UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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34TH REGULATORY INFORMATION CONFERENCE (RIC)

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TECHNICAL SESSION - TH30

THE FUTURE OF INCIDENT RESPONSE:

LEVERAGING TECHNOLOGY

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THURSDAY,

MARCH 10, 2022

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The Technical Session met via Video-Teleconference, at 10:30 a.m. EST, Clay Johnson, Deputy Director, Division of Preparedness and Response, NRC, presiding.

PRESENT:

CLAY JOHNSON, Deputy Director, Division of
	Preparedness and Response, NSIR/NRC

ELIZABETH (LIZ) WILLIFORD, Emergency Preparedness
	Manager, Southern Nuclear Company

VICTOR CUSUMANO, Chief, Technical Specifications
	Branch, Division of Safety Systems, NRR/NRC

CHRISTOPHER (CHRIS) VAUGHAN, Geospatial Information

     Officer, Federal Emergency Management Agency

FLORIAN BACIU, Response System Coordinator,

     Emergency Response Center, International

     Atomic Energy Agency

A-G-E-N-D-A

P R O C E E D I N G S

10:30 a.m.

MR. JOHNSON: A warm welcome to everyone
joining us for this RIC session on the Future of
Incident Response, Leveraging Technology. My name
is Clay Johnson. I'm the acting director for the
Division of Preparedness and Response.

Next slide please. Our agenda, each of
the presenters will give approximately a ten-minute
overview of their areas. We will have a Q&A session,
and everyone in the final session will be able to
stay on for a couple more minutes.

Next slide please. As an overview we've
all experienced amazing challenges in our lives and
our work over the last two years. This technical
session on the Future of Incident Response,
Leveraging Technology, allows our distinguished
panelists to share insights on how technology is now
used to support efforts to protect the health and
safety of the public from a wide variety of events.

Next slide. Our first panelist is Liz
Williford who is the Fleet Emergency Preparedness
Director for Southern Nuclear. She will be providing
perspectives on advancements in technology for

response centers in coordination with offsite response organizations.

Next slide, please. Our next panelist will be Vic Cusumano who is the Chief of the Technical Specifications Branch here at the NRC. Vic will be talking about the NRC experiences in leveraging technology.

Next slide. Chris Vaughn is the Geospatial Information Officer for the Federal Emergency Management Agency. And he will speak to advancing innovative technologies within the emergency management community.

Next slide. And our last panelist will be Mr. Florian Baciu, the Response System Coordinator, with the IAEA Incident and Emergency Center. And he will be speaking to the IAC developments for information sharing in nuclear or radiological emergencies.

So thank you all to the panelists. And now a warm welcome to Liz Williford.

MS. WILLIFORD: Thanks for the great introduction, Clay, I appreciate that.

Good morning, everybody. Thank you for the opportunity to present here today. I have a

really long title to this presentation. But really what I want to share is what Southern Nuclear has learned in the last couple of years during the pandemic and the advances we've made in technology. And really, the key takeaway is we can't go backwards from what we've learned.

Next slide. So again, this all started around COVID when we had, you know, these things we still had to do due to regulatory commitments, the communities, emergency preparedness. We didn't really stop. We just had to figure out how to do things differently. So out of necessity, we learned a lot. It was pretty difficult in the beginning, but I got some pretty interesting things to share with you that we learned.

Next slide. So, me personally, I'm not the most technologically advanced person. I am not really a doctor, and I can recall Microsoft Teams being rolled out to our company and saw the little icon. I thought that was cute. Well, I dialed into my bridge line and was very content with doing that and really wasn't interested in being on video or any of those type of things.

But fast forward, you know, probably a

year later the mentality completely changed. It's like why are we going to drive to go meet people face to face? Why would we be on a phone call and not be able to see the expressions on other people's faces? And we just, the shift was so quick, it was kind of remarkable.

And at Southern, there was about a 24-hour turnaround before we went from everybody in the office to completely virtual. So, it took a little lagging time to get up to speed with Teams. But I'll show you some of the things we learned there.

Next slide please. So Teams, you know, all the platforms that we have, Zoom has very similar things. Teams has it. And we just slowly, when you roll something out to the nuclear organizations it's almost like a new toy. So, everybody goes through and sees what they can find new in the system.

And one of the best things we discovered was during a couple of drills. We were trying to have two different conversations and somebody was dialed in to their phone, and somebody was on a computer watching one meeting and reading another meeting. So, this live transcription ability in these breakout rooms, it really, what we found, it

drove up our efficiencies and how we responded to different (inaudible).

We were able to, you know, everybody says that there's no such thing as multi-tasking. Well, I beg to differ. When you use Teams, you can go back, you can read things, you can share information for a ton of people all at one time, so great capabilities there with all these virtual platforms.

Next slide, please. So, what you can see here is how our fleet is laid out. You can see we're pretty spread out. And we have an EOF that supports three of our sites, soon to be four sites with Mobile 3 and 4.

In the past, we were developing drills by going to the sites and running simulators. We couldn't do that during the pandemic. You know, you couldn't really travel due to company policies, you know, different things like that. You couldn't find rental cars. So, we got creative out of necessity.

We used Go Pros to mirror images for these teams to catch what was going on in the simulators. So, you felt like you were really there. And one of the best things we found is that we could get our whole fleet to help create drills and look at

different things all at the same time versus traveling to one place. And you don't have that person there, so then you have to redo it again. So, all this geographical distance was collapsed. And we could all do something at the same time.

And another function of our Teams was able to record these sessions. We could go back, and if we missed something we could easily record it, and go back and see it again, and redo it. So, it really upped our efficiency. It saved us quite a bit of money on travel and time in the far end.

It's a six-hour trip from, you know, the corporate office to the Vogtle Office. So, it saved us tons of time on the road and really upped our efficiency in drill development. And we were able to get more people involved and the right people involved without having to take a lot of time traveling.

And that led us to start thinking about, you know, if I can do dose assessment in Birmingham from my house, you know, why couldn't I do it from Vogtle or Farley. And it presented this concept of a remote DRO which I'll talk about a little bit more later.

Next slide, please. So, shifting gears, the pictures you see here is our joint information center and how we assembled for our press conferences. So, what you'll notice in that first picture on the top left, if anybody can see that, that five out of seven people in that room are on a telephone talking to somebody outside of that room. And it's more than likely they're asking all the same questions to different people.

So, with this virtual workplace and this hybrid response, they can all be logged into a Teams meeting or a Zoom call. And then everybody can see the answers that the offsite see or that they asked us. And everybody can get the same answer at the same time. The information is so much faster that way and so much more clear.

Another thing we found by working this way, and getting rid of the brick and mortar, and going to the virtual, is you get a lot more engagements. We went back, and we looked at, like, our drill records and our critiques. And we were getting a lot more feedback and questions asked and answered in half the time. So, it's just a great lesson learned there.

And then you see in this bottom right corner, this is one of my favorite pictures. There's about ten people in the room, and seven of them are writing stuff down, taking notes, and only one or two are talking, the spokes-people for the drill.

Well, what do you think happens the moment they're done with the discussion? Everybody turns around and starts, hey, I missed this. What did you get?

So, with this live transcription it's all there. It's all written down. They can actually engage, and ask questions, and participate. And we got a lot more out of these virtual press conferences and joint information center drills than we did prior to the pandemic.

Next slide, please. And this is just another illustration of how we've shifted gears into -- we used have, you know, 50 people in a room. And we'd go back and forth, and people would be taking notes. And now you get the same amount of people, you still get to see them on camera and then, again, you have this ability to use a chat function.

So, you know, at times you have trouble getting a word in edgewise. Well, with this platform

and just like we're doing here, you have this function where, even if you run out of time, you can go back later and follow up and provide additional information. So, our efficiencies went up there as well.

Next slide, please. All right, as I mentioned before, you know, the way we were designing drills during the pandemic led us to think, hey, if I can do dose assessment in my house in Birmingham, why couldn't I do it if I were at the plant?

So, this augmented DRO that we expect to drive into the plant sites to support their drill, the timeliness of their response could be increased by, you know, at least an hour. In some cases, some of our plants it takes up to, you know, 70 minutes to drive from your home to the plant. And then you've got to setup.

But if I can pull out my laptop, you know, as soon as I get the notification of an emergency and start doing dose assessment immediately, it improves our response time immensely. You've got to work out some of the kinks with the communication and getting the right people on the right Teams meeting. But that's not anything we aren't doing every day.

So, we as an industry are working with NEI to pursue this further. Obviously not every function can be done remotely, but the ability to get the right people to respond at the right time, there's just endless possibilities there.

Next slide, please. Taking this a step further, we're working with our training department for both maintenance, technical training, and emergency response. So, if you look at this first picture, and if you advance the slide a little bit more, some other pictures will pop up.

But I was playing with my kids, virtual reality glasses, these Oculus things, and can actually tour the Chernobyl plant right now with these virtual reality glasses. So, our Maintenance Department's looking at, you know, functions they can do there. And I think the possibilities of what we could do in the emergency response space are just, you know, you can't put a top on it. I mean, you could keep going and going. We can't minimize the capabilities there.

Advance the slide, please. And one of the other things with not being able to do a lot of training in person and having small classroom sizes,

not being able to spread out like we otherwise would, we had our Alabama Power friends come up with this. They call it nuclear in a nutshell.

And what it is is just two or three-minute long videos talking about different segments of our emergency response in their training videos that you can watch at any time, anywhere. So, it keeps their proficiency up without having to sign up for a class or have multiple sessions of it. So, it's just another efficiency built into the way we learn during the pandemic.

But all these things, you know, are just, they were kind of out of necessity. And when we go forward at this point, there's no reason to go back. It just saves so much time and really opened our eyes up to the ability to respond to emergencies differently and remotely. And it's just really an exciting opportunity for us to continue to have better response, more timely response. And as a side, it helps save money and resources as well.

So that's all I have for my presentation. And the way this virtual meeting works, we get to introduce the next presenter. So I get to introduce Vic. And the way I want to do that is tell a joke

to Vic and see if he knows the answer to this.

So, Vic, what do you think's the most popular meal at our nuclear plants?

MR. CUSUMANO: Ham and cheese sandwich.

MS. WILLIFORD: Fission chips.

MR. CUSUMANO: Oh, my God. On that note, ha, ha, ha.

MS. WILLIFORD: Thank you all, appreciate it.

MR. CUSUMANO: I actually said ham and cheese because at one point I was talking to someone who did incident response. And that was the only meal they had for about three days during an event. That's all their contractor brought in.

So, Vic Cusumano, I'm a branch chief here at the NRC in tech specs. And for about six months last year I spent my time in our incident response organization trying to take a look at what we've seen, what we learned during the period in which the world shut down. And I had a lot of things that Liz just said. So, my presentation might be a little bit shorter.

One thing I wanted to point out is that it changes just how we are, right. For those of us

who've been around awhile, remember the only way you

used to do business correspondence was by mail. And

then Fed Ex came along, and answers were expected by

the next day. And then email, you know, if Clay

emails me something and I don't respond in a couple

of hours, he wonders if I'm even working.

So, things change all the time. The pace

has picked up a bit. But this is just life, right,

this is just how we change.

Next slide. So, in communications, that

phone on the left there is what was on my desk about

25 years ago. You had to be at your desk to use it.

But I'll tell you what, that's a much better speaker

phone than what's built into most of our phones today.

But you had to be at desk.

Then that pager thing came out, right.

And all of sudden you were expected to be reachable,

you know, anytime, anywhere. And it wasn't just for

doctors. I may or may not have thrown my pager off

the 59th Street Bridge driving to Manhattan one day.

But I knew I'd have to go look for another darn pay

phone somewhere.

But the last picture on there is where

we're at now. That screen on your phone, or on your

desk at work, or at home, is the way to get in touch. And, you know, like Liz was saying, we're probably not going to go completely backwards from this. There are just too many advantages.

Next slide. So, let's set you up for success here. That's a view of our emergency response center which some of you will get a virtual tour of, if you haven't already.

The timing worked for us. I'll take credit and say it was great planning on the part of the NRC and there might have been a little bit of luck involved. But before COVID came upon, we transitioned from a fairly rigid, wall in, not very scalable, but very location-centric incident response program which was working fine for us.

But we transitioned to one that better matched the National Incident Response Center which turned out to be more scalable, more role focused rather than location focused. And it turned out it lent itself much better to incorporating remote responders. So, we were fortunate in that way.

And Dave Nelson, our CIO, got a major pat on the back from the Chairman in this plenary that, you know, a few months before we locked down, he took

all our desktop computers away and replaced them with laptops. So on, I think it was March 17th, we were all able to pick up our computers and go home. And most of us didn't miss a beat.

So, you've got to think ahead. If you think that the way things are today is the way things are going to be tomorrow, A, you're missing an opportunity and, B, you're setting yourself up for failure. So be prepared and hopefully preparation breeds luck.

Next slide. So, we did a couple of things. We looked internally to what were our experiences here at the NRC. And then a few of us, myself included, reached out to the rest of the world to see how they did. And that's how I met Chris and I met Liz, was through some of that outreach.

Our experience was pretty good. I mean, like I said, we didn't miss a beat and conducted more exercises than we normally would have during that timeframe and actually responded to one weather event on the Gulf Coast. We used the same tools you did. I mean, we started out with Skype and transitioned to Teams.

And like Liz said, the tools, it's like

having a new toy. I've just discovered the white

board feature. We're having a good time with that.

I've got to keep the people in my branch from drawing

silly pictures on it, but that's an aside.

So we met with our internal stakeholders

in the regions, and got best practices, and heard a

lot of common themes. And one of the most important

was incident response -- is the one thing we have to

get right. There's not a lot of wiggle room there.

So, we have to be very cautious about how we embrace

new technologies. You want to be able to take

advantage of the good bits but not put your core

mission at risk. So, we'll talk a little bit about

that. And then we looked external to the Agency.

Next slide. We benchmarked ourselves

against other international regulators. I really

want to thank the other folks at IAEA for providing

us a lot of their experiences in writing, and to IRSN

for taking a lot of time to talk with us about what

they saw in France during their extended quarantine

periods.

Other federal agencies, you know, FEMA,

Homeland Security, EPA, all shared with us their

experiences. And they were different in a lot of

ways than ours. And we'll talk about why in a second. And other state and local regulators, Montgomery County here in Maryland, Fairfax County in neighboring Virginia, the state of Maryland's Emergency Response Organization, all participated in sharing information with us.

And then in the industry side, I got information from the New York City Emergency Response 911 folks. We reached out to Duke, we reached out to Liz at Southern, and heard from the SAFER folks, the ones who run the shared parts inventory system here in the US that a lot of the nuclear plants use, as well as running the FLEX warehouses in two locations in the US where they keep generators, pumps, and all that stuff that can be shipped to wherever it is in need should there be a real emergency. And they shared their responses.

The biggest takeaway from all of this was, though, your tolerance for how much you can incorporate remote response into your organization is going to vary tremendously with your mission. As an example, Chris in FEMA, you know, their mission is a lot more boots on the ground, command and control, let's get this thing done, than the NRC.

So, their tolerance for remote response, I'm expecting you're going to hear, is a little bit less than ours. But most, not all, but most of our mission during an incident would be oversight, communications, things like that where it does lend itself a little bit more readily to remote incident response. So, the mission matters.

So, what did we find here? Next slide. We were able to accomplish most of what we needed to do. And most of these things fell into pretty much four categories. We found, like Liz did, that much of our work can be done remotely.

We do want to caveat that with just because you can do a thing doesn't mean you should do that thing. But in our case, we found that, you know, we could do it. And in some cases, the thing we were trying to accomplish, you know what, remote performance of that task was the best way. And I'll give you an example of that in a little bit.

But then we found that there were some things that were better done in person. If you had your choice, being there in an emergency response center with your fellow responders was the preferable way to do something.

And the fourth category of things we found were some things we're doing in person in one of our pre-stage emergency response centers was the only way to do it. And we'll talk a little bit about those two categories.

So next slide. Where do we find emergency response to be preferable? What did it buy us? Liz did a good job describing how it worked at her organization. And I think our experiences were similar. It expanded the pool of people we have to respond. And we were able to get the right people with the right expertise, regardless of where they were, online pretty much immediately.

You know, we have geographic diversity already here at the NRC between headquarters and the four regions. But we have more full-time teleworkers than we had before. And that number might grow over the next few years. We now have people in San Francisco, we have people at places we don't have a regional office. And those people might be in a time zone that makes more sense to support an event. We might have expertise we don't have elsewhere.

So, for those folks listening that are, you know, working at the NRC, if you know something

that we need to know about during an event we are going to find you. We might get you out of bed. But we have the ability to do that now where we didn't easily do it before.

Taking commuting out of the question, I'm very happy not to spend as much time on the DC beltway as I used to. But from a practical point of view, taking commuting out of the equation for a lot of folks, at least here in the DC Metro area, that takes an hour to two hours off of your report time for an incident.

That might allow us to go to shorter shifts, and do other things, or split some of your time in a response center, some at home, and that might allow us to have a more sustainable response over the long term.

You know, we were active for a long time during Fukushima. That wears on staff. And having the flexibility to do it a different way might increase our sustainability of response.

One of the things we found actually did work better was document creation. And we do a lot of reports during an exercise and an event. We actually found that using Teams and SharePoint in One

Drive, and having the three or four authors of the document editing that in real time on a screen, talking to each other about it, we were able to produce paperwork a lot quicker than sharing Word documents in email. So that was just a much better way to do it.

So, some things work better, and some people mentally like that environment better. They might not speak up in person in a big room, but they're much more willing to share their knowledge in a Teams environment in a chat. So, the personalities matter as well. You have to think about the people side of your equation.

So next slide. Where is in person or being in a staged center the better way to go? Well, the first thing is just having redundant, robust power systems and communication systems, if this is the one thing we have to get right, there is a lot of sense in having at least a portion of your response in a protected environment where you've got those redundant, robust power systems and communication systems.

You know, personal experience, during one of our weeks where we had a couple of drills going

on, that week I lost power and phones from my house
twice for hours at a time. That's a challenge,
depending on your role in the organization. So
having some sort of a protected systems environment
is important.

Some of our events and some portions of
our events require access to classified systems,
classified communications. If you have a security
event, you're going to be using classified equipment,
classified communication systems. Most of us don't
have those in our basements at home. So, there are
things where you're going to need that protected
environment where you've got a SCIF, for example.

And Liz alluded to this, I think she
didn't mention it, but on one of her slides how much
of communications is visual. And that rich in-person
communication face to face is important when you have
those high trust conversations.

Briefings are sometimes better done in
person. Prepping senior leadership for briefings
external to our Agency is sometimes better done in
person. Situational awareness, being able to look
out across a room and see, you know, which part of
your team looks really excited and go find out why,

right.

We were able to do some of that by dropping in on Teams chat rooms. And I did use the live transcription so I could listen to one and read another. And that alleviated some of what we've lost by being together, but not all of it. So, I just want to moderate that a little bit.

And the last thing I heard as a common theme, from talking to folks inside and outside our organization, was some of our training is better done in person. Now, some of our training is better done not in person. Because you can reach more people.

Some of it can be asynchronous in time with small nuclear nuggets that we were talking about earlier. Those are great. But some of it does work better when you've got someone standing over your shoulder, you know, pointing at the screen and telling you, no, this isn't what you need to do right here.

And just one sort of funny thing, when I was talking to our folks that manage the SAFER organization and the Flex Warehouse, they have all those backup diesel generators and everything. They did remind me that virtual oil changes are really

hard to do. Some things you just have to be there.

So next slide. So just in closing, I agree that we can't go back, but we have to go forward smart. There is no one right answer. We can't be rigid about this. The future's going to be some sort of a hybrid response organization to get the benefits of both and mitigate the risks that both have.

But we have to recognize that even though some of our positions in our response organization might be better suited to an in-person, being there in person, that's going to vary with the nature of the event.

You know, if you've got a security related event at one of your nuclear plants, the information traffic's taking mostly classified. That's going to drive you to a much larger in-person share of the response than for a very slow developing weather event, you know, coming in on the Gulf Coast where the right answer might be an almost completely virtual response, at least in the beginning.

So, let's be smart about this. Let's recognize the advantages but also recognize that things are going to change with the type of event, the complexity of the event, and even where you are

in the event. And it's okay to ramp up an in-person response when things get crazy and then ramp it back down and go virtual again, or more virtual.

So, if I had one message to leave, there is no one size fits all, and we have to think and be smart about how we do this. That's what I heard from our organization and yours. So, with that, I would love to hear what Chris has to tell us about how things went with FEMA, and no joke, Chris, sorry.

MR. VAUGHAN: No. Thanks, Vic. I'm sitting here wracking my brain, what am I going to tell Florian. Florian's after me. So, let's see if we can at least set a good precedent here. So, thanks so much.

So first of all, thank you very much for inviting me to be a part of this esteemed panel. I've learned a lot just in preparation for this presentation. So, it's great to be with you all today. I'm going to try to bridge a little bit of what Liz and Vic have just talked about and then also add a little bit about what we do from an all-hazards approach.

And so I concur with my two previous colleagues, a lot had changed. In my role at FEMA,

I primarily support, when we activate, I support something called the National Response Coordination Center. And I've been through a number of activations, you know, things like the Presidential inauguration. We did that virtual.

And a lot of what I saw happen is, actually, it broke down so many barriers. You could argue that this is a disadvantaged COMS environment, disadvantage communications environment, one when everybody is disadvantaged. And everybody is sitting in their, you know, their house or their virtual workspace. It really forces people to use the same similar communication platforms.

And in fact, I would argue that it increased our knowledge management, right, so you hear Liz and Vic talk about, you know, we used to mail correspondence. And then we sort of moved into the era of email and there were timeframes.

Well, what I'm seeing, especially when we activate for large scale hurricanes, is those chat sessions, those Teams environments, whether you are technology agnostic, Zoom, Amazon Chime, whatever, there's this flow of information that is occurring.

And I think that next revolution that we

are going to actually start to see is what people just started talking about, of capturing that knowledge that's passed verbally. Now it's passed in a text. And technology is such, and it will be such in the very near future, where that information is stored and curated in a way that becomes actionable.

So let me talk a little bit about that from my perspective. So once again, my background at FEMA, I've been here for about 13 years, is as the Geospatial Information Officer.

Next slide, please. And what we do, and my team in particular, is to help support decision makers in understanding the size, scope, and extent of a disaster. And so a lot of this stuff we do is actually virtual. It's remote. We actually, really, one of our primary things is remote sensing.

And so this is a good example of a plane flying over. This could be a plane, this could be satellite, where you're literally, quintessentially, this term remotely sensing the environment. And so during things like -- this is an example from Kentucky, Kentucky tornadoes that just occurred this past December -- we can fly a plane over post incident

and measure the level of impact to an environment very, very quickly.

And in fact, one could argue that we can do this, not in replacement of the ground responders, but we can really get a very comprehensive understanding of impact by how many structures were impacted; how many government buildings were impacted; how many nursing homes, schools, hospitals, all of those things can be assessed virtually.

And I would argue that these last two years, due to COVID, really pushed that agenda. So not only is our communications changing on how we communicate with each other, but also the way that we perform our assessments, and the way that we, you know, understand an incident as it unfolds.

So, I'm going to speak a lot today about an all-hazards approach to emergency response. Please keep in mind, you know, thankfully we don't have nuclear power plants melting down often, thankfully, right. And that's the good thing.

But you can take the same concept of an all-hazards approach, whether it's a tornado, hurricane, flood, Zombie apocalypse, nuclear power plant situation, and follow the same all hazards

approach. You get to the same crisis decision, answers that, you know, chances are it's going to be the exact same questions that senior leadership is going to need to know immediately following an incident. So that's where I'm coming from today.

So next slide. All right, so here's a good example of how we do what we do, right. So once again, the hazard, flood, hurricane, tornado, nuclear (inaudible) man-made.

We spend a lot of our time actually curating data. So, a lot of our data we have, a new product that we're actually, we're about to release. It's called USA Structures. It's a data set that encompasses the entire continent of the United States and all of our territories. And it does identify the, you know, those key elements, that key infrastructure such as police stations, fire stations, nursing homes, government buildings.

And then we model our impacts on that. So, there's a number of ways for us to do incident awareness and assessments, to estimate the level of impact, and then we actually use a number of remote sensing, I talked about that a little bit, remotely set sources such as UAS, our managerial systems which

should be a great capability.

If a power plant goes down, you can send a UAS in versus having to send in a manned aircraft and exposing that pilot to potential radiation. So that's a great example of where UAS will be perfect in this kind of situation.

Another good example of a real world situation that we had not that long ago, about a year and half ago, two years, there was a volcano explosion in Hawaii. And we actually primarily used UAS, the heat, the duration, we needed to monitor the flow of that volcano. UAS was a perfect solution for that.

So, we use a mix of remotely controlled technologies with a mix of sensors on them to understand and extract relevant information. I mean, we also have a large crowd sourcing campaign that we often use and leverage.

So once again, this whole concept of virtual, you know, I can use folks in Kansas, I can use folks in South Dakota, I can use folks in upstate New York to help us virtually assess damages or sift through this mountain of information that is occurring all around us.

And so we use crowd sourcing technologies

to curate information as well as to assess damages from all of this information, both open reports as well as imagery that's collected. And then we spend a lot of time actually curating or working on our applications to disseminate this information.

And I would argue that, you know, the world around us is changing. Primarily my role has been in what is called GIS, the Geographic Information System. But things are starting to change where, you know, you're getting more data analytics, data science, and trying to show the compilation of all of that.

And so a lot of folks coming out of undergrad or grad school today are statisticians, economists, mathematicians, you know. And that's really a lot of the foundations of artificial intelligence. So not to throw so many buzz words into this conversation, but you're hearing it from my colleagues, my fellow panelists. Information is all around us.

Capturing that information, sharing that information, pulling in these live, real-time sensors and feeds equals the need for better technology, such as artificial intelligence, to help pull it all

together, pull the streams, and identify and generate new insights to help senior leaders make relevant decisions.

And so we also spend a lot of time curating and reporting out things through infographics and, you know, very curated reports to make sure that leaders can make a decision based on the most relevant information.

And then we also spend a lot of time pushing for information for mobile applications. A good example of that would be the RadResponder network. You know, there's mechanisms to pull information in through live data streams but also to report information that's through mobile apps. And for us, it's all in the name of supporting a disaster survivor.

And two of my colleagues just talked about reducing time, reducing complexity, enhance the situation awareness. All of these things are happening, and they're only getting better.

All right, next slide. So, I talked a lot about this already. I'm going to breeze through this slide very quickly. But, you know, for us this all-hazard approach really follows, you know, what's

the steady state situation, how do we bring in disaster models, crowd sourcing imagery?

We have a number of crisis management systems. You heard us talk about it, whether it's WebEOC or other types of crisis content management systems. And how do you pull that information from mobile applications and support the first responders?

So, our search and rescue teams, you know, deploy out immediately. Vic talked about, you know, ground response. There is still a big need for ground response in the initial stages of an incident. How do we get that information from those boots on the ground?

In addition, how do we push all this information from remote sensing and modeling to those first responders to offset or reduce the amount of physical presence that they needed to, you know, fast forward that information that was shared.

Well, we've got ways to do that. And to us, it all focuses and curates back to a structure-by-structure assessment. So whether the model is assessing the individual structure of what we think a likely impact is to that structure, hospital, fire station, nursing home, as a result of a nuclear

explosion, you know, or how do we assess that virtually from a remote sensing perspective or, if need be, from a ground-based perspective from a search and rescue operator in the field with a mobile app, all of it is in the name of knowledge management and sharing that information in real time as fast as possible -- as accurate as possible and as fast as possible.

Next slide. Here is a good example of what I just talked about, how we do that, once again, this thing called USA Structures. All of this information that we're collecting actually, in fact, fuses back to this individual Structure.

So, what I mean by that is a home, a residence, a nursing home, a government institute. You know, if 15 people are looking at the same nursing home and assessing it from their own programmatic view, our way to fuse all that is back at this USA Structure level.

And so we're building out these tools, these capabilities to help fuse this information, have that very granular information, almost in real time, to then report back up, report stash forward to utilization (inaudible). We do that deeper dive

analytic assessment immediately following.

Next slide. Can't get better than this, right. So, here's a good example of how all this fuses together with the President of the United States looking at one of our products. He's actually pointing at USA Structures. This was, I think, two days after the tornadoes affected Kentucky. And so we know the level of impact to residential structures, commercial structures, government structures, fire stations, nursing homes.

And you can imagine, if you will, this same similar thing, you know, from an all-hazards perspective could occur as a result of a nuclear situation, all right. So you're talking about clue modeling. And you could intersect all that rich detail from a model perspective, maybe fly and validate that with remote sensing imagery or ground-based damage assessments from mobile applications.

Next slide. And it's really the fusion of this information that generates additional insights such as socially vulnerable information. What's the power outages in the area? What's the hazard exposure? You know, where do I really need to prioritize my response? And the way we do that

is a (inaudible) ranking system. And that helps us prioritize limited resources such as commodities, water bottles, tarps, infant and toddler kits, meals ready to eat. So, we take this information to make actual decisions on resource deployments.

Next slide. All right, next slide, please. Yes, I briefly mentioned the idea of artificial intelligence. So, this is really where the world of geospatial technologies are starting to really, you know, hit this zenith. And it's really a compilation of imagery, Cloud technologies, this advanced modeling, deep learning, machine learning kind of concept where you can -- you know, for Hurricane Ida in particular, we used all this high-resolution imagery following Hurricane Ida.

And I believe we assessed over 600,000 structures within an hour. That's the scale and the speed at which we're able to do these kinds of things now. So, I think, you know, in the terms of an NRC kind of incident response, very, very quickly being able to identify impacts, very quickly, and being able to fuse that and generate that insight to senior leaders in a very rapid fashion.

Next slide. I've talked already briefly

about UAS, once again using that all hazards approach. These are tools and technologies that we use on a routine basis. This is a good example of UAS being flown following the Surfside (FL) structural collapse.

And so we were able to measure all your metrics. We were able to monitor change over time as they were extracting debris and rubble from the collapse of this apartment building. We were able to measure the volume of the debris and how quickly we were able to make progress to search for survivors.

Next slide. I'm going to start skipping through this. I've gone a little over time. And I don't want to take up any more time away from my colleagues. Next slide, please. Artificial intelligence, we talked about that, rapid assessment through all these technologies.

Next slide. I think I sent the extended version of this presentation to Sally. So next slide. Let's get through this. Holy Cow. Keep going. Next slide, next slide. I am looking for my wrap up.

All right, here we go. Hopefully this is my last one. So, we really are trying to, you

know, there's a lot of information, a lot of data that we're curating. Really, we're trying to shoot for a ten-second product.

So, wrapping all this up, fusing all this information, what's the impact, what's the social vulnerability, what's the type of population that was impacted, trying to present this to our senior leadership in a product that they can understand, in ten seconds or less, what we're trying to convey. That's our goal. That's what we're trying to shoot for.

So, with that, I'm going to actually stop it, I think that's good enough for today, and turn it over to my colleague, Florian. I'm going to follow Vic. I do have a joke, but I'm going to save it. It's a terrible, bad joke. I'm a Dad. I've got a bad, bad joke in my head. But I'm going to pass it over to Florian and get off the stage. Thank you.

MR. BACIU: Thank you, Chris. We go straight forward into this presentation. What I want to tell you a bit, some of our IT products, the breadcrumbs which we develop to stay in contact with our counterpart and to allow them to feed us with information.

And also, again, maybe I'll say a few words about how we were doing in the last year or so with all this involving of the technologies in what we do with the training, with the (inaudible) like you guys were presenting a bit before on your work.

My name is Florian Baciu. I'm the Response System Coordinator in the Incident Emergency Centre in the Agency. And we'll get you quickly, I hope, to this.

Next slide, please. I want to, as I said, talk a bit about these tools which we have developed, a base of work of it, and about these tools using all these acronyms. I hope that we can go quickly through it and give you a quick image on what we are trying to achieve with this.

Next slide, please. We are basing our work here on the international conventions, basically the two very important convention information for the notification of (inaudible) for assistance in case of a nuclear accident or a radiological emergency.

We also have to take care about the (inaudible) of the Agency and, of course, you have the operating (inaudible) of safety standards and arrangements which are binding for us in our work and

also binding for our counterparts.

We work with more than 400 organizations directing in our response work. But also we work internally here in the Agency with a large number of people from all the departments. And we try to be prepared and be able to respond all the time.

And I'm just going to say about our roles. We have roles both in preparedness in EPR and in Response. I don't insist otherwise on the preparedness where we need to build capacity, (inaudible) capacity for EPR and for implementing these standards. I'll just talk a bit from these roles in the Response.

Next slide, please. We have to deal basically with the fuel, a few things, the notification and the information exchange when the emergency hits, taking care of public communications. There's a (inaudible) to perform this.

We need to do also assessment and prognosis. That's a task which we got after Fukushima basically, to cover it with an opinion, to counter, if you wish, our judgement of the situation based on our standards and based on how we see these standards being implemented.

We need also to care for assistance
matters when assistance is required. We need to have
a process, and we need to have the resources in place
to deliver this.

And finally, we need to have this, what
we call inter-agency coordination where we work with
many UN agencies and try to come to a common language
and to the synergies on these things.

Next slide, please. The first two which
we strongly use and which we invest a lot in this
thing, we were looking many years ago at some
solutions with advantages. And these advantages,
like for instance, WebEOC and other things.

And we choose to develop our own path.
We choose to go forward and have this platform for
communications based on functions, and roles, and
based on standard forms which are available to our
counterparts.

The platform is very strong. And we keep
it robust in terms of (inaudible), in terms of the
security of information. And it allows our
counterparts to start communicating and to share
their information. This is called the Unified System
for Incident Information Exchange in Incident

Emergencies. And it's our main communication tool.

We have, next slide, please, a tool which is important in supporting these communications. And it's about the monitoring data. We collect monitoring data from existing member states. And we reference this monitoring data through what we call, for instance, the Operational Dimension Levels.

And this will give a very quick image on what is the situation on the ground in terms of, you know, the need to implement or not the certain protective actions. And so when we are --- we are collecting a lot from Europe. We've got data from Japan, US, Canada, but of course we need to do more to collect data from all other existing records. We don't build networks and monitor systems. We just collect from our counterparts this data. That's the monitoring part.

The next slide, please. For the assistance tools, we are using both our unified system, for instance, emergencies. And the RANET mechanism and concept we have developed, Response and Assistance Network. And up to now we have 37 member states telling us how they could possibly help.

We organized this information. And all

the systems on the UC we can collect requests for assistance, offer up assistance. We are matching these things, and we are able to dispatch all resources and also, of course, there are resources in member states.

We have a very scaled process for this. And we were -- maybe in the last decade we had a couple of cases per year or so on average, but we need to deploy missions, for instance, to give medical advice or missions to look for screening of radiation or to recover radiation services.

And actually, just last year we were kind of, laboring our first, if you wish, 100 percent neutral mission of assistance by giving, for instance, medical advice in a case where, in Thailand there were a couple of individuals which were exposed in a research facility.

The mission was of that nature that we could document and have the medical doctors looking at all the facts and then being able to come with this very, very, good medical advice. So that was the assistance.

Next slide, please. Assessment and prognosis tools, we have put together a manual to

deliver this, to tell our counterparts how we do the process here so that they are well understood, and we can be well supported. And we are running exercises for this with them.

And, next slide please, we have developed certain, what they call tools to do this. For instance, it's very, very important to use this reactor assessment tool. We have, of course, even accessed our counterparts to use this and to go for the various type of reactors, going from the known conditions to be able to say what is the status of the critical safety functions, for instance.

And based on the information from the counterpart and knowing that collaborator will report on what is the status summary, what is the known information about the facility and what is our brief assessment, saying that our assessment is we see that, for instance, actions taken are in line with, say, the safety standards of the Agency and are corresponding to the necessities of the response, the phases.

So these tools are important. We have those for, for instance, reactor assessment but also for public information, also some tools to orient the

response of, say, the nuclear security specialist.

All these are available, and they are used by our counterparts a lot. And they give a good perspective on what are we aiming. And they would know what is the information expected on their side for us, then, be able to fulfill this.

Next slide, please. We have a tool which is called EPRIMS, Emergency Preparedness, Information Management System. It's a strong tool allowing our counterparts, the member states, to self-assess where they are in terms of EPR and then allowing us to see where the needs are in terms of technical cooperation projects and assistance activities on how we can enhance the capabilities in EPR based on their self-assessment, and then based on missions which they deployed.

We have this (inaudible) missions which are to evaluate what is best practice of implementing the various criterias and the safety standard. And again, these would all allow us and them to have a good orientational record of priorities in terms of helping.

Now, the next slide I just want to say a few words about how we are internally training. Our

system, we have in the last (inaudible) the Incident

Emergency Center in the Agency. And this is just the

nucleus of what we call the Instant Emergency System.

We have a few hundred people which are

trained to response on the various functions,

everything by the plan and everything by the

procedures. And we were very active in this during

the pandemic in the last couple of years. We're

keeping this system working as we had to come up with

a number of tools allowing for the remote training

and the remote participation.

They got an internal home page where

people have access all the time to this information.

They can take sessions independently from remote to

refresh their knowledge. And we are mixing this also

with sessions of training and exercises in present.

So, we combine these things.

And just to mention a few words at the

end about the training, next slide, please, it's

about a strong transition from entirely an in-person

approach to a blended learning approach where we have

these sessions by the trainers in a virtual

environment.

So, we are putting also this pre-class

assignments, small group sessions to practice, also in-person. Then we are using intensively the Teams and the WebEx environments to carry on with our lectures. We also do a lot of tools to keep the Teams dynamic, you know, with the slides and other types of platforms, and also a lot of eLearning and how to do Windows which are available to our staff members to keep them active on the other training program.

We also embed this in what we call -- we have a management system for the learning and discounts for each of the individuals in their, you know, evaluations and PBRs. It allows them to follow the progress and allows us to recognize this progress.

And we continue to take very much care of the rules also of the COVID, of the pandemic. So, in all our in-person sessions, you know, the use of the mask, the assigned seating, and all these things we had to very carefully take care. Because people see our vulnerability here, you know, in some training or exercise this week would affect other people. Then we will lose that capacity to some extent. So, we were very careful about this.

And, of course, we went to see how we can really work from remote, the remote access for the IES responders, you know, taking care of all the security and the security of information. And this is done, of course, with the IT support. And we have done good progress in trying to use the tools from remote and assemble the Teams, you know, combined with some people working from remote and some people working from here in person.

That's what I wanted to share with you. With this, yes, thanks and back to you, Clay, thanks.

MR. JOHNSON: Thank you so much. And a big shout out to all the presenters, very insightful, very informative. You know, I got a couple of nuggets that I can use for the future. So, thank you for that.

We're going to shift into some Q and As. And I would like to start with a question for Liz. How do you deal with common mode failure in case of a cyber attack?

MS. WILLIFORD: Yes. Thanks, Clay. That's a really good question. I like that question a lot. So, I mentioned during my presentation, we're working with NEI with Charlotte Shields. We're

writing a white paper about the remote ERO and that's a common question. You know, what if your Internet fails? What if your platform fails or there's something wrong there?

And really, the answer is pretty simple if you think about just nuclear power in general. You're always going to have a backup. You're always going to have a comp measure available in case something goes down. So even back when we had fax machines, you know, there's a failure there that's possible. So, what's your backup to communicate in that case?

So, there's a lot of different options. You know, we can always -- I suspect we'll maintain bridge lines for a redundant, independent communication method. And in the case of remote response, if your network goes down, you always have the option to go back to the regular augmentation and drive it into the plants.

One thing we've also thrown out there within our fleet, you know, right now we have three sites operating reactors. Well, the likelihood of an event happening at all three sites at the same time is relatively low. So, at each site, you have

personnel available to respond remotely with a pretty strong infrastructure there in communication, and backup diesels, and things like that.

So, there's a lot of different options to take their backup measures to have it communicate with -- just like any technology, we'll have a backup and a backup to the backup. So, there's a lot to be done there. But we're working through that with the industry and the NRC. Ray Hoffman and Jesse Kegashive (inaudible) have been very helpful in working with that and coming up with a viable option for comp measures.

MR. JOHNSON: Wonderful, thank you for that. Vic, I have questions for you. Does the NRC have minimal requirements or minimum capabilities for remote responders? You're on mute.

MR. CUSUMANO: Okay, somebody had to do it, it had to be me. I'm not aware of any minimum requirements for remote response. I think we're being flexible right now in matching what we have to do with what we can do. I think that's something we are sorting out.

And one of the things I've worked on for the last six months while I was working with Clay was

what does that remote response look like and how much of it should we plan to be doing. You know, what's the capacity we need to think about for an emergency response center? It's probably not going to be 100 percent. So, I don't know if there will be a minimum, but I think rather than a capacity it might be more a minimum in performance.

MR. JOHNSON: Thank you, Vic. And Chris, let's see. Are there any remote communications platforms that permit encrypted messages?

MR. VAUGHAN: Well, so that's out of my lane. I'm sorry, I don't know the answer to that one. Great question. We do have a whole group dedicated to disaster emergency communications, you know, specially degraded COMS environment. Especially after a tornado or a hurricane goes through, we'll deploy in our own communication packages. So, I would have to defer to them for that great question. But, yes, out of my lane. Thank you.

MR. JOHNSON: Thank you. Florian, a question came your way. How do you manage all the connections with so many types of technologies used

by all the member states?

MR. BACIU: Well, we reached our arrangements, and we have, you know, probably these arrangements, we are running annual workshops where we invite a lot of counterparts. And we try to stick to the book. We say look, we've got many communication channels.

The strongest is this website of ours which is secured. And by the way, relating to the previous questions for encryption, we have set up portions of our system to handle encrypted information, both in transport and in storage. And South Pacific users would have access to this area where information is encrypted.

But coming back and setting the arrangements, our exercising, practicing the arrangements and doing them, guys, whatever you have there at your end, then we like to promote and to use these arrangements and these channels of ours. So, try to accommodate and have your input in our system to whatever internal arrangement you may have so that they can keep all the communications.

MR. JOHNSON: Thank you for that. Let's see, Chris, I believe I have an easy one for you.

How did you transition from your university Bachelor of Arts to this role in FEMA?

MR. VAUGHAN: Somebody's doing some digging. No, that's good. Yes, so I have a Bachelor's in Sociology and a Master's in Counseling Psychology. How the heck did I get into all this technology stuff?

Well, it's actually because of the military. So, the military, I ended up in the intel field, intel career. From the military, then that transitioned into, you know, roles within the intelligence community. But I had a natural affinity for disaster response.

So, it's actually kind of a perfect world for me. I lean techie, you know, I love kind of trying to figure out how technology can support crisis decision making and then ultimately, you know, for disaster survivor outcomes. And so, it's just kind of a perfect blend.

And then also I would have to say a lot of this stuff, when I was going through college, you know, the technology just wasn't even close to where it's at today. So, there's a lot more folks coming out of undergrad and graduate programs that have a

lot more exposure and academic prowess than I do on the technology side.

But it's, you know, it's got to take a blended approach to make sure that the decision makers know what the techies are saying. So, I feel like I'm walking in two separate worlds. But, yes, somebody's doing their LinkedIn homework. Ha, ha, ha.

MR. JOHNSON: Well, thank you for that. Thank you. Vic, another one for you. Does the NRC have difficulty finding the right technology that meets your needs and is interoperable?

MR. CUSUMANO: I think I'm going to go with --- the short answer is no. One thing we learned during the last couple of years is that our OCIO, the Chief Information Officer and his team, think ahead. They're plugged into what we need.

I really haven=t found anything to be lacking over the last couple of years that they didn't resolve really quickly or had already been working on by the time we raised it. So no, I think we're good.

MR. JOHNSON: Thank you. And just to be responsive to the earlier question, I was informed on the side that Signal, Teams, and Zoom can all support

encrypted communications, so anybody who was wondering. I didn't know that either.

Let's see, Liz, we do have another one for you. Do you know what the most unpopular entree is at nuclear plants?

MS. WILLIFORD: I do not know that.

MR. JOHNSON: Patty Melt Down. Ha, ha, ha.

MS. WILLIFORD: That's pretty bad.

MR. JOHNSON: Yes, they are bad. Let's see, well, it looks like we're running out of questions. No more coming in.

So, Chris, I guess the last one goes to you. With all of your data collection, with all of your remote sensing, do you run into bandwidth problems, especially in disaster areas?

MR. VAUGHAN: Absolutely, without question. When you start talking about imagery, just imagery alone, you're in the gigs if not terabytes, you know. The data we collect can be very intensive. A good example of that is we did -- one of the data types that we have LIDAR, light detection ranging. It's very heavy in terms of data processing.

But I would say that that's really where

the advantage of Cloud compute technologies has advanced the state of the art in all of this. And so, you know, you can take imagery, or LIDAR, or other kinds of sensor technologies from a plane, fly it to the next closest node that allows you to upload to your Cloud provider of choice, let the Cloud do the heavy processing.

And honestly, that's when I get back to the slide that I, you know, presented. You know, we're trying to present a lot of information, contextualized information, into a product that a senior leader or leaders plural can take advantage of all of that really heavy backend processing data collection, right.

And so, the outcome is the answer not the process or the authority raw data. So, a lot of our time is spent trying to enhance the efficiencies in the workflow and the processing of that really heavy stuff. But we wouldn't be anywhere today if it weren't for Cloud compute technologies.

MR. JOHNSON: Thank you for that answer. And a big thank you to all of you for your participation, for your insights, and for sharing this wealth of knowledge. There's a lot of useful

information here, so a shout out and a thank you.

And I believe that ends our session.

(Whereupon, the above-entitled matter went off the record at 11:43 a.m.)