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>> Okay. How about this here. How about this here?
>> Mic check, 1, 2, for translation booth.
It's good.
>> All set?
(silence).
>> Check, mic check, 1, 2.
Mic check, 1, 2.
Mic check 1, 2.
>> Check.
>> It's this one. Next and back. If I try it, it works. There you go.
>> Global emergency telecommunications is critically important to all phases of disaster management so that we can save lives and prepare people for disaster situations.
(music).

>> Emergency telecommunications is critically important to all phases of disaster management. Preparedness, response, recovery --

>> Good morning, everybody.

(french language).

(no English language).

>> And many sectors, including the disaster management, and so the objective of this session is to identify a number of innovations, you know, in these technological areas that are relevant to the disaster management and see what possibilities exist.

Finally, we'll have a discussion around what are the challenges when it comes to scaling some of these so-called destructive technologies? What technologies exist for technology and interoperability and ultimately the ability to scale so that these technologies achieve the full benefit of mass impact that they promise and bring with them.

So, the session will have four presentations from four distinguished presenters. The first presenter will have today is Vanessa Gray. She's the head of the division of least developed countries small island developing states and emergency telecom division at ITU. I think beyond this she does not need any introduction and she has been very active throughout the last few days.

We have Mr. Kevin Allen from IBM and he's leading the Call for Code Initiative and we'll hear more on that. We have Ms. Kim Mallalieu, the deputy chairperson of the telecommunications authority at Trinadad and Tobago and we have Team project Loon participating today. Ms. Julie krearny the Head of Regulatory Affairs at Loon and Jennifer Miller who is General Counsel at Loon.

So I'm certain that will be filled with exciting information and revolution of what these destructive technologies can do, and hopefully after around a 12-minute presentation from each of the presenters, we'll have discussions, questions, and answers, and this will be the format of today's session.

So with this, I welcome the first presenter, Vanessa Gray, to talk about the disruptive technologies and the uses in the disaster management. Thank you.

(Applause).

>> VANESSA GRAY: Thank you very much and good morning, everybody. I'm making the first presentation to speak about a study that I too just released, and the study is really an overview of the advances that we have made in terms of using ICTs and disruptive technologies for disaster risk reduction and management.

So, it's really the rapid spread and falling prices of supporting digital infrastructure and devices, such as wireless broadband networks, smartphones and Cloud Computing that have

created the application for disruptive technologies for disaster management, and the study that I will discuss, it looks at the current use but also at the potential opportunities of ICTs and disruptive technologies for disaster risk reduction and management. And here disruptive technology includes the innovative applications of new technologies and how they're used in disaster management.

The study presents a number of concrete case studies, country case studies from different countries around the world.

One of the areas where we've really seen substantive progress is in the area of drones. One of the first documented uses of drones was in 2005 after Hurricane Katrina hit the U.S. because roads were blocked by trees, then drones were used to make assessments, to search for victims, and also assess river levels.

And aerial drones are currently used in a number of disaster phases. For example, for preparedness to monitor volcanic activity, for response, delivering equipment to locations where ground-based transportation has been disrupted, and also in the recovery phase for making photos of disaster areas for damage assessment.

And the picture that you see here on the right-hand side shows an assessment of affected areas following Cyclone Pam one of the worst disasters that hit Venuatu and drones were used particularly because Clouds were obscuring the satellite images and we had about 200 flights from drones and they were used really to guide relief workers by assessing the level of destruction and to guide funding and recovery efforts.

And in this case, the Government of Venuatu owned the images but they shared them up on an open mapping tool and shared them with the disaster communities and the eight organizations and volunteers uploaded and geotagged from social media and added to the value of the maps.

There were challenges in terms of connectivity, in terms of weather, also data formats, and but overall the experience provided valuable insights with drones providing the fastest method of mapping damaged areas. And we heard a little bit about potential uses of drones also yesterday in the discussions and countries planning on using drones for assessments.

In terms of Big Data, we know there is an avalange of data by tons of transactions as well as Internet activities to name a few. Big Data Analytics holds enormous potential for crisis management. For example, cell phones are used for Big Data to monitor population movement, and analysis of social media, communications during disasters are used to identify threats, for example, Twitter.

And we have the use of financial transactions to monitor economic activity, and the image you see here on the shows the relationship between financial transactions in an area in Mexico

that was hit by a hurricane, and it shows before, during, and after the hurricane, and to analyze the economic impact.

So the day before the hurricane hit, transactions were made in particular to buy food and fuel. The day of the hurricane hit, there were no transactions, and then it took about two weeks to recover and to go back to normal levels of transactions compared to pre-disaster times, and so this is a really important analysis that can improve understanding of which groups are most affected for targeting post-disaster assistance, and this is also something that came up yesterday, that we need to be able to identify the most vulnerable groups, and this is an important tool, and it also shows how long it takes to return to normal and to generate estimates of the economic impact of disasters.

In terms of the Internet of Things, the use of sensors for monitoring conditions that could trigger disasters dates back a number of years and improvements in Cloud computing, broadband wireless networks, the sensors themselves, and data analysis have led to the emergence of powerful, integrated and realtime systems referred to as the Internet of Things. And sensors can be used in a number of cases to identify potentially dangerous situations. For example, sensors to identify fires and trees, in rivers to identify floods, and also potentially to alert oncoming earthquakes and I think we'll hear more about the sensors in the next presentation on this panel.

Artificial intelligence really holds tremendous potential for disaster management. Humanitarian groups, for example, are hoping to speed up map creation by using machine learning to extract objects, such as buildings and roads from aerial images and we'll hear more about this on Friday in a presentation.

And considerable research is also being devoted for the use of AI for detecting and possibly one day predicting earthquakes. The volume of seismic data has increased exponentially providing fuel for solutions to reliably detect earthquakes, so there is a huge amount of data that has to be analyzed, and scientists have based detection on continuous seismic records searching for repeating signals that could provide information on upcoming earthquakes.

On robots, these have become more sophisticated through integration with microprocessors and sensors, and their growing dexterity makes them suitable for disaster situations that are very often too dangerous for humans. Robots can, for example, search rubble, they can detect sounds, they can film, and also detect to sense survivers and assess damaged buildings or contaminated areas, and this is the case for example, the image on the right-hand side is a robot called Little Sunfish that was used in Japan to search around the reactor for radioactive material, and it's currently also in Japan that the possibility for commercialization of robots is

underway and these are then designed specifically for cases of disasters.

Another important part is the use of Big Data and Crowd Sourcing. We have smartphones and these have generated huge opportunities for the public, so for the crowd to assist in helping to respond to disasters.

First of all, if you look at the bottom of this triangle, we have crowds as sensors and here the user doesn't really need to do much except carry the phone because that generates data from the sensors and from the GPS in the phones.

The second is crowd as social computers, where users generate data by using apps, such as those of a social media, and these data are then collected by platforms and like the crowd as the sensor, the user doesn't really have to do very much to provide this information.

We also have crowds as reporters, and here users offer their own information, for example, over Twitter and this can then be used by, for example, international aid organizations.

We also have the Facebook Crisis Response App that allows users to mark themselves as safe and to inform friends and family, and a number of platforms are also used to crowd source for those affected by disasters and mobile money is a safe way for relief organizations to transfer funds to those affected by disasters.

Finally, we have crowd as microtask and this is a bit more of an active and advanced application where here users create content such as adding roads or buildings to satellite images so this is a very quick and cheap way, especially since the crowd often does this on a voluntary basis. On the other hand, the crowd has to be a bit more skilled for this kind of use.

One of the challenges during a rapidly evolving disaster is coordinating and verifying information among different stakeholders, so we need to make sure that the information is correct, and the Blockchain distributed ledger system and chain of verified records here could play a significant role in improving information control.

In the U.S., for example, the Center for Disease Control and Prevention is planning a pilot to test Blockchain for rapid and reliable collection of data during a crisis in order to reduce the spread of disease.

But this could obviously also be used in the area of disaster management since similar to the public health system, agencies offering relief, need to share trusted data quickly to collaborate effectively.

Some relief agencies have also begun accepting donations in Crypto currencies such as for example Bitcoin,.

So some of the key findings from the report, we have a lot of examples that illustrate how disruptive technologies today are

refining processes by spreading critical information more quickly. They improve understanding of the causes of disasters, they enhance early warning systems and damage assessment, and they add to the knowledge base of the social behavior and the economic impact of disasters.

We know that applications of disruptive technology to disaster management, they vary very much in pace, in scope, and in impact. And for example, social media platforms such as Facebook and Twitter have been applied in a number of events and aerial drones and IoT are increasingly used as experience is gained and also as the costs are falling. This is very important.

On the other hand in the study, we also show that older technology, such as satellite imagery and most -- remain the most important method for detection, monitoring, and assessing disasters. And text messages also has the widest reach for communicating, so still the go old SMS.

And this is important, and I think also referses to something said yesterday in the first panel, we need to adapt the types of technologies that we are using to the users and their skills and their availability of connectivity.

Big Data, robots, and artificial intelligence remain largely experimental and large-scale impacts are will require more time and investment in skills in the future.

The report, the study offers a number of recommendations and I just want to highlight two or three. One is the reach, and this again goes back to when we use ICTs and disruptive technologies, we really have to see who are we using them for, who is the constituency, because if people do not have access or do not have the skills to use certain technologies, these will be very limited.

One example is for example, Twitter has been used a lot by humanitarian aid agency, but globally only a very limited number of people actually have access or use Twitter.

We also suggest to develop a global repository that could feature information on how digital technologies are being applied for disaster management and would raise awareness and understanding. Today there are really hundreds of applications of disruptive technology that are underway around the world, but very often they're sort of hidden in research papers and so it would be good to have maybe one platform, one information source where people can go to compare and see what is happening and also to learn from other projects and to avoid duplication. I think that would be a very useful thing to have.

And finally, in terms of partnerships, we need private/public partnerships. We know that the private sector is very active in developing and researching disruptive technologies for disaster management, and also a lot of the Big Data that is useful for disaster management is held by the private sector.

And there is also research is done a lot by the academic community, and so these research, public/private partnerships and also with the research community are very important.

The report has a number of other recommendations, and I think some of them will also be addressed today during the panel, and I invite you all to have a look at the report. Thank you very much.

(Applause).

>> KARTIK KULKARNI: Thank you, Vanessa. So next up is Kevin Allen from IBM Digital Business Group and he'll be talking on the Call for Code.

>> KEVIN ALLEN: Good morning. Thank you Kartik and thank you to the ITU for welcoming IBM. I appreciate the message and it's inspiring to be in a room with so many people dedicated to do so much good.

I want to talk about two initiatives today. One is Call for Code and the other is Code and Response and these are two initiatives we launched over the last year to really put a framework and purpose behind the work that IBM is doing in the space of responding to and helping people and populations recover from natural disasters.

The first Call for Code, we announced Call for Code last year with a bold idea. You know, we wanted to see -- we had a hypothesis and we wanted to see if software developers, technologists, and data scientists could save lives through code.

We launched a five-year 30 million dollars investment to address this and inspire coders to come up with solutions to address natural disaster preparedness, response, and recovery.

The outpouring of work that we saw coming from this program was overwhelming. We worked with a hundred thousand developers around the world that committed their time and talent to creating that's applications.

We saw more than 2500 potentially life-saving applications submitted as part of Call for Code.

We awarded the Top 5, and they were awarded by a panel of judges that included the top UX and design lead at Twitter, the head of the United States -- the U.S. National Disaster Preparedness Institute, and Former President Bill Clinton of the U.S. and so this panel awarded its inaugural prize to Project Owl. And Project Owl stands for organization whereabouts and logistics.

So you can think about this as a two-part solution. One is an IoT device that is about the size of my fist that you would put -- that you can distribute across a geographic area, and it provides connectivity in an area where there is no connectivity and where there is no electricity.

The other part of the solution is the OWL Software Management System that connects first responders and victims in the event of a natural disaster.

So one of the interesting things about Call for Code is this

team not only one the $200,000 grand prize, but it also received support from the Linux foundation as an Open Source project, so the Linux Foundation is the world's largest Open Source organization with hundreds of projects under its banner, and so this team of five has grown since then through this Open Source framework to a team of more than 50 developers who are working on this solution and donating their time and talent to help Project OWL become a viable solution.

Now, we didn't want to stop there. IBM also committed the use of its Corporate Service Corps, a program within IBM if you've been with the company for two years you can dedicate four months out of the year to dedicate to a project. So we put the might behind Project OWL but we really needed a framework to implement the solutions, and that framework that we came up with is Code and Response, and so last month we launched Code and Response as a four-year 25-million dollar investment to implement top projects from Call for Code and also our partnership wts Clinton Global Initiative University Program and so we're taking -- IBM has been doing coding competitions for years, but it's only in the last year that we really saw the need to focus our efforts with these coding competitions on national disasters and to take those top projects that come from these coding competitions and actually put them into production.

So right now, there is a team in Puerto Rico that is working with Project OWL to implement that solution. We're testing it with the CI O's Office of Puerto Rico and ITDRC among other stakeholders and implementation partners in that project.

And an important thing to note is that Project OWL is not an IBM company. We have no stake in the company. You know, they use the software solution based on the IBM Cloud but other than that, this is not -- you know, we don't look at this as a money-making venture. We look at ourselves as facilitators, collaborators, and convenors and that's really why I'm here today and, you know, one of the important reasons why I wanted to come here and share this message with you is because, you know, the partnership piece of what we're doing and the Open Source piece of what we're doing are so critical to really making sure that these solutions are being put into production in areas that need them the most.

So, in addition to Code and Response, you know, this idea of responding to natural disasters as a cooperation is nothing new to IBM. You know, we've been -- since 2001, we've responded to 80 natural disasters around the world. Last year we had a heavy presence around responding to Hurricane Michael and Florence in the United States.

We partnered with the Red Cross numerous times on, you know, bringing our capabilities to the table when it comes to natural disaster response.

We use technology at IBM to solve problems, and we see natural disasters as one of the most critical problems facing our planet today, and so that's why we've made this commitment and that's why we're here.

So what's next? This year we're adding -- we're launching Call for Code March 25 and will be open for smitions for the 2019 challenge. We're adding healthcare as a component to Call for Code this year using the Sendai Framework as a jumping off point to help inspire software developers to come up with solutions that will address healthcare in particular in the event of a natural disaster, so think of how you can is apply Blockchain to track medical supplies and donations, think of how you can find ways to use technologies to connect healthcare providers with victims and vice versa.

And how can we serve -- how can we bring mental healthcare to those who need it in the wake of a natural disaster, and how can we ensure that the most vulnerable in our populations are served. You know, we think that technology can play an enormous and impactful role in making sure that we're addressing that.

We're also implementing, as I mentioned, Project OWL through our Corporate Service Corps working with partners in the public and private sector, so working with some of our clients as well to make sure we're bringing that to life.

We're also continuing our commitment to respond to the next natural disaster, and expanding our scope of partnerships globally, which again is a big reason that I'm here today is to meet many of you and see if there are opportunities that we can collaborate.

So how can you be involved? You can work with us to spread the word to your communities that we're doing this, and that IBM is committed over the next five years and beyond to bringing code to address some of these challenges that are faced in times of natural disaster.

You can become a Call for Code supporter and I can speak with you more about what that means, and you can become a Code and Response implementation partner and help brings projects like Project OWL and PD3R, the runner-up, it was the runner up in call for code last year it stands for Post Disaster Response Recovery and Reconstruction and that project specifically uses artificial intelligence technology to take a photo of a damaged building and assess whether that building is structurally sound enough to reoccupy or whether a structural engineer needs to come out and do further assessment.

That project specifically came from an organization called Build Change and a team within that organization built PD3R and saw a need in Nepal following the earthquake in 2015, they saw people still unable to go into their homes, and so working with us -- so there are opportunities to work with us not only around Project OWL but any number of the top projects that have come out of this

competition.

You can become -- we're also looking for judges for this year's competition, and a big huge thing that we're trying to do is to educate developers about the problems that are faced in the times of natural disaster, so if I'm just an average software developer, I may not know what someone -- what you all face on the ground in your day-to-day. And so through content, providing videos, articles, blog, tutorials and what we call code patterns, we're educating developers about the problems that exist around the world and helping to inspire them to answer the call and to address those challenges.

So with that, I think you very much again for letting us come in and talk about these initiatives. We're incredibly excited about the opportunity that exists here and I hope to speak with many of you about how we can work together with these projects. Thank you very much.

(Applause).

>> KARTIK KULKARNI: Thank you very much, Kevin. So the next up is Kim Mallalieu, and after all the sessions we'll have time for discussion, so save your questions until then.

>> KIM MALLALIEU: Good morning. Thank you, Chair. Yes. I'm thinking, yes. So thank you for having me, and so today, I want to do a lightning presentation. I'm sorry, the pointer is not working, but on massification -- oh, goodness gracious, it's massification of disaster detection and monitoring.

On the agenda run through resilience scale, innovation and innovation feeds resilience and of course this can only happen in the presence of enablers.

Let's think about what it is to have technological resilience because there are lots of other dimensions of resilience but let's just look at technological resilience in particular to disasters.

One of the key things is multihazard early warning and response.

For this, a multiple suite of sensors is essential input, and multiple channels of dissemination and communications are also essential.

Another requirement for technological resilience in the context of disasters is geographic coverage. When I say geographic coverage, I don't only mean the scale of coverage. I also mean the density of coverage.

For this, two key things, one denseification and another is massification. There is that word again.

Ask any engineer about what it means to be resilient and the answer will invariably be availability. The availability of service. And the two traditional ways that you affect availability of service are diversity and redundancy.

This is not all you need. You also need accessibility, so

end users need to have channels through which they can access service, telecommunication services.

For this, there are two key things. One is a diversity of channels through which users, end users can access information, SMS, smart phone, VHF, radio, et cetera, et cetera, and also that they are all compliant. They're compliant with many different things, with standards, with regulations, with procedures, with networks.

Vanessa has carried us through a tour of disruptive technologies that find a home in this disaster risk management cycle. Mitigation, preparedness, response, recovery. What do we mean by disruptive technologies? I interpret this to mean the set of technologies that accompany traditional technologies and slowly emerging ones. But these ones, these disruptive ones are those that change the way that we do things, that change the way that we interact with the world, that change the way, of course, that markets are run and that transactions are conducted. But very much so, that change the way we interact with the world.

You remember from Vanessa's tour that there are robots, there are UVs, unmanned vehicles, and these enable, for example, monitoring and warning response and also communications. Very different things that they do and very different roles that they play. It's very important in disaster risk management.

Also, AI, machine learning, Big Data, those are our babies. Risk knowledge, they translate data into knowledge, risk knowledge in particular, and all of the analysis, all of the predictions, all of that.

The Cloud conditions, yeah. Storage competition, redundancy, Blockchain for trust and for reducing transactional risk. All of these, very, very important disruptive technologies.

But let's look at three here, just for the moment, let's look at IoT. IoT for monitoring and warning because we're talking disaster management. IoT for massification and there is that word again.

Let's also think of 3D printing. 3D print something a very, very powerful and rebirthing technology that finds a natural home in risk management; particularly in the response and recovery phases.

And my personal baby, the next generation of amateur radio. Amateur radio represents that nexus of all of the things that are good to me. It's that community of people who do what they do for the love of it and for the service of it. They invest their own money, very little because they are supremely resourceful to experimenting, to exploring, to finding solutions, and always to provide service to the public.

Last year we held a little event, at the University of West Indies and one of the aged mature persons took some cheap wire, connected to a cheap fishing line, a very cheap fishing line, and

through multiple tries was able to hall it over a huge cemetery, cemeteries are hundreds of years old and they're beautiful.

At the top of the cemetery, this cheap wire was our antenna that we used to communicate across the world to Eastern Europe over the HF bands using Morse Code. It took several tries but maybe 35 minutes to have the antenna and have us up talking to eastern Europe using Morse Code.

The lowest bandwidth of all communications.

So keep an eye on the next generation HAM. So imagine, imagine a smart world surprising a set of fixed and mobile sensors deployed not only through infrastructure, and when I say infrastructure, I mean through operating service providers, through the Caribbean Institute of Meetolgy and Hydrology, not only through infrastructure but through crowd.

Imagine this world in which sensors are deployed massively, but more so opportunistically. An example, my pet of course, would be smart C is Caribbean a set of heterogeneous sensors distributed opportunistically and ad hoc over the Caribbean sea.

With that that are themselves heterogeneous, TV white space, LTE, GSN, anything you can think of. Connecting to the Cloud through heterogeneous data and information delivering heterogeneous data and information products and these aggregated with other sources of heterogeneous data and information products and all process in the Cloud using compatible formats, for example, the cap and distributed to a heterogeneous set of end user devices.

Imagine that we can take all of that data, gathered ad hoc, opportunistically, over time, over the whole of the Caribbean Sea or the Indian Ocean and we can manipulate that so that those who generated the data can see their data. And those who didn't can see the data completely anonymously, can see heat maps of any kind of parameter that shows you temperature, this is an undergraduate student of mine at the university. Yeah. It can be anything, pressure, air pollution, the color of the ocean that reflects the algae population, et cetera, et cetera, et cetera. Just imagine.

Now imagine that this massification, as I say, is affected through a combination of infrastructure and crowd. So we ask ourselves, what is necessary for this massification? Well, one end of it is device massification and the other is deployment massification. For device massification, at the very least we need affordability, but we also very importantly need acceptability. Affordability, how do we get that? Well, obviously, we massify. To massify there are a number of things we need, chief among these are the means of production and the other, the incentive to produce.

Acceptability rarely boils down essentially to conformance and interoperability for which we need standards and regulations.

Massive deployment from where I stand today in this conversation requires agency. What do I mean by agency? Agency

is the capacity to exert power, personal power. Agency. Agency requires two key things, accessibility and ownership. When I say ownership, I mean personal ownership. And accessibility in turn requires skills and opportunity. Ownership, knowledge, and empowerment. Let's think of this device, the ripe probe that was introduced to us yesterday and imagine this ripe probe, as you walk in the door and you go through the registration at the ITU desk for GET 2019, imagine that you get a program and you get a right probe and imagine that ITU does that at every single conference it has.

Can you see how we can start to -- we can start to start a program of massification. Can you see it?

So let me tell you what I think is disrupting technology. I think what is disrupting technology is the make a movement. This is the democratization of the means of production. What are makers? Makers derive identity and meaning from the act of creation. They are distinguished from past inventors by theincredible power of modern technologies and the globalized economy to connect and learn, and as a means of production and distribution.

There are many examples of this, the Make a Movement and agency apply to the disaster risk management sphere. In IoT, 3D printing, the 3D printing here is 3D paws, 3D printed automatic weather systems that Dr. Darryl mentioned yesterday.

You can put these together for 200 bucks and the templates are all available and you 3D print them and ship them. Okay.

The thing is that there is a quality issue. Okay. So the 3D pause is a very cheap device you can put together in your garage, but there are some aspects that do not meet the quality requirements of your national meteorological service.

So do you abandon it? No. You use it to the extent that it can be used so that, in fact, in the end we end up with a mix of high-quality sensors and moderate quality sensors. Use and manipulated and processed according to their quality.

Of course, enablers are important and the three pill ars of enablers for this are products, markets, and regulation. Products, as platform, and as frameworks to be extended to be applied to be implemented and open of course, but at quality. What quality? A mix of quality levels.

>> KARTIK KULKARNI: You have two minutes.

>> KIM MALLALIEU: And I will take two minutes. The markets have changed, the markets are changing. I will go through very quickly. So the markets, the new face of the market is going to look more like an experience environment. Democratize, comoditize, 15 minutes on regulation, next generation regulation to me and this is personal to me is competent, responsive, and dynamic?

How so? Because it will and it must use those very same disruptive technologies, leveraging for example, IoT and AI.

Create steps is the my last slide share. I recommend the consideration for the development and deployment of infrastructure and crowd-based sensors crowd-based through personal agency, IoT. The developmental resource hub is very much along the lines of Code for Code. Forgive me, it's stress.

Conformance and interoperability by design, the specification of essential standards, test specifications, pre-compliance testing, mutual recognition agreements between countries, peer support communities, open your data, open your data, open your data, make your APIs available, and of course public awareness.

I think I don't have time to go through this, but what this graph would show you if I had time is the difference between IoT, machine-type communications and, for example, ultra-reliable low latency communications and mobile broadband. They're completely different markets, but this one, this very one, MTC IoT, represents a set of opportunities for the developing world to innovate and through innovation and scale to build resilience. Thank you very much.

(Applause).

>> KARTIK KULKARNI: Thank you very much, Kim. Next up is Team Loon. That's you.

(laughter).

>> JULIE KEARNEY: Wonderful. Thank you so much, and thank you, Kim, for your enlightening presentation. I will be drawing on that. My name is Julie Kearney, with Loon, joined here by our General Counsel Jennifer Miller. We're thrilled to be here. I'm going to walk around too, I'm feeling the need to get out of my seat. We're new ITU Development Sector members and we thank Doreen for having us here and Vanessa and the wonderful ITU staff and also the local staff here in beautiful Mauritius.

Coming from California, we're melting a littlebit, but it's a beautiful place to be melting, so thank you so much.

We are a new company, so we were born out of are Google's Project X. Project X is called the Moonshot Factory where they take big-world problems, seemingly unsolvable world problems and try to find solutions for them, and that is exactly where Loon came out of.

We are the Loons, we are floating cell towers in the sky, we're an infrastructure company, and we were developed to bring Internet to unserved and underserved communities.

So now that we're a standalone company under Alphabet and Google is our sister. We were a child and now we're a sibling. We have been coming out over the last year to really educate and inform and find ways that we can work with regulators around the world and telecos to bring our service to those who are unserved.

I'd like to start with a video because a video is worth many,

many words and we only have 12 minutes, so we'll start with the video that shows where Loon was able to come in and deliver service after the hurricanes in Puerto Rico and Caribbean.

(music).

>> When I really realized what was going on, it was the next day and I was trying to call my dad. I was trying really hard to communicate with him, and I couldn't. This was me, a government official, and was not being able to communicate with his father.

>> I didn't expect it was going to be this bad. I knew it was going to be bad, but I wasn't expecting it was going to be this bad.

>> We had Internet before Maria, we had so many things that we depended on the Internet for everything.

>> We actually have two launch sites, one in Puerto Rico and one in (?) and what happened when Hurricane Maria went through is it took out a substantial amount of equipment and we had to found new ways to navigate the balloons down to Puerto Rico. Loon wasn't for disaster response but since we were on the ground in Puerto Rico, we were able to quickly respond.

I'm excited that we were able to provide basic connectivity to hundreds of thousands of people after the hurricane.

Some of the things that we learned from this experience were that before a disaster strike, we need to secure a spectrum, import all of our equipment, and test the full system so that we can restore connectivity as quickly as possible.

>> There has to be a playbook for disaster. Telecommunication has become a necessity, so I'm a firm believer that Loon should be part of that disaster response playbook for telecommunication.

(music).

>> We're going to give back. We have to give back. We were doing it before and we can do it again. The Internet is going to do that.

>> JULIE KEARNEY: Thank you, and we'll bring up our slides. Pam, thank you, and Garam, they let us do this video on very short notice, so thanks to the great WiFi here at the hotel. Thank you ITU.

So I would like now, because this is a beautiful idea, balloons in the sky, but you probably wonder how did they -- how do they get there? Jennifer Miller, our General Counsel, we're collaborating because collaboration is key in what we're doing and Jennifer will talk about how the balloons are sent into the stratosphere and a little about the mechanics behind it and I'll come join you to talk about more of the disaster recovery.

>> JENNIFER MILLER: Thank you. Thanks for letting us tag team. We thought this would be more fun this way. Thank you so much for having us. We're just delighted to be here and to meet

all of you and talk about Loon.

We thought it would be useful to highlight the team that's here from Loon, Julie, myself, David in the back, and we're really pleased to be here.

So as Julie said, Loon is balloon-powered Internet. We started, as Julie said, just as I was going to say as part of Google, trying to solve massive problems, and our mission, our core mission is to bring Internet to those who don't have it and they may not have it because of the terrestrial geography may be such that infrastructure cannot be provided or it could be because they've had a national disaster and their connectivity has gone away.

So how do we connect? Many people, this picture I think is very, very useful to explain how Loon works. You can start over on the side with the ground station going up to the balloon. The balloon then is like Julie said, a floating cell tower and talks to your standard handset on the ground. We use standard LTE frequencies with our partners, and we talk to those handsets directly without the need for any terminals or need for any special devices.

The other thing that I thought was very, very interesting that Kim was talking about, she was talking and Vanessa as well about IoT devices. One of the things that Loon could be very, very useful for is working with IoT devices where you need connectivity spread out over a very, very wide area because as you can see, when you have a floating cell tower, your area of coverage is much, much wider than a terrestrial cell tower would be.

So here is just an image of that. Showing how far and wide the Loon balloon can cover.

Everyone always asks, well how do the balloons get to where they need to be and how do they stay there? So we launch our balloons out of both Nevada and Puerto Rico and traverse the winds, it's fascinating a control center in California where we take wind and weather data from all over the world using automation, machine learning, and the balloons are programmed where to go and they traverse the winds, they go up and down in the different wind currents so we can launch a fleet of balloons and that fleet of balloons can stay over peru or Caribbean or over Kenya and we don't just launch one.

We would launch a flock or a group of them, and they would go together, and so the service area would stay the same while the balloons might float around a little bit.

This is what our balloon looks like. It's huge, it's the size of a tennis court. You can see the little people underneath. It's useful just to see the scale.

Folks when we got here said, oh, did you bring a balloon? It would be way too big, but we do have a really cool headset that you can see the balloon, so we have it in the back and virtual reality

headset for folks to look at after.

And then how we launch, you saw a little bit of this in the video, and we have a flight system powered by solar panels and batteries, completely self-powered. The balloons last, they stay a loft about 160 days at this point. Our goal is to have them stay afloat for 350 days, we're on our way to that. That's one of the launch sites. At scale we can launch 1 balloon every 30 minutes. When it's time for the balloons to land, we coordinate both our takeoff, flight, and then landing with the different air traffic controls all over the world. We land in a pre-determined landing site, working with air traffic control to make sure the balloon makes sure where they and we would like it to. Then it's collected, and you can see one of our recovery teams will go and collect the balloon and it will either be recycled or reused in the community where it lands.

And as I was saying, here is today's configuration. What's really nifty like I said is that it's transparent to users. We're a infrastructure provider. We work only with teleco company providers. For instance we're about to go to market in Kenya working with telecom Kenya, we're very excited for that. Your handset would show you're connected to your provider and not to Loon.

It's been a very exciting year. Just one last thing before I turn it over to Julie is we graduated from Google to become our stand alone company and we're about to launch in Kenya and we're really, really excited about that.

And then the other thing that was really exciting, and I think the next slide is this one, and this is really pertinent to disaster recovery. So one of the things that we've been working really hard to do is to build what we call a balloon mesh network in the sky, so that you can start from your single point on the ground with your ground station and extend your reach balloon-to-balloon-to-balloon much, much further than if you go to the ground station to the balloon to one user. We've now established links over 7 balloons over 1,000 kilometers and so it's very, very exciting technologically for us.

And with that, I'll turn it over to Julie. Thank you.

>> JULIE KEARNEY: Great. Thank you so much. Thank you for your wonderful company today. David yesterday spoke a little bit about the disaster recovery effort, so I won't dwell a lot on our slides, but for those who were not there, we heard in the video presentation that preparation is really important and Loon is ready, we're able to launch within about 72 hours where we know we need to be, we can launch from Puerto Rico and Nevada, so this is a way too familiar site for many of you in this room and it is really devastating for the world as well.

So you need immediate service. We have the benefit of being weather resilient, power resilient, we're self-sustained in terms of our power with solar panels that with batteries powered by solar

panels. We can be in the air, like I said, within 72 hours and standard -- standard devices.

So Kim and others have talked a lot about interoperability and we think this is the ultimate in interoperability. It's a totally transparent system. You think that you are working with your local provider, and again we are a complement to the local system.

We have a history of helping not only in the Caribbean but also in Peru when they experienced their massive floods. We partnered with Telefonica and we're working with them as well still doing a lot of testing and we still have a very active presence in Peru as well and we're pleased to meet many of you today and talk about future opportunities to work with you as well.

So 600 bits of data, 200,000 users benefited from the Loon service in Peru and this is when we were Project Loon pre-graduation.

And as you can see, this is the connectivity that was provided in Puerto Rico post-hurricane. The towers are not looking so good. And 250 plus users in Puerto Rico, you can see where the coverage was enabled.

And back to preparing. Preparedness, one of the keys of this whole summit today, we're in the Cloud, we're on the ground with our infrastructure, and of course we're constantly fleet planning and testing. We have many balloons in Peru and they're on their way to Kenya now.

We are tied very closely with all of you here at the ITU and we've circled two of the key -- two of the key tenets of the ITU Sustainable Development Goals as well.

I would like to talk a bit very quickly. I don't know if we get brownie points, Kim because you talked about technological resilience and we believe with innovative technologies, drone, balloons, we have geographic coverage. Obviously, we have availability and accessibility. Do we get a star, a gold star? (Laughing). We're improving every day.

Joe Barton mentioned something yesterday during the afternoon breakout and he talked about regulation and having systems in place as part of your preparedness where regulators can respond quickly and nimbly when emergencies happen.

In the U.S. for Puerto Rico, the FCC was able to grant a special temporary authority so that we could have access to the spectrum to deliver the service in cooperation with partners, T Mobile and AT&T and so that was one of these instances where we needed to get coverage in Puerto Rico, the regulator partnered with us, and with our Teleco partners and we had a STA grant within minutes or maybe seconds, and so I think in terms of having a nimble infrastructure in place and being ready to react, it's really important.

And we talk about, again, drawing on Kim, competent, responsive, and dynamic regulation, and not just for emergencies,

but as we're trying to deliver innovative technologies to the underserved.

>> KARTIK KULKARNI: Two minutes.

>> JULIE KEARNEY: Two minutes. Okay. I think that is actually my swan song. Thank you so much for being here. Jennifer and David and I are available to answer questions. Because we're a tech company, we have virtual reality glasses that Jennifer referred to that show one of our launches in Puerto Rico, and we also have a 3D, it's really cool so please come see us.

And also, 3D of our payload as well, and so please come visit and we look forward to working with you and meeting you. Thank you.

>> KARTIK KULKARNI: Thank you so much.

(Applause).

>> KARTIK KULKARNI: So the time is now for the discussions, questions, and answers. I've been told there are some people joining remotely as well, so I'm not sure how to recognize them. Okay. There is a person over there who will tell us if there is somebody who has a question.

So, yeah, feel free to ask questions to any of our presenters. Make sure you direct the question to one of the presenters and you can raise your hands and we'll go from there.

I see one hand over there. Yes? I thought I saw a hand.

>> Do you need a microphone?

>> (Speaking off mic). -- even though you are post-disaster, there are still lots of alerts that need to go out, a particular bridge goes down or whatever. Can you intersect or can you do some broadcast with balloon cell tower in the sky?

>> JULIE KEARNEY: To answer the question or restate the question. You're asking if we can offer a service like an SMS?

>> AUDIENCE MEMBER: (Speaking off mic).

>> JULIE KEARNEY: Yeah, so we are an infrastructure, and so think of us like a tower in the sky. We're not actually doing the service delivery but we're partnering with the Telecos, so if there were a teleco component to this we would work with them, but we are the delivery. I think Kim has something to say though.

>> KARTIK KULKARNI: Kim wanted to add on to this.

>> KIM MALLALIEU: Yeah. Just to say that because Loon, if I can, because Loon works with LTE and LTE supports multicast, that would be intrinsic and so delivery to multiple users and end users would be intrinsic to LTE.

>> AUDIENCE MEMBER: Okay. This is something we'll need to investigate but I'd love to talk with your technical folks about how to do that. We have experts on cell broadcast who can work with you on that.

>> JULIE KEARNEY: Sure thank you.

>> KARTIK KULKARNI: Anybody else? I see one more hand up there. Yes. Go for it.

>> AUDIENCE MEMBER: This question is for Vanessa. In the report that you presented, is there any analysis on the quality of data that you obtained through crowd sourcing, especially from social media that transfers the information of data you receive? Thank you.

>> VANESSA GRAY: Thank you. Thank you very much. Actually, we don't carry out in that stud study an analysis but I think it's a valid point because if you hand it over to the crowd you rely on ability and trust worthiness so it's a valid question and in the study we don't address it.

But one of the things for crowd sourcing, so the idea is to have many people involved, a crowd, then it can increase the reliability of the information.

So if you then combine it, for example, with machine learning or artificial intelligence and you see a reoccurring pattern, it gives you a sense of the reliability and the trustworthiness of the data that is produced.

>> KARTIK KULKARNI: Thank you, Vanessa. More questions? There is a hand out there. The last. Yes?

>> AUDIENCE MEMBER: Hi. This is a question for Google Loon. Just two quick questions, actually. First of all, what are the service regions that were mentioned on the slides, so I guess which parts of the globe are you able to service right now.

And the second question is, who are your customers for Loon? Is it the mobile network operators? Are they paying you to come and provide those cell towers in the sky? Is that how the business model works?

>> JULIE KEARNEY: Sure. Starting with your first question for coverage, so at this point, so we are a year out from graduation -- actually it feels like a year to Jennifer since she brought us to graduation, so it's been since July.

So we are currently testing in Peru, and we are on our way to Kenya to do commercial deployment, but we're looking at other regions all the time.

Again, we are not -- we are propelled by the wind. We have no mek analyzed propulsion so we're at the mercy of the winds, but of course with our algorithms that tell us where to go and up and down, and so we are finessing the balloons. They're constantly under development to give broader service coverage.

A lot of the coverage that we're looking at as well has to do with what the country regulations are, and so looking for overflights to get to countries that are interested, so we need aviation authority because we do get all necessary approval, and so we're -- when I say we're limited by the regulatory environments for aviation and teleco, we're working on that. Hopefully being here helps to educate. I haven't answered your question though.

We are looking at regions where the regulatory authority is

open to having us serve.

The other component you asked about a mobile network operators. We partner with mobile network operators as a complementary service for unserved areas, and so the business model is to find partners, Peru, Telefonica, telecom Kenya, we're interoperable, we're open to any partner, we work with anybody so we're not just looking at one partner. We'll dance with anyone who will dance with us. (Laughing). Did I answer your question? Sort of?

>> AUDIENCE MEMBER: Yes. Thank you.

>> JULIE KEARNEY: We would love to come visit all of you. Be nice to us. (Laughing).

>> KARTIK KULKARNI: We had one more person who raised a hand. Yes.

>> AUDIENCE MEMBER: Communications engineer from Department of Civil -- the use of communication is being used --

>> KARTIK KULKARNI: Excuse me, can you direct the question to one of the presenters.

>> AUDIENCE MEMBER: For the use of balloon for communications.

>> JULIE KEARNEY: You are from where, sir? Which country?

>> AUDIENCE MEMBER: Mauritius.

>> JULIE KEARNEY: Oh, wonderful. We met your friends. A telecom engineer from the Department of civilization. My question is simple, is a use of balloon regulated? Is the use of the balloon regulated? Mauritius the use of drone is regulated.

>> JULIE KEARNEY: Right. Well, I would say I will encourage all of you not to regulate it. (Laughing).

But in terms of regulatory -- so balloons are different. We're novel and innovative, and so in terms of aviation, we follow all of the aviation protocols and in terms of having tran responders. With he do more than is required, we're not an aircraft but safety is our number one priority. We want air traffic control to know that we're there. Jennifer is welcome to speak to sort of the aviation part.

On the regulatory side, because we work with telecos we don't get our own licenses, but because we work with and use their licenses, we're operating in the e-band, so 70 to 80 gigahertz, and in the U.S. for example, we don't have regulations yet. It's an experimental license.

In Kenya, there are no e-band regulations so we have authority from them to use that band. It's a great band for this service because it's not congested.

We like light regulation. I'm not encouraging anyone to go out and make rules, but talk to us if you want to make them because we'll help you.

I hope that answers your question.

>> AUDIENCE MEMBER: Okay. Thank you.

>> KARTIK KULKARNI: Thanks. I guess there may be people who are joining remotely that have questions, so I wanted to see if there is anybody on the telecom who have questions? No? None?

>> JULIE KEARNEY: Actually, I should add that we are considered to be a haps for ITU purposed, high altitude platform station.

>> KARTIK KULKARNI: Yeah, please go ahead.

>> AUDIENCE MEMBER: Thank you very much. I have a question for Loon. Could you tell us a bit more about how you deal with other countries in -- let's say you have a country where there has been a disaster and then you have a neighboring country, and what I understand is that your coverage is wider than the coverage of the mobile operator, so how do you deal with that other country in case to prevent interference in its own network or presence in the other country as well, is there any kind of agreement in which you would need?

>> JULIE KEARNEY: Well, so we've had two instances of disaster recovery for Puerto Rico. There was no service at all, so no one to interfere with and the FCC, we worked through AT&T and T Mobile and their towers were not in good shape, so because there was -- and it's Puerto Rico, an island, and there were no interference issues there, no service, no interference, it was just us.

In terms of Peru, we were serving, I believe we also covered and you'll see from Lima, but they were lacking service as well and the coverage, Jennifer may be able to speak more to it, but there were no interference issues.

Usually in terms of disaster areas, a lot of times, for instance heaven for bid anything in Africa, but we're not usually dealing with cases of interference. We're very aware, acutely aware of any interference issues that could happen with another country's LTE service, for example, and we have not yet had any experience with that.

>> JENNIFER MILLER: But to add to that, as we do we'd talk to the different regulators in all the different countries and our balloon has four sectors that point outward, and we would as we came closer to the border turn down the service to avoid the interference at the boarder, but we would always be working with neighboring countries to make sure that we were collaborating and working together to make sure that there was no interference.

>> JULIE KEARNEY: And the way our service is engineered, we're aware of the RF interference and we know what's there. And again, it's a collaborative and cooperative effort. For the areas where we're serving, we're not looking to serve a commercial service in any populated areas. We will not be coming to Washington DC, for example, or New York. We're looking at those rural, unserved,

underserved areas and the hope is that if we have a service that extends across a boarder that we can work with that country to deliver service to those underserved areas.

Our goal too is to provide service in a way that we are complementing the existing carrier and not competing and not serving their service areas, but that once we have enough people in an unserved or underserved area, that the teleco we're working with or another says hey, you know what, if I think it's worth putting some infrastructure there, then we have done our jobs, then we can fly somewhere else.

But the goal is to bring people online to give good data to the carrier, the local carrier and decide if it's a good proposition for them to build out their own infrastructure.

>> KARTIK KULKARNI: Thank you. I think there was one more hand in the first row. I guess, yes, please.

>> AUDIENCE MEMBER: My name is zosam from CIC the telecom Regulator in Saudi Arabia. My question is to Loon. Are you going -- in your solution, you are trying to resolve the issue of disaster or you are trying to help the operators to increase the capacity? What is your objective here?

>> JULIE KEARNEY: Both.

>> JENNIFER MILLER: All of the above.

(laughter).

>> AUDIENCE MEMBER: Because the capacity and finding size, especially in crowded areas, it's very critical issue with mobile operators. Sometimes they don't have sight, sometimes renting the place of that site is very expensive for the operator, and so from what I heard from you, you are just targeting the rural area. Correct?

>> JULIE KEARNEY: We're targeting, yes, we're targeting underserved or unserved areas, but we don't want to competed with an existing MNO. We don't -- we want to supplement and complement their service. I don't think we would be very welcome if we were coming in to disrupt an already healthy market, and the goal is to two-part.

We've proven to be a very effective disaster relief operation, but we're also a very effective fill where telecos just cannot reach. So again, two-part, and maybe we'll say if there are problems with congestion, we don't want to get involved in that.

>> JENNIFER MILLER: Right. If you remember the slide that showed the cell tower and radius and the balloon being so much higher and wider, we're perfectly and uniquely to cover the areas where there isn't infrastructure already.

>> AUDIENCE MEMBER: Okay.

>> KARTIK KULKARNI: We have last few minutes, and I had a question. So you know, when we talk about this destructive technologies, most of them are in the experimental phases and

they're implemented in an ad hoc manner and one-off implementations and many are successful. But to realize the mass benefit, the mass impact potential that these technologies have, there is inevitably the need for skill. Right.

And it's just really important that, you know, we figure out what challenges exist that toward scaling these disruptive technologies, and what recommendations that we as a panel make in order to, you know, go ahead and address some of the challenges.

So I wanted a unique perspective from each of the presenters on this particular topic, and I want to begin with Kevin.

>> KEVIN ALLEN: Thank you. A big way that we're looking at scale with Call for Code with the projects that are coming out of Call for Code is through that code and response framework and taking those projects and then finding implementation partners, whether it's the public sector, or you know other private companies like ourselves that we can bring into the mix to add their expertise and add their -- to add their take on it.

The other area that we're looking at is the Open Source area, so by bringing in the power of crowd, essentially, as developers, we are opening up these technologies to get contributions, to get open governance put into place around these technology solution, and that allows us to get more, you know, more experts. And it allows us to innovate faster, at a much faster rate than we could if we were just -- you know, if it were five developers in -- you know, sitting in Silicon Valley. If we're able to open it up to the world, then we can get all different perspectives and scale that much more quickly.

>> KARTIK KULKARNI: Thank you. I wanted Kim's perspectives.

>> KIM MALLALIEU: Yes. I'm very with Kevin on that. I think that the massification is key, and a key enabler of massification is to enlist and encourage all of those publics beyond the commercial developers, so really to look at the Open Source developers and for open hardware as well as open software and to share resources, reuse code, extend code. The only caveat though is that it's very, very important to build in an intrinsic conformance and interoperability quality by design, but all of this can be massified through the sharing of resources.

>> KARTIK KULKARNI: Thanks. Did you want to add something?

>> VANESSA GRAY: In the study I presented scaling is very important, and it's very important then to bring down prices and make the applications and services available for many people. And I think I also mentioned this repository because a lot of things are happening at the moment, and a lot of the research is sort of, you know, hidden a little bit, and so I think one good way towards scaling would be to have a repository, this platform of information of what's already available, what can be done, because then we also

avoid duplication and can see how, you know, form new partnerships because sometimes it's maybe easier with similar groups or organizations or even companies could be working on similar projects but don't necessarily know about it, so I think such a platform, a repository would be very interesting and maybe even something that, you know, we can ask in this room. Is this something, you know, we different organizations should build, put together. It could be, again, open to the public to provide the kind of information that they want to add, and it could be open to anyone, so it's maybe something we could take a step further even from here. Thank you.

>> KARTIK KULKARNI: Thank you. Jennifer, did you want it add something?

>> JENNIFER MILLER: Sure. When I think of scale, I think of technological scale and to me it's all about innovation. When I joined Loon, I would have never thought that a balloon floating up in the stratosphere could provide connectivity on such a massive global scale and solve such big problems, so in my view it's all about thinking creatively, flexibly, and with innovation like Kim was saying in the slides, that's what scale is really all about, is really trying to look at problems from a unique perspective so that you can try to break down barriers and solve really large problems that no one thought you could solve, but you usually can if you think really creatively about it, so it's innovation for me.

>> KARTIK KULKARNI: Thank you. How about Julie?

>> JULIE KEARNEY: Thank you. I think in terms of scalability and tech, collaboration is key. Loon is successful because we've taken models that allow us to use other parts of the network that already exist and having collaboration with regulators, whether they're aviation authorities like our colleague here or teleco authorities, having that common goals toward delivering a service allows us to be more efficient and effective as we scale for the common good.

>> KARTIK KULKARNI: Thank you. So I think to wrap up, we had a great session where we saw diverse examples of disruptive technologies and innovations. I think we started out with a broad landscape overview of this disruptive technology landscape, you know, specifically in the disaster management area.

We saw 5G, artificial intelligence, and Big Data, drones, robotics, Internet of Things, what these technologies can, you know, do or cannot do in the context of disaster management. And we had some specific initiatives, such as the Call for Code and we had Project Loon that have really taken the -- or have pledged to take the disruptive innovation to the next level.

And we saw approaches to massification, as Kim calls it. And all of these are I think critical to make sure that the disruptive technologies see the day of light and not -- go beyond just one

particular pilot and one particular deployment to the mass benefit or the mass impact that they kind of promise.

And I think we had a good discussion around how do we scale this disruptive technologies, that the approaches ranged from that we need to build a repository. Yes, I mean, today I don't think there is one platform where we can search for the solutions. They're all kind of decentralized and fragmented, and it's really important to build this database. We have databases for everything but not for disruptive technologies, unfortunately.

And we talked about interoperability and the need for standards and protocols so that different people can build upon one another.

The sectors kind of reminds me of the situation that existed pre-wiFi era when people were deploying their ad hoc wireless communication network, but then to the extend the benefits of wireless communication networks to masses to every cell phone, there was a need for standard. That's where IEEE came and said look, there is a need to build a standard. The standard set off a frequency definition, frequency ranges, a standard set of protocols, standard set of APIs, and once the standard was put in place, hundreds of manufacturers, hundreds of device companies, technology disseminators came together and started working together.

I think such an ecosystem needs to be put in place so that disruptive technologies can scale. I think that that recommendation, we can perhaps close this panel. Thank you very much for participating in this panel. It was amazing to have you here and listen to all of the wonderful initiatives and work. And thank you all for great questions.

(Applause).

We need to vote. So there is a QR code somewhere here. So sincere request to all of you to really open it up and provide your inputs on how helpful the session was.

>> If the QR code doesn't work, just use the URL.

>> KARTIK KULKARNI: Thank you.

(coffee break).

>> Dear delegates it's time for the coffee break. Please be back spot on at 11:00. We'll start on time. Thank you.

(music).

>> Welcome back, everyone. I hope you had a good tea break and refreshing tea break. We're ready to start Session 5 Emergency communications for better preparedness. I introduce the moderator Ms. Salma Farouque, the with the world communication cluster, ETC and World Food Program, welcome to the panel and to Ms. Farouque.

>> SALMA FAROUQUE: Thank you very much. Warm welcomes to everyone, my name is Salma Farouque and it's a privilege to be here for this Forum. Specifically to this session, emergency telecommunications for better preparedness. And thank you to the

Government of Mauritius for having us here today and also to the ITU for hosting this event as well.

So the Emergency telecommunication's cluster by way of -- it's led by the World Food Program and it's a pleasure to have the chair of ETC, Enrico who we saw yesterday speaking on the panel, and as part of that network of organizations, we work together and there is a number of partners of the Global ETC in the room, Ericson, of course the ITU, Net Hope and among a number of others. We come together as last resort to provide communication services in times of emergency.

Increasingly, of course, we see and we understand the creation and the slitification of national disaster management offices of emergency telecommunication policies at a country level where countries are really taking that lead in providing communications services to support the disaster responses in their own countries.

So the ETC is actually increasing capacity to be able to support the preparedness and activities of national governments as they strengthen their capacities in those areas. By way of example from an ETC point of view, we have been -- we saw earlier on disruptive technologies and heard about drones and Big Data and all sorts of other technologies coming up. We're also increasing our capacity in the area of drones and we've been doing workshops in a number of countries where we bring together civil aviation authorities, we bring together disaster management agencies, ministries of telecommunication and other actors from the humanitarian sector to talk about drones from a coordination point of view, flying point of view, and those kind of things things and how to create regulations contextual and specific to what is needed. These are specific things that the ETC does and we've run workshops in the region as well.

I just wanted to provide that by way as a introduction.

I'd like to really introduce the speakers we have on the panel today. This session is running for one hour and we have four speakers with us on the stage. First of all, we'll have Timothy Kelly from the World Bank and he's the Lead Digital Development Specialist with the World Bank and he'll be starting to kick off the session.

Then we'll have Mr. Bevil Wooding from the Caribbean Outreach Liaison from the American Registry for Internet Numbers, and then Ken Okong'o from the GSMA and also important part of ETC and a lot of work with us.

Then finally we'll wrap up with Sathya Narayanaswamy from Viasat who is the country manager for India. Then we'll move to some questions as we come to the end.

If I could call up first Timothy to the podium to talk a little from the World Bank perspective in preparedness.

>> TIMOTHY KELLY: Thank you very much, Salma. So in the

last session, we heard a lot about new technologies, exciting things such as drones, such as artificial intelligence, such as Blockchain, et cetera, and different ways of approaching disasters and responding to situations of urgency and need.

In my presentation, I want to talk not about new technology but rather about old technology. I'll be giving five particular mini case studies of old technology in action, and when I mean old technology, I mean at least 20 years old, SMS, cell phones, mobile money, et cetera.

One of the reasons I think old tech is important because it's generally cheaper than new tech, generally much more widely available, and it's in the hands of the people we're trying to serve.

One of the reasons we're here, 1998, 21 years ago the Tempary convention was signed on emergency communications in Finland, and of course it's since become a very successful and a number of countries have signed and if your country hasn't already signed the Temporary Convention, I would urge you to do so.

And I was very happy to say that back in 1998, working at the ITU I got to work with the then Secretary General of the ITU who passed away a few years ago, but I think he would be delighted to see the legacy of what was done 21 years ago.

So old technology, there is probably no more important technology in terms of responding to disasters than cellular coverage.

Back in 1998 there were fewer than 700 million cellular subscribers or cell phones around the world and now there is 7 billion, a 10-fold increase in 21 years. But globally, there is still around about 400 million people that lack access to any kind of cell signal.

Now in the presentation from the Loon that we heard before the coffee break, that's one approach to extending access, but in the long term those people need to be within a cellular signal so I'm going to be talking about what the World Bank Group and other development partners are doing to extend cell coverage to those 400 million people.

It's relationship to emergency preparedness is that cellular signals obviously give you the ability to make and receive phone calls as well as make and receive SMS or mobile money payments.

So we've been working in a variety of countries using a mixture of universal service funds and funds from other developmental partners to expand cell networks and I'm going to talk about two particular cases in Tanzania and Negar where we've been doing that, we managed to bring cell coverage to 2.5 million people for the first time. 2.5 million dollars in funding from the World Bank Group and also the local universal service fund in Tanzania and that mobilized 700 million -- or I'm sorry, 70 million dollars from the private sector and so a ratio of 30 to 70, and we did it through a mechanism

of reverse subsidy auctions to attract private sector investment in a competitive manner.

We're now extending that to the smart villages program in Negar where we're aiming to cover around 700 villages in the one of the poorest countries in Africa with west lowest levels of cell phone penetration.

A second case study is mobile money, and again mobile money has been around for almost 20 years and began as just a way of transferring credit, air time credit from one user to another, and in many countries that we work in such as South Sudan that's still the main form of mobile money, but obviously starting in places like Kenya and Tanzania, mobile money is much more sophisticated.

Now, it's important for emergency preparedness because you need to be able to send and receivele money, funds, remittances in times of emergency. It builds up resilience, it helps locals to be able to prepare and respond, and it also helps with things like saving.

So one of the responses that the World Bank Group has been working with is cash-based payments, and we've been working in particular in Somalia where the multi-partner fund has been conducting research on mobile money usage in vulnerable communities as a way of helping both government and humanitarian organizations, and we're working particularly in concern to use mobile money for cash-based payments. Very happy to see the Director General of the Regulatory Agency of Somalia in the audience with us.

What we found in Somalia is that it's used by about 72% of the adult population, which is a huge number. The usage of mobile money in a country like Somalia is much higher even than in my own country, the United Kingdom.

And among the users that we mentioned, a lot of them mention issues like convenience, low transaction costs, but it's also about increasing resilience in times of hardship.

Somalia because of climate change is very much affected by drought, affected by floods, but equally many of Somalia citizens are nomatic and internally displaced and mobile money can play a critical way. So having a safe and security trusted system of mobile money is one of the best forms of preparedness for emergencies.

A third case study, again, using a very well trusted technology is meteorological hydrological data collection. I hope you've seen the hydroweather data session outside the meeting room. It consists of a coconut on a string, and it's very good for telling what the actual weather is like, but it's not very good at forecasting and not very good at disseminating the data, but it's pretty accurate for what it does.

And we've been working with organizations across Africa with development partners to provide timely and accurate hydromatter

data so organizations can help prepare for emergencies in. Case study yesterday from the Caribbean, we heard a lot about how much more you can do with a six-hour lead time to prepare for an emergency compared with say a lead time of just minutes.

And so our response here is based on technical cooperation, on developing automated hydromat station that can broadcast the data or send and receive the data with very limited manual intervention.

And we're working on the Africa hydromat program with a number of partners that you'll see in this slide.

The fourth case study of how we can use this old technology for emergency preparedness is looking at the actual signals that are broadcast from the cell towers. The signal attenuation, in other words, how the signal grows or diminishes according to the weather situation, in particular heavy rain, tells you a lot about realtime data about what is the situation of a particular storm that's developing or brewing in a particular country.

And the importance of realtime data is that it enables you to track how that storm develops geographically over the territory of a country.

So we've been working in particular in Mali and also in Bacina Faso and using signal attenuation for flood coding, and we've been using the rain cell application as a way of understanding what is realtime data on the development of storms across the country.

And then finally, and last case study, back to Somalia again, we're working on understanding how digital technologies are being used for early warning systems together with the multipartner fund, we worked with a company called Alti to conduct a household survey among vulnerable communities and we conducted groups with service partners and NGOs to better understand the potential of early warning systems.

What we've found is at the moment despite the very widespread usage of cell phones in Somalia, only one out of about five or six different early warning systems is currently using mobile phones to collect and disseminate data, and that was for flood warnings, and so we argued that there were a number of different ways in which we can use technology in a more sophisticated way and in the report, which will be published shortly, we have a number of recommendations on what could be done to improve early warning systems in Somalia.

So in summary, let's not be obsessed with new technology. Let's think about old technology as well and how we can improve the usefulness of old technology, how we can extend cell phone coverage to all the world's inhabitants, that by the way as colleagues from ITU, and that was very much the mandate of ITU, and how we can think about creative ways about using the technologies that we have available for emergency preparedness solutions. Thank you.

>> SALMA FAROUQUE: Thank you. Thank you, Timothy.

(Applause).

We'll now move to Bevil. Bevil, thank you for taking the stage.

>> BEVIL WOODING: Thank you very much. Good afternoon and good morning, everyone. I'll be presenting the view from the American Rej industry for Internet numbers, one of five in the world, and I'll also talk as stand point as role for Caribbean network operator's group which is a voluntary network of network and systems administrators that function out of the Caribbean region.

And we had a very interesting experience over the past few years coming in the aftermath of the 2017 hurricane season, which I want to draw upon in this presentation to you.

That ARIN region includes, Canada and United States as most people are aware of but also several Caribbean territories and my role involves working with those territories to ensure that they have the same facilities and number of resources that you would find in other regions.

This map shows you the other regional Internet registries, and all of the RIRs do more or less the same thing, manage the distribution of resources, provide DNS and who is directory services, but one of the most relevant rule of the RIR that we want to focus on this morning is a rule of supporting Internet infrastructure through technical coordination, and that's where ARIN took a very, very deliberate role in supporting the Caribbean Region following the aftermath of the 2017 hurricane season.

One of the ways that we did that was to participate in the Caribbean Communications Resilience Commission, which you would have heard about yesterday in the Caribbean case study that came up.

And part of that rule in examining what went wrong and what could be done to improve the resilience of the region, led us to developing a series of programs and initiatives that I want to share with you.

So ARIN put a particular focus on Caribbean network resilience and the reason for this is simple. We recognized that in the destruction and devastation that followed the hurricane season, when you put the spotlight or magnifying class on the state of the networks there was a rule for the major telecom providers that everyone looked at but also unfulfilled by smaller networks that could have provided a backup or ancillary support for communication services in most of the territories. And in looking at that missing links in terms of what is the nature of the networks around the region, I recognized several things.

One, in spite of the increase in use of network-based services and in spite of the increasing dependence on the Internet as not just a provider for economic transactions and so on, but also as a social empowerment platform. There was not sufficient attention being paid to the resources behind the network.

In other words, the technical community response known for actually securing and administering the network services won't get the kind of attention capacity building focus or education outreach that we felt could have helped mitigate some of the more disastrous aspects of the storms.

So we put this spotlight on technical capacity building, looking at those who run and administer the networks, how they secure the networks, what do they know of or what do they understand in terms of network administration best practices?

We also looked at the issue of strengthening the network infrastructure resilience, working not just with the major provides, but also working with the regulators and working with the private sector and Civil Society communities to ensure that network build-outs were being done in an appropriate way.

And of course, working with organizations like the CTU, Caribbean Telecommunications Union to strengthen and improve disaster mitigation and response and planning and capability. This became the focus of ARIN's efforts and focus of outreach in the Caribbean in the last two years. In site of that outreach and as part of the research with the survey done by the Commission to Communication Resilience, we found these things, inadequate coordination, for overoftenning entity with power. When you say the Caribbean entities need to be strengthened, there is no one place to go to and focus the attention in terms of helping or supporting that strengthening.

More robust telecoms, infrastructure needed and you heard that yesterday inside of case study on greater disaster capability management.

So ARIN had it work out its part in support something and responding to the identified areas or gaps, and what we did was established three -- established something called the ARIN Caribbean Forum, a unique structure within ARIN three mainstreams, one dealing with the technical community support and that involved collaborating very specifically with the Caribbean Network Operator's Group to help bring awareness to some of the best practices in network design and network administration.

Part of that work with the technical community group involves the establishment of a Caribbean Emerging Network Startup Program which will actually then encourage the proliferation of more autonomous networks within the Caribbean region. This is getting -- how to get an autonomous system number, how to set up basic routes and connections and pairing arrangements with major provides and others and getting those technical skills done.

I also involved looking at issues of Internet protocol Version 6IPV6 adoption and increased across the region.

We also established a public policy group which is done in collaboration with the Caribbean Telecommunications Union and that

group is looking at the policies across the region as it relates to network development, Internet usage, and Internet resilience as part of our support for the region.

And then finally, the sector group looking at the issues of law enforcement and public safety agency collaboration and cybersecurity. And this was part of our response to it. And this is not happening in a vacuum. While ARIN regional and net registry has a very specific focus on the Internet and number resource utilization, we understand that the numbers are being assigned for a reason, and the reason is for building out the Internet and the Caribbean, and the Caribbean Internet is being built out because there are economic, social, and development imperatives that have to be supported.

So ARIN has deepened relationships with the Caribbean Internet Governance Forum, the CTU, Caribbean Pairing Forum and other organizations within the Internet global community as part of this outreach.

And the objective is very simple. We want to make sure that the region is never ever again in a position where it has neither the resources nor technical infrastructure needed to respond in what is expecting to be an increase canning and even more damaging climate-related incidents coming in the future.

And this is our contribution to that, and it's a contribution that we're taking very seriously as part of our securing of the Internet in the Caribbean space. But it's also part of our commitment to human resource development, knowing that the region needs to have indigenous capacity to support growing use and dependence on the Internet as a platform for growth and development. Thank you.

(Applause).

>> SALMA FAROUQUE: Thank you. Thank you. Now to Ken from the GSMA. Thanks, Ken.

>> KEN OKONG'O: Morning, everyone. Yes, welcome to this presentation about GSMA. And I want to first of all thank Mauritius. I want to thank ITU for having invited us to this global forum on emergency telecommunications so that we can showcase what we do for the mobile -- in the mobile industry in this place of emergency telecommunication.

First of all, let me just -- someone asked just where I was sitting, what is GSMA? Yeah. GSMA is a global mobile industry association, a number of members across the world, 800 mobile operators and over 300 technology providers in the space of mobile ecosystem and we do a number of things in our non-profit which is the foundation and that's where mobile for development sits and in the mobile for development, we have a program called Mobile for Humanitarian Innovation and that is where we do -- we touch on issues on emergency telecommunication.

And one thing that we've got to recognize and one thing that we've seen is that disasters occur in, and they change in complexity, they're not the same all over,.

And still within that space, we see there are the role of the regulator, the role of the government, and the role of the mobile operators who are our members and those are the areas of focus that I want us to touch on and then I'll also go to the mobile humanitarian connectivity charter that I mentioned earlier.

You can see the quotations from the United Nations from mobile operators and even from humanitarian agencies, still looking at this it puts -- it puts into context the role of the regulator, the role of the government, and the role of mobile operators.

You can see what, for example, the regulator says about the role of mobile telecommunication and emergency telecommunication. It's a vital part and it's vital in humanitarian response which follows.

And therefore, in this we look at the role of this to actors in the context of national emergency telecommunication and these are some of the issues that we've come up with that we feel that when doing a national emergency telecommunication plan, we need to identify first of all, the government needs to identify first of all, the required or relevant agencies that can help or are involved in disaster management.

And in this place, we also encourage regulators to encourage operators to develop business continuity management practices, which I'll explain further.

In this also, we also encourage regulators in our work that they facilitate operators in establishing early warning systems, and with this also trending, it's also relevant because you cannot overlook trending, and in trending we try also to encourage regulators to come out with trending initiatives for various players in this space.

And therefore, you may have had over the last few days that we've been here, that the mobile telecommunication systems are not really designed for these critical missions and sometimes they've got to be changing regulations to satisfy the needs of the time in times of disasters, and even collaboration has been mentioned and I'll explain it further.

And these are some of the practices that we've seen among our members and one of the innovative practices that we see, for example, in Turkey for turk Stan, these are issues that we took for granted with you Turkey, or Turkistan, for example, vets the suppliers so there is not any failure in supplying relevant equipment or relevant products or services that are needed during an emergency.

Nepal, for example after the earthquake or tsunamis that they had position portable base station, like the ones on the wheels on the right-hand side, so that they can come or come in handy in the

time in a disaster.

And then in the Middle East has also equipped senior management with satellite phones just in case there is a disaster and mobile services go down.

In Japan, you can see entity and KTDI, they build station in excess of required standards just so they could withstand the pressures associated or pressures that they experienced during disasters, and through all of this we still see the role of mobile operators, and we keep asking the mobile operators that they also create enabling policy environments so that operators -- so the role of regulators so that operators can get a conducive environment so that they innovate in this direction.

I want to talk about early warning system briefly, and this has been mentioned in the past, and those are some of the advantages that we have for using the cell broadcast service that has been defined earlier and the SMS as a form of early warning system.

But one thing that I want to underscore about the cell broadcast system is that in as much as it's what we see as the commonest practice among our members in as a form of early warning system, there is also the underside of it because once you send an SMS to someone or a text message or to someone stressed, you might also want to respond and this is a one-way -- this is a one-way communication that the receiver cannot actually return any response and that's why we talk about SMSs.

Though, SMSs also got their downsides, but we say that it's possible for one to respond using an SMS so that you also get to know the situation that this person was distressed is in.

And we definitely set an industry standards and guidelines when using SMSs. For example, we ask fundamental questions when doing such guidelines, like does the operations or does the responder have the capacity to process incoming responses while using SMSs?

And these standards all come in form of capacity-building trendings that we offer to policymakers and regulators across the world at their own cost, so policymaker who is interested can also contact us.

These are some of the early warning systems and services that we see among operators, for example in the Philippines. Philippines is one country that experiences an average of 20 major storms in a year, and so the government, for example, and mobile network operators work hand in hand. In 2017, the maps communications and the globe telecom in India sent around or close to 260 million alerts to communities that are living in places of high risk in of tsunamis.

In the Maldives, for example there is also that also works on similar issues and this happened when -- this is where the SMS helpline that they had was to be used as a water helpline when the

fire broke out in the Maldives water company, and South Africa, for example, it's also the (?), one of our grantees that and this is a sensor-based system for actually communities that live in areas that are common with shack fires in South Africa.

There is also another foundation, also one of has records to monitor population flows before and after disasters and it's something that they seek to do in Haiti and Nepal.

You can see, I just want to underscore one area and that's about partnerships -- not innovative policies that regulators can work on, and then this is also facilitating the cost domes and even the relief workers or the relief staff or ones that get in during an emergency. These they can do with coordination with government arms that are involved in this preparedness.

Example of innovative policies, let me just mention one, and this is the case of the Philippines Financial Regulator. This is what has been not been mentioned but it has the aspect of the digital identity. This is after the government relaxed normal customer requirements for actually people who lost their IDs and wanted to access it, must have been coming in term of form of mobile money. You can see also Turkey the same has also relaxed some -- Turkey also relaxed some requirements to deal with privacy laws so that they could also use their technology or mobile platform to locate the people who are missing.

This is the summary of the GSMA humanitarian connectivity charter that has been developed after years of intensive consultation, and summary which was presented earlier, but one thing I want to underscore about the partnership of the examples already running is this very common, right around here running in my country, Kenya, a long-standing partnership that has also helped Red Cross in delivering humanitarian services.

Also Refu night, operators, humanitarian agencies and the government and even technology providers, and Ericson in this case it is used to look at what is missing and the loud ones. As of last year, I wanted around 1 million refugees registered on this platform, and around 40,000 refugees already located or gotten in touch with with missing loved ones.

Yes, this is one of the trends just before and so I'll just keep it. Yes. Thank you. That's what we do for the mobile industry.

(Applause).

>> SALMA FAROUQUE: Thank you, Sathya.

>> Good morning. Thank you to Doreen and her team and the ITU for this opportunity and also for Mauritius for being excellent hosts. My name is Sathya, and I represent Viasat. We are a satellite broadband provider and I'm here to talk not just about satellite, but also not just about Viasat but also the general role of the satellite industry that it can play in this or as part of

this process.

Quick introduction, so you have some background on where I'm coming from. We basically look at broadband as a platform, right. In our view, having broadband everywhere makes it easy for people to plan, makes it easy for people to build capacity, makes it easy to respond, and all of those things that we see as connecting people being critical to developing plans for emergency and disasters.

Quick word on us. We provide connectivity and coverage today in many parts of the world, primarily in North America and Western Europe, in the Caribbean, and we're also operating in partnership in Brazil, but also operating in partnerships in Australia and with our Viasat 1 and 2 satellites, and then eventually we're building the next generation of satellites which will provide connectivity all over the world.

The idea here is with the reach of satellite and amount of capacity we can provide broadband becomes easily available even to the billions who remain unconnected with existing terrestrial or mobile technologies.

So if you look at it, I think a lot of what I'm going to focus on is talking about unconnected communities and how we connect them to affordable broadband so that they can be part of, and they can be enabled as part of this process.

Two things that I wanted to focus on in terms of messages. If I wanted, whenever I talk to people here they tell me, oh, satellite, it's old, it's slow, and it's expensive. Right.

Well, what I wanted to tell you is that none of those things is true. This is not your grandparent's satellite broadband. Yeah. We're not old. Technology is moving really fast and just because you heard of satellite for the last 40 years doesn't mean it's the same satellite that flew in 1970s flying again in 2010, so that's number one. Okay.

Number two, it is not slow. Today we have connections that can deliver 100 mega bits per second to users, all right, 100 megabits per second, that's number two.

The third most important when people tell me it's expensive, we're working on fixing that and we're fixing that in many parts of the world. Here is an example.

This is what's going on in Mexico, right. We talked a lot about low income communities, and these are basically community WiFi systems that are being set up in these low-income communities in Mexico and we're also doing this in other parts of the world in Brazil and other developing countries where they have no other option for connectivity. These are WiFi meshes being set up, connected through satellite terminals and now we're in over 2,000 communities, expanding fast, with over a million people that are going to get covered.

And for people who tell us that this is expensive, here is

the answer. These are low-income communities and there is WiFi and broadband is really affordable to them.

But it also -- so part of making this WiFi and broadband affordable is that it enables a lot of the other interesting things that have been talked about. We talked about sensors, we talked about capacity building, we talked about network resilience, right, making mobile money available, and all of these things become a reality before the disaster strikes, too. Right. Vastly increasing preparedness because availability of broadband is really one of the direct linear components for driving this capacity building.

This is an interesting picture that says this lady was captured on video saying we actually thought of moving out of this community because we did not have Internet. Right.

But the way it's set up is if you look at the resilience of the infrastructure and this is what I wanted to point out also, is the way satellite networks are constructed, we have the satellite terminals on the side of a building. Right., and it's easy to set them up, get them pointed, and they're connected to a WiFi mesh.

The beauty of the way the networks are set up is that the large gateways that connect all the terminals together via the satellite are actually in other parts of the country or other parts of the world in less disaster-prone areas, so you eliminated about 50% of your risk due to some of these disasters that could happen.

So when the disaster comes through, blows through, even if some of these go down, it's easy to set them back up. Right. For example, Ken had a slide that talked about cell on wheel, which was actually a satellite terminal being connected to -- or providing connectivity to a mobile network, right. So this is all about the ability to satellite to come in and enable a lot of other technologies, also, in terms of areas in times of emergency.

Just a zoomed out view of what the world looks like once you connect.

So what's going on, what are some of the other interesting use cases we're seeing and what are we doing? We saw a presentation about disaster maps yesterday. We are actually doing Mobile World Congress we announced we're collaborating with Facebook as part of driving this community WiFi effort where we're going to be working together to find communities that are disadvantaged, right. It's a similar effort to what was talked about during disasters, to find communities that are unconnected after the disaster, but this is also about finding communities unconnected before disasters, right. How to get broadband to them faster, and to be able to quickly roll out broadband-based services to these communities.

Another example that's going on is around telemedicine. Today we're trialing a number of pilots where we're enabling video conferencing in the ambulances which are bringing people across.

We all know that responsiveness after disaster when there is medical attention required is extremely important. We're actually trialing these as hybrid systems where there is both cellular and satellite available in the ambulances. You can go in and be able to bring in patients into the nearest medical care centers, but the consultation and the emergency response is already prepared when the ambulance is already on the way, bringing those who are suffering to these centers.

I think I'm going to briefly mention this slide, but I think our next event is really going to be around this, around Brazil, so she's going to spend, Patricia is going to spend about 30 minutes on this.

I wanted to point out one thing the satellite terminal on the top is actually sitting on top of a cable reel, right. So when this happened, we had to quickly go out of that and to be able to find anything that looks like it's fixed on the ground, concrete blocks, cable reels, whatever it is set terminals up, get connectivity going, dozens of terminals up and being able to provide broadband quickly, and so this is an example of having thought about a good partnership, looking at satellite communications as being part of the disaster planning made a big difference around, you know, it was good to see us being part of this and being able to provide some of these services that the first responders needed.

Another example, basically we've talked about many examples, Puerto Rico was another example. This was a picture that I could really relate to because I live in India and we had a hurricane pass through about a year and a half ago and this is what my street looked like, except for the fact I didn't have one of those terminals, right.

And you know, trees across the street, being able to provide first responders support was really what this was about.

And last, not just about connectivity, but another application for satellites is really around imaging, right. This is an example of a refugee camp on the Bangladesh boarder, right, where we're able to use imaging to find out what's going on with activities, is the camp expanding, is the camp reducing, are we seeing enough resources being available to address these crises, and so satellite imaging is another application that can actually help build capacity and to be able to respond better to some of these crises.

The last thing I wanted to talk about was really a call to action, right. And I'm going to say this conference was a good -- it was a good learning for me because I actually went and read through the Sustainable Development Goals in great detail.

And one of the -- some of the really that resonated with me in a sense that it was not just about disasters, but also talked about things like economic shocks and sustainability and having

communities where you can build and you know you have jobs and things like that, and we really see broadband as a platform to do that, right. Whether it's supporting jobs, whether it's providing opportunity, whether preventing people from migrating always into cities which exacerbates disasters, so all of these making broadband available is a critical part to us.

So what we're looking for or our recommendations to policymakers is really about saying, let's ensure that the not old, not slow, not expensive, new, fast, inexpensive satellite broadband is part of the planning process, is part of emergency planning and preparedness. We are a lot less susceptible to damage from terrestrial infrastructure, and I think that being part of the resiliency solution we could be really helpful. And part of the policies to think about is to look at, you know, whether it's policies supporting spectrum for satellite, which continues to be an important part of it. Rapid licensing and permissions, like my colleague also talked about, being flexible and being able to provide access to markets. And inclusion and planning I think will really make a difference in making us part of the disaster preparedness and also the post-disaster recovery scenarios. Thank you very much for the opportunity.

(Applause).

>> SALMA FAROUQUE: Thank you, Sathya, for wrapping it up there with the talks.

I'd now like to open it up to the floor for questions and also invite remote participants who may have a question to also jump in. Could I have a raise of hands for anybody who has a question?

Is it possible to just have a little bit of an understanding of how to make or join from a remote point of view to ask a question? No remote questions at this stage. Okay.

So though no questions from the audience anyone? Yes, we do have a question in the back there. Thank you. I'm sorry, there is a microphone if you press the button and speak into the microphone. Thank you.

>> AUDIENCE MEMBER: Yeah communications engineer from the Department of civilization of Mauritius.

Okay, we have talked about disruptive technologies, all technologies, okay. While here, I would like to point out that we should not forget about PSDN a public switched communications network and we talk of tell phone exchanges and these still exist and they're still being used for communications. So what about the future for PSDN? Thank you.

>> SALMA FAROUQUE: Thank you. I'm wondering if I could put the question to Timothy who talked a little around old technologies and you know the penetration of fixed line phone usage in today's context and sort of rampant use of mobile technologies, could you take that question?

>> TIMOTHY KELLY: I went 21 years back in my use of old technology, but we can go a lot further back than that. And of course the Public Switch Telephone Network is the core still of most of the Internet usage as well as of fixed line telephone use, and so certainly there is a role for that. Most emergency 911 services in most of our countries still use the PSDN and one of the big advantages is it provides its own power source so even when the power is down your phone often works which isn't the case with Skype and the like.

>> SALMA FAROUQUE: That's very true. And perhaps, Ken, also you mentioned around the 800 operators that are members of the GSMA, but I'm sure that many of them are both mobile network operators but at the same time they're still operating fixed-line networks as well.

>> KEN OKONG'O: Thank you. That's a good question, but we are in the mobile industry sector. Our members are full members are mobile providers and so fixed line providers would be as -- members.

>> SALMA FAROUQUE: Thank you. Joe from the U.S. Department of State.

>> AUDIENCE MEMBER: Hi. Thank you, Salma. As I look at this panel of a number of stakeholders and considering -- I was just considering your relationships with the communication's officials you deal with, and I was curious just about in your collaboration -- in your collaborations or your stakeholder engagement, are interest any particular key lessons learned that over the years that you've worked in this that you might have accumulated?

>> SALMA FAROUQUE: Perhaps I can take that question a little bit as well, Joe. I'm sorry to hog the floor. But from the perspective of the cluster and the global ETC who are a network of organizations, more and more we see when we work at the country level with the disaster management offices, the establishment of a sector-based system or a working group-based system where different sectors are represented from a disaster management point of view, and it's increasingly obviously included emergency telecommunications.

I think it came through in quite a lot of the talks we had today, the concept of coordination and making sure that the conversation is not just led by the regulator where everyone is looking at one organization to say where are the satellite phones and vits and everything else because it's not the responsibility of a single entity. Perhaps it's the responsibility of a single entity to convene and bring the parties together, but at the end of the day it's the contribution of all of those parties, and so I think that the lesson learned is that often at the table, it's just -- it's not -- there is not enough participation from the

stakeholders that need to come together to provide that support, and I think perhaps mentioned in the context of the Atlantic hurricane season, participating in coordination meetings and not feelings the stakeholders were there at the table and contributing to putting services back up, not wanting to put words into her mouth, but that's perhaps one of the challenges and it's just recognizing that that responsibility exists across the board from the private sector, government sectors, regulators, Civil Society, et cetera, so perhaps that's one element there and one of the key focus areas of the ETC in terms of bringing people around the table.

I'm not sure, I'm looking at you because you have your microphone, Sathya.

>> SATHYA NARAYANASWAMY: Happy to add to that because we have a couple of regulators here that we work with on a regular basis and many across multiple countries.

I think one of the key lessons is that this is really an approach, and I'm speaking from the technology angle, that it requires a lot of different technologies to come into play. Today we talked about, you know, the presenters were talking about radio, high-frequency radio and so on, and so I think the key here is if you think about it from my engineer perspective or mathematical perspective, the event might be low probability in many cases but the consequences are so extreme that you really have to look at what are all the things that you can do to prepare for a disaster, and that means being able to include a lot of different options and not excluding any one of them because many, many options exist and in different parts of different countries, different options could work better, and so from a policy perspective, I'd say that it's important for policymakers to look at not just one technology or two technologies, but also to look at what are all the different avenues, different options that are available and to ensure that there is a framework that exists to support them, and not have to, you know, scramble in the last minute when there is a disaster.

Enabling those things is very, very important, and I think something like that part of what Bevil is trying to do there and I think that's what he emphasized.

>> SALMA FAROUQUE: Could I say before Bevil jumps in, could I ask from the interpreter in the back if we could have an extra 10 minutes. Would that be acceptable? We have a, yes, thank you, Bevil.

>> BEVIL WOODING: I wanted to add to that because I think it's a very good question that puts a spotlight on the importance of cross-sectoral collaboration for effective emergency planning and response.

One of the things that we've found is that typically the planning that was taking place was taking place as you heard yesterday in silos, and on the after-side of the disaster you

recognize there are many players and not just technology players and not just infrastructural players, but all need to work together to have an effective response.

So part of what we're doing with the ARIN Caribbean Forum which is a model that can be applied in any jurisdiction, is making sure that there are -- that there is a consensual ongoing conversation between players from the finance sector because money distribution of ATM uptime and stuff, that was part of the response requirement, you have the infrastructure side where there were limited technical resources available to help restore networks. We are making sure that they're part of the equation and effective investment is going into the technical capacity building, but then there is the policy side and regulatory oversight dimension as well where all of those players need to be having the same conversation about the issue of preparedness and response capability planning.

And that's what the Forum is designed to do and I know there are many institutions that have to drill into details that are sector specific, but what we're trying to ensure is that there is this ongoing group-wide conversation where everyone at least knows that this is what the person beside me is working on or considering as I develop my own plans within my own sector.

>> Just to add on that point, referring to relationships with regulators, it is very important to go back to the Temporary Convention dated from 1998 because it is a legal document and in at least 50 countries that have ratified it, and when disaster strikes, there is nothing better than having a law in place that allows you, for instance, to bypass some of the restrictions on the import of telecom or satellite equipment.

And while there are other sort of agreements such as the humanitarian convention in place, nothing replaces a law, and so I would urge our colleagues from the ITU to consider revisiting the Temporary Convention because I think we've had a number of very good suggestions as to new things that could be added to the Convention and I think you referred to the case in Japan where cell operators were allowed to increase the cell power from cell towers in areas of emergency, and we also heard about importing or using different parts of the spectrum in different times of emergency, and so you know let's go back to our history books and dig out the Temporary Convention and make it relevant for today. Thanks.

>> Thank you. Let me add on to that about partnerships and collaborations and this is the very basis of GSMA humanitarian connectivity chapter because it's about partnership. How the actors can also assist industry in emergency preparedness, and we also draw this from the Sendai Framework where we're talking to governments, we're asking governments, by at the end of the day the coordination of the international government sits in their province, and therefore they've got to make it multi-sectoral and

all-inclusive. Thank you.

>> SALMA FAROUQUE: Thank you very much. I think our time is coming closer to a close, so can I just ask if there is one last question? Yes? There is a microphone behind you. Yep.

>> AUDIENCE MEMBER: Thank you very much. My name is the Telecom Regulatory Authority of India. I just have a suggestion and not a question. You know the mobile payment issue came up today. It came up yesterday also. I just wanted to share that, you know, the mobile payments so far generally have been, you know, the same operator.

You know, if you are a customer of Operator 1 you can transfer money to Operator 1 customer only, and so there is no interoperability in that system, and that becomes a real, real constraint.

Just wanted to share India's experience about 1.5 year's back we came up with a interface specification and we just prescribed the APIs, we just prescribed as to how and what is the protocol for transferring money from let's say Mobile operator 1 to Mobile Operator 2, and anybody, in fact any bank to any bank, put it this way. We don't have the concept of mobile operator doing banking, but they can get a payment bank licenses, certainly, and many of them have got.

So we just prescribed that protocol, and that protocol has absolutely opened and there is nothing secret about it. Once you have that protocol in place, the operator or the payment bank people, which are many of them are mobile operators themselves, they have now put up applications, so now it is from within any bank to any bank, and any application to any application, and that's the way it operates.

And today we have 1 billion mobile transactions, this up PI transactions per month. Imagine this has crossed all the debit and credit card transactions in the country, more than double, you know, the total number of debit and credit card is much, much less an the UPI.

So what I wanted to say is this is something that could be utilized anywhere else in the world and you just have to put from today the bigger players like Google Play and the apps, all of these bigger players also have applications on the same UPI platform and that makes every application interoperable and that you get the skill, you not only get the skill, but you also get the convenience.

So I say that's something which I just wanted to share with you and of course UPI is available, you know, you can go to the website and you can just see what the specifications are and you can just start doing it in your own country. Thank you.

>> SALMA FAROUQUE: Thank you for the observation and it almost reminds me of the time when number portability became about and gave everyone a lot of flexibility to not be locked to a

particular operator, and that's really good and perhaps we can share more as output of this workshop.

Perhaps there we may start with closing, but just before we do I just perhaps would like to do a little summary of what we've heard as we wrap up.

So from Timothy, we heard about 5K study, but I think the key piece that was coming out of there was not so much the focus on new technologies but the focus on old technologies going back 21 years I think it was. And I think that's a real sort of shining light on appropriateness, and I think that's come up a few times during the last couple of days, around the appropriateness of technologies. We all represent many different countries in the room here, and perhaps the level of advanced technologies at differing levels.

And it actually remind me in terms of a small anecdote, when I was some time back a couple of years ago at a workshop, and we were talking about technologies and early warning, and the Minister of the Church said I offer all of my churches to ring the bells when an early warning needs to be communicated to the people.

And so it's as easy as perhaps ringing the bell, but having a process behind that, or sending the message but having a process behind that, so it doesn't -- so the whole spectrum there needs to be considered as we move ahead, so I thank you for that.

And Bevil, I think really focused on three points and really highlighted coordination, which I think we touched on in these questions, but also the resilience of networks and there is a general assumption as all of us are using the Internet and accessing the WiFi that the Internet just works, but it doesn't just work, but it actually takes a lot of infrastructure that sits behind it, and so those kind of things I think in the work that you're doing is fantastic to try and strengthen that in the Caribbean.

We then obviously had had Ken speaking from GSMA perspective, and the work that GSMA doing with the mobile network operators of which there are hundreds of members, one around the humanitarian connectivity charter, which I think enshrines fundamental principles of sharing information and working together, which I hope as output of here we share the principles of the GSMA humanitarian connectivity charter to those who are not aware of the details of it.

But also, sort of highlighting the point around two-way communication, and an early warning system is very one way, but what about when people need to talk about, and how do we enable that mechanism to happen as part of those communication systems?

And also, that point around business continuity planning, and I think GSMA may have some guidance around establishment of business continuity planning, and so that process of it being dynamic and business continuity planning, once you have it you keep on testing it, does it still work.

And then we'll close it up with Sathya who talked about broadband satellites and opportunities of satellites across all of the range of the sustainability and development goals and so not just in disaster context but also social impacts of enabling communities in remote places through perhaps the use of broadband satellite technologies, and then also but we heard earlier from Loon, and the ability of using new technologies to connect underserved populations.

So I think there are so many technologies and systems and opportunities that we've discussed today, which is wonderful, and I just wanted to thank all of the speakers that we had on the stage today for the contributions and look forward to further discussion on preparedness as we move ahead. So thank you very much.

As we close, I think I should just mention a couple of things. One was that we have a side event straight after this session, which is from the Brazilian National Telecommunications Agency and I think they'll be giving a half-hour presentation and I don't believe we'll be having any interpretation in the next session.

So thank you very much.

The other thing I would like to mention is the very important voting app. If we could, if everyone could just provide some feedback on the session that we've had today. So thank you and that will bring it to a close.

(Applause).

(session completed at 2:08 a.m. CST)

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Lunch is being offered to the ICT to all delegates at 12:30 and the vouchers will be distributed out the side doors by the left there. Thank you.