medical systems. They help keep track of patients, provided medical records for these individuals, and also aided in the reporting process to public health authorities.

In many different respects, these technologies provided crucial information for treating the epidemic and addressing many of the important societal health issues that have developed.

I think one of the reasons why the world was able to deal effectively with Ebola, the mobile piece of the story is something we all should appreciate.

In order to help us understand the power of mobile technology, we have brought together a number of distinguished experts here today.

To make opening remarks, we are pleased to welcome Nate Tibbits to Brookings. Nate is the Senior Vice President of Government Affairs for Qualcomm Incorporated, and in that position he's responsible for the company's D.C. office and its work on public affairs and public policy.

Prior to joining Qualcomm, Nate served as Executive Secretary of the White House National Security Council, and fitting with our focus today on Africa, Nate actually grew up in Lesotho, and spent considerable time there in college. In the 1990s, he also spent five years working at the National Democratic Institute on Election Monitoring and Democracy Training, and spent time in Ghana, Malawi, Namibia, and South Africa.

Please join me in welcoming Nate to Brookings. (Applause)

INTRODUCTORY REMARKS

MR. TIBBITS: Good morning. Thanks, Darrell, for the warm welcome. Our General Counsel, Don Rosenberg, was going to be here today and unfortunately couldn't make it, so I'm his fill in, but I'm really delighted to be here.

I'd like to thank The Brookings Institution for hosting this event today, and to our panelists for their commitment and dedication to research in the field of mobile health.

For over three years, Qualcomm has collaborated with Brookings, and we have had the privilege of working in partnership to explore the positive social and economic impact of mobile technology around the world.

Qualcomm, for those of you who might not be familiar, is a global leader in wireless technology. Our technology and chip sets can be found in many of the mobile devices you have with you today. Our innovations in technology enable billions of people across the world to access mobile broadband.

We are able to do this because our dedication to research and development and our business model allow us to license our intellectual property and reinvest a significant portion of that revenue back into R&D. This commitment of approximately $34 billion cumulatively over our 30 year history helps us work on new ideas and innovations.

Increased access to mobile technology encourages growth in the broader economy of a nation. A recent study of six countries by the Boston Consulting Group showed that mobile is contributing more than $1.2 trillion in GDP from those six countries alone, which is a massive amount. It empowers businesses and people connecting them rapidly to a global market, enhancing the flow of information and

improving access to health care.

When Qualcomm was founded, no one could have predicted the transformative effect that wireless technology could have had in health care and in some many areas of our lives.

I'm really honored to be here today to have this opportunity to share with you how Qualcomm sees mobile technology transforming access to health care globally.

Through advanced wireless technology, it's possible to connect the world's front line health workers to critical job support tools, ultimately improving public health outcomes.

This is critical because front line health workers are the first and often only link to health care for millions of people living in the developing world.

According to the World Health Organization, developing countries face a health care work crisis with 57 countries in need of trained health care workers. Currently, just one percent of the world's population provides health care services to more than seven billion people on earth, most of whom live in developing countries.

At the same time, approximately half the world's population are expected to become mobile Internet users by 2020. This growth is expected to come from developing countries where most people will be accessing the Internet for the first time through a mobile connection. In Africa alone, the total number of mobile broadband subscriptions is expected to grow seven times, from just over 105 million in 2013 to 805 million in 2018, which is an amazing and dramatic increase.

At Qualcomm, these data points reveal an unprecedented opportunity to leverage the benefits of advanced wireless technologies and mobile tools to address some of the world's pressing health care challenges.

Mobile technologies can help health care providers in emerging regions

to access the latest professional development tools, provide interactive job aids, and assist in supervisory support, helping lower costs and increase efficiencies, and ultimately improve health care outcomes.

mHealth services are already transforming health care as we know it. They ensure that people living in developing parts of the world, both rural and remote areas, have better access to front line health workers, medical services, and information they need to help them lead healthier and more productive lives.

mHealth has the potential to dramatically alter the landscape for how health care services are accessed and delivered, especially in emergency situations.

In the case of infectious disease outbreaks like the recent Ebola crisis, advanced wireless tools and platforms can provide immediate preventive and sometimes life saving solutions.

During today's panel, you will hear more about a successful maternal health project in Nigeria that has inspired new forms of use for the mobile platform that focuses on the training and tracking of Ebola outbreaks.

Additionally, we know that governments are facing increased health care costs due to a myriad of issues, including increased incidence of communicable and chronic diseases as well as large demographic shifts in aging populations.

Mobile can reduces costs by allowing for remote monitoring of chronic diseases while allowing patients to age in place. Mobile can also improve efficiencies in public health and serve as a mechanism to extend the reach of doctors and front line health workers.

For example, imagine you are a patient experiencing symptoms related to your cardiovascular health, and you live hundreds or maybe even thousands of miles from a heart specialist. Now imagine being able to hold in your hand a mobile phone with

a built in electrocardiograph sensor, and in less than a minute, have the mobile device read your heart data, transmit it to a cardiac specialist who can then provide diagnosis, consultation, and treatment remotely.

Mobile isn't just a game changer for heart health. It's also positively impacting treatment for other critical or chronic conditions like diabetes and HIV. This is just one of the examples of the sort of innovation that demonstrate how mobile technologies can improve and change access to health care.

The program that I just described is an example of work being done in China by Qualcomm Wireless Reach, which is our initiative that works to demonstrate innovative uses of wireless technology.

With over 100 projects in 40 countries, the goal of wireless reach is to create projects that leverage wireless technology to strengthen economic and social development with a focus on education, entrepreneurship, the environment, public safety, and in particular, health care.

We believe that mobile broadband is a well suited solution for mobile health education, capacity building, and maternal and child health, and health crises, of course.

Today, you will hear directly from some of our Wireless Reach partners who are doing very important work in West Africa. It's been a privilege to collaborate with them on a maternal and child health care project and explore how mobile technologies can have a long term impact on patient health.

You will also hear how these technologies support policy maker efforts to achieve development goals set by the United Nations to improve maternal health and reduce child mortality.

Nigeria suffers from one of the highest maternal mortality rates in the

world. Approximately 630 maternal deaths per 100,000 live births. In fact, in some midwife service centers, that number is even higher, close to 1,000.

In comparison, the maternal death rate in developed countries is 16 per 100,000 births. In addition, this maternal health project in Nigeria has quickly adapted to disseminate critical information and education to curb the spread of Ebola and prepare front line health workers for any contact with the disease.

The adaptability of the technology to address an acute health care crisis is invaluable and we are fortunate to hear firsthand about how this exciting work has unfolded from today's panelists.

Qualcomm's belief that access to mobile technologies can improve people's lives is at the core of what we do every day. At Qualcomm, we are working to imagine the possibilities, envision success, and invent new solutions.

Eventually, mHealth will just be health care, and Qualcomm's technology will be part of the global connectivity fabric powering transitional care, chronic care, and connected therapy management solutions.

The effect of mobile technology on health care in Nigeria and worldwide, sometimes in global health crises, is undeniable. Our work is not done, and unfortunately numerous barriers continue to inhibit the ability to create today's and tomorrow's life changing health inventions. It is crucially important for inventors to have the ability to realize the benefit of their creations - their intellectual property.

The revenue generated by these types of inventions fuels virtuous cycles of R&D based innovation that lead to future discoveries of treatments and cures.

Expansion of mobile broadband services also depend on a government's ability to provide access to spectrum and continuous investment in mobile communications infrastructure.

Certain policies and regulations are crucial to encouraging global development in support of every nation's priorities. Government regulation and policy has a significant impact on encouraging development and access to all that mobile technology and devices enable.

We must keep in mind that here in the United States and around the world the incredible innovations we hear about today are possible thanks to these fundamental policies and regulations that exist today.

It is our hope that Qualcomm's inventions as well as the tangible examples made possible through our Wireless Reach program will demonstrate, inspire, and ultimately extend health resources to front line health workers globally, providing people with unparalleled access to care.

Thank you all very much. (Applause)

PANEL DISCUSSION

MR. WEST: Thank you, Nate, for those remarks and also your leadership in the sector as a whole.

We are pleased to have several individuals who are at the forefront of mHealth innovation, especially as it relates to Ebola and maternal care. All these individuals have worked at the front lines in West Africa, in several different countries, and we are going to draw on their expertise today.

We are pleased to welcome Deborah Theobald. She is Co-Founder, Chairwoman, and Chief Executive Officer of Vecna Technologies. That sounds like three full-time jobs there, maybe more. (Laughter) She co-founded Vecna in 1998 and provides strategic vision, executes tactical directives, and designs the next generation of product solutions.

She also serves as the Executive Director of Vecna Cares, which is the

non-profit arm of the company, supporting initiatives in Africa. Among other things, that organization has the goal of improving quality and access to health care as well as supporting local technology programs in K-12 schools.

We also have Okey Okuzu, who is the Founder and CEO of InStrat Global Health Solutions. He founded this firm in 2009 and focuses on global health innovation. He helps to identify and deploy technology based health care solutions to underserved markets using SMS and 3G wireless technologies. He also spent 10 years at Pfizer with responsibilities including finance planning and business development, and then also joined Norvartis Pharmaceuticals as the Director of Strategy and Innovation.

Dr. Oshin is the Deputy Project Director of the Subsidy Reinvestment and Empowerment Program for Maternal and Child Health in Nigeria. From 2011, he served as Senior Technical Assistant to the Minister of State for Health at Nigeria's Federal Ministry of Health, and was part of the ministerial team that organized the Saving One Million Lives Initiative.

He also has led the development and implementation of Nigeria's country implementation plan for the United Nations Commission on Life Saving Commodities for Women and Children.

I want to start with Deborah and just ask if you could tell us about Vecna Technologies and your interest in mobile health solutions.

MS. THEOBALD: Sure. Vecna Technologies was founded in 1999, and it is a health care information technology and robotics company. We have been providing health care solutions to first world health care for about 17 years now.

Most of our products and services focus on interoperability and automation within these areas, and most of our customers are Government and private, so we service the Veterans Administration as well as large health care systems.

We are very understanding of health information systems in these health care facilities across the country and in many different types of areas.

In 2009, I became aware of global health through several different circumstances and acquaintances, and as I began to understand the challenges of data collection and analysis for global health programs, I started to see how much need there was for quality information, and just some basic simple streamlined tools put into place, how they could have a very large impact.

We started to take a look at what the barriers were in 2009 for implementing these types of systems, and I even took the opportunity myself to go and live over there in these countries and to understand what these actual projects were, not just for two or three weeks, but for the next eight or nine months, as to how we were implementing these types of systems and what kind of barriers came up about that.

It was very interesting for me to see some of the wastelands of technology projects that had been tried to be implemented before and why they happened and where, and then to try to understand how we could start to implement new systems.

Obviously, the first barriers that we came up against were your infrastructure barriers of power, computers, low IT literacy, and also infrastructure network or IT services.

If you're going to be doing electronic data collection, you are going to have to have electronics, and how do we support that. We took some of our hardware expertise and put that to play in these areas and created our CliniPAK, and after five iterations, we have now a single box that helps to put together all of those power management, computing, inverter, and wireless needs, local wireless, and also Internet connectivity into one box.

We also took on the electronic medical record aspect of it. How do you create streamlined software tools that can really help people and be adopted easily.

We have also been working now with projects such as these to look at what the implementation factors are, what are the methodologies that can really make these successful.

I think from a Vecna/Vecna Cares' point of view, this has been wonderful for us to transition our technology into use around the world and to incorporate that with other open source technologies and other commodities that can really transform the gathering of information.

Information is the power, power to understand the issues that are at hand, power to communicate those issues and those needs, and power to change and allocate those resources effectively and do the most with the resources that we have at hand.

MR. WEST: Okay. Thank you very much. Okey, you founded InStrat Global Health Solutions and helped to deploy health care solutions in underserved markets. How is your company using mobile solutions and data intellects?

MR. OKUZU: First, thanks very much for that introduction, Darrell, and thanks very much to everyone who took the time to be with us here this morning, and to everyone who is on the live webcast.

I started InStrat in 2009. The premise that emerging health technologies, especially mobile health, give us the unique opportunity to overcome the barriers that have impeded health care delivery in places like Africa, and also to give us a new approach or a new platform for health care delivery.

Since then, we have tried a number of different technology platforms and have settled on three. The three platforms that we are currently working on is SMS

technology or text messaging for remote patient monitoring for chronic disease patients. We have been offering that in Nigeria since 2011. We also provide hospital management systems that have electronic health records confidence, and the third platform is working with Vecna to promote and implement CliniPAK in Nigeria.

I would like to just recognize the fact that we started in 2013 with a pre-pilot into health facilities just outside of the Federal Capital territory in Nigeria, and we are now in 51 health care facilities, and along the way, we have put in place operating procedures, learning and experiences that position us pretty effectively, I would say, to scale this platform more broadly, and we look forward to having these conversations with you this morning.

Thank you.

MR. WEST: Thank you. Dr. Oshin, you have served in Nigeria's Federal Ministry of Health. Can you tell us about your background and responsibilities?

DR. OSHIN: Thank you. Although I'm a doctor by training, I think I have more development background because of my Master's degree in Poverty Reduction. I worked in Nigeria in various capacities for agencies, international and local.

About three years ago, I joined the Ministry of Health. I think we had some achievements. We had Let's Save A Million Lives. In framing that, we developed a program called the Subsidy Reinvestment and Empowerment Programme for mother and child health. What we did was set up supply and demand interventions, from deploying health care workers to areas in the country, also addressing the key bottlenecks, to see how we could obtain efficiencies, like mobile health solutions. I now sit on three committees.

MR. WEST: Let's talk about the Ebola crisis. Each of you have worked in various African countries, places such as Nigeria, Liberia, and Sierra Leone, among

other places. I will throw this out for each of you and each of you can respond in kind.

What role did mobile play in fighting Ebola? Maybe we will start with Deborah.

MS. THEOBALD: The Ebola crisis was something that took people by surprise, and in some cases, we were looking around to see what tools we had that would make an impact here. It was interesting for us as a project and as a consortium to take a look at what are our resources to help work with this crisis.

We had two great opportunities. I will actually let Okey talk to one of them that we did, that we built upon, our CliniPAK system, that he was saying is out in 50 clinics right now.

We have a baseline infrastructure of digital health records and electronic communication with front line staff workers. That has been hugely positive, and that we have put into practice with some Ebola outreach.

Having that health system infrastructure already in place that we could tap into and access all those people immediately was a very good place for us to start, and something that I wish we had more access and more spread among the clinics so that we could have reached more people at this point.

I think the investment in the health systems' infrastructure before these crises start was really impactful.

Another thing that I was personally involved in that we received funding for was to take our CliniPAK system to Sierra Leone and Liberia and to put it into actual Ebola treatment units.

Our hardware component of this was unique in that the CliniPAK that we had created was able to overcome a lot of the infrastructure barriers that were creating a lot of havoc for clinical health care workers in these Ebola treatment units, these ETUs.

We were able to take the CliniPAK and set it up within the green zone in these Ebola treatment units. Basically, you plug it into a car battery, 12 volt car battery, and turn it on. From there, you have a server, a wireless network, and your software that can be accessed by tablets within the range of this local wireless network, and that range included the green zone and the isolation zones.

Health care workers within the isolation zones were able to use tablets that were designated for these suspected cases and confirmed cases wards, and document care within those wards. Then that information was available to everyone throughout.

The problem that this was solving is that anything that goes into these red zones cannot come out, including paper. People were documenting care within these care zones and they had no way of getting that out. Again, we were able to take this technology that had been used within these health systems for basic primary care, for basic maternal and child health services, and we were able to rapidly deploy them for these emergency responses.

I think having the foresight of investing in these technologies that are really for health system strengthening and for empowerment of electronic capture and sharing can be used very quickly in some of these responses.

MR. OKUZU: Thanks for that, Debbie. How we used this in Nigeria just really demonstrates the versatility of this platform. As Debbie referenced, the investments that were made in creating this platform really paid off in this instance because Nigeria was suddenly faced with the potential for a major crisis in Ebola.

What we did on our team was to sit back and brain storm about what we could do given the technologies that we had and just a moral obligation to try to extend that to help people avoid this catastrophe.

Let me try create the scene for you, and that is we are working with health care workers in remote places, and in some of the places that we were working in, there is no power, there is no portable water. Somehow, we were able to put in electronic health data collection mechanisms.

People in those communities don't have much access to communication, so as this Ebola potential became real, people didn't have all the information that you have about what it is, how to prevent it, what your personal risk was, so these front line health workers had that risk.

Secondly, given the ignorance that they had around this disease, they also bore the other risk of if there was a potential, somebody got sick, they would end up at the health care center and interact with people that didn't have much more information than them.

What we figured was we have a unique opportunity given that we are working with these front line health workers to leverage CliniPAK to very quickly disseminate information on Ebola.

I'd like to recognize the participation, the partnership, and the leadership of the state government in Nigeria on this effort.

What we did was within three days we had developed and were ready to push out an Ebola awareness tutorial that was specifically designed for the understanding of front line health workers. It took a little bit longer than three days for the government to approve the dissemination of that material, but once it was ready, we pushed the material out.

Before we did that, we did a baseline survey of front line health workers to assess the knowledge and attitudes of front line health workers towards Ebola, and then we did this tutorial.

After the tutorial, which was viewed by over 1,000 people, 1,000 front line health workers -- I should mention anecdotally we understand that each front line health worker that is educated on subjects such as these influences or educates at least four other workers around them. By touching over 1,000, we were able to touch over 4,000, educate over 4,000 health workers.

After the tutorial, we then did a post-tutorial assessment of the same workers that did the pre-tutorial assessment, and I am pleased to announce on all the indices that we measured, we achieved significant increases in the knowledge, by an 11 percent increase in front line health worker knowledge on Ebola.

On other behavioral attributes, things like common sense things, how often do you wash your hands, how often do you wash the surfaces that you work within, how often do you make contact with people who have been diagnosed with things like Ebola. On all these, we were able to achieve anywhere between six percent on the low end and 39 percent growth in a shift in attitudes towards this disease.

We felt that with this project, we were able to significantly shift front line health workers towards knowledge and attitudes towards Ebola disease.

I should also add that a really heartwarming experience that we had was when we heard from multiple people, multiple front line health workers, who were in these distant, remote health care facilities, who had many more interactions with the Center of the Ministry of Health, and many more communications with the Ministry of Health, when we pushed this, we heard that the fact that somebody cared enough about them to send these tutorials to help them get better educated, to help them be prepared for this outbreak, signal to them that somebody cares about their well being, so that was a really good impact of this project.

The other thing that fortunately was not used, and I say “fortunately”

because in Nigeria, Ebola was very quickly brought under control, the fact that we also were able to deploy and put in place an Ebola management algorithm that stepped health care workers through very simple questions, all the way from a patient presenting with suspicious symptoms, down to isolate and notify the national Ebola response authorities.

I say "fortunately" that it wasn't used because it was under control, but we are pretty confident that if a patient presented in any one of these facilities, any one of the health workers that had CliniPAK would very quickly know exactly what to do with this patient.

I might add that is probably more than a number of institutions even here in the U.S. could have done at the time.

Thank you.

DR. OSHIN: We looked at the Ebola response in Nigeria as successful because of the declines, the health care workers being provided with information on how to manage patients, and also to protect themselves, and lastly, there was this Center which was set up to ensure you could reach out to mobile technology, and being able to deploy resources efficiently from just one Center, this was based on a mobile platform that was deployed.

I think all of those things together really helped us in having a rapid response and control.

MR. WEST: Another question for each of the three of you. What benefits did you find, and also what barriers did you overcome, and how did you overcome them?

MS. THEOBALD: The Ebola response?

MR. WEST: Yes.

MS. THEOBALD: The technology is not usually the barrier to some of

these projects. In fact, sometimes the technology can be quite simplistic. The real thing is how to implement and overcome necessarily the attitudes or the systems within which the technology is going to be deployed.

When we are looking at a particular response to a crisis, who is it that's getting involved. For example, the group that we worked with in Liberia is called the International Rescue Committee, IRC. They were very free in telling us that this was a big risk for them to take on an electronic medical record and deploy for this type of response. It's unproven. Nobody else is doing it. They felt like they were going out on a limb.

A lot of people viewed technology as something that they can't place a lot of confidence in, something that is going to turn around and bite them, and maybe because it has in the past. Technology can be a very temperamental friend or foe, depending on what side of the battle you are on.

This is me coming from owning a technology company. Sometimes it is your greatest asset and at other times, you just want to throw it out the window.

When we took it over to Liberia, there were a lot of people who stood back and wanted to watch and say how is this going to work, is this really going to happen, can you really do what you say you're going to do, is this really going to be easy enough, are the doctors really going to accept this, and the nurses.

We have people coming from all over the world who are going to be using this and we don't have a lot of time to train, it's a very stressful environment, we wear three gloves on one hand in touching the tablets and things.

There were a lot of logistical barriers to overcome and attitudes that were very interesting to me to start to understand. We worked a lot with health systems in putting this in place for primary care and for maternal and child health and such, so I felt

like we understood a lot of what we were coming up against as far as health care worker concerns and some of the methodology for having everything on board, and all the authorities up the chain on board before we put this system in, and making sure it was really working into the ecosystem of what was already there.

When you are coming into an evolving ecosystem, where people don't really know what the clinical protocols are, maybe they are changing every day, and the doctor that was here yesterday has not gone home and there is a new shift of people coming in, and how are we going to manage all that.

That was a very interesting thing for us. What was critical is that we had a platform that was very configurable and we could change things rapidly on the fly.

We got a call in the beginning of October, and we left the day before Thanksgiving to go out. That was a very short period in which we had to gather all the requirements for patient flow, for clinical protocols, for medications that would be there, and load all of those into our system, and allow that to be as easy as possible for people who are in these very hot, very sweaty environments, covered in personal protective gear from head to foot, goggles, masks, gloves, and then trying to use an electronic tablet. You can imagine that would be very stressful.

Not only using the tablet to document care, but that is the side note, what I am actually doing is giving care. How do I make this easy enough for people to have confidence and to feel like it's not going to hold them back from doing what their real mission is.

I think when we looked at the barriers and what we had to overcome with that type of an implementation, luckily, we had a platform that was able to overcome some of the fundamentals, power and the infrastructure, and all of that. We didn't have to worry about that, it was already taken care of so we could focus on the

important things, how are we triaging a patient, how is that patient going from here to here, who is taking them, what questions are they are going to ask, what is the easiest way for us to ask those and get that information into the system, what are the protocols, how do we make it easy to track what the patient has received over these last couple of days and communicate that to the entire staff. What are the reports that you need to have, the snapshots of who is in, what their state is, those types of things.

We were able to build that out very quickly on this platform and then to go and train people within a day while we were there. The next day, they were training their staffs. Then have the staff and the trainers feel confident about using that system when they are going into these high risk areas to give care.

When you think about implementing a technology system or solution in response to this, the technology hopefully is something that is a grounding facilitator to all these other moving parts and helps to bring all those together.

MR. OKUZU: Thanks, Debbie. I agree with everything that Debbie said. She's covered most of the barriers. What I'd like to focus on is the human factor. I think Debbie alluded to that when she said the technology is the easy part.

Fortunately for us, we have gotten the technology to the point where it is invisible. If you want to pull up today's weather, you really don't care how many satellites your phone is hitting. If you touch that icon, the weather comes up and you pull up a nap. The technology is invisible as long as it works.

We are getting to the point where the technology is becoming invisible, so what that does is spotlight the human factor. The human factor is evident because we are talking about bringing people -- it is a paradigm shift. People are working in a different paradigm currently in the past than the paradigm we are trying to push them towards. You have everything from disbelief to resistance to ignorance.

There is not an one size fits all approach to every one of those issues, and there is also not an one size fits all approach to every single person. There is not an one size fits all approach to every single situation.

We have to very quickly identify the human factor as an issue and very quickly figure out how to overcome that human factor.

I will just illustrate with a couple of anecdotes. We train front line health care workers, and within 30 minutes, people who have never touched a tablet computer, or Smartphone are able to use the tablet computer within 30 minutes. That is phenomenal.

Then we go away, and we're looking at the data, we're looking at the reports coming in, and they are sending the data every day and it's all working well. Next month, we go back and they say well, we really don't want to continue this, and somebody says why, because it's not my job to capture data on the tablet computer.

Fine. This is the same thing as paper, it's just a different form. Well, my boss didn't tell me that. Okay. Let's tell your boss to tell you that. The boss says, well, it's not the organizational policy to capture it. Before you know it, you have to go right to the very top, and the government has to set up a policy to capture data electronically.

You see how this human factor very quickly becomes a national policy issue, or you have a decision maker who all his life, the discipline has been to make decisions based -- it's not their fault. It's because they haven't had the data or the data they have had has been reliable, and their professional discipline has been to rely on their instincts, and then suddenly you provide fancy charts, make your decision.

The guy is looking at this and it goes counter to his entire professional orientation, so we need to recognize that there is a process through which you bring people from this, you help them work through this paradigm shift, and that is the most

difficult in my experience, the most challenging because there are just too many different pieces. Everybody responds differently. You have to identify, figure out how to overcome it.

In some cases, we have gone to places and we have said please, please, just do this because it helps us, or do this because it helps you, or if you do this, you won't spend a week at the end of the month on your reports.

Actually, in some instances, we have developed PowerPoints with the potential outcomes and decisions, and we say here are the decisions you need to make, all you have to do is say yes.

I think without overstating it, the human factor is a significant barrier that we are going to keep hitting on for a very long time.

In terms of the benefits, and I think you asked about the benefits as well, correct, it is just the fact that we are enabling things that have not been done before.

I'll give you a couple of examples as well. The data that we are providing has enabled us to highlight service delivery gaps. You have a bureaucrat at the Ministry of Health who has 5,000 facilities under his oversight and has instituted programs that are supposed to be implemented identically in every single one of 5,000 facilities.

Unfortunately, he doesn't have the data coming back to him reporting on how each one of those facilities is implementing these programs, so he then sits back and assumes it is working exactly the way he instructed.

We all know that it is never the case even here in the U.S. Now we are able to provide data that comes back to him and says you draw a curve, here are the outliers, here are the people who are doing it really, really well, and they have practices that you need to communicate and you need to emulate, and you have people that are not even doing it.

When you provide this data, they see there are service gaps that they need to fill, whether it is delivering vaccines to some facilities or putting in additional staff in other facilities, we have been able to directly impact that.

Another anecdote, and I could spend three hours giving anecdotes, but another one is where you know they can do demand capacity planning. If you have women, pregnant women, who have gone through the fourth antenatal visit, you can pretty much tell that over the next month or so, there will be deliveries.

If we give you a report that in this month, you had 300 antenatal four visits, perhaps you can plan for 300 deliveries. What does that mean? A skilled birth attendant that can handle 300 deliveries, it is the facilities, the medication, care for the infants' right after they have been delivered.

They are able to do better demand capacity planning because we are providing data. I know this is translating to better health care for the patients and better health care outcomes. In time, we will document the impact on maternal mortality, but we are contributing to it right now.

Thank you.

DR. OSHIN: That is responding to change. (Audio loss) We actually get our reports from the Cloud, but that might not be accepted because it is not coming from the -- to maximize the potentials that we have.

MR. WEST: I am going to ask one last question and then we can open the floor to questions and comments.

What are the lessons for other countries? Each of you have kind of given a rich description of what you did, what some of the benefits were, some of the barriers that you were able to overcome. Based on all this, what are the lessons for other countries?

Addressing the human factor, public policy suggestions, changes in the legal or regulatory structure. What are your thoughts?

MS. THEOBALD: I'll take it from a data perspective. Something about mHealth that I see as a big opportunity now, that we have all these new innovative platforms that are out there, how do we bring those all into something that is more substantive.

Don't think of it as an mHealth program that you are putting into place to solve one consolidated or targeted focused problem. That may be the case, but how does it fit into the larger information ecosystem that you are creating within the country.

What we are trying to do is establish an information infrastructure, something that feeds into -- it is a mobile health platform that then feeds into a patient record. We are capturing patient centric data to a patient record.

Every time somebody fills out a survey about a care they have just given, so they have documented that care experience and it goes up into the Cloud, we take that and we match it up to the patient, and we continue on a longitudinal record about the care that person has received over the course of the whole episode of care, which may be a pregnancy, delivery, and then even on into the child's life, immunization and care.

What that means is, and this is interesting, we have gone places, and the front line workers have said this is a really interesting program, who is this for. We say it's for you. This is for you to have for your operations, for your programs. This is not a researcher coming in. This is not an NGO saying I want to know about this or know about this, let me take your data and these results and then we will come back and give you another program to do.

This is about what care are you giving right now. What barriers are you facing right now. Let's understand the public health system, the midwives and the

patients they are seeing right now, and let's put that into a record that will stay. Let's put this into a program that is meant to stay forever.

Some of the things that we really are focused on is how can we make tools that integrate into this ecosystem. Like Dr. Oshin said, we want to integrate into the DHIS 2, and we are working on that actively now. We want to be involved with the policies and the decisions so that this is a program that can be used every day within these clinics, and it sets the baseline and the foundation.

What is different from this program from many other programs. When you look at it from the surface, maybe not much, we're capturing data on patient care, but how we look at this is no, we are laying a foundation for other programs to come in on top of, to build.

If this is a highway, okay, it's a one lane highway, but it's paved and it's there, and now you have it and people can use it for maternal child health data, but our next initiative this year is to put primary care on top of that.

Why are midwives in this part of the clinic using tablets to capture their data, and the clinicians over here are using paper to capture primary care/outpatient care.

We are combining the entire clinic, the entire health care data capture, to get on to this infrastructure, and to be patient centric, so you are not just getting aggregate numbers at the high level to say well, we distributed 50,000 immunizations, and you say to who, what was the outcome of the birth and the mother all the way through prenatal care and then to the immunization.

How many of these children received all of their immunizations, and what are the same factors between those children, who are the children who didn't get them all, and how do we then learn from that, and then put interventions on top of this baseline,

then you have metrics that can be compared and managed with quality, and the conclusions you are drawing from that data, you can have confidence in, or at least you can know with confidence what the limitations on those were, instead of having a myriad of questions around them that you can't even answer.

We are really excited about this project and laying that foundation and looking at that in a long term perspective, and we are really grateful for our partners for working with us on that vision.

MR. OKUZU: Again, I agree with everything you have said. To add to that, I think we can't underestimate the impact of what we are doing. It is a big deal, and we are instituting change, and naturally, most people are uncomfortable with change or resistant to change.

There is enough inertia in technology adoption in and of itself, and when it comes to changing the way you work, changing the way you interact with patients, it just makes people uncomfortable, so there is resistance and inertia that we have to overcome.

In our experience, it's been more effective where there is top down buy in, where somebody says you have to do this, right. If that decision has been made and communicated down the line, it is our job to foster the buy in bottom up.
We have mechanisms to do that, and we have done that effectively, but the forces that we have to come up against are that much more powerful if there is not the top down support because we are swimming against the tide the whole way.

Whether it is the head of the Ministry of Health or the head of the program communicating down saying this is a new way of working, and we would like to embrace it, we need to embrace it, this is your job, we have to do it now.

It really helps people feel comfortable in embracing that change, and

then in that process, we then have to start to put in the changed management processes to get people comfortable with taking risks and making mistakes and not feeling like there are very serious consequences if they make mistakes.

I think if you are able to at a policy level get that top down directive, it really makes the work a lot easier, and that is direct experience because we have had the opportunity to work in context where we have worked bottom up and where we have had that top down buy in, and it has been significantly more effective when it is top down.

DR. OSHIN: I'll go last.

MR. WEST: That means you can correct any mistakes.

DR. OSHIN: It needs to respond to problems and institute solutions. For instance, when we had the experience in Nigeria, we had our own set of protocols. I would say from the onset, the solutions need to respond to specific problems, and that is where the value comes in.

We have to set up a practice so policy makers, programmers, mobile operators, everybody that is involved in the field come together to begin to work out what should be a roadmap for transitioning from where we are to the mobile system.

I think always from the onset to think about going to scale. I would say have a roadmap for how to reach those milestones to take you to the next steps.

MR. WEST: Let's open the floor to questions. If you can give us your name. There is a microphone coming up.

QUESTIONER: I'm from the Embassy of Uganda in Washington, D.C. This has been a very interesting discussion in how mobile technology can be used to improve health care.

My question goes to the panel. In regard to Africa, deep down in the village, how do you envision mobile technology affecting them positively? How are we

going to reach that local person in the village, rural community? I have been waiting to hear how we are going to really benefit the local man with this new innovation. Thank you.

MR. WEST: Great question. Anyone want to respond?

DR. OSHIN: I'll go first. (Laughter) I like your question. In Nigeria, we think no matter where you are in the country, most people now have a mobile phone, so that's good. I'll give you an example. Where we generate demand, we need to empower them with education, and we are working to use the mobile phones to give to new and expectant mothers. We launched a program last year called Money For My Phone, with cash disbursements to mothers.

MS. THEOBALD: With the cash disbursements to mothers, so there is a protocol that WHO has endorsed that is able to improve outcomes for mothers, for expectant mothers, and that is for ANC visits and attendant birth.

What Dr. Oshin is picking up on with the program for cash transfer, conditional cash transfer, is if women complete that protocol, they will have money given to them, so what is the documentation for that care.

We are looking at how we can work into that program to provide that documentation for that care, so when you come in and you have a visit and it's documented through these electronic systems, then it automatically generates a report of who has that conditional cash transfer, eligible for that conditional cash transfer.

Then possibly through our data capture, as a caregiver is working with a patient, a mother comes in and the caregiver is there with the tablet, and they are documenting care as they are sitting in front of them, when you document care and you say what visit is this and they say visit two, a message can pop up and say let the person know that if they complete two more visits and a skilled birth, they will have the

opportunity to have a cash transfer.

This guides the caregiver in that interaction. That is for participation in a certain program. You could also have those messages pop up for any number of things, let the woman know that her blood pressure is high or her iron is low and she needs to be particularly careful about this.

Again, we have this infrastructure in place and we already have some clinical support for that interaction between the caregiver and the patient embedded in our system, but there is even more and more we can put on top of that.

When you talk about how is this benefitting somebody, the people in the village, the people on the ground, the normal people walking around in the country, this is getting better care to them at the point of care. It's allowing us to have better outreach to them and put in better programs for them.

MR. OKUZU: Thanks. Let me start by saying at least half of the health centers that we are working with or the communities that we are working in are exactly what you described. They are places that are not on the national power grid. The question is how do we provide power for the tablets.

They are in exactly the place you just described. How do you get enhanced care to that woman in that community. Let me give you a very quick example. This is real. In one of the states we are working, they have this program called the BA Safe Motherhood Program. In that program, they have health rangers that go out to the communities and perform outreach, they figure out how they are doing, how the baby is doing, try to bring them into the health care system.

These people go blind. They go without the history. If you're able to arm that person with the patient's history, first of all, you are able to make that a much smarter visit. There are 10 people on your list, these three people are compliant with everything,

scratch that. You focus on these people. This person, make sure that you bring her to the nearest specialist because she is high risk, or that person, this is her history, this is what you need to counsel her on.

You make that interaction a much higher value interaction in that community that you have described. Those are the communities we are working in as Dr. Oshin said, the focus is on the rural communities. There are a lot of resources being devoted, but there is not nearly enough being devoted to the rural areas.

QUESTIONER: Hi, I'm Arthur Allen from Politico. It's interesting that Brookings invited people from this one specific project. What I hear from people who worked introducing technology in Africa is various countries are littered with great sounding projects that were abandoned after a few years.

I was wondering if the participants could talk about what kinds of -- it sounds like a wonderful project. I was wondering how is it being sustained? What is the plan for sustaining it? How long is it being funded by Qualcomm, and then what is the plan after that ends?

DR. OSHIN: I'll start. I think the difference with this project is it really wasn't initiated, it was in a response to government efforts to improve our health outcomes. We see it as more of a collaboration or partnership.

Second is the footprints in the country -- we want to save lives. There is an ongoing platform to continue the discussions. Where we are now is just realizing the results from this pilot phase to inform the next cycle.

I think most programs don't go through that to ensure that it becomes within the government's -- I think this is where this is different. Nigeria is a big country. We can seek partnerships and collaborations based on people's interests and to see everybody's contributions after that.

MR. OKUZU: I'd like to come at that from two different angles. One is from the public/private partnership angle and the second one is the social impact investment.

This has been successful because there has been a very strong public/private partnership involved in this, and the government has institutional programs and institutional knowledge. The private sector has a discipline and execution experience and competence to drive those through the public institutional systems.

Of course, with the funding, we are able to do that, and then prove the outcomes. When you prove the outcomes, sometimes I get this question in Nigeria, and I come back to people and say well, I remember a time where you had to stand for three hours to cash a check. Now, you can pick up a phone and transfer money.

If somebody had told you to drop that system and go back to three hours, you would be up in arms. If we are able to prove program by program that these outcomes, the only way to these outcomes is through this system, then the sustainability is embedded in that value proposition, right.

With social impact investment, InStrat, for example, is a for profit company that is working within a social impact space that Qualcomm is funding. It is incumbent on me for my company's survival to prove those outcomes and to identify the sources of sustainable funding to keep those outcomes going. Otherwise, my company goes out of business.

MS. THEOBALD: I will just say from an IT company who is implementing systems throughout the world, we are employing industry techniques in this, so when we take a look at this, we are taking a look not from the research or program or other things, we are looking it from an operational point of view.

When we put a system in place, we are looking at adoption, data quality,

data dashboards, these types of things, not necessarily from the clinical point of view of follow, but we want to say implementation, adoption, operationally, is the system getting us what we want.

I think that has been something that is very unique. We want to see that people are submitting their data on time and it's complete and how many of the fields are filled out. Then we want to close that feedback loop back to the individuals who are taking that data.

We have very clear methodologies that we are putting into place, and that we continue to challenge, to see what kind of efficiencies we can gain from this. Where are the efficiencies we can gain in technology, are there better things coming on the market, the tablets are getting smaller, they are getting cheaper. Is there something else that is becoming even better to do this with.

Solar power, overcoming the barriers. How do we make this more accessible to people. The methodologies of adoption or training, feedback, can we use sales force, can we use other tools and incorporate them in so that we are not using people, that this is all automated, so that feedback loop is automated.

Part of scale is this initial capital investment and the people and the training and getting the people to do the adoption, but eventually you are going to get to a steady state of support, what is the cost to just keep it running.

We are trying to keep driving that down, what are the tools that we can bring in, what are the methodologies to make sustainability less and less expensive.

MR. OKUZU: Just on sustainability, one state government we are working with has made a commitment that they are going to scale this across all the health centers in their state, and they are now working on how they are going to fund it, and in that state, they have about 550 facilities. It's not going to be all at the same time.

It might be in chunks of 100 or 200. They have made that commitment because they see this as a critical imperative to the vision of their health care delivery, and the near term vision of their health care delivery, by the way.

QUESTIONER: Raelyn Campbell with Mobile Alliance for Maternal Action, MAMA. I kind of wanted to piggyback on that because my question was about cost savings. Obviously, MAMA is about demand generation, making sure women go to their four antenatal visits, vaccinations, and different practices and behavior across the continuum of care.

At the same time, listening to the Ebola conversation, MAMA can also be about demand mitigation and making sure practices that can be adopted at the home, knowledge that can be acquired through mobile messaging can help bring down the number of visits and the burden on the health care workers at the front line.

I'm just curious, you were kind of alluding to the cost savings, but how each of you look at models for saving costs over the lifetime of the project and how that helps governments save costs in other areas, in education of the health care workers, and how this mobile approach has more cost effective ways of getting information to people and saving costs on other sides of government budgets maybe.

DR. OSHIN: (Inaudible) To move to a mobile platform, we had to convince the directors, the audit people. I think what we need to do is to work on what are you going to expend on your current system as it is, and what would you expend using a mobile solution or approach. (Audio loss)

QUESTIONER: Hi, I am from a Nigerian think tank called the Center for Public Policy Alternatives. It seems like you guys are all alluding to a very specific Vecna mobile platform that has been rolled out in Nigeria, and I understand it is called CliniPAK.

I wasn't previously aware of it, so I really would appreciate sort of more

details about exactly who is using it, is it must midwives, where is it being used, is it in community centers, is it in government clinics, is it in private clinics. Where exactly is the data going.

Somebody alluded to the idea that maybe the Ministry of Health is collecting data and using it. Is it going to the Ministry of Health, is it going to state governments, local governments, where exactly is it going and how is it being used, especially in Nigeria, since most of you have that experience in Nigeria. I would really like to learn more specifics. Thank you. And how is it being funded currently. I don't think we got an answer to that question. Thanks.

MR. OKUZU: It is being funded by Qualcomm. Thank you. (Laughter) Right now, in Nigeria, we are working -- since you want us to be specific, we are working in four states, Anambra, Kano, Ondo, and the federal capital territory. (Audio loss)

SPEAKER: Somebody talk to the audio people and tell them to take care of this problem. Sorry.

MR. OKUZU: That is probably more interesting. (Laughter) For the people on the line, there is an audio interference from a different session that is going on, but I believe it has just been addressed, so we will carry on.

We are working in these four states, we are working with Subsidy Reinvestment, who has a Maternal and Child Health Program. We are working with the National Primary Health Care Development Agencies, and they have midwife services, and we are working with the Ministry of Health.

The data that we are capturing currently goes to the stakeholders. We send it to the Subsidy Redevelopment leaders, NPHCD leaders. We send it to the Ministry of Health.

We send it also back to the facilities to populate the reports that they then submit up to

the National Health Management Information System, which we are currently working to overcome by directly reporting our data from CliniPAK into the National Health Management Information System.

You asked quite a few questions. I'm not sure if I have addressed all of them.

MS. THEOBALD: I can say a little bit about CliniPAK. The CliniPAK system that we are using in Nigeria is based off an open source platform called ODK, and specifically we are using a modification called Calm Care, which was put together by another group called Tamagi, and there are a lot of really fabulous tools out there.

What we try to do at Vecna Cares, the non-profit arm of Vecna, is to consolidate these tools into one larger infrastructure or ecosystem. What we are doing with that is taking some of the more user friendly or the ones that fit the situations in which we are implementing and connect them into a larger infrastructure.

We have a clinical database that the information from all the clinics feeds into, so we are creating something of a master patient index, and we are creating for each of those the documents of each of their interactions with the health care system.

That is what feeds the aggregate data that gets pushed over to what Okey was referring to, the DHIS 2 system, which is a national reporting system. What that does is it takes patient information and aggregates it into such numbers and totals, and pushes it over to that system. That is what we are achieving this year, instead of having to have that reporting system from the clinics.

We are actively generating data dashboards that we then distribute to our stakeholders. We are refining those data dashboards, and that is what I was talking about with the automation.

I didn't get to address one of the things you had brought up, which is how

do we drive down the cost efficiencies. What we really want to do is see how we are using the resources we have right now and how can we use them more efficiently. What we are doing is, as Dr. Oshin was saying, the changed management, and working together with policy, et cetera, and Okey was saying this is not my job. We are actually working together to make it people's jobs.

What is the medical records officer doing at the district level now. Now we have to train that person. Yes, there may be some investment in training and human capacity building, but we are actually working that into a system that is already there, that is already funded, that is already moving forward.

We are looking for opportunities like that where we can again set up this automation of this reporting and push it back to people, allow them to make better decisions with their resources. This could be as far as how many visits do we get to a center and is it well staffed, or are there too many people for the visits they have, and sort of manage their human resources better.

This could be what Okey referred to, immunizations that are sent to various locations. If you can say my refrigerator is down, don't send me immunizations -- vaccines, I'm sorry -- that is going to save a lot of vaccines from going bad. If you can say we are up and running and we are having a lot of people coming in, we can send you more.

Having that communication infrastructure put into places is hopefully going to be something we can show the impact of in efficiency gains with the resources that are resident in the system.

MR. OKUZU: Especially when you are now able to plan ahead.

MR. WEST: I think we have time for one last question.

QUESTIONER: Good morning, ladies and gentlemen. My name is

Rosemary Secaro. I am with an organization called Hopeful Tomorrow. We are based here in Washington, D.C. and in the rural areas of Kenya.

We just started mobile applications, working with the government, and I commend you very much for what you said about human factor. When it comes to government regulatory and licensing of frequencies, it took almost six months looking at our frequency.

What advantages or disadvantage did you get by getting the frequency and looking at communication. We have many organizations doing what you are doing, what I am doing, but they don't know what each other is doing. Everybody is duplicating everything.

How do we get that information, get a conference or event, all these people to come and listen to what you are doing. We need all this collaboration and information to show what we are doing, especially in the rural areas, who need more attention than the urban areas.

How do we go about it and how do we come together to work together? Thank you.

MR. WEST: Coming to this event is the first step. (Laughter)

MS. THEOBALD: We are also working in Kenya. I understand what it is that you are saying. Because we do a lot of work in health care here in the United States, there are some pitfalls that we hope that you will not fall into, and one of those pitfalls that we are suffering a lot from right now in the United States is inoperability, so the ability to exchange health information across facilities, states, or whatever.

One of the problems with that is we have no standards, right. We have no standards for the data, for how to transmit that data, how that data is being stored.

These are issues that will be popping up with you, so it is not an intention

to limit the innovation of technology, to end any of these successful programs that you have had. You should definitely continue to support them, and the tools that are working for you should continue to work for you.

It's not limiting the amount of players in this space, but it is giving them a framework in which they can contribute to health information ecosystems.

If you have a mobile health program that is coming in, you need to understand what issue are they addressing and what piece is that playing into your larger system. If, for example, we are addressing maternal child health within the subset of clinics and we are feeding up into a larger system, then if we are setting up a master patient index or something that is patient centric, we should be conforming to a standard of how that information gets transmitted back and forth and saved.

When you have another group that is doing that same thing, they build it to that standard, and then we are able to combine those. If you have something in the north or something in the south or southwest, then those can eventually come back altogether.

When you think about policies within your countries, don't think about it as saying you are an admitted vendor or admitted technology or admitted this, because you may be hampering innovation.

Instead say you must be able to transmit your data, share your data, conform to these standards, and then mandate that we all contribute to the DHIS 2, that if you set up or adopt a national patient index or just individuals, that could be generalizable enough that people could feed into that.

Then if there is specific program data that they are using on the ground in those areas, those can be within their own format, but then the other data can be freely shared among all these programs.

From a technical point of view -- sorry, if that was a little too deep for you or too technical into the weeds there -- we are very anxious to see the eHealth policies become more of a standards policy so we can avoid a lot of the headaches that will continue to plague the United States and first world health care for decades to come.

MR. WEST: It's been great to get the perspective from the front lines. Those of you who want more information, Okey has a demonstration on the laptop, so you can come up afterwards and see what they are actually doing.

I want to thank Dr. Oshin, Okey, and Debbie. Great innovation that each of you are doing, and we really appreciate you coming here to share your thoughts. Thank you very much. (Applause)

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