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3RD GLOBAL FORUM ON EMERGENCY TELECOMMUNICATIONS (GET-19)  
INNOVATING TOGETHER TO SAVE LIVES: USING TECHNOLOGIES IN  
DISASTER MANAGEMENT  
SESSION 2: HIGH LEVEL DEBATE: INFORMATION AND COMMUNICATION  
TECHNOLOGIES FOR SAVING LIVES - LESSONS FROM THE CARIBBEAN, A  
CASE STUDY  
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>> MODERATOR: Good afternoon. So welcome to session 2 "High Level Debate: Information and communication technologies for saving lives, lessons from the Caribbean, a case study."

A special welcome to our remote participants but thank you all for joining us.

As we were reminded this morning, there is little we can do to mitigate disasters, however, there's a considerable amount that we can do to mitigate the impact of these disasters. Even for the most vulnerable people and for the most vulnerable countries.

This afternoon's panel will draw on the experience of a sample of least developed countries, and small island developing states. SIDS in the Caribbean. We welcome in particular the lessons learned from the devastating impacts from hurricanes Irma and Maria that hit several of our countries in 2017.

In this session, we will set out to identify key lessons learned from Irma and Maria, and best practices that we can carry on, replicate and improve going forward.

We are honored today to be joined by an illustrious panel of Caribbean ICANNs, Ms. Bernadette Lewis, the Secretary General of the Caribbean Telecommunications Union. Nikima Royer CEO of Digicel, Dominica and Dr. Damian Barker and Dr. David Farrell, principal of the Caribbean institute for meteorology and hydrology.

You will find their bios in the conference program. Our panelists were all invitees at an emergency telecommunications forum held in Dominica four months ago. We had a declaration on ICT for resilience in the Caribbean.

Among the recommendations were that the ITU provide assistance to Caribbean countries to develop and implement a standard national emergency telecommunications plan and associated instruments. The ITU also hosts in conjunction with the CTU national and regional workshops for stakeholders involved in disaster management and in the provision of telecommunications and ICT resources, to discuss and localize the standard national emergency telecommunications plan in each of our countries.

Finally, the forum, through its Parish Hall declaration recommended that the ITU explore in collaboration with local and regional counter parts additional innovative ways and initiatives to assist Caribbean countries to more effectively and efficiently use ICTs for vulnerability mapping, monitoring, detecting, predicting, warning, and responding in relation to

disasters.

The forum also set out in its declaration specific recommendations for various local and regional stakeholders.

Today, we will hear the perspectives of key representatives of those stakeholder groups. We will cover different sectors, hydrometeorology. I always have a little difficulty with that one, disaster management, telecommunications. We will hear from regional, as well as national organizations represented on our panel, and we will hear from the public as well as the private sectors. Again, on our panel.

As we begin, I would like to remind you to anticipate your poll, which will come at the end of our session. Remember our polling app.

So let us kick off the session with Dr. Farrell, principal of CIMH, the Caribbean institute for met and hydrology. David, you recall that the Parish Hall, that all stakeholders assist in disasters. Through their capabilities, capacities, resources and mandates. It is for this reason that I remind you of the devastating hydrometeorological events Irma and Maria and they triggered the early warning systems for SIDS, small island developing states.

So recognizing the critical role that early warning systems play in monitoring and forecasting the rapid intensification of hurricanes, we would like you to share with us what went wrong in 2017. Be sure, of course, to share with us what went right, and to recommend national and regional improvements that are necessary. David?

>> DAVID FARRELL: Good afternoon, and thanks a lot for the invitation to this meeting.

Let me start by saying that I have never been identified as an icon.

(Chuckles)

And so this is new territory for me.

So I run the Caribbean institute for meteorology and hydrology. Part of our mandate is training, research, in hydrometeorological systems. As well, we have a number of other functionalities, including instrumentation, and supporting early warning systems across the Caribbean. So we operate at a regional level and not necessarily at the national level, although we provide considerable assistance at the national level.

So to understand what went wrong and what went right, I think one of the first things, really, is to understand the structure of forecasting in the Caribbean. In the Caribbean, not every country or island has its own forecasting office,

weather forecasting office. Some countries depend on other countries to provide the forecasts for them. And so in that context, this whole issue of communication becomes extremely critical at the regional level, as well as at the national level, and those countries forecasting for other countries have a challenge in transferring information to the dependent countries.

The dependent countries then have a responsibility to take that information and convert it into further useful information at the local scale taken into context local nuances.

If the chain of transfer information is broken, the challenge becomes grave, and so in 2017, we had this particular scenario occur.

But before I get into that, what I will start by saying is that there are a couple of things that people want to know for every weather event. People want to know what is the hazard. What hazard am I going to face at the particular location that I'm at?

Then the next thing that people want to know is, when will it arrive? And so that allows people to start to prepare.

The next question is: Who is exposed? Am I exposed? Is someone else exposed? What are the vulnerabilities within the system? And for people who have lived through hurricanes, how long?

And so we talk about, well -- we try to educate the public. When the eye goes by, the storm is not over, because one gets the sense that the storm may be over. And finally, what are the impacts. The impacts, the likely impacts help us to prepare better.

These things we take into consideration in the Caribbean when we look at preparedness and forecasting, et cetera.

So the goal of the region, of course, is to build the best early-warning system possible, whether that be the way we manage information, the way we monitor and detect systems, the way we deliver information, and the preparedness and the response capabilities of the region. And within that context, there are quite a number of institutions that play a role. The Caribbean meteorological organization for which the CIMH is a part of it. The Caribbean disaster emergency management plays a role.

Then we get to the militaries of the region that have to play a role within the whole system. And so the system depends, again, on communication as we prepare and disseminate information across wide body of institutions.

Now, just to put into context what happened in 2017. I went

to Tomas, and it impacted St. Lucia. It was the first major impact I had been to and I cried.

Then I went to Erika in Dominica, and the level of devastation left me in awe. I hadn't seen that level of devastation at all. And then I went to Dominica again after Maria. And I'm very familiar with Dominica. So there's nothing about Dominica that I don't know or don't expect. But going to Dominica in 2017 for Maria, I wasn't in awed, I was just overwhelmed. The level of destruction and impact to everything in Dominica was unimaginable.

And in particular, the level or the lack thereof of communication between Dominica was incredible as well, because most Dominicans had not gotten a forecast for over a day and a half. The other part is there was still a tropical system to the east of Dominica, and so there was a lot of debate as to whether they were going to be impacted in a day or day and a half, or whether they would not be impacted.

And so I arrived in the first group of people who were flown in by helicopter. And so the first question I was asked, what is the weather east of us? I'm not a meteorologist, I will tell you that. I'm actually a hydrologist, but I knew the weather. And so I became the local liaison to the forecast.

And so that was the first part of the challenge, is communication. The met service in Dominica. Dominica depends on Barbados for its forecast. The met center was badly damaged. Early-warning systems across the island were badly damaged.

And so we had a challenge in how to deliver information critical to the national security to the authorities in Dominica. And so we had one cell tower going and so we were able to work through that one cell tower to initially produce forecasts by SMS. And so if -- most people understand forecast by SMS, short, to the point, and that was it. There was nothing else to go into that SMS message.

When the telecom system crashed completely, we had a short lull and then other systems came online.

So that is the experience of what happened then. But the problem is for hydrometeorological systems is forecasting. And Dr. Mallalieu to talk about forecasting and the rapidly changing system. Forecasting is an uncertain science. There is no exact solution for anything. We live in the realm of probabilities and possibilities.

Forecasting for rapid intensification complicates the matter even further. It doesn't matter whether you are in a SID or a developed country, wherever, rapid intensification is difficult

and tropical environments.

And so we had Maria went from essentially a category 1 in the morning to category 5 in the early night. So essentially five jumps in intensification.

At each jump in intensification, we had to be delivering messages to people, and we had to ensure that people were getting the messages. And so this was the first part of the complication because if I'm telling you every couple of hours, well, no, it's not category 1 anymore, it's going to be category 2. Oh, by the way, sorry, it's no longer category 2, it's category 3. Well, hold on a second. It's no longer category 3, it will be a category 4. Within an hour I come back and tell you, category 5. Well, unfortunately -- fortunately for us, there's no category 6. We could have probably gone to a 6 if there was a 6. We had to be updating what we were doing, both with the national persons, with the regional persons and continuously updating the information.

Now, you have to also remember that persons in country are also getting their information, not just from the national meteorological service, but from a wide range of sources on the Internet. And so the first challenge there is how do you harmonize all of that information? Or even if it's possible to harmonize it?

And so what are people really preparing for? And so this was one of the conversations that we had with persons in Dominica after the event. What were you really preparing for? And some people said, well, you know, we really thought it was going to be this. We thought it was going to be that. And so there was no real -- well, at the national met service level, there's consensus within communities that may not be consensus for what people are preparing for.

And we also have to remember that category 5 is about wind. Category 5 is not about rainfall. And so if you are getting a record rainfalls along with severe winds, the question becomes, again, what hazard are you preparing for at your particular geographic location? And this is, again, part of the challenge. And so we started looking at things like impact forecasts and trying to get to this point of what exactly is a person, a, location preparing for. What are the follow-on hazards they may face?

If I can, Dr. Mallalieu make one or two other points here. In Christmas eve 2013, the Caribbean was struck -- the eastern Caribbean was struck by a massive convective system, deep intensification. Record rainfalls occurred throughout the

eastern Caribbean, from Dominica, the southward into the Grenadines. Were people prepared and were people ready for what was happening? Again, we had record rainfalls but we had no winds of significance. And so, again, the question came about, what is are we really preparing for or preparing communities for?

There was a family that went home because of the rains. But members of the family died because of the landslides because of the rains. When you think the safest place is your home, sometimes most unsafe place is your home, depending on the hazards and whether you understand the hazards.

The robustness of the telecom system for the hydromet services continues to be a concern. If the hydromet services can't function and they couldn't function in the eastern Caribbean, then there was considerable risk to the public. And this is something that we are trying to address.

So that is what went wrong. The resilience of the met services is in question. I'm not certain whether this is the case in other SIDS regions or not, but the resilience itself of the met services is challenged in quite a number of jurisdictions.

And the -- in terms of how we deal with some of these situations, how we integrate information, again, this whole issue of integration information to support the decision making, because at the end of the day, we are making decisions.

Now, there is are -- there are three situations that one can face and make in a decision. You can have either total -- too little information to make a decision, and then you make an educated guess in some ways. You can have too much information to make a decision at which you start filtering through all the different possibilities which becomes a distraction or you can have the optimum amount of information to make a decision. And to me, part of the challenge that we are facing now is getting to the optimum amount of information to make a well-informed decision to help the public make better decisions quickly rather than having to sort through a multitude of possibilities to actually arrive at a decision within a limited amount of time.

>> KIM MALLALIEU: Thank you very much. Let's turn now to Mr. Damian Barker, who will share with us the experience of the department of disaster management of Anguilla, for which he's the deputy director. Anguilla, you may know is less than 5% the size of Mauritius. Damian, among other things, the Parish Lall declaration recommended that governments establish clear lines of responsibility for the leadership of disaster risk

management, develop and adopt policy and regulatory frameworks, recognize the importance of national and regional telecommunication -- emergency telecommunications and facilitate the ICT requirements of approved international disaster assistance organizations.

So Damian, please share with us what worked best for the department of disaster management of Anguilla in 2017, and the key challenges that you face with cooperation and coordination between the department and other organizations in charge of providing humanitarian relief for the Caribbean islands.

>> DAMIAN BARKER: Good afternoon, everybody. I didn't realize I was that small, less than 5% of Mauritius. I feel a little intimidated now.

(Laughter).

But that said, Anguilla is a UK overseas territory, and so when it relates to having standard operating procedures for how relief is supposed to work, we have plenty.

If it's one thing we are good at is having procedures. And so the disaster management act of the land gives disaster management, the governor, and the department of disaster management oversight over all disaster management on the island. So, again, we are -- we are well set with procedure.

In 2017, we were met with something that defied procedure. This was nothing procedurable about Hurricane Irma. As Dr. Farrell was saying, it was a case where the escalation of the storm was rapid and unimaginable. And I'm sure if you -- a short, very short story of how -- just to paint a picture of how hurricane Irma affected us. I was in the planning department the morning that Hurricane Irma hit. The procedures said we must do. And he was busy checking on the speed of the storm. So when it reached a certain point, he said, I think we are in trouble. And me being in the disaster management, I had to try to assure him that was not the case.

If we are good at anything in Anguilla, we are good at hurricanes. And we learned our lessons very well with Hurricane Donna in 1960s devastated the island and we have a tendency to overbuild our infrastructure of hurricanes. We thought the equal measure of anything that would come our way.

When the speed reached a certain point and he asked me again, and I was forced to answer -- he said, what is this going to do to us, and I was forced to answer, I don't know. It was a humbling and sobering experience for me. I probably shouldn't have answered him that way, but I was shocked myself as to what was going on.

And so we battled open and we figured it out.



That's basically how it went. You batten down and you wait it out. And in the morning we came outside to see what was left of our beautiful island. The good news was that our infrastructure did stand. We didn't lose houses. 90% of the houses had concrete roofs to again with. So we didn't lose too much infrastructure in that way, but every single pole was on the ground. And most of the cell phone towers. And the good news is if you are 5 square miles, if you have two cell phone towers remaining, you can still have communication. Luckily for us, that was the case.

So even at Irma's worst, we did not lose communication across the island which was a very good thing.

What Irma did do, though, was put to the test all the paper we had with procedures on it, put it to the severe test. And like anybody in a situation like that, there are certain areas where we excel and certain areas that we realize that we need to scale and things needed strengthening.

When it came to relief, relief was a tricky business, because the government stockpiles at that time were not significant. The Red Cross may have had significant stockpiles but the Red Cross, and one of the few people to lose their building roof was the Red Cross, which put a lot of strain on the apparatus.

We managed as best we could, but when you have to provide relief for a large segment of your population -- and this is the situation that you have to understand, Anguilla has never faced before. We were never faced before where we had to provide relief for substantial amount of our population.

The international assistance came, the regional assistance came, et cetera, and private individuals, and coordination was a problem sometimes on what would be the standard issues that you get with relief coordination. Anybody that's in disaster management, know that it never goes as smoothly as you want.

The loss of the Red Cross meant, for instance this was a big issue. That the supplies had to be moved to the NCO warehouse and for the first time in X amount of years the people of Anguilla, knew where the NCO was and that caused logistical issues. I will have to say even security issues because this is usually a a restricted area.

There were cultural issues to take into account. Anguilla now has a large Dominican population, and cultural differences is the best way to put it when it comes to attitudes towards obtaining relief, provided even more pressure to us, the organization that ended up having to deal with it.

Some people were basically more willing to stand in line

than others is what I'm trying to say. And the reporting after that was not exactly fair. But these are things that anybody who is familiar with disaster management would be able to relate to. It was not -- I guess I can't say it was expected but it was not unmanageable.

So basically, there are, of course, issues with goodwill sometimes. You get too much of what you don't need or too little of what you do. There are issues with some organizations needing to, providing goodwill but then requiring, what can I say advertising, requiring recognition for their work, and sometimes that can run contrary to what you need to do.

And the overall effort that is required to coordinate relief. So I don't want to speak too much more about what went wrong.

What went right, I would say that -- as I said, we were blessed to not ever lose communication at any point in time, which means that all the pressures and the problems were about this strain placed on procedures and people. And as Dr. Farrell was intimating, it was a very tough experience to see what Irma did to Anguilla.

At some points, I didn't cry, but I have to say I got close sometimes when I saw. I really didn't think that we would recover as quickly as we did. We literally had not one pole standing. So things like that were an issue. But as I said, the Red Cross lost their building. We quickly allowed them to use the NOC warehouse. So that was good for us, and the relief organization.

The relief did come. We eventually got a handle on what was coming, and figured out a way to get relief to the most vulnerable. Of course, that took time to get roads cleared, et cetera. And as I said, every pole was on the ground. So road clearance was an issue. So you get a little bit of flack unnecessarily and undeserved for that. But at the end of the day, we had more successes than failures and at the end of the day, I would say we did very well and we didn't ever have an occasion where the country was hungry or anything of the sort.

>> KIM MALLALIEU: But Damian, can I ask. You say the poles were down. The towers were down but you never lost communications. I just wanted you to clarify that before we move on.

>> DAMIAN BARKER: Every pole was down but two cell phone towers stood.

>> KIM MALLALIEU: Okay.

>> DAMIAN BARKER: In Anguilla, the land line network took a

long time because that came back with the poles, but we had -- we had cell phone towers. And the truth of the matter is Anguilla is a very cellular phone country. Everybody has at least one or two cell phones.

>> KIM MALLALIEU: And I will share with the audience, Alyssa yesterday mentioned that the highest point in Anguilla is the 30-meter tower -- water tower; is that correct?

>> DAMIAN BARKER: Yes.

>> KIM MALLALIEU: Thank you very much, Damian. We will move on to Nikima Royer. She's the CEO of Digicel in Dominica. We will turn from the public sector to the private sector to hear Nikima. As you can gather, Dominica was one of the hardest hit by Hurricane Maria in 2017. Not long after the island was blind sided by Erika in 2015. Nikima was in Dominica with us last December, and therefore was one of the authors of the Parish Hall recommendations, and that is the private sector work in partnership with different stakeholders to reduce risk through the application of technologies, data, skills and other capacities and strategies for disaster management.

So Nikima, tell us, how does Digicel work with the governments, the disaster management authority, the met office and other ICT industry players in times of the disaster.

>> NIKIMA ROYER JNO BAPTISTE: So Dominica's experience was much different than Anguilla's experience. Dominica went completely dark. We lost all forms of communication for a number of days.

And unlike Anguilla, Dominica lost 90% of all roofs on the island, while Anguilla kept 90% of theirs standing. The devastation that was wreaked on Dominica was something like Dr. Farrell said, that I had never seen before. I had never imagined and I had no idea how to get through. It was devastating to walk out of a house after spending eight hours in a bathroom with six, seven, eight people, and to see your beautiful green island, your lush green island burnt and charred.

And the only way to get through such devastation is together. Not one person, not one entity, whether you are a public sector or whether you are a private sector, whether you are a regulator, it doesn't matter who you are or what you are. But in times of devastation, like the devastation that Dominica saw and felt, the only way to get through it is to go.

In advance of the hurricane season, and Dominica now is on a hurricane season, not hurricane season. There are only two seasons in Dominica right now. So in advance of the hurricane season, we, of course, partner with the government who is the

lead for disaster preparedness and management in Dominica. We meet with them regularly. We participate in all the workshops. We participate in the conversations. We share the data. We give the reports and all of those kind of good things. Right?

But those are only good things because after a storm, and after a storm like Maria, you realize that you can never be fully prepared. Not psychological or otherwise for such devastation. That's why it's so important to develop your BCP.

I will say once you have developed the BCP, keep updating and keep practicing it. And after you have the first one really good, do a second one and do a third one and do a fourth one and a fifth one and never stop. Because that first BCP that you put in place, those plans, those plans we put together with the government, we decided we were going to strategically locate heavy equipment. We know Dominica, we know the terrain. We are going to have landslides, we will have flooding and we will strategically place heavy equipment so we can clear the roads quickly, so we can clear the critical paths for the utility companies and the telecommunication companies.

With we opted Digicel to position fiber in key locations knowing where breaks may occur to ensure the quick recovery time. We knew we would probably lose electricity and put fuel in different places. Guess what happened. Heavy equipment got washed away in landslides, and our fuel got stolen or water logged and all of our strategic planning was blown away along with our roofs and our homes and our belongings. So we had to adjust and we had to adjust quickly. And the only way to do that is through collaboration. Collaboration with not only the utility companies were highly dependent on our utility and our competitor.

In times of disaster -- and I was so pleased when Enrika spoke about this, in time of disaster, there's no business. It's people and country first and foremost. Everything else will come after once you have recovered. In terms of collaboration with the government of Dominica, Digicel fortunately has a very positive relationship with the government of Dominica. And we were able to support them immensely throughout the recovery of Maria.

Digicel and I -- I became a hotelier. I became a shelter. I became a builder, a carpenter, a -- you would be surprised at the things you have to do in a time of disaster. But we were able to be one of the first responders on the island and we chartered three helicopters that brought in teams to assist us in the recovery. And one of the great things that these helicopters came in full, they would leave empty. They became

an evacuation mechanism, not only to recover people from isolated positions and bring them to more populated areas. We were able to evacuate 200 people out of Dominica to other territories to seek medical assistance.

We brought in chartered boats with supplies, humanitarian supplies, hygiene supplies, and we assisted in the dissemination.

We provided the Prime Minister and the Minister of National Security with two satellite phones so that they could not only communicate with each other, but that they could communicate to the outside world. We provided the Prime Minister's office with 100 mega bites of fiber connectivity so that he could update the international communication on the status of Dominica as well as the assistance we needed. And this connectivity also allowed CNN's Michael Holmes and Anderson Cooper to feature Dominica, the CNN factor. To get the lights on and people thinking about you, so you could get the assistance you needed.

And courtesy of my chairman, along with being a brilliant entrepreneur is also one of the most philanthropic hearts that I know. In addition to supporting the team -- our team members and ensuring the people are first and that's the first thing. When I spoke to Dennis, he asked, how are the team? Are they accounted for? And Dennis made a pledge to Dominica to help the country rebuild and we did that through rebuilding six primary schools and that was a commitment made to the Clinton Global Initiative of which Digicel is a network partner.

And through doing good, more good came of it. So the united -- the United Way in Trinidad and Tobago provided jungle gyms for these schools and additional equipment and materials for these schools. And then again, Expedia, the Sexton foundation, the construction for change, further partnered with us to solarize these schools.

We also redid over 100 roofs. So a small dent into that 90% and incidentally, there's still a number of roofs in Dominica that are still under blue tarps. From a humanitarian standpoint, we definitely partnered with the government and the people.

Just one more point, Kim. Additionally outside of that, because what's important is the preparation, the recovery, but balancing the recovery with the preparation for the next one. Because the next one is going to be -- it's not, it's when. It's not if it will happen, it's how severe is it to go happen. And the government of Dominica -- I'm not sure if some of you would have seen Prime Minister Roosevelt Garrett speaking at

the United Nations, when he said that Dominica small nature island of the Caribbean is on the forefront of the war against climate change. Although our small nation did not contribute to the effects, we are the ones that are being impacted and he made a call for Dominica to become the first climate resilient nation and Digicel has latched on to that because it's important for us to build back better and coming out of hurricane Maria, we made a pledge to the people of dome that we will never go black again.

The fact that communication was cut off will never happen to us again. And coming out of Maria, the government of Dominica took the bold step to issue an RFP to upgrade the entire infrastructure and services of the government of Dominica. And through a highly competitive and transparent RFP, Digicel has won that bid and we are going to be partnering with the government of Dominica for the next 15 years to rebuild their entire infrastructure.

And my good colleague Mr. Barker and I had a rambunctious discussion about aerial connectivity versus underground connectivity and my response to that one is, one size does not fit all. And Dominica is unique. In 2015, we were impacted by water, which washed away our underground connectivity. In 2017, we were impacted by Maria's high winds which washed away our aerial connectivity, as well as impacted the underground.

So going forward, we will have a hybrid solution with the core services underground and a resilient, redundant and aerial and satellite. And these are the services we will be providing to dome, in addition to connected health, learning hubs, CCTV, and facial recognition and license plate recognition and all towards building back better and becoming a more resilient country.

An resilience is not how long you can stand up. Resilience is when you are knocked down, how quickly can you get back up and that is the pledge that Digicel will make to Dominica and to the Caribbean.

>> KIM MALLALIEU: You have me in tears.

>> NIKIMA ROYER JNO BAPTISTE: I'm surprised I'm not crying. Usually when I talk about this, we cry.

>> KIM MALLALIEU: What we understand from your stories is the opportunities to seize and build back better. When we are really reduced to rubble, you know, what can emerge? These are the possibilities. This is a wonderful story. Thank you so much for sharing that with us Nikima.

Okay so here to bring to a close this first round of discourse is Ms. Bernadette Lewis, the Secretary General

Caribbean Telecommunications Union. Let me congratulate the CTU like the WWW on its most excellent and impactful work over the past 30 years.

To wish you 300 more under your leadership, no less, and to say that I share the region's excitement of the upcoming week of anniversary celebrations for the CTU. Now for your perspectives.

>> BERNADETTE LEWIS: Thank you very much, Madam Chair and thank you for the congratulatory words.

I wanted to speak -- I think it was clear from David and Damian, the importance of communication and in a disaster situation. You know, you need that information and, of course your issue that it's all forms of communication, the wireless, the wired, the fiber, the satellite, it's absolutely spot on.

The Caribbean Telecommunications Union, we have been working to harmonize the administration and the use of spectrum across the region, and this includes a spectrum for emergency communications, for public -- public protection, and disaster relief.

And we in 2013, we started this program of progressive harmonization, and we have established two standing committees, the Caribbean's spectrum management steering committee, and also -- which oversees the work of a Caribbean spectrum management task force, which is a multi-stakeholder group that is directly -- it's made up of the public, the private sector, just as you said.

It's about everybody. It's about collaboration. Different stakeholders bring different perspectives to the table and it makes for better outcomes. So we have the spectrum management steering committee, the spectrum management task force, which has been leading the work to harmonize the use of spectrum across the Caribbean. It doesn't happen overnight. This group is in -- it has been in operation for sometime and already we are seeing the results. We are making good progress towards the harmonization across the region.

And one of the outputs. Recent outputs of the Caribbean management task force has been the development of a strategic plan for spectrum management in the Caribbean, and that also speaks directly to the use of spectrum in emergency situations.

So -- in addition, and after -- in the aftermath of the 2017 devastating hurricane season, we established a commission for communications resilience in the Caribbean, and its purpose was to first try to understand the nature of the communication failures and disruptions that had been experienced and also to make recommendations about policy and regulating strategies

that would help create an enabling environment, enable Digicel to do what it wants to do, never go black again in the Caribbean.

So the report is about to be published, and it makes very, very specific recommendations about many aspects of the policy and the regulatory framework that needs to be in place to enable that building of resilience for the communication resilience. We also -- the CTU also collaborates directly with many of the organizations that are responsible for -- for emergency response. We deal with Sedama. They have been referenced already for the day.

>> KIM MALLALIEU: The disaster emergency management agencies.

>> BERNADETTE LEWIS: That's right. We have worked collaboratively with CDEMA, and we have been actively encouraging our member countries. We have 20 member countries that make up the CTU to sign on to the national conventions like the Temperry. And there's the amateur radio permit, and these are things that we bring to our general conference of ministers. We give them the direction that this is what you need to do and we would give them the process, if necessary, of how you go about signing on to these conventions. I think it's very important.

We cannot overstate the value of collaboration. It is absolutely essential. No one organization could deal with disaster management, and I would like to stress not just the -- the municipal or your national but your regional and your international relationships. Those things have to be put in place. And the time to start is now, if you haven't already had those relationships and have maintained them, you need to start now. So I would just stop there for first pass unless you have questions.

>> KIM MALLALIEU: I would like you to expand a little bit on the amateur radio agreement, and -- and the activities within the CTU that you have in mind, perhaps, to promote amateur radio in the Caribbean.

>> BERNADETTE LEWIS: Oh, absolutely. It's quite remarkable that just before the hurricane season, we called the IARU representative for Region 2 and we were asking him, you know, about the amateur radio, the organizations, the clubs, how are they positioned, are they ready?

And we got -- the feedback we got was quite disturbing. There is a need to cultivate a new generation of HAM operators. There's a need to bring the amateur radio fraternity into the formal processes for disaster management, and response.



And, you know, we have to look to updating, you know, the amateur radio fraternity. They are looked at as old school but there's huge developments in terms of the capabilities and what you can do. You now have the amateur radio -- the Winlinks connection through the Internet. Those are things that we have to help in building the capacity of our amateur radio operators. Yes?

>> KIM MALLALIEU: And in your celebrations, you set aside that IRU is celebrating telecommunications. In fact, if I'm not mistaken, there's one sector for regulators on amateur radio, and another on emergency telecommunications, amateur radio telecommunications. You know, I will be at both.

>> BERNADETTE LEWIS: Yes.

>> KIM MALLALIEU: I have even given my notice even though the registration has not opened, I will be there.

>> BERNADETTE LEWIS: I can give you the dates. They are the 2<sup>nd</sup> and 3<sup>rd</sup> of main in port of Spain Trinidad and Tobago. You can go on the CTU website and we will post that information next week.

>> KIM MALLALIEU: And I mentioned in a chat over drinks last night, Nikima mentioned that on the top of their building, the Digicel in Dominica, the amateur radio society mounted an amateur radio antenna. And she said, well, she doesn't understand it very much, but they agreed that they will come and manage when the need arises, which I thought was wonderful. Again, collaboration.

One of the spectacular things about amateur radio is that it's pretty much infrastructureless. So when an event is approaching, the amateurs take down their antennas and when the bulk of it is gone, they raise it up again.

And with the use of HF radio, high frequency radio, they can cover several countries. Certainly in the Caribbean, they can cover several countries and in principal around the world.

So thank you very much. I think that we have done a really excellent job starting at the hydromet, moving towards the disaster management, getting into the service provision and wrapping up with the policy and the regulatory approaches and strategies and harmonizing efforts at a national and regional level. So thank you very much for our first round of discourse.

I would like to open the floor up now for questions, particularly from our -- but not limited to our remote participants. I would not want them to be left out at all.

And don't forget, of course, that there is -- we will close our session with an evaluation.

So questions from the floor, including our remote participants?

Okay.

This is the post-lunch hesitation, I'm sure. And we have a question from FCC.

>> AUDIENCE MEMBER: I'm Kelly with the US Federal Communications Commission. I thought it was interesting, comment about how the forecasting is not done in each of the countries. And I wondered if you could share more about how across the Caribbean islands there is communication and coordination and how you do disaster response.

Thank you.

>> KIM MALLALIEU: Is this about -- can I just ask, is this about the hydromet component or the DME component?

>> AUDIENCE MEMBER: More on the -- yeah, the disaster management part. That in itself was interesting to me that not all the countries might have the same capabilities within each of them.

>> KIM MALLALIEU: So perhaps Damian will take that. Yeah?

>> DAMIAN BARKER: Okay. I will let Dr. Farrell start, because I'm actually -- Anguilla is actually in that arrangement right now. We don't do our own forecasting. So I will let him start and I will explain after that.

>> DAVID FARRELL: Okay. I will set the context for Damian to respond. Within the Caribbean meteorological organization, there's an arrangement. And one has to remember that Damian's -- what is it 35 square miles, Damian? Has probably a relatively small population. We go from populations of several million all the way down to populations under 10,000. And so Montserrat would have a population under 10,000. It's irresponsible to think that Montserrat would have full forecasting capabilities.

There are several established forecasting offices in the Caribbean. Diane, Trinidad, Barbados, St. Lucia, Antigua and Belize. Those are the forecasting offices. Within those arrangements, there are a number of dependent countries and so Barbados provides a forecast for Dominica and St. Vincent and Grenadines and Trinidad and Tobago provides the forecast for Grenada, especially for severe weather systems. Antigua provides St. Kitt's Montserrat and Anguilla and British Virgin Islands.

And Bahamas provides for the Turks and Caicos islands. The idea is that there's not a requirement for each country to then maintain operational forecasters, although as I will talk later, the recommendation is that they should at least have the

skill. And so at the moment, that skill is absent.

And so there is this mechanism which allows at the national level for the forecast of them to be propagated to disaster management agencies, where the disaster management agency now takes lead.

There is a caveat. Every island has a disaster management agency, but not necessarily a forecasting office.

>> DAMIAN BARKER: All right. Okay. So I'm going to potentially flog Dr. Farrell here. It's all in good fun. We are from the same country. The thing about the arrangement -- and I get why you asked the question, because there are challenges with the arrangement. It's not unusual for me to be in Anguilla, giving out a forecast of sun and it's pouring buckets of rain and I have to call Antigua and it's pouring over here. Why is your forecast saying it's sunny?

That's a consequence, obviously, the arrangement, and I think that the arrangement was put in place back when small island meant you didn't have skillsets to match the bigger islands. That's no longer the case. It's not unusual for us to come at loggerheads at meetings about this arrangement. And I have to say I'm personally not a big fan of it.

I think we need to take our own destiny to our hands sometimes. The equipment that's required has costs. Training has costs and we will have relevant skill sets in the islands. The only good thing about hurricanes I can say is after the hurricanes come investment. So it is important for Dr. Farrell to note that we are going to try our very best to -- to stand on our own two feet when it comes to these basic -- this basic part of forecasting because at the end of the day, I never want to be in a position to say to anybody again, I don't know when they ask me a question relating to the impacts. I hope that answered the question.

>> KIM MALLALIEU: SEC. Vanessa.

>> AUDIENCE MEMBER: Vanessa Gray from ITU. I would like to know a little bit more about, I guess what worked and what didn't in terms of alerting, bringing messages to the communities that had to be alerted, and that had to be informed about certain actions to be taken. So I guess my question is particularly for Damian and also Nikima. And maybe because yesterday we had a workshop on the common alerting protocols and maybe Damian could say a little bit about that because not everyone in this room was at that workshop and so that could be of interest.

Thank you.

>> DAMIAN BARKER: Okay. I'm very popular this afternoon.

When it comes to communication --

>> KIM MALLALIEU: Always.

>> DAMIAN BARKER: Communicating alerts, as mentioned by Vanessa, Anguilla has the longest running alerting system protocol in the Caribbean and we use it for every event that affects Anguilla which thankfully is not a lot. I always say the best way to use a warning system is sparingly or not at all. But for Irma, it was activated, people got messages on their phone and email. We didn't do the radio. They would have known the hurricane was coming, just not that the hurricane was coming.

So we have -- well, the warning system, we got the messages out to the public, and it was not a matter of them not being aware. After the event, we could have used it to send messages because our infrastructure -- our communication infrastructure did survive, and whether that is purely because of luck or investment, and -- and infrastructure, stability, we can argue, but at the end of the day, we did have the procedures in place and the system in place to warn the public. And that's the important thing.

A hurricane is not exactly the best -- a best hazard to have a cat-based warning system. You usually have days in advance to warn the public but it's important to have the procedures and the protocols. We did eventually in the end when we get to relief, the police went around with bullhorns too, which was very interesting and -- I -- even though we had the system, they choose to do that through relief and I thought I was very good.

They came to us to give them the message to go with. So that -- that improved coordination and information was happening.

>> NIKIMA ROYER JNO BAPTISTE: Dominica and notifications. Maria -- Maria was an anomaly. It was initially supposed to pass across us as a tropical depression or a tropical storm. And like Dr. Farrell said, I was sitting down when we activated our CMS. So a very short story, Kim. My husband's birthday is on the 15<sup>th</sup> of September. We celebrated his 40<sup>th</sup> birthday on the 16<sup>th</sup>.

On Sunday morning, I'm waking up, and hoping to eat amazing cake. And I got a group CMS, a storm is coming and you need to activate now. Rally my team and while we are sitting to determine what is done first. It's going from a tropical depression to a category 1, to cat 5 in a matter of hours! An all means of communication was out. We did SMS, we did social media, we did the website. We did the radio, we did the TV and

we are fortunate to have a TV service, as well as a mobile service, and we were able to disseminate. That our ODM was sending out messages. The problem was not that the messages didn't get out. It was that the warnings were not heeded by persons.

I remember I had specific team members and I said, you need to come out where you are. Where you live is dangerous. Where you are is prone to landslides, the water levels, get out, get out, get out! And I remember being on the call with my region CEO, look, I will go out there and physically move them myself. They can't stay where we are and we did that.

So persons are complacent and we saw that again this year with the number of close threats. Berle came advance of us in April, well in advance of the hurricane season and we are on heightened alert because what has come. CMS and BCPs activate and it's straight to the hundred. There's no stop at 25 or 50, and it's straight to 100. Oh, Berle was there, nothing happened. That storm came and like it didn't have any rain. Not even one drop of rain fell.

>> KIM MALLALIEU: Yes.

>> NIKIMA ROYER JNO BAPTISTE: And for me, I'm so traumatized and I'm like how short-term can your memory be? Do you not remember what happened a mere two years ago? I don't believe that the concern is whether the messages are communicated or received. The concern is the messages are not being onboarded because persons look outside, just like Damian said and it's not raining, right?

And the last time -- like our government went full out as well, 100%, where the country was shut down. National security was called. Curfew was put in place. You needed to get your badges and they were beaten up the following day because nothing happened. Because persons don't remember what happened in 2017, what happened in 2011, what happened in 2009, and what happened in 2007, because every two years Dominica is impacted by a natural disaster. We have to have persons -- not being paranoid or not overly cautious, but just be prepared and be constantly prepared and be constantly vigilant. I don't think it's communication that's the issue, it's the onboarding the messages.

>> KIM MALLALIEU: I would like to invite David to share with us some of his experiences and perspectives from -- from a hydromet organization about this very issue of getting the message out, the channels and -- yes, David, please.

>> DAVID FARRELL: Okay. I will start by defining what the system looks like, the early-warning system in a sense looks

like.

And so, the effort if thing -- the part of the early warning system, really is about satellite observations. And so we usually have a suite of satellite observations that cover the Atlantic, where the new goals are satellite systems. The resolution is extremely fine. You get a lot more spectral information on the systems.

The next part really -- and that's observation, and so we can look at cloud organization, et cetera.

The next part of that is numerical weather prediction, and so covering the -- well, globally, there's -- the global numerical weather prediction products that come out every six hours and so you have the GFS model by the United States. You have the unified model by the United Kingdom. You have the ECMWF platform, and the Canadians have a platform and everyone has a platform to some degree.

The challenge, really, is about resolution when it comes to the islands. And so for tropical storms, everyone can see a tropical storm coming but the issue then becomes resolution, in terms of what really will happen on country.

So the CIMH, has one from the Mid-Atlantic over to the Gulf of Mexico, running 4-kilometer resolution which is the finest resolution over the region. And so that gives you the start of the predictive process.

Once the system gets within landfall, then this' a series of weather radars across the eastern Caribbean, western Caribbean that form a mosaic. Within 400 kilometers, you can get a better sense of the organization of the system. That information also feeds into the numerical weather prediction products which further improves the numerical weather prediction products. Over land -- when the system gets over land, there are a series of networks, national and regional which track wind, rainfall, pressure, relative humidity, moisture, et cetera.

A lot of that information, actually is in the CIMH network. So the CIMH network is observation stations across the eastern Caribbean and other parts of the Caribbean that we get, near realtime and we send it through the Digicel network or we send it through the flow network, with probably a five-minute delay. We can actually reduce the delay but reducing the delay increases the costs.

So we are tracking data in near realtime across the entire Caribbean. That data goes into a common platform that anyone can see -- well, I should say anyone with a password can see. And within that environment, there is infrastructural

information on countries. There's also wave models running. There's also housing information, demographic information. There's also geophysical hazard information and so on.

And so within that environment, one can start talking about an integrated platform for decision making. And so that is one of the things that we run across the entire region. That integrated platform is now connected on to a cap network. And so the new technology that we're developing with our partners is now taking information out of that platform, which allows us to do impacts forecasting and through the cap network to send information on the specific impact that a community will face.

But the cost of that network is expensive, of course. And one of the things that we started to do was to try to bring down the costs and I know there's a session that talks about IoT tomorrow. But we have started to implement IoT within that platform. So now we have got low cost sensors running in that platform.

We're starting now to talk about printable automatic weather stations and so that is now one of the new things that NOAA produces, the costs are down but delivers the information. And the good thing about it, you can put it at very good at-risk environments. It's about \$200. It's cheap.

And so the idea is to now provide a level of information at every community or most communities over the next couple of years so that communities will be aware and receive information specific to their risk factors.

There's no need to produce rainfall -- or sorry, to provide certain types of information, let's say rainfall information to a community that doesn't have a rainfall challenge.

But you provide it really to the people who would have rainfall, flood, landslide challenges. And so a lot of information is going to be more and more targeted within the environment as well that we run, there is the ability to crowd source information back.

And so we get a sense of what the impacts are. And by building a catalog of impacts we can start talking about future prediction, because we know the catalog of impacts for this particular region is X, the catalog of impacts in this region would be Y and we can start talking about how do you mitigate the impacts within these different communities based on the community need, rather than trying to do it across the board at an expensive cost but not necessarily meet the community needs.

And so this is the new platforms that we're building. There are IT intensive and there are communications intensive and so

there's a lot of need for looking at redundancy within the framework to make it work. And so if you go back to Dominica, I could see everything that was going on at Dominica, and I can tell you when the electricity went off, because our network stops transmitting almost at the same time across the country, even though the stations were collecting data. There was no way to get the information out until you visited the station or the networks came back up.

And so this was a critical part of what we were trying to look at as we move forward. That was brief.

(Laughter).

>> KIM MALLALIEU: Thank you for that. And perhaps, David, shall I run the risk of asking you to just make your final -- we're going to do just one final round of recommendations, brief. So a single recommendation for us going forward. But brief.

>> DAVID FARRELL: Brief. Okay. In terms of the recommendations that were put together, I would say that the most important recommendation coming out of the would, that was done post 2017, really is to look at the framework through which the hydromet services work. Most people are familiar with having legislation and legislation guiding how their particular sector works.

In a lot of cases, there's no legislation governing how the hydromet services work, what they deliver, how they deliver, and apart from probably why they deliver, I think a lot of that needs to be harmonized but also with the relationships with partnerships that needs to be better organized and better articulated.

It was interesting that when the CTU talked -- the CTU talked to CDEMA as a critical partner but hydromet has to be a critical partner without the hydromet and without the forecast for the future climate change, one of the things we have to look at is really how the hydromet community functions effectively and efficiently within the whole regional structure and that requires a lot of partnership and a lot of discussion, and I think that this is the time to really have that partnership and discussion to really build a much better early-warning system across the region.

Thanks.

>> KIM MALLALIEU: And thank you very much. So Damian, can I ask you to offer one recommendation for us going forward? The key recommendation, really to build resilience and to be able to deliver a more efficient, effective, disaster management service.



>> DAMIAN BARKER: Okay, Kim. That was about the question I had before happen. And I think I changed many mind several times about what I was going to say. In the end, since it was originally an ICT recommendation. I think we will go off script and recommend something that is unusual for me. Everybody expects me to talk about warning systems every time I talk. What I will say, though, is my friend with whom I had rambunctious argument -- discussion. Sorry. Reminds me of something that happened after hurricane Irma and I told you we did not use communication on Anguilla but obviously the entire island was not able to have communication all the time.

And what we saw was that for many months after Irma, people would congregate by free WiFi hotspots all hours of the day and night I saw children doing their homework and that affected me deeply because we usually think of ICT as -- ICT in one of the two ways. How we use it as government to communicate the critical information, the disaster information, the disaster management information or we think of it as a bad thing, of all the bad things on social media.

What I would like to say is these days people look for food, water, shelter and then communication and we need to start to treat it as such. In this case, it was the other telecommunications that set up the hotspot, it was to the Digicel this time. And the government did set up a hotspot for people. And I think we need to remember that ICT is supposed to help us communicate and make people's lives better. That's why it's so important and I'm so happy to hear Digicel says they never want the communication to go dark again in the Caribbean.

I heard several people say that Irma was very hard for them but the only thing that kept them going was using Whasapp. We put in place all the structures that are necessary to ensure that we have connectivity.

>> KIM MALLALIEU: Thank you very much, Damian. Nikima, can I ask you to wrap up.

>> NIKIMA ROYER JNO BAPTISTE: I feel like Damian was cheating and reading my notes because my sentiments are quite similar to his. Telecommunications is now considered a life line utility. The same as water, electricity, air, shelter and so on and so forth. And my request, it is not a recommendation. My request is that all of us in this room appreciate that communication is hope.

And do not let the drive for preparedness, nor the drive for resiliency be a buzz word that disappears next month or next year or five years from now.

Climate change is upon us. Again, it is not if we will be impacted. It is no longer when we will be impacted. It is no how severe will the impact be? And each and every single one of us, whether we are in a government institution, a private role, an academic role, we have a responsibility to the country and to the people that we operate with and we provide those life line services to, to ensure that we are as prepared as possible, appreciating we may never be completely prepared.

But we need to ensure that we build this preparedness, this drive for constant development and constant resiliency in every single thing we do. It can not be come to Mauritius for a conference or come to Dominica for a conference. It has to be in our day-to-day business operations. It has to be in the day-to-day business conversations and it needs to be continuous. It's not a recommendation, Kim, it's I request and a call to action that we ensure we make this a part of our daily lives with our family and friends and businesses and with our partners and just to continue. Collaborate to go because we are not going to make it through individually. We will only get through if we do it together.

>> KIM MALLALIEU: Thank you. Well taken. Bernadette, I give you the last word.

>> BERNADETTE LEWIS: I will start with my 1.1, building resilience. There's a financial cost to building resilience and it takes time, but we absolutely must start now. It requires a robust ecosystem of many diverse national, regional and international players. Those relationships have to be build. You want to be careful that you don't put back what you lost. And that means you build better. That means the standards for buildings. You heard the report from Anguilla, 90% of there are buildings stood up and you had standards for buildings and installations. These things absolutely have to be done.

There's the opportunity of these wonderfully new emersion technologies and we hear about the LEOs and the TV-wide space and make use of them.

It would help to, if the governments could give incentives to encourage operators to move in that direction, making use of the technology to leap frog and be better and stronger. And, of course, again, this is my part one. You have to work on the amateur radio and cultivating that new generation.

We see the silver hairs of the existing group. You know, we have to spark the imagination of the group coming up because they have a significant role to play in that whole disaster management program.

>> KIM MALLALIEU: Thank you, Bernadette. I would say not only a new generation of amateur radio operators, about the a new generation of amateur radio technology, but more on that tomorrow.

So it is left to me to just do a brief summary, if you will allow me, and I will see if I can understand my handwriting.

So David, all of the panelists, I thought were absolutely brilliant and I thought them very much. But here are a sample of points and I don't pretend that they are comprehensive, nor the most important, but they are the ones that I wrote down.

David, I understand from you that it is important to understand the hydromet processing chain. Forecasting is not an exact science and we must all be very sensitive to that. It's probabilistic.

Damian, I was awe-struck by your recount of the Anguilla story, that you tend to overbuild infrastructure. I have never heard that before. And that your infrastructure stood up 90% of your roofs are concrete and stood up. That is a case for the history books.

You did not lose your communications, despite the fact that all but two of your towers fell and all of your poles were down.

We understood that your relief -- the relief efforts had some challenges for stockpiling, logistics, security issues. We all take that on board, that's been our experience across the board.

Nikima, while your story, as I said was really a tear-jerker, Dominica lost all communication. Dominica's experience was the compliment of Anguilla's. Dominica lost 90% of its roofs. Nikima made the point, that together is the only way to get through devastation.

And Bernadette explain a rare case where the private sector work consistently and comprehensively with the public sector. And for the emergency planning and the telecommunication planning, she also did in all honestly explain to us the realities that even though these procedures were activated on the day there were occurrences that they could not anticipate.

Occurrences that rendered all of the best plans lacking. That's not the proper word, but nevertheless, we understand that there is so much that we can do and from her story, I believe, that it's clear that Digicel did everything that it was really possible to do.

I think it's very important for us to understand that there are -- under certain circumstances, there must be losses. It is a tradeoff. We can -- it is physically possible. I think

it is physically possible to remove all devastation, but the cost in all dimensions of the cost to do that is very often simply unrealistic.

So really, it's a matter of where do you draw that balance? What can we do that can yield the biggest impact, but still is within reasonable power to do.

We heard that the O'Brien, his mantra was people first and Nikima said that through doing good, more good game, a lesson for all of us. And there were many more lessons that Nikima shared with us, that he thought were quite profound. But closing, one size does not fit all. You remember the story about the fiber underground, and that hybrid that really to billion resilience, we must build diversity and hybrid use -- use of hybrid technology, aerial, microwave, et cetera.

Bernadette emphasized the importance of communication, of all forms both interpersonal, interorganization, as well as all forms of electronic communications.

In 2013, the CTU, the Caribbean Telecommunications Union started its program of progressive harmonization, and Bernadette has shown us that it takes time. Harmonization, like so many other things, though necessary is not something that you wake up and you just do or you have done. It is something that you plan and you build and you execute painstakingly and lovingly over years and years of commitment. And the CTU has done that to -- to a remarkable degree.

It's important, the CTU -- Bernadette also stressed the importance of signing on to international treaties conventions, protocols and, of course, she emphasized the importance of the HAM radio communication.

I think I have about one more minute. So Damian said that procedures and resources are in place for early-warning messaging, that was prompted by Vanessa's question. Nikima said that Maria was an anomaly, but nevertheless all channels were activated, all messaging channels were activated, TV, radio, SMS, mobile app, website, social media, but that, in fact, in her experience, the real critical issue was not the translation and the transmission of communications over electronic media, but it was the personal heeding of the messages. And a mix. No one size fits all. In other countries it could be -- we heard from our friend sierra Leon, that so much of his country is simply not connected.

So the reach of electronic media is rarely a critical factor.

So we take all of these experiences in some. We localize them in our own couldn't try circumstances and we build back

better.

David, again, include met in your conversations, not only in the conversation, as we have done today, but also in your partnerships. Damian, oh, I love this one about the free WiFi because at the end of the day, that's what the people want, to be connected.

And that's why ICT ultimately exists. And it's so easy to get tied up as both Nikima and Damian said, to get tied up in ICT for service. ICT for -- for the organizations and ICT for all of these big things, but at the end of the day, in the devastation it really is personal communications that matters.

Nikima put a challenge to us and the challenge was that each of us, every day, day in in and take out, in all of our procedures and conversations, form a call to action to build resilience in everything that we do.

And Bernadette, closing reminded us of the reality check. This is a good way to close, but it costs money. It costs time, and it costs lots of other resources to build resilience. Is so we build anyway. How do we build? We build through partnerships. We build through partnerships that leverage the strengths, the diverse strengths of diverse agents this ecosystem in which we all live. So thank you to the ITU. Thank you for -- can I please take a moment to mention that both the officer in charge, as well as the chairman of the board, I my past students in the MRP telecommunications system. So thank you very much. And the panelists thank you for sharing the very wonderful experiences with us.

And now the last thing and the most important, perhaps is -- (Feedback) is you turn your attention to the QR code, point your cameras and take the quiz.

Except for the four of us. Thank you.

(Applause).

>> Excuse me, before everyone leaves, we have three things to mention. Let us start with a few housekeeping rules. Thank you, Vanessa.

So for the housekeeping, we need to know all the details of delegates who will be leaving after the conference. Not everyone has given the details. So we will be passing around some sheets so you can fill in the blanks. Some people have given and some haven't. So some people from -- members of staff from the effect will do that, from the ICT team. This will be after tea break, we will pass around paper. And then as we exit for tea breaks, I will be given the invitation that will be given from 6 p.m. to 9 p.m. and later announce the exit. I think the exit is going to be from the front. But

around the side that way. That's what I was told yesterday. We will confirm later, but there are the invitation cards.

Thank you very much.

>> Thank you, Mira.

>> Then I would like to announce that the next session is breakout session. We have two breakout groups and the first break out group will be on the disaster connectivity maps and just a very brief overview. So access to ICT networks and services are critical, and particularly in times of disasters and realtime information on the type, the level and the quality of connectivity are important to identify connectivity gaps and to make decisions on where and when to deploy often limited financial human and physical resources. And so the objective of this session is to address possible ways to develop disaster connectivity maps that build on different sources and can provide live information on the ground when the disaster strikes.

And this breakout session will be taking place in this -- in this room. These will be more informal sessions and there will be no translation.

Then we have the second break out group that is on frameworks for -- on a framework for connectivity cooperation. While connectivity challenges arise during almost every disaster or emergency, each has its unique circumstances and obstacles to overcome, and the objective of this session is to come to a common understanding approach to reestablishing connectivity during a crisis, to enable well-meaning responders, including service providers, governments and other stakeholders to move quickly to restore connectivity when people are most in need.

Now, there's obvious a close link for these two issues. Buzz to restore connectivity and possibly on sharing connectivity they need to have information on their availability, the quality and reach of connectivity that is still available. And also where best to restore this connectivity.

What we are planning to do is we have these two breakout sessions. And on Friday, we will be presenting the results from these two breakout sessions. So in any case, you will be able to learn about and also comment on both of these sessions but today you will have to decide. So after the coffee break, either you stay in this room for the disaster connectivity maps or you go to the Barracuda Room which is two floors up and some people from conference will help you find that room. The Barracuda Room, it's close to the lobby for the hotel and the

results will be presented on Friday.

And then we have one more announcement on will table top exercise that we are all looking forward to tomorrow.

>> Thank you, Vanessa. Good afternoon, everyone. My name is Mike. I will be coordinating the table top exercise tomorrow afternoon. The simulation exercise. And I have a request for you, for your action this evening.

So what we would like you to do is to prepare for the exercise tomorrow. We would like you to read five documents about 20 minutes of your time this evening. If you could please do that, that would be fantastic. It would really make life a lot easier for you tomorrow. It will help you understand the situation and the scenario that you will work through if you are able to read them tonight. Its just five documents and that is the URL to get to the GET-19 website and I will show you what it looks like. You have to click on that Button on the right-hand side to find the five documents.

I have one other question for you, though. The question is please raise your hand if tomorrow you would prefer to have a printed copy of the presentation in French. The presentation on screen will be in English. If you would like a printed copy in French to work through, please raise your hand now.

Okay.

>> Keep your hands up. Hands up.

>> Okay. Okay. So we'll print about 15. So make sure we have spares. Thank you very much. That's it for me. And what time are they coming pack from the coffee break.

>> So the coffee break -- what time is it now? Okay. So if you could be back by 4:00 in this room or Barracuda for the second breakout session. Thank you very much.

(Applause).

(End of session)

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