

**USING INNOVATIVE TECHNOLOGY AND PRACTICES  
TO ENHANCE THE CULTURE OF PREPAREDNESS**

---

---

**HEARING**

BEFORE THE

**SUBCOMMITTEE ON  
EMERGENCY PREPAREDNESS,  
RESPONSE, AND  
COMMUNICATIONS**

OF THE

**COMMITTEE ON HOMELAND SECURITY  
HOUSE OF REPRESENTATIVES**

ONE HUNDRED FIFTEENTH CONGRESS

SECOND SESSION

JULY 25, 2018

**Serial No. 115-74**

Printed for the use of the Committee on Homeland Security



Available via the World Wide Web: <http://www.govinfo.gov>

U.S. GOVERNMENT PUBLISHING OFFICE

34-350 PDF

WASHINGTON : 2019

COMMITTEE ON HOMELAND SECURITY

MICHAEL T. MCCAUL, Texas, *Chairman*

LAMAR SMITH, Texas	BENNIE G. THOMPSON, Mississippi
PETER T. KING, New York	SHEILA JACKSON LEE, Texas
MIKE ROGERS, Alabama	JAMES R. LANGEVIN, Rhode Island
LOU BARLETTA, Pennsylvania	CEDRIC L. RICHMOND, Louisiana
SCOTT PERRY, Pennsylvania	WILLIAM R. KEATING, Massachusetts
JOHN KATKO, New York	DONALD M. PAYNE, JR., New Jersey
WILL HURD, Texas	FILEMON VELA, Texas
MARTHA MCSALLY, Arizona	BONNIE WATSON COLEMAN, New Jersey
JOHN RATCLIFFE, Texas	KATHLEEN M. RICE, New York
DANIEL M. DONOVAN, JR., New York	J. LUIS CORREA, California
MIKE GALLAGHER, Wisconsin	VAL BUTLER DEMINGS, Florida
CLAY HIGGINS, Louisiana	NANETTE DIAZ BARRAGÁN, California
THOMAS A. GARRETT, JR., Virginia	
BRIAN K. FITZPATRICK, Pennsylvania	
RON ESTES, Kansas	
DON BACON, Nebraska	
DEBBIE LESKO, Arizona	

BRENDAN P. SHIELDS, *Staff Director*  
STEVEN S. GIAIER, *General Counsel*  
MICHAEL S. TWINCHEK, *Chief Clerk*  
HOPE GOINS, *Minority Staff Director*

---

SUBCOMMITTEE ON EMERGENCY PREPAREDNESS, RESPONSE, AND  
COMMUNICATIONS

DANIEL M. DONOVAN, JR., New York, *Chairman*

PETER T. KING, New York	DONALD M. PAYNE, JR., New Jersey
MARTHA MCSALLY, Arizona	JAMES R. LANGEVIN, Rhode Island
THOMAS A. GARRETT, JR., Virginia	BONNIE WATSON COLEMAN, New Jersey
DEBBIE LESKO, Arizona	BENNIE G. THOMPSON, Mississippi ( <i>ex officio</i> )
MICHAEL T. MCCAUL, Texas ( <i>ex officio</i> )	

KERRY A. KINIRONS, *Subcommittee Staff Director*  
MOIRA BERGIN, *Minority Subcommittee Staff Director/Counsel*

# CONTENTS

	Page
STATEMENTS	
The Honorable Daniel M. Donovan, Jr., a Representative in Congress From the State of New York, and Chairman, Subcommittee on Emergency Preparedness, Response, and Communications:	
Oral Statement .....	1
Prepared Statement .....	2
The Honorable Donald M. Payne, Jr., a Representative in Congress From the State of New Jersey, and Ranking Member, Subcommittee on Emergency Preparedness, Response, and Communications:	
Oral Statement .....	31
Prepared Statement .....	32
The Honorable Bennie G. Thompson, a Representative in Congress From the State of Mississippi, and Ranking Member, Committee on Homeland Security:	
Prepared Statement .....	3
WITNESSES	
Mr. Daniel Kaniewski, Deputy Administrator for Resilience, Federal Emergency Management Agency, U.S. Department of Homeland Security:	
Oral Statement .....	4
Prepared Statement .....	6
Mr. Daniel M. Cotter, Director, First Responders Group, Science and Technology Directorate, U.S. Department of Homeland Security:	
Oral Statement .....	11
Prepared Statement .....	12
Mr. Dereck R. Orr, Division Chief, Public Safety Communications Division, National Institute of Standards and Technology, U.S. Department of Commerce:	
Oral Statement .....	20
Prepared Statement .....	22
Mr. John V. Kelly, Senior Official Performing the Duties of the Inspector General, Office of Inspector General, U.S. Department of Homeland Security:	
Oral Statement .....	24
Prepared Statement .....	25
APPENDIX	
Questions From Ranking Member Donald M. Payne, Jr. for Daniel Kaniewski .....	45
Questions From Ranking Member Donald M. Payne, Jr. for Daniel M. Cotter ..	51
Questions From Ranking Member Donald M. Payne, Jr. for Dereck R. Orr .....	52
Questions From Ranking Member Donald M. Payne, Jr. for John V. Kelly .....	53



# USING INNOVATIVE TECHNOLOGY AND PRACTICES TO ENHANCE THE CULTURE OF PREPAREDNESS

Wednesday, July 25, 2018

U.S. HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON EMERGENCY PREPAREDNESS,  
RESPONSE, AND COMMUNICATIONS,  
COMMITTEE ON HOMELAND SECURITY,  
*Washington, DC.*

The subcommittee met, pursuant to notice, at 2:44 p.m., in Room HVC-210, Capitol Visitor Center, Hon. Daniel M. Donovan (Chairman of the subcommittee) presiding.

Present: Representatives Donovan, Lesko, and Payne.

Mr. DONOVAN. The Subcommittee on Emergency Preparedness, Response, and Communications will come to order. The subcommittee is meeting today to receive testimony on the development and use of innovative technology and practices to enhance the culture of preparedness.

Before I recognize myself for an opening statement, I would like to welcome the gentlelady from Arizona, Mrs. Lesko to the committee. Welcome, Mrs. Lesko.

I now recognize myself for an opening statement. I want to welcome our witnesses here today to discuss an issue that is important to our homeland security, fostering a culture of preparedness.

The events of 2017 emphasize the importance of being prepared for the range of threats that we face. In 6 months alone, there were 3 devastating hurricanes, some of the costliest wildfires that moved through California, and 2 separate ISIS-inspired terror attacks carried out in my home town of New York City.

As the 2018 hurricane season has begun, recovery from last hurricane season is on-going. For so many Americans, it will be a long road to pre-storm restoration. I speak from experience to this point.

Nearly 6 years later, I still have constituents grappling with the lasting effects of Superstorm Sandy. All of these events underscore the need to foster a culture of preparedness where citizens and Government work together to mitigate the impact of future threats.

We must work together at all levels of government and with the private sector and the public to identify new and innovative practices and technology that will enhance our prevention, preparedness, response, and recovery capabilities.

We need to continually re-evaluate the policies and practices we use to respond and rebuild in the wake of a disaster. Investments

in mitigation need to be made to create stronger, more resilient systems in a cost-effective manner.

Local communities have to be empowered to manage their own basic needs and allow neighborhoods to come together to lend a helping hand. We need to ensure our first responders have the tools and cutting-edge technology that will enable them to get their vital jobs done, whether stopping terrorists or preparing for the next natural disaster.

American ingenuity should be nurtured to find creative solutions to ready our communities for the next threat. That is why I am pleased to have our witnesses here today to discuss how they are thinking outside of the box as they work to address the threats that we face.

I am particularly looking forward to hearing how FEMA is using lessons learned from the 2017 disasters to enhance our ability, working with our State and local partners to respond to hurricane season.

I am also interested in learning more about how the Science and Technology Directorate is supporting FEMA in its efforts and working to enhance first responder technology. Finally, essential to any successful response effort, it is the ability of our first responders to communicate and I look forward to hearing about NIST's efforts to enhance first responder communications.

[The statement of Chairman Donovan follows:]

STATEMENT OF CHAIRMAN DANIEL M. DONOVAN

JULY 25, 2018

I want to welcome our witnesses here today to discuss an issue that is important to our homeland security: Fostering a culture of preparedness.

The events of 2017 emphasize the importance of being prepared for the range of threats we face. In 6 months alone, there were three devastating hurricanes, some of the costliest wildfires to move through California, and two separate ISIS-inspired terror attacks carried out in my home town of New York City.

As the 2018 hurricane season has begun, recovery from last hurricane season is on-going and for so many Americans it will be a long road to pre-storm restoration. I speak from experience on this point. Nearly 6 years later, I still have constituents grappling with the lasting effects of Superstorm Sandy.

All of these events underscore the need to foster a culture of preparedness, where citizens and governments work together to mitigate the impact of future threats. We must work together at all levels of government and with the private sector and the public to identify new and innovative practices and technology that will enhance our prevention, preparedness, response, and recovery capabilities.

We need to continually reevaluate the policies and practices we use to respond and rebuild in the wake of a disaster. Investments in mitigation need to be made to create stronger, more resilient systems in a cost-effective manner. Local communities have to be empowered to manage their own basic needs and allow neighborhoods to come together to lend a helping hand. And we need to ensure our first responders have the tools and cutting-edge technology that will enable them get their vital jobs done.

Whether stopping terrorists or preparing for the next natural disaster, American ingenuity should be nurtured to find creative solutions to ready our communities for the next threat.

That is why I am pleased to have our witnesses here today to discuss how they are thinking "outside the box" as they work to address the threats we face. I am particularly looking forward to hearing how FEMA is using lessons learned from the 2017 disasters to enhance our ability, working with our State and local partners, to respond this hurricane season.

I am also interested in learning more about how the Science and Technology Directorate is supporting FEMA in its efforts and working to enhance first responder technology. Finally, central to any successful response effort is the ability of our first

responders to communicate and I look forward to hearing about NIST's efforts to enhance first responder communications.

With that, I welcome our witnesses here today. I look forward to our discussion.

Mr. DONOVAN. With that, I welcome our witnesses here today and I look forward to our discussion. I am going to allow Mr. Payne, when he arrives, to give his opening statement. I would also like to remind Members that statements may be submitted for the record.

[The statement of Ranking Member Thompson follows:]

STATEMENT OF RANKING MEMBER BENNIE G. THOMPSON

JULY 25, 2018

Good morning. I would like to thank the Subcommittee Chairman and Ranking Member for holding today's hearing on innovative technology and practices for increasing preparedness.

Throughout my 25 years in Congress, I have seen natural disasters devastate both my District and other communities across America. Unfortunately, the 2017 hurricane season was no exception. In fact, it was one of the most devastating hurricane seasons in history, with Harvey, Irma, and Maria striking our shores.

I am concerned about the Nation's preparedness for natural disasters. Clearly, nearly 13 years after Hurricane Katrina, we are still struggling with gaps in preparedness. The 2017 hurricane season, and Hurricane Maria in particular, exposed many of these gaps.

For example, FEMA's recently-released 2017 Hurricane Season After-Action Report recognizes that one of the many errors in the Federal response to Maria was that FEMA did not have enough disaster supplies in Puerto Rico.

That is a basic element of disaster preparedness that FEMA has to get right.

I hope the Trump administration will take seriously the after-action report, along with upcoming work from the DHS Inspector General and the Government Accountability Office, to improve their abysmal preparedness and response for Hurricane Maria.

While I look forward to a productive conversation on technology today, we must also continue to press FEMA on how it handles the fundamentals of disaster preparedness.

In its efforts to move forward in preparedness technology innovation, I hope FEMA, S&T, and NIST will prioritize technology that will aid first responder efforts to keep communities safe and provide for efficient asset management during natural disaster response.

Finally, I would note that preparedness has become even more important in the face of climate change, which is affecting weather across the globe and right here at home.

Unfortunately, the Trump administration has failed to recognize climate change, even dropping the concept from FEMA's Strategic Plan. Given how destructive the 2017 hurricane season was, along with the wildfires that year, FEMA must get serious about the science behind these events.

How can we expect communities to prepare for extreme weather when the Federal Government will not acknowledge that destructive weather patterns are occurring at a rate not seen before? I urge our witnesses from FEMA, NIST, and S&T to thread climate change into preparedness technologies and innovation.

I thank all the witnesses for attending today's hearing. I look forward to your testimony.

I yield back the balance of my time.

Mr. DONOVAN. But in the mean time, I now would like to introduce our panel of witnesses.

I thank you, all, for being here to discuss this very important topic.

Dr. Daniel Kaniewski, he currently serves as the deputy administrator for resilience at the Federal Emergency Management Agency. Thank you for coming today, sir.

Mr. Dan Cotter is the director of the Science and Technology Directorate's first responders group at the Department of Homeland Security. Welcome, sir.

Mr. Dereck Orr is the chief of the National Institute of Standards and Technology's public safety communications division. Welcome.

Mr. John Kelly is the senior official performing the duties of the inspector general at the Department of Homeland Security. I welcome you, sir.

The witnesses' full written statements will appear in the record. The Chair now recognizes Administrative Kaniewski for 5 minutes for his opening statement.

**STATEMENT OF DANIEL KANIEWSKI, DEPUTY ADMINISTRATOR FOR RESILIENCE, FEDERAL EMERGENCY MANAGEMENT AGENCY, U.S. DEPARTMENT OF HOMELAND SECURITY**

Mr. KANIEWSKI. Good afternoon, Chairman Donovan, Ranking Member Payne, distinguished Members of the committee. My name is Dan Kaniewski and I am here to testify about how FEMA is using innovative technology and practices to enhance the culture of preparedness.

Now, as many of you know, 2017 was a busy hurricane and wild-fire season. I was awaiting Congressional confirmation as I watched Hurricane's Harvey, Irma, and other disasters around this country happen in front of my eyes.

Now, I was on the sidelines. I was watching this on TV. I was afraid I would miss hurricane season. Now, as it turns out my fears were unfounded. I became FEMA's acting deputy administrator the day Maria made landfall.

Consider the following about last year's historic disaster season. Hurricanes Harvey, Irma, and Maria caused a combined \$265 billion in damage. Each of these hurricanes was among the top 5 costliest hurricanes on record.

In response, FEMA coordinated large deployments of Federal personnel, both before and after the storms' landfall to support response and initial recovery across 270,000 square miles. FEMA facilitated logistics missions that involve more than \$2 billion worth of commodities, moving across several States and territories using multiple modes of transportation.

In total, hurricanes and the California wildfires affected more than 47 million people, which is 15 percent of the U.S. population. FEMA registered nearly 4.8 million households for assistance. That is more survivors registered than Hurricanes Katrina, Rita, Wilma, and Sandy combined.

Now, we recently released our findings from our comprehensive review of our response to last year's hurricanes, it is the 2017 Hurricane Season FEMA After-Action Report or AAR, which is available on *FEMA.gov*. As a standard procedure post-disaster, the AAR is not meant to place or skirt blame, it is intended to identify what went right, and what can be improved before the next disaster strikes. AAR's are part of our DNA in emergency management.

Thousands of emergency managers see the value in learning from ourselves and each other. Our lessons learned are driving targeted improvements across the agency, and directly informed our 5-year strategic plan. Today, given the focus of the hearing as a

culture of preparedness, I will highlight goal one in that strategic plan which is fostering a culture of preparedness.

First, we need to acknowledge that during a disaster, individuals in the impacted communities are the first responders. There will never be enough first responders, emergency managers, or service providers to meet the needs of the entire community impacted by the disaster event. The innovation that we need to make is to change the culture of our Nation to one of preparedness. We need to empower individuals with the skills and information they need to help speed the response and recovery efforts.

Toolkits to help build individual preparedness are available at *ready.gov*. As discussed more in detail in my written testimony, FEMA is involved in a number of innovative technologies to enhance our ability to help people before, during, and after disasters. Crowdsourcing is not new, but FEMA leveraged this capability from volunteer networks to enhance situational awareness during the 2017 disasters.

Immersed is a virtual reality tool created by FEMA that allows users to assess the benefits of mitigating against flood hazards. The Flood Apex Program is a program of DHS Science and Technology Directorate and supports FEMA and communities to better understand the breadth and severity of flood events.

Of course, not all innovations are technological in nature. At FEMA we are continually examining ways in which we do business and find more effective and efficient ways to accomplish the goals of our strategic plan. To ensure our agency is best aligned with our strategic priorities, for example we recently announced the formation of a new organization called FEMA Resilience. Which is an organization I am proud to lead.

We are also finding better and smarter ways of doing business in the field that have a more direct impact on survivors. For example, we are streamlining our inspections process to damaged homes, so that fewer people need to knock on a survivor's door to validate damages sustained in disaster. As we utilize authorities granted by Congress, FEMA continues to engage reinsurance markets as one tool to help strengthen the financial framework of the National Flood Insurance Program.

FEMA secured \$1.4 billion in reinsurance coverage from 28 reinsurers to cover qualifying NFI fee flood losses in fiscal year 2018. To complement that coverage, FEMA is exploring additional reinsurance placement through a transaction that would for the first time engage the capital markets. Finally, as tomorrow is the 28th anniversary of the Americans With Disabilities Act. I would like to highlight a few things that we are doing at FEMA to align with access and functional needs.

We are empowering all of FEMA employees through the development of training so that every single FEMA employee is able to integrate serving people with disabilities into the work we do every day. We are also encouraging our State and local partners to improve accessibility in their communities for people with disabilities by utilizing mitigation funds to build back stronger utilizing universal design buildings, so everybody can access and utilize community facilities. That improves communities' resilience. Now, there are many efforts going under way right now at FEMA, and

we continue to move forward with those with our dedicated work force, our partners, our stakeholders to innovate and improve the way we help people before, during, and after disasters.

Congress and this committee are key partners in all of this, and we appreciate your support, and ask for your continued partnership. Thank you again for the opportunity to testify. I look forward to your questions.

[The prepared statement of Mr. Kaniewski follows:]

STATEMENT OF DANIEL KANIEWSKI

JULY 25, 2018

INTRODUCTION

Good morning Chairman Donovan, Ranking Member Payne, and Members of the subcommittee. My name is Daniel Kaniewski and I am the acting deputy administrator at the Federal Emergency Management Agency (FEMA). On behalf of U.S. Department of Homeland Security (DHS) Secretary Nielsen and FEMA Administrator Long, thank you for the opportunity to discuss lessons learned from the 2017 hurricane season, FEMA's new Strategic Plan, and how both of those are driving innovation at FEMA and emergency management at all levels.

2017 HURRICANE SEASON

The 2017 hurricane season was busy for many of us in the emergency management field. I was awaiting Congressional confirmation as I watched Hurricanes Harvey and Irma come ashore and was anxious to join FEMA, worried that I would not be able to contribute to FEMA's efforts during the hurricane season. It turns out the worry was misplaced as I became the FEMA acting deputy administrator the day Maria came ashore in Puerto Rico.

Administrator Long has testified before this committee and others about the extreme nature of last year's disaster season, so I'd like to take this opportunity to focus on some of the key themes and lessons learned from these experiences.

KEY THEMES & LESSONS LEARNED

Hurricanes Harvey, Irma, and Maria caused a combined \$265 billion in damage and were each, individually, among the top five costliest hurricanes on record. In response, FEMA coordinated large deployments of Federal personnel, both before and after the hurricanes' landfalls, to support response and initial recovery efforts across 270,000 square miles. These deployments included more than 17,000 FEMA and Federal Surge Capacity Force personnel, and nearly 17,000 personnel from the Department of Defense. FEMA facilitated logistics missions that moved more than \$2 billion worth of commodities across several States and territories, using multiple modes of transportation. FEMA Urban Search and Rescue Task Forces, comprised of State and local emergency responders, saved or assisted nearly 9,500 lives across the 3 hurricanes. In total, the hurricanes and California wildfires affected more than 47 million people—nearly 15 percent of the Nation's population. FEMA registered nearly 4.8 million households for assistance.

The unprecedented scale, scope, and impacts of the complex combination of disasters, tested the improved capabilities that were developed and as a result of lessons learned from Hurricanes Katrina and Sandy.

Following the 2017 hurricanes, FEMA thoroughly reviewed preparations for the immediate response to, and initial recovery operations. Some themes that emerged as we identified lessons learned to help the agency, the emergency management community, and the Nation in preparation for future events include:

- Sustained Whole Community Logistics Operations.—The scale and duration of life-saving and sustainment operations showed that FEMA must be ready to support logistics missions that span weeks or months, particularly in remote locations where commodities and equipment are transported by non-traditional methods. Plans and procedures for resource movement and transportation logistics, including the last mile of delivery, must be effectively coordinated with other government agencies, non-profit organizations, and the private-sector supply chain.
- Federally Supported, State-Managed, Locally-Executed.—FEMA's ability to provide support in disasters builds on, and is subject to, the capacity of State, local, Tribal, and territorial (SLTT) governments. If these governments are well-

resourced, well-trained, and well-organized, the effectiveness of FEMA's assistance is enhanced. If the SLTT government's ability to respond—for example, the ability to provide law enforcement, medical support, or commodity distribution—is diminished, then FEMA and its partners must find ways to deliver and support these critical services. FEMA is not traditionally a first responder but had to play a more direct response role following Hurricane Maria.

- **Staffing for Concurrent, Complex Incidents.**—When Hurricane Harvey made landfall in Texas, FEMA had staff deployed to 32 Presidentially-declared disasters across 19 field offices. By the time Maria made landfall, following Harvey and Irma, decisions regarding personnel made in support of one incident had impacts to on-going disaster operations. FEMA and our Federal Government partners rapidly surged and deployed personnel to support immediate response operations. FEMA also relied on mission assignments and the Surge Capacity Force to supplement our existing disaster workforce, pulling resources and personnel from across Federal Government departments and agencies.
- **Survivable and Redundant Communications.**—Following Hurricane Maria, Puerto Rico's communications infrastructure was so completely devastated that assessing the needs and the capability of Puerto Rico and its municipalities proved extremely difficult. FEMA provided satellite phones to each of the 78 municipalities in Puerto Rico to gather information on municipality impacts and critical needs. However, this short-term solution had limited success in addressing overall communications challenges. The private sector played a key role in restoring communications, including cell towers and allowing open roaming services, and is a critical partner for restoration of communications.
- **Responding During Long-Term Infrastructure Outages.**—Too often, we assume the loss of power, communications, and water infrastructure following disasters will be limited in duration. The condition of critical infrastructure in Puerto Rico and the U.S. Virgin Islands, the logistical difficulties of transporting crews and equipment to the islands, as well as a number of other unique factors, created significant challenges. We need to be prepared for long-term outages of these critical systems, while our SLTT and private-sector partners work to mitigate future damages to these vital systems.
- **Land Use Planning.**—In Texas, we saw the importance of land use planning and local building codes. New development should be built away from high-hazard areas and existing structures should be relocated to safer areas when possible to minimize impacts from hazards. It's both how we build and where we build that affect local and regional risk. Land use regulations are a vital resilience tool for local governments and FEMA encourages regional coordination to help make decisions that best reduce risk. Codes and standards are also only as good as the mechanisms in place to enforce them.
- **Disaster Sheltering and Housing.**—Providing housing for survivors following the 2017 hurricanes was a challenge, especially when a disaster devastates a community that already had limited affordable housing. Regardless of the readiness of an SLTT government, when dealing with the displacement of tens of thousands of survivors from their homes, there is no easy or one-size-fits-all solution. FEMA has authorities to provide sheltering options including the Transitional Sheltering Assistance (TSA) program that provides assistance to SLTT governments for survivors to stay in hotel rooms, as well as a program that provides for basic and temporary home repairs to make a home safe and habitable while the survivor makes arrangements for more permanent repairs. Any sheltering option is, by design, a temporary, short-term solution, designed to be a bridge to middle- and longer-term solutions. We have other programs and authorities that assist with housing, including rental assistance, repair assistance, multi-family lease and repair program, and manufactured housing units. With all of these options, we partner with our SLTT stakeholders to identify the sheltering and housing solutions that make the most sense for each State, each event, each community, and each survivor. The State of Texas, for example, is taking a very hands-on approach to managing housing solutions for their residents after Hurricane Harvey. States have a much better familiarity with the needs of their residents, the local laws and ordinances that can impact some of the FEMA housing options, and are better situated to design and administer to the survivors in their communities. Regardless of the tools we are able to provide, however, permanent housing solutions and full recovery needs are best addressed by insurance. FEMA assistance programs are not designed to return a survivor's home to its pre-disaster condition. As we know, though, there are too many people in our Nation that are underinsured or not insured at all.

## FEMA STRATEGIC PLAN

We used many of these lessons to inform the goals in our Strategic Plan, which includes: (1) Building a Culture of Preparedness; (2) Readyng the Nation for Catastrophic Disasters; and (3) Reducing Complexity of FEMA Programs.

*Build a Culture of Preparedness*

First, we need to acknowledge that during a disaster, individuals in the impacted communities are the first responders. We need to empower individuals with life-saving skills to help speed the response and recovery efforts. Do they know how to shut off their water and gas? Do they know to check on their neighbors? Do they know CPR? We also need to encourage individuals to be financially prepared for disasters.

Another key element to fostering a culture of preparedness is closing the insurance gap, which is the difference between what is currently insured and what is insurable. There is no more important or valuable disaster recovery tool than insurance, and we need to dramatically increase coverage to close the gap. This of course includes our country's National Flood Insurance Program.

As we approach the 2018 hurricane season, it is more important than ever that individuals protect themselves with flood insurance. Flood insurance—whether purchased from the National Flood Insurance Program (NFIP) or through private carriers enables insured survivors to recover more quickly and more fully after flood events. It is one of the best ways for individuals to financially protect themselves from losses caused by floods. Without flood insurance, survivors must recover with loans and very limited Federal assistance. For example, in Harris County, Texas following Hurricane Harvey the average Individual Assistance grant was \$4,200, in comparison to the average insurance claim payment of \$113,000.

Following a series of short-term extensions—and two brief lapses in the program's ability to sell and renew policies—Congress must now reauthorize the NFIP to sell and renew flood insurance policies no later than July 31, 2018.

FEMA continues to emphasize the importance of a multi-year reauthorization to promote stability in the real estate and mortgage markets and enable households and businesses to manage their risks through the purchase and renewal of flood insurance policies.

But it's not just flood insurance. All types of insurance have a role to play in reducing financial risk for individuals, communities, and Federal taxpayers. We aim to help transfer risks from individuals and governments to private insurance and reinsurance markets, through public education and innovative programs.

Those who are most vulnerable are also less likely to have insurance—making their disaster recovery even more challenging, and in some cases, nearly impossible. FEMA programs were never intended to supplant homeowners' insurance policies. FEMA's average disaster payment to individuals and households is a few thousand dollars. This is far short of what most homeowners would need to rebuild, yet few individuals understand the limited scope of FEMA's individual assistance programs.

We also need to build more resilient communities to reduce risks to people, property, and taxpayer dollars. Developing resilient communities ahead of an incident reduces loss of life and economic disruption. When communities are impacted, they should focus on rebuilding infrastructure smarter and more resilient to reduce risks of damages, protect taxpayer investments, and promote economic stability.

Thus, as some are aptly calling our "moonshot," FEMA aims to quadruple National investment in mitigation by 2022. The National Institute of Building Sciences in the United States recently released a study that found, on average, \$1 spent on Federally-funded mitigation grants saves the Nation \$6 in future disaster costs. This is up from a 2005 study that found that \$1 spent on mitigation results in \$4 in savings.

*Reorganization*

As you may surmise, many of these objectives under the Culture of Preparedness Goal are closely related and all aimed at making our Nation more resilient. In order to ensure our agency is aligned with this goal, the administrator recently announced the formation of a new organization in FEMA called Resilience.

The new organization includes the National Preparedness Directorate, Grant Programs Directorate, Federal Insurance and Mitigation Administration, and National Continuity Programs. I am proud to lead the new Resilience organization as deputy administrator, along with Carlos Castillo, who is our associate administrator for Resilience.

*Ready the Nation for Catastrophic Disasters*

Of course, if we are more resilient as a Nation, we can focus more of our efforts on readiness for truly catastrophic disasters. As I mentioned earlier, the 2017 disas-

ters challenged many of our planning assumptions for catastrophic disasters. We can't just continue to plan, train, and exercise for what's easy; we need to prepare for catastrophic events that stress our logistics, supply chain, continuity of operations, communications, and staffing capacities—just to name a few.

FEMA's internal focus will be on ensuring that the agency is ready for catastrophic disasters. Thus for the 75 percent of Presidentially-declared disasters that are under \$41 million each year, FEMA is looking for State and local governments to play a more significant role. FEMA will continue to fund recovery for these smaller disasters, but will increasingly rely on the State and local governments to manage their own recovery programs.

FEMA aims to have these smaller disasters be Federally-supported, State-managed, and locally executed. An example of this is in Texas where the State has stepped forward to run the housing mission there rather than it being a Federally-led endeavor. This allows the State to administer innovative housing solutions with FEMA support. We are also working on embedding more FEMA staff with our State and territorial partners to help them with readiness for catastrophic disasters.

#### *Reduce Complexity of FEMA*

Finally, FEMA is committed to simplifying our recovery process and making FEMA's programs as clear and easy as possible for survivors to navigate. We can't implement any of these goals and strategies without ensuring they meet the needs of survivors. Throughout the Federal Government, there are a number of programs intended to offer assistance to survivors. We are working with our partners to streamline and consolidate some of these activities to ensure survivors can better navigate our various programs.

### INNOVATION

The Strategic Plan provides us a framework through which we can develop and create innovative solutions to the challenges we faced—and lessons we learned—during the 2017 disasters.

#### *Streamlining Inspection Process*

One of the innovations we implemented real-time during the 2017 hurricanes was in line with our third strategic priority, reducing the complexity of FEMA. Thanks to some outside-the-box thinkers in the field, we were able to streamline some of our processes for disaster survivors. One way FEMA supports local communities post-disaster is by providing damage estimates that can validate damage to a survivor's dwelling, when requested. Information collected during damage estimates often duplicates information collected from other inspections, including those for individual assistance and flood insurance. These overlaps can result in unnecessary process delays and wasted resources.

A mitigation team was working in Austin, Texas, to support Hurricane Harvey and wanted to find a way to streamline the process. The mitigation team then piloted a way to collect and analyze individual assistance and National Flood Insurance Program (NFIP) inspection data to create a "damage portfolio" to triage homes that likely were, or were not, damaged substantially by the disaster. This initial information collection negated the need for a second substantial damage inspection.

Thus far, the pilot has been a huge success:

- It reduced damage inspections by 66 percent and already saved \$14 million by reducing inspection costs.
- We inspected 29,000 structures damaged by Hurricane Harvey instead of 80,512.
- We reduced the total project completion time from 123 workdays to 51 workdays.

We are exploring ways to use technology to further streamline the inspection process.

#### *Crowdsourcing*

FEMA also leveraged crowdsourcing data from digital volunteer networks to enhance situational awareness during the 2017 disasters. Volunteers crowdsourced information from on-line sources, including social media and other open datasets, to build curated products and maps. They reviewed satellite imagery creating more comprehensive maps and analyzed aerial imagery to assess damage.

Coordination between FEMA and these volunteers created two-way communication to foster unity of effort. FEMA used crowdsourcing to a greater degree than in previous disasters to augment its traditional methods to gain situational awareness on critical infrastructure. Crowdsourcing also aided the agency in collecting and analyzing images to determine the extent of the damage in Puerto Rico.

### *IMMERSED*

Consistent with our first strategic goal, we are looking at ways to reduce risk through mitigation efforts. Flooding is the most common and costly natural disaster, which is why it's critical for community leaders to be equipped with the information, tools, and skills needed to take mitigation action and build resiliency. To help educate community leaders about the value of being prepared for the worst, FEMA created a virtual reality experience about flooding and resilience called IMMERSED.

Using technology to place users at the center of a flood crisis, IMMERSED allows them to assess damage in a community and see the benefits of mitigation first-hand. By working through simple tasks, users experience a major flood event in a realistic manner. After experiencing IMMERSED, users are encouraged to explore additional information about mitigation actions and are provided details on grants and other available programs to support communities.

#### *Modernizing the HURREVAC Application*

For years, the HURREVAC application, a storm tracking and decision support tool of the National Hurricane Program, supported emergency managers as they handled the challenge of developing detailed evacuation plans, preparing staff through training exercises, and evaluating real-time forecasts to determine if evacuations were necessary. FEMA created a working group with State, local, and Federal partners to provide input into the next generation of HURREVAC. Working in collaboration with the DHS Science and Technology Directorate, the working group focused on how FEMA could enhance the current HURREVAC capabilities, creating an integrated common operating picture for all levels of government.

A new emergency management hurricane decision-support platform is being developed and will be tested during the 2018 Hurricane Season. This modernized application, called HV-X or HURREVAC-eXtended, will enable emergency managers to make timely and accurate evacuation-related decisions.

#### *Flood Apex Program*

The Flood Apex program at the DHS Science and Technology Directorate is supporting FEMA in driving new innovation for the flood management community. It was created to bring together new and emerging technologies with the sole purpose of increasing community resilience to flood disasters. Flood Apex provides new decision support tools to FEMA, State and local governments, and other stakeholders throughout the emergency management community.

Flood Apex is developing new lightweight, networked flood sensors through the Small Business Innovation Research program that are cheaper than current solutions and easier to deploy in large numbers. These sensors can be deployed in a variety of locations that experience flooding, not just along rivers. Damages to critical infrastructure, such as roads, bridges, dams, and levees, make up a significant portion of the costs from flood disasters.

#### *Future Innovations*

We are also exploring the use of Unmanned Aerial Systems (aka drones) for aerial imaging in remote, contaminated, hazardous, or dangerous areas that pose significant risks to aircraft crews or ground personnel; as well as tactical search-and-rescue or victim recovery operations that require dynamic, near-real-time observation systems.

We're looking to harness innovative solutions to advance our other strategic goals as well. For example, FEMA is using what we call PrepTalks to advance our priority on fostering a culture of preparedness and to spur innovation within the emergency management community. PrepTalks are given by subject-matter experts and thought leaders to spread new ideas, spark conversation, and promote innovative leadership for the issues confronting emergency managers now and over the next 20 years.

Last, we recognize that good ideas for innovation can come from a diverse range of sources. Administrator Long hosted "Discovery Change Sessions" to engage stakeholders and inform the Strategic Plan. FEMA received 2,300 comments from these sessions, and we conducted a trend analysis that informed the three goals in our Strategic Plan. Additionally, the administrator initiated Partner Strategy Sessions, welcoming more than 150 members of the public to share thoughts and reactions to our Strategic Plan. From these sessions, FEMA received 1,100 ideas for implementing the Strategic Plan. We believe that our Strategic Plan is not only applicable to what we do at FEMA, but can be a blueprint for all levels of emergency management.

FEMA also is empowering its own employees at all levels, and promoting a culture of learning, creativity, and innovation within the agency through our Innov8

initiative. Innov8 is an agency-wide collaborative process that allows all FEMA employees, including Reservists and IM COREs, to submit proposals for action aligned with the 2018–2022 FEMA Strategic Plan.

CONCLUSION

Congress, and this committee in particular, is a crucial partner in this process. I appreciate the active engagement of this committee as we look for ways to more effectively fulfill our mission.

Thank you for this opportunity to testify before this committee, and I welcome any questions you may have.

Mr. DONOVAN. Thank you, sir. The Chair now recognizes Mr. Cotter for 5 minutes.

**STATEMENT OF DANIEL M. COTTER, DIRECTOR, FIRST RESPONDERS GROUP, SCIENCE AND TECHNOLOGY DIRECTORATE, U.S. DEPARTMENT OF HOMELAND SECURITY**

Mr. COTTER. Chairman Donovan, Ranking Member Payne, distinguished Members of the committee, thank you for inviting me here to speak today. I appreciate the opportunity to discuss Department of Homeland Security Science and Technology Directorate's work in using innovative technology to enhance a culture of preparedness. Chairman Donovan, I would like to also take this opportunity to again, thank you for your visit to New Steel in New York City last August.

Both our staff and many local first responders, they really appreciated the opportunity to show you the innovative work they have been doing, it has been a real lasting boost to both our staff's morale and the first responders and community. So thank you for that, sir. I have been the director of the First Responders Group or FRG for the last 3 years, and I have over 30 years of experience working on programs to aid and preparedness. Science and Technology partners with the agencies at all level of government by developing requirements, conducting technology scouting, leveraging existing investments, developing innovative technologies, testing and evaluating technologies, transitioning and commercializing technologies.

But most importantly, integrating these technologies into regular use. For example, the Flood Apex Research Program was initiated at the direct request of the FEMA administrator. We have partnered on research related to public safety communication for nearly 15 years with the public safety communications research laboratory for the National Institute of Standards, represented by Derek Orr here today with us.

I would like to use my time to highlight several examples of our work on behalf of FEMA and the public safety community from my written testimony. Providing advanced personal protective equipment for first responders is one of our key research areas. In the past, we have developed lightweight wildland fire fighting gear with over 17,000 units in use at this time.

We recently developed new firefighter gloves that provide high levels of burn and puncture protection and far greater dexterity. Over 2,300 pairs of these gloves have been sold to date. One of our latest products to come on the market is improved turnout gear for firefighters. In essence this is their work suit, this is what they wear when they go to work in a fire.

The new gear we have developed is specifically designed to reduce exposure of firefighters to cancer-causing particulate matter. We have achieved this by adding Nomex leather interfaces around things like the wrists, to prevent the cancer-causing particulate matters from reaching the skin of our—of our firefighters.

Another example is RIC-M, the Radio Internet-Protocol Communications Module. This \$800 device provides an alternative for public safety organizations to spending \$15,000 or more to upgrade their legacy radio systems. We have sold over 450 of these units. That is a cost avoidance benefit to public safety of about \$6.5 million.

Finally, I would like to highlight our low-cost flood sensors. Today, we rely heavily on highly capable hydrologic and meteorologic monitoring stations for flood warnings. However, these stations may cost as much as \$50,000 or more. The sensors we are developing will cost under \$1,000, this will enable communities to economically densify flood detection networks, extending the abilities of communities to detect rising water beyond what is currently possible.

This will allow for improved local flood warnings, leading to fewer deaths, injuries, and damages. My written statement for the committee includes additional work examples including our collaboration with FEMA and with PSCR. We in S&T work, support, and improve at all levels of government first responder safety and effectiveness to mitigate the impacts of natural disasters, as well as support other missions outlined in my written statement by developing innovative tools to enhance mission performance and preparedness.

Chairman Donovan, Ranking Member Payne, distinguished Members, thank you again for your attention to this important mission, and for the opportunity to discuss and work with you today. I look forward to answering your questions.

[The prepared statement of Mr. Cotter follows:]

PREPARED STATEMENT OF DANIEL M. COTTER

JULY 25, 2018

Chairman Donovan, Ranking Member Payne, and distinguished Members of the committee, thank you for inviting DHS to speak with you today. I appreciate the opportunity to discuss the Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) work in "Using Innovative Technology and Practices to Enhance the Culture of Preparedness."

I have been the director of the First Responders Group (FRG) for the last 3 years and have over 30 years of experience working on programs related to preparedness. Prior to my time at FRG, I served as the DHS chief technology officer and geospatial management officer. In addition, my career has included 17 years of experience working for the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers, and the U.S. Geological Survey, and a decade of experience working at the executive level in the private sector. My experience in this field led to my selection as a fellow of the American Association for the Advancement of Science in 2005.

CULTURE OF PREPAREDNESS

FEMA's Strategic Plan for 2018–2022 sets clear goals for building a culture of preparedness and readying the Nation for catastrophic disasters. The strategy recognizes the critical roles that State, local, Tribal, and territorial (SLTT) governments, as well as the private sector and non-governmental organizations (NGO's), have in preparedness and response.

S&T, through research programs such as the Flood Apex program, Hurricane Technology Modernization, and Radiological/Nuclear (Rad/Nuc) Response and Recovery project, is delivering innovative capabilities for FEMA to help meet these goals. These include new capabilities that were used operationally by FEMA during the 2017 hurricane season.

Critically, all of these programs are based not only on our partnership with FEMA, but also on a strong, collaborative focus with our SLTT, private-sector, and NGO partners. Through these collaborative efforts, we are working with FEMA to ensure that the results of our research increase disaster response and resiliency at all levels of governments.

The vast majority of incidents are handled at the local and State level. For example, first responders and emergency management officials handle over 240 million 9-1-1 calls per year, rarely requiring any form of assistance from the Federal Government. However, in those rare instances when the SLTT community requests the support of the Federal Government, it is paramount that the responding Federal community is instantly interoperable with the SLTT community, able to communicate, and share mission critical data. Federal authorities' ability to integrate to a wide variety of local needs is essential for rapid and effective response. Technologies and standards to share data range broadly from the status of first responder resources in the impacted area to the status of critical infrastructure, including energy, water, communications, and transportation lifelines.

Additionally, improved modeling, data analytics, and mitigation techniques are critical to increase resilience. The need for technologies to ensure interoperable communications and information sharing between and amongst the Nation's tens-of-thousands of governmental units and first responder organizations is more critical than ever before.

#### THE ROLE OF RESEARCH AND DEVELOPMENT

S&T is unique and essential in its ability to perform research for our operational components and across the Homeland Security Enterprise. DHS S&T has statutory responsibilities to perform research to develop new technologies that enhance safety and efficiency for all first responder disciplines, such as enhanced personal protective equipment, and ensure public safety voice and data communications interoperability between and among the Federal Government and the SLTT public safety community.

S&T understands that having the right technology in the hands of the Nation's 3.3 million first responders can save critical minutes or seconds—and reduce injuries, save lives, and limit property damage. S&T plays an indispensable role in the Federal Government conducting critical research and development for first responders across all disciplines and at all levels of government. These responders serve in over 70,000 organizations across the Nation including not just FEMA, but DHS operational components, such as the U.S. Immigration and Customs Enforcement (ICE), U.S. Customs and Border Protection (CBP), Transportation Security Administration (TSA), U.S. Coast Guard (USCG), U.S. Secret Service (USSS), and the National Protection and Programs Directorate (NPPD). The needs of responders and the public are at the center of every decision FRG makes. That is why S&T partners with agencies at all levels of government by developing requirements, conducting technology scouting, leveraging existing investments, developing innovative technologies, testing and evaluating technologies, transitioning and commercializing technologies, and integrating technologies into regular use.

S&T supports operational components to address some of the most critical issues facing the Department and first responders, including: Improving first responder safety and effectiveness; mitigating impacts of natural disasters; providing tools to render safe Improvised Explosive Devices (IEDs); assisting survivors from earthquakes and other disasters; identifying threats in passenger bags; saving children from human trafficking, slavery, and sexual abuse; and improving situational awareness for humanitarian assistance and disaster relief. S&T also provides systems engineering advice to support complex, integrated technical solutions, human systems integration, architecture development, and transition and acquisition decisions.

The goal of FRG research is to ensure first responders: Have the personal protective equipment they need to work safely in any environment; are never out of touch with their peers or command regardless of where they are operating; and have all information needed in real time to operate safely, effectively, and efficiently. We summarize this by saying that the first responder of the future will be: Protected, Connected, and Fully Aware.

The Next Generation First Responder (NGFR) Apex Program is a 5-year program that began in January 2015, and is part of a longer-term S&T commitment to envision and assist the responder of the future. NGFR continually collaborates with first responders across the Nation on various projects—from developing program requirements to testing prototypes of technology. These cutting-edge technologies will improve emergency response time and accelerate decision making to save more lives.

NGFR is comprised of more than 15 research and development projects, ensuring that responders are better protected, connected, and fully aware. NGFR is enabling new, non-traditional public safety technology developers—including start-ups—to easily “plug and play” their technologies into a system. NGFR reduces barriers to developing first responder technology and opens doors to entrepreneurs, while lowering costs and increasing choices for public safety organizations. NGFR is incrementally delivering these capabilities over the program cycle and will continue to partner with first responders to test and evaluate innovative technologies before they are available on the market.

FRG partners closely with NPPD’s Office of Emergency Communications and the Department of Commerce’s National Institute of Standards and Technology (NIST) and National Telecommunications and Information Administration (NTIA) as well as their associated Public Safety Communications Research (PSCR) program. By collaborating with these partners, as well as coordinating directly with the First Responder Network Authority (FirstNet), an independent authority within NTIA, FRG is playing an important role in the implementation of the Nation-wide public safety broadband network.

#### TRACEABLE REQUIREMENTS

As a research organization, S&T recognizes that it is a mission support organization and does not own the DHS component or first responder mission. Our job is to understand the needs of the communities and focus our research efforts into developing effective solutions. Our goal for most of our first responder research activities is to provide solutions in the 18–24 month time frame. We make sure that these new technologies and capabilities are available to first responders by coordinating closely with FEMA to assure that these technologies can be made available on the FEMA Authorized Equipment List (AEL), and therefore eligible for purchase with Federal grant dollars. This includes working with groups such as the National Fire Protection Association (NFPA) and NIST, to ensure compliance with all applicable standards.

To gather and validate requirements, S&T works directly with front-line mission personnel at all levels of government and from all disciplines. As part of this effort, S&T leads the First Responder Resource Group (FRRG), which is composed of 140 fire, emergency medical service (EMS), emergency managers, and law enforcement first responders from various State, local, and Federal agencies across the country, including DHS operational components. This group meets annually to identify high-priority capability gaps and to help make first responders aware of technologies that S&T has transitioned to the commercial market. The most recent meeting was held earlier this year and included over 103 attendees with representatives from DHS component agencies that included FEMA, ICE, CBP, USCG, the Federal Law Enforcement Training Centers (FLETC), and the Federal Air Marshal Service. By the end of the meeting, the FRRG members were able to help S&T identify 24 new capability gaps, which will assist in determining what new projects will be funded by S&T and ultimately transitioned to the commercial market place for the first responder community to purchase.

The FRRG process has led to dozens of cost-effective solutions, such as:

- The Electronic Recovery and Access to Data Prepaid Card Reader, a card-reading device system capable of analyzing and freezing funds on pre-paid bank cards that are suspected of having ties to criminal activity. The device is being used in 42 States by over 900 agencies, as well as in 3 other countries. Federal, State, local, and Tribal law enforcement agencies have seized over \$10 million in criminal funds after law enforcement conducted investigations and obtained authority to seize these funds through the judicial system.
- FRG developed the Wildland Firefighters Advanced Personal Protection System to provide unprecedented protection to wildland firefighters. The NFPA certified garment system improves radiant thermal protection; reduces heat stress; and improves form, fit, and function. The garments are commercially available from two manufacturers who have sold more than 20,000 garments.
- In partnership with first responders, the U.S. Army and the private sector, S&T developed the Enhanced Dynamic Geo-Social Environment (EDGE) Virtual Training tool that is available free of charge to any first responder agency

across the country. S&T established a point of distribution for the software and the first environment, a multi-story hotel. Currently, 600 agencies across the Nation are using EDGE, as well as two other nations. A school building environment will be available later this year and promises to help first responders and school personnel better prepare for active-shooter incidents.

#### TANGIBLE RESULTS

S&T, through its FRG, has transitioned 47 products and completed 80 other projects that have resulted in knowledge products such as standards, concepts of operations, and other guidance for first responders. Working with the DHS operational components, S&T has built strong partnerships to deliver technically sound, cost-effective technologies that have yielded significant impacts including:

- Aided in identifying over 475 child exploitation victims, in coordination with ICE's Homeland Security Investigations, using advanced facial recognition tools.
- Improved emergency management mutual aid in 40 States, reducing time to identify resources from 72 hours to as little as 30 minutes.
- Partnered with 14 countries and over 40 start-ups to increase technology development globally and bring new technology to market more efficiently.
- Deployed the Android Team Awareness Kit (ATAK) to enhance situational awareness at National and border security events. ATAK is a tool that allows all emergency workers to share situational awareness in an unprecedented way. ATAK has already saved lives during emergency response activities by enabling 300 unique users across 17 agencies participating in the hurricane response (i.e., Hurricane Harvey, Hurricane Irma, Hurricane Maria) to share information and awareness via ATAK, which impacted 3,000 rescues.
- Supported search-and-rescue units across the globe, including FEMA's Urban Search-and-Rescue teams, by rapidly locating survivors buried under collapsed buildings after earthquakes through the use of Finding Individuals for Disaster and Emergency Response (FINDER). FINDER is a tool that detects human heartbeats under rubble piles.
- Supported radiation detection training, through the National Urban Security and Technology Laboratory, for over 2,000 law enforcement officers.
- Published over 1,000 System Assessment and Validation for Emergency Responders (SAVER) Reports—S&T's version of Consumer Reports® for responder technologies.
- Published the Radiological Dispersal Device (RDD) Response Guidance: Planning for the First 100 Minutes, co-branded with FEMA and the Department of Energy's National Nuclear Security Administration, which was incorporated into FEMA preparedness planning and training.
- Integrated the Rad Decontamination App into FEMA's RadResponder toolkit. RadResponder is a smartphone app that can be downloaded by any first responder and provides them with just-in-time guidance to deal with rare radiological events.
- Created the Toolkit for Radiological Operations Support Specialist (ROSS), a FEMA National Incident Management System position developed with S&T, which is posted to RadResponder for first responder access.
- Provided technology evaluations to enhance responder capabilities during Active-Shooter events, including an exercise last year with the New York Police Department, Fire Department of New York, Metropolitan Transportation Authority (MTA) Police Department and MTA Metro-North Railroad, New York State Police, and U.S. Army National Guard.
- Developed the Smoke and Particulate Resistant Structural Turnout Ensemble, the first turnout gear to offer firefighters protection from exposure to hazardous, cancer-causing chemicals. Today, there is an extremely high likelihood of a firefighter developing cancer due to exposure to hazardous chemicals and particulates.
- Developed and tested the Pat-down Accuracy Training Tool, a mannequin with embedded sensor technology that provides objective feedback on pressure, sequence, and coverage during pat-downs at four airports and the TSA Academy.

#### S&T INNOVATIONS AND PREPAREDNESS

Working with FEMA in supporting the strategic goals of a culture of preparedness and readying the Nation for catastrophic disasters, S&T is collaborating with Federal, State, local, territorial, and Tribal governments, as well as the private-sector and non-governmental organizations to advance a whole-of-community approach to increase disaster preparedness.

### *Shaken Fury*

This includes support to FEMA's 2019 National exercise Shaken Fury 19, which S&T is using to help elevate regional resilience in the New Madrid Seismic Zone through the generation and adoption of new information-sharing technologies and protocols that will enhance shared situational awareness between critical response and recovery organizations and their associated operations centers. This transition of new innovations and technologies is facilitated through a strong standing relationship with the Central United States Earthquake Consortium (CUSEC), an association of 8 member and 10 associated States.

Within the scope of Shaken Fury 19, S&T is working with FEMA and CUSEC, as well as the Department of Defense and the National Guard, to integrate several new candidate capabilities such as:

- CUSEC Regional Common Operating Picture enhancements
- Tools and guides to improve situational awareness and emergency management response
- Mutual Aid Resource Planner
- New technologies for communications restoration, including the next generation of deployable communications infrastructure
- Autonomous mass casualty patient monitoring and tracking
- Use of unmanned aerial systems for damage assessment
- Testing of S&T sponsored low-cost flood sensors.

S&T recognizes the importance of capturing lessons learned from events such as Shaken Fury 19; therefore, S&T has developed an Incident Management Information-Sharing Capability Maturity Model (IMIS CMM) that provides a means for the SLTT community to objectively assess their ability to share information with partners. Assessment results will be used to steer corrective actions to increase interoperability between all levels of government.

### *Flood Apex program*

The Flood Apex program was created at the request of the administrator of FEMA to bring together new and emerging technologies designed to increase communities' resilience to flood disasters and provide new decision support tools to FEMA, State, and local governments, and other stakeholders. The Flood Apex program is focused on six research challenges:

- Reducing flood fatalities
- Reducing uninsured losses
- Improving mitigation investment decisions
- Enhancing community resilience
- Improving data and data access
- Improving modeling and predictive analytics.

To address these challenges, S&T is focused on:

- New flood sensors and alerting
- Smarter remote sensing and situational awareness
- New products from high-performance computing and artificial intelligence
- Realigned economic incentives and risk analysis.

While the Flood Apex program is not scheduled for completion until fiscal year 2020, research products are already transitioning into operational use. These include the use of deep learning techniques with high-resolution satellite and aerial imagery, to produce building outlines needed by FEMA for recovery operations. Over the course of hurricane response and recovery operations, S&T delivered over 19 million building outlines across 8 States, Puerto Rico, and the Virgin Islands. These outlines supported a variety of Federal and SLTT emergency management and first-responder functions and activities. FEMA alone used these data to expedite over 115,000 damage assessments. The Flood Apex technologies helped support FEMA in speeding the release of over \$200 million in disaster assistance to survivors.

Other technologies, such as the low-cost flood sensors, Observed Flood Extent, and HAZUS Tsunami Module, have been proven and are now moving to various States of adoption and use. We are working with the Association of State Flood Plain Managers and others to stimulate flood-proofing innovation and advance flood mitigation. These innovations include pursuing development of Nationally-recognized standards for flood-proofing products, such as water-proofing materials, semi-permeable barriers, and smart sensors.

On-going Flood Apex research is supporting FEMA in the areas of flood insurance research, working with leaders in the private sector and academics. FEMA recognizes that insurance is one of the most important disaster recovery tools. Our research is focused on helping FEMA to close the insurance coverage gap in the area of flood insurance.

#### *Wireless Emergency Alerts*

S&T's research and development efforts are also having game-changing results on emergency alerts, warnings, and notifications to communities across the Nation. S&T led an effort to improve geo-targeting capabilities and public response to alerts and warnings. In partnership with FEMA, the Federal Communications Commission (FCC), and the wireless industry, S&T helped develop Wireless Emergency Alerts (WEA) to enable the dissemination of alerts to mobile devices and the geo-targeting of specific locations so that only people in the affected area are notified. As part of FEMA's Integrated Public Alert and Warning System, WEA enables the distribution of Presidential alerts, AMBER alerts, and imminent threat alerts (e.g., hurricanes and tornadoes, where life or property is at risk) to mobile devices, including cellular phones and pagers. The FCC adopted FRG's research findings and recommendations on message effectiveness, increased character length, addition of URL links, pictures, and videos to the alerts, and employed new technology to support geo-targeting functions. In the last 5 years, WEA has been used to issue over 35,000 emergency alerts. The National Weather Service has sent well over 33,000 WEA alerts. California officials used WEA 4 times in response to the 2017 wildfires in Northern California, and 16 times for the Los Angeles area wildfires to successfully move citizens to safety. WEA was also used extensively in all areas affected by the 2017 hurricanes, including 21 WEA alerts sent in Puerto Rico. Additionally, WEA provides awareness that has aided in the recovery of missing children. In 2016 alone, 179 AMBER Alerts were issued in the United States involving 231 children. Since system deployment in 2012, WEA has been credited with the safe return of 47 missing children.

#### *Response and Defeat Operations Support (REDOPS)*

Recognizing a gap in responding to IEDs, S&T launched the REDOPS program, a collaborative effort with the Federal Bureau of Investigation (FBI) and the National Bomb Squad Commanders Advisory Board to develop render safe countermeasures for the Nation's 466 bomb squads. REDOPS develops innovative tools, as well as Tactics, Techniques, and Procedures to support State and local bomb squads. Results of this research have been published in 9 Special Technicians Bulletins and 16 Test and Evaluation Reports and have been incorporated into trainings by the FBI's Hazardous Device School.

#### *Interoperable Communications*

One of S&T's key statutory responsibilities is in the area of ensuring first responder communications and data interoperability. It is the objective of S&T research in the area of interoperable communications to ensure that responders are always connected, even in the most challenging environments. S&T has a long history of collaboration with NPPD/OEC and NIST/PSCR on developing solutions for interoperable communicators based on LMR technologies.

*First Responder Electronic Jamming.*—Without radio and cellular communications, first responders' safety is imperiled and their ability to perform their mission is jeopardized. S&T has continued to conduct extensive research into the impacts and mitigation of both intentional and unintentional jamming. Over 1,000 first responders at the Federal and SLTT levels have participated in our innovative research and field experimentation over the last several years. As a result of these efforts, we have been able to produce technical guidance on jamming detection and mitigation for the first responder community and we are working with the private-sector equipment manufacturers to help improve communications resiliency. Additionally, S&T and the FCC released a joint alert to the law enforcement community with findings from the 2016 First Responder Electronic Jamming Exercise, which has reached more than 100,000 stakeholders. The most recent exercise, held in 2017, evaluated how tactics and technologies could help first responders identify, locate, and mitigate the impact of jamming threats.

*Datacasting.*—First responders often have problems sharing mission-critical information, especially video, when networks become overloaded. S&T supported the development of a datacasting capability, which enables voice and video communications to be transported via existing broadcast television signals to deliver encrypted data to targeted recipients. S&T conducted various datacasting technology pilots with the city of Houston. As a result of these pilots, Houston Fire Department is currently using datacasting technology during operations. Specifically, the Houston Fire Department used datacasting technology to stream video from boots on the ground back to command centers to provide situational awareness during Hurricane Harvey response. The investment in datacasting technology has helped to enable reliable video transmission during large-scale

events where bandwidth and network capacity are usually problematic. Further, S&T is working with FLETC to conduct a datacasting technology pilot to improve responder training in fall 2018.

*Information Sharing.*—We are working to provide first responders with the information they need in a timely manner and provide intelligent technologies that will help them filter through meaningless information and manage their communications seamlessly and without losing time and focus. This includes our partnership with NASA JPL to develop artificial general intelligence for first responders, a cutting-edge digital assistant that provides data analytics, and alerting and analysis. We have conducted testing of this technology in the field and the feedback from first responders and experimentation results have been extremely promising.

*Project 25 Compliance Assessment Program (P25 CAP).*—S&T is improving Land Mobile Radio (LMR) interoperability through P25 CAP, which has a rigorous process to ensure radio systems are demonstrated to be compliant to standards and interoperable. The program affects well over 1 million devices in use today. S&T significantly enhanced the program to address new interfaces and standards and formed a new partnership with the Department of the Interior to establish a laboratory to test new interfaces not tested before, which will also have a potential impact on interconnection of LMR systems to FirstNet.

Additionally, we have also developed an Integration Handbook, as part of the NGFR Apex program, to guide industry in development, design, test, and integration of responder technologies. This handbook outlines a “plug-and-play,” standards-based environment that enables commercially-developed technologies to integrate and interoperate. Once we have completed our coordination with industry and the first responder community, we hope that the Integration Handbook will become a key reference for first responder communications interoperability and part of the FEMA AEL guidance.

Our research also extends into areas of close cooperation with PSCR. Some examples include:

- Cooperation and coordination of research on in-building location services
- Use of LIDAR “point clouds” for situational awareness and 3-D mapping
- Coordination of R&D on communications resiliency (participation in First Responder Electronic Jamming Exercises)
- Coordination of deployable communications in adverse environments.

#### *Hurricane Evacuation Planning and Decision Making*

We have collaborated with FEMA and the U.S. Army Corps of Engineers, as well as State and local emergency managers to develop the Nation’s next hurricane evacuation planning and decision support system. This new system, called Web-Based HURREVAC, provides an anywhere, anytime, any device, mobile decision support and training platform for emergency managers during hurricanes. HURREVAC is being used by emergency managers in Atlantic and Gulf coastal States, Hawaii, the U.S. Virgin Islands, and Puerto Rico, and will be operational for the 2019 hurricane season to support 25,000+ emergency management stakeholders. This new system provides innovative visualizations of hurricane data and information for evacuation planning and decision making, reducing uncertainty at all stakeholder levels and improving shared understanding of available weather information and developing threats. Using this innovative technology to enhance preparedness will directly impact local communities by lowering the probability of over evacuations, avoiding unnecessary costs, as well as lowering the probability of under evacuations, saving lives.

#### *Training and Virtual Reality*

Providing effective, realistic, and effective training tools for first responders is another role played by S&T. In addition to EDGE, S&T is developing virtual Incident Command System (ICS) training tools for firefighters, as well as training tools for TSA and CBP.

We provided 45 ScreenADAPT® systems to TSA and conducted evaluations with hundreds of Transportation Security Officers (TSOs) on single and dual view systems at 8 airports across the Nation. ScreenADAPT® uses eye-tracking technology to examine visual search performance and adapt to trainee’s needs in real-time. In some evaluations with TSOs, ScreenADAPT® increased efficiency and effectiveness of trainees, reducing false alarms, and the need for unnecessary manual secondary bag searches that can slow checkpoint throughput. S&T developed a web-based version of ScreenADAPT® and transitioned it to USSS to provide a distributed capability for advanced X-ray image analysis training to 500+ uniformed USSS officers. S&T also developed and implemented the Eye-identify system, building off

ScreenADAPT®, at the FLETC CBP Field Operations Academy providing enhanced impostor detection training. Eye-identify tracks an officer/agent's eye movements during training to determine where, how long, and in what sequence a trainee is looking at an ID or a face.

The U.S. Border Patrol (USBP) identified a need for improved tracking training tools, methods, technologies, and capabilities. Tracking, also known as “sign cutting,” is executed to find evasive, hidden, or missing people along our Nation's borders. S&T conducted an analysis of existing training, as well as in depth interviews, ride-a-longs, and walk-throughs at various border locations. S&T then created comprehensive, video-based training utilizing both 2D and 3D videos that have been incorporated into the new training program for all newly-hired agents at the USBP Academy at FLETC. USBP Academy and FLETC representatives have collaborated with S&T to provide iterative requirements and for the development of a comprehensive web-enabled Signcutting and Tracking Training module that is being transitioned to provide a distributed capability for both new hire and recurrent/refresher training.

#### *National Urban Security and Technology Laboratory (NUSTL)*

NUSTL has been helping to secure American Cities against threats for over 60 years, delivering innovative technology, training, and science in 41 States and 306 cities across the country. This program is the DHS lead for testing of UAS counter measures technologies. In addition, the Laboratory develops and transitions to operational use rad/nuc response and recovery tools. These include modeling and simulation tools, radiological dispersal device guidance, and creating a Nationally-recognized position definition for a Radiological Operations Support Specialist. Through these efforts, NUSTL is enabling FEMA to:

- Increase capability at all levels of government to manage and characterize complex and catastrophic incidents.
- Improve responders' ability to save lives during the initial response operations of a radiological incident.
- Minimize impact to community and economy through improved methods of incident stabilization, radiological clean-up, and recovery.

#### FUTURE OF INNOVATION

The advent of the era of “Big Data” and the “Internet of Things,” combined with the emergence of a way to discover and move vast amounts of data and information that will result from the public safety broadband initiative, paves the foundation for our ability to make rapid progress toward building a culture of preparedness and readying the Nation for catastrophic disasters. The new tools S&T is working on in the areas of modeling and simulation, data analytics, and artificial intelligence will provide unparalleled capabilities to FEMA and the SLTT community to understand their hazards and risks, mitigate, respond, and recover.

With the pace of innovation only accelerating, the power of information and technology in the hands of our first responders will increase dramatically over the next decade. S&T research, driven by the requirements of FEMA, other DHS operational components, and the first responder community, will be an indispensable part of this acceleration of first responder capabilities. As first responders become safer and ever more efficient in the mission, the capability of communities to withstand, recover from, and respond to catastrophic events will increase.

Combine these advancements with more effective insurance coverage and tools, mitigation programs enhanced with better analytics and products, and far more efficient and effective interoperable communications, and we can be optimistic for a future characterized by increasing disaster resilience at the local and State level.

S&T is adding value at the intersection of Smart Cities and Internet of Things (IoT) through the integration of new and existing technologies applied to public safety needs with an emphasis on commercialization through industry partners. S&T-funded programs to advance technologies and implement a streamlined process for getting capabilities commercialized and available to first responders and industry investment partners. In fact, we are funding 13 small businesses to integrate Smart City and IoT technologies in the following areas:

- Unmanned Aerial Systems for indoor search and rescue;
- Building sensors for detection and situational awareness; and
- SmartHubs for responder-focused mobile communication and sensor suites.

Four small businesses are showcasing their prototype SmartHub technologies today (July 25) in Chicago to public safety officials, building/real estate and insurance industry partners, and the venture capital community.

Some of our planned Smart City development includes: Tampa, FL, and St. Louis, MO, as well as supporting public safety with established stakeholder communities

(e.g. Torrance, CA; Ellicott City, MD; Charlotte-Mecklenburg, NC; Norfolk, VA; and the States of Kentucky, North Carolina, South Carolina, and Texas).

Chairman Donovan, Ranking Member Payne, and distinguished Members of the committee, thank you again for your attention to this important mission and for the opportunity to discuss S&T's work in the area of preparedness. I believe that the preceding examples are representative of how DHS S&T is making a tangible difference in the work that America's first responders do every day. I look forward to answering your questions.

Mr. DONOVAN. Thank you very much, sir. Mr. Orr, the Chair recognizes for 5 minutes and isn't it difficult to speak after somebody who brought toys with them?

Mr. ORR. I feel a little bit under-prepared but—

Mr. DONOVAN. That's all right, we will take it into consideration. Thank you.

**STATEMENT OF DERECK R. ORR, DIVISION CHIEF, PUBLIC SAFETY COMMUNICATIONS DIVISION, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, U.S. DEPARTMENT OF COMMERCE**

Mr. ORR. Chairman Donovan, Ranking Member Payne, and Members of the subcommittee, I am Derek Orr, division chief of the Public Safety Communications Research Program, the PSCR at the National Institute of Standards and Technology known as NIST. Thank you for the opportunity to appear before you today to testify about innovations in the field of emergency communications.

PSCR's mission is to research and develop critical technologies, features identified by public safety entity, so that these practitioners will soon have access to smarter, and more effective life-saving technology. PSCR works closely with public safety, government, and industry stakeholders through workshops and summits to publish R&D roadmaps and leverages those road maps to develop targeted strategies and program plans.

We also work closely with our Federal partners including FirstNet and DHS's Science and Technology Directorate and the Office of Emergency Communications to ensure effective coordination mechanisms are in place to support our shared public safety mission. Our Nation's first responders deal with emergencies every day.

Whether it is a routine traffic stop, a multi-alarm fire, or a large-scale event such as the hurricanes of last summer, or the attacks at 9/11, the ability of first responders to communicate with each other on scene as well as through Incident Command remains one of the most critical determinants of emergency response success.

At PSCR, we believe that innovative technologies can help and we are working to accelerate their arrival. First, we conduct internal research at our laboratories across five key public safety technology areas. No. 1, ensuring voice interoperability between current land mobile radio and new broadband devices for the period of time that these two technologies coexist.

No. 2, making mission-critical voice communications possible on new broadband devices. No. 3, advancing location-based services for personnel and assets especially inside of buildings. No. 4, researching advanced user interfaces for their abilities to access and transmit complex information. No. 5, promoting analytics tools that will

help public safety make use of large amounts of data becoming available.

Some of our most recent lab projects include using state-of-the-art laser technology to quickly and easily map and develop three dimensional models of buildings for the creation of enhanced maps and location tracking for first responders, a virtual reality test environment to measure the impact of future user interfaces on public safety operations, mission-critical voice measurement methods which will allow public safety and industry to compare land mobile radio with broadband, so as to determine when and if transition to broadband is possible for mission-critical voice communications, and small self-contained network-in-a-box prototypes which responders could rapidly deploy using drones to establish communications anywhere.

Putting this technology in the hands of public safety personnel would help them assess emergency scenarios safely and smartly before sending in boots on the ground. It would help them reduce the harm to citizens and property and it would help them avoid unnecessary injury or even death.

PSCR not only conducts internal research but also put substantial resources into promoting the development of these technologies externally through grants, cooperative agreements, and open innovation prize challenges. These efforts give NIST access to experts and innovators from around the world and greatly expand the number of researchers focused on key public safety communications issues.

To date, we have provided over \$40 million in grants in cooperative agreements to nearly 40 recipients, and more funding opportunities are on the way. Additionally, in 2018, PSCR launched and completed its first two technology-based prize challenges with total prize amounts of roughly \$400,000.

These challenges were focused on the use of drones for expanding network coverage and on using virtual reality to develop effective in-building navigation interfaces for future heads-up displays. Through these challenges, we have engaged with innovators from all walks of life, and seen companies in partnerships form.

I firmly believe that encouraging these open partnerships between public safety, private industry, and academic institutions is strengthening the pace of and passion for delivering tangible solutions. Never before have there been so many people focused on communications technology R&D beneficial to our first responders.

In closing, I would like to highlight the PSCR tagline, “pulling the future forward”, we are committed to reducing the time in which public safety will access these key technologies by accelerating the pace of research in the areas and expanding the number of research focused on the mission.

By establishing measurement methods, enlisting new research recruits, and developing proof-of-concept technologies, all with traceable links to public safety, we will transform the future of emergency response, making the best possible use of time, talents, and resources.

Thank you for the opportunity to testify. I would be pleased to answer any questions you may have.

[The prepared statement of Mr. Orr follows:]

## PREPARED STATEMENT OF DERECK R. ORR

JULY 25, 2018

## INTRODUCTION

Thank you Chairman Donovan, Ranking Member Payne, and Members of the subcommittee. I am Dereck Orr, division chief of the Public Safety Communications Research (PSCR) program, which is one of the primary Federal programs conducting research, development, testing, and evaluation for public safety communications technologies. The division is housed within the Communications Technology Laboratory (CTL) at the National Institute of Standards and Technology (NIST) in Boulder, Colorado. Thank you for inviting me to testify today about innovations in the field of emergency preparedness and specifically on emergency communications.

Our Nation's first responders deal with emergencies every day. And whether it is a routine traffic stop, a multi-alarm fire, or a large-scale event, such as Hurricanes Harvey and Sandy, or the attacks on 9/11, the ability of first responders to communicate with each other, on-scene as well as through incident command, remains one of the most critical determinants of success for emergency response.

Since 2002, NIST's PSCR program has worked to drive innovation and advance public safety communication technologies through cutting-edge research and development (R&D). PSCR works directly with first responders and the solver community to address the public safety community's urgent need to access the new and improved technology that enhances the public safety community's ability to respond to emergencies. PSCR's mission is to research and develop the features identified by public safety entities as critical so that these features will soon be available to enhance their performance. Drawing on critical requirements provided by public safety practitioners, such as the First Responder Network Authority (FirstNet), the PSCR program provides insight to wireline and wireless standards committees developing standards for voice, data, image, and video communications.

Since June first of this year, approximately 235 miles southwest of the NIST labs in Boulder, a significant wildland fire has been burning. The fire spans almost 55,000 acres and is currently only 50 percent contained. This incident has required the deployment of almost 1,000 personnel, as well as 24 engines, 7 helicopters, and 2 fixed-wing aircraft. This is a complex response requiring reliable communications and constant situational awareness. The primary means of communication for this response effort is Land Mobile Radio (LMR), a proven narrowband technology that is used for mission-critical voice communications; you might be familiar with LMR as "push a button to talk" technology. Almost all information, such as changes in fire behavior, personnel and asset location, status updates, and weather conditions, will be transmitted via these radios.

Now, imagine a world in which future technology—for example, highly deployable drones with autonomous flight controls—serve as communications hubs, allowing for not only voice communications, but location-mapping, video analytics, and real-time weather updates.

Imagine that all of this information could be easily transmitted to first responders' broadband devices, such as smartphones, tablets, and even heads-up displays. Putting this technology in the hands of first responders would help them assess emergency scenarios safely and smartly before sending in personnel. It would help them reduce harm to people and damage to property. It would help them avoid unnecessary injury or death.

Congress did much to lay the groundwork for this vision in the Middle-Class Tax Relief and Job Creation Act of 2012, which, among other things, charged NIST with utilizing up to \$300 million from the Public Safety Trust Fund to conduct research and assist with the development of standards, technologies, and applications to advance wireless public safety communications.<sup>1</sup>

At PSCR, we believe this future is achievable, and we are working to accelerate its arrival.

## FUTURE TECHNOLOGIES

Getting cutting-edge technology into public safety community's hands for day-to-day operations can be a difficult task. For example, using a smartphone while wearing structural firefighting gloves is almost impossible. Having to aggregate and make sense of millions of pieces of information coming in from multiple sources, including from sensors, video cameras, and social media, while simultaneously responding to an active incident, is not effective. Many technology products designed

---

<sup>1</sup>Public Law 112-96, Section 6303.

for broader commercial markets do not provide solutions specific to the needs of the public safety community. Given this reality, research carried out at NIST can be nothing short of transformative, helping to focus the attention of product manufacturers and service providers on critical public safety research and development. I would like to describe for you a few of the ways in which PSCR is doing this.

First, we conduct internal research at our laboratories, where PSCR serves as the objective technical advisor for critical public safety communications technologies. Over 45 division staff and an additional 50 researchers from other NIST labs and divisions are researching and developing communications technologies and measurement standards across five key public safety research areas:

- Integrating the Long-Term Evolution (LTE) technology that powers most mobile phones with traditional first responder LMR technology for the period of time that these two technologies will coexist;
- Making mission-critical voice capabilities available on LTE broadband devices;
- Enabling location-based services for personnel and assets, especially inside of buildings;
- Enhancing user-interfaces for accessing and transmitting complex information; and
- Promoting public safety analytics tools that will help the public safety community make use of the large amounts of data that will be available to them.

Some of our most recent lab projects include:

- Using a backpack outfitted with *Light Detecting and Ranging* technology, otherwise known as LiDAR, which emits a pulsing laser to quickly and easily map and develop three-dimensional models of buildings for the creation of enhanced maps and location tracking for response activities;
- Developing a Virtual Reality (VR) Test Environment for assessing which future user-interfaces will have the largest improvement on public safety operations;
- Creating mission-critical voice measurement methods that will allow public safety and industry to compare LMR with LTE, so as to determine when and if transition to LTE is possible for voice communications; and
- Working with industry partners to prototype small, self-contained LTE “networks in a box” that responders could be rapidly deploy using drones to establish communications anywhere.

Second, PSCR puts substantial resources into promoting the development of these technologies externally, through the Public Safety Innovation Accelerator Program (PSIAP). The PSIAP is carried out primarily through grants, cooperative agreements and Open Innovation Prize Challenges. These PSIAP efforts give NIST access to experts and innovators from around the world, and greatly expand the number of researchers focusing on key public safety communications issues. In 2017, PSCR awarded \$38.5 million in grants and cooperative agreements to 33 recipients—including teams from New York University, Rutgers, the Atlantic City Police Department, and the State of New Jersey Office of Homeland Security and Preparedness.

Through PSIAP, we are accelerating research in the areas of mission-critical voice, data analytics, location-based services and network resiliency. Thus far in fiscal year 2018, we’ve engaged PSIAP award recipients both with grants and Open Innovation Prize Challenges. To date, we have awarded \$6.1 million in grants and cooperative agreements to 7 recipients for research into enhanced user interfaces. In addition, we anticipate that over \$4 million in additional Federal funding opportunities for mission-critical voice and location-based services will be awarded by the end of this fiscal year.

In 2018, PSCR has launched and completed its first two technology-based prize challenges, with total prize amounts of \$400,000. These challenges were focused on baselining the maximum flight time possible for a drone carrying a payload similar to our “network-in-a-box” prototype, and on using the Virtual Reality Test Environment to develop effective in-building navigation interfaces for future first-responder heads-up displays. Through these challenges, we have had the opportunity to engage with innovators from all walks of life (e.g., professionals, academics, and hobbyists), see companies and partnerships form, and witness people become passionate about using their skills and knowledge to help the public safety community even after the competitions have ended. I firmly believe that encouraging these open partnerships between public safety, private industry, and academic institutions is strengthening the pace of—and passion for—delivering tangible solutions. Whereas just 2 years ago the PSCR footprint extended little beyond our laboratories in Colorado and Maryland, today, roughly 150 entities from around the world are engaged in bringing innovation to public safety. Never before has there been such focus on communications technology R&D benefiting first responders.

Between 2013 and 2016, PSCR engaged hundreds of public safety, Government, and industry stakeholders through workshops and summits to publish targeted

R&D roadmaps. PSCR leverages these roadmaps and continues to gather input from our diverse stakeholder base to develop our innovation strategy and program plans. We also work closely with our partners at FirstNet, the National Telecommunications and Information Administration (NTIA), the Department of Homeland Security (DHS), the Department of Justice (DOJ), and the Federal Communications Commission (FCC), to ensure effective coordination mechanisms are in place to support our shared public safety mission. These communities and partnerships are fundamental to the success of the program, because, as noted by an attendee at our Annual Public Safety Stakeholder Meeting, “it may be the greatest technology in the world, but if it doesn’t help first responders, they’re not going to adopt it.” We at PSCR are laser-focused on helping first responders.

In closing, I’d like to highlight the PSCR tagline: “Pulling the Future Forward.” By statute, NIST’s window within which it must obligate monies from the Public Safety Trust Fund will end in 2022, now just 4 years away. To make the best use of the resources provided to us within this time frame, we are making special efforts to focus our R&D and program plans by employing the following three criteria, which any PSCR initiative must satisfy: First, it must address an urgent and unmet need; second, it must not be redundant with what is happening in the private sector; and third, it must transform the public safety mission. This is our success framework.

NIST is committed to reducing the time by which public safety will get access to these key technologies by accelerating the pace of research in these areas and expanding the number of researchers focused on the mission. By establishing measurement methods, enlisting new research recruits, and developing proof-of-concept methodologies, all with traceable links to public safety, we will transform the future of emergency response—making the best possible use of time, talents and resources.

Thank you for the opportunity to testify about NIST’s work regarding innovations in emergency preparedness technology. I will be pleased to answer any questions you may have.

Mr. DONOVAN. Thank you, sir. The Chair now recognizes to Mr. Kelly for 5 minutes.

**STATEMENT OF JOHN V. KELLY, SENIOR OFFICIAL PERFORMING THE DUTIES OF THE INSPECTOR GENERAL, OFFICE OF INSPECTOR GENERAL, U.S. DEPARTMENT OF HOMELAND SECURITY**

Mr. KELLY. Chairman Donovan, Ranking Member Payne, distinguished Members of the committee, thank you for inviting me here today, my testimony focuses on Office of Inspector General audits, assessing the efficiency and effectiveness of FEMA’s information technology activities that support its multiple missions.

Numerous OIG audits conducted since 2005 disclosed that FEMA maintains outdated IT systems and infrastructure. This hinders FEMA’s ability to effectively carry out disaster response and recovery efforts. Long-standing deficiencies hamper FEMA’s ability to effectively integrate internal systems to perform end-to-end mission functions, track and manage disaster-related funds, and share information with external emergency management partners.

These deficiencies limit real-time coordination across disaster efforts as shown in 2017 and in many other years, FEMA regularly responds to multiple major disasters, as such, effective IT systems are essential for FEMA to successfully execute its mission. We attribute FEMA’s IT deficiencies to ineffective IT management practices.

FEMA lacks four key elements to carry out its mission. First, it lacks centralized planning, development and management of agency-wide IT resources. Second, a comprehensive IT strategic plan with clearly-defined goals and objectives that guide program office initiatives. Third, an approach to modernize its IT infrastructure

and systems. Finally, a comprehensive understanding of existing IT resources and needs throughout FEMA.

In addition, FEMA's chief information officer lacks centralized budget authority to provide guidance, and oversight, and establish a formal governance process that guides agency-wide IT decisions. Despite the importance of IT resources to FEMA's mission, our reports repeatedly identify problems with IT systems and infrastructure.

After the four hurricanes devastated Florida in 2004, and after Hurricanes Katrina, Rita, and Wilma devastated the Gulf Coast in 2005, we reported that FEMA encountered challenges supporting response and recovery operations, establishing a strategic IT direction for system modernization and improving its logistic information systems.

More recently, in 2011 and 2015, we reported that FEMA's outdated mission-central, mission-critical IT systems still could not fully support emergency mission operations. Our reports reiterated that a lack of integration among FEMA's IT systems hindered FEMA from successfully executing essential functions such as logistics management, financial management, and grant management.

To address the IT system and management issues identified in our 2011 and 2015 audits, we made a number of recommendations. However, this past February, we issued a management alert, pointing out that FEMA had made limited progress improving its IT management, and has not taken steps to adequately address our recommendations.

Many of the issues we identified in our reports, even those disclosed in our mid-2000 reports, remain unchanged, and adversely impact day-to-day operations and mission readiness. The management alert highlighted that due to competing priorities, FEMA's CIO removed funding and staff resources needed to effectively address our recommendations.

Given the importance of IT resources to FEMA successfully executing its mission, that decision was shortsighted. In May, we initiated a comprehensive audit regarding FEMA's IT management approach. We expect to issue that report in early 2019.

In summary, IT systems play a vital role in supporting FEMA's response and recovery efforts. Slow progress in addressing longstanding IT issues hampers disaster response efforts and results in wasted money. Having reliable and efficient IT systems and infrastructure is critical to support disasters, especially given that Congress appropriates on average more than \$10 billion a year for FEMA's disaster relief fund.

To be good stewards of tax dollars, FEMA needs strong IT leadership direction to finally overcome its IT management. Mr. Chairman, this concludes my testimony. I would be happy to answer questions from you or other Members of the subcommittee.

[The prepared statement of Mr. Kelly follows:]

PREPARED STATEMENT OF JOHN V. KELLY

JULY 25, 2018

Chairman Donovan, Ranking Member Payne, and Members of the subcommittee, thank you for inviting me here today to discuss information technology (IT) and management practices at the Federal Emergency Management Agency (FEMA). My

testimony today will focus on the Department of Homeland Security (DHS) Office of Inspector General's (OIG) work to assess the efficiency and effectiveness of FEMA's IT in supporting mission operations.

Numerous OIG audits conducted since 2005 have disclosed that FEMA's outdated IT systems and infrastructure did not enable FEMA personnel to effectively carry out disaster response and recovery efforts. Significant long-standing deficiencies continue to hamper emergency support operations in the following areas:

- Inability to integrate FEMA's internal systems to perform end-to-end mission functions;
- Inability to track and manage disaster-related funds effectively;
- Inability to share information with external emergency management partners; and
- Limited real-time awareness or coordination across disaster response efforts.

We attribute these deficiencies to ineffective FEMA IT management practices. Principally, FEMA lacks key elements needed to carry out centralized planning, development, and management of agency-wide IT, including:

- A comprehensive IT strategic plan with clearly-defined goals and objectives to guide program office initiatives;
- A modernization approach to modernize its IT infrastructure and systems;
- Comprehensive understanding of existing IT resources and needs throughout FEMA;
- Centralized budget authority for the FEMA chief information officer (CIO) to provide guidance and oversight; and
- An established, formal governance process to guide agency-wide IT decisions.

These challenges have resulted in considerable wasted resources as system users conducted time-consuming, manual workarounds and ad-hoc processes.

Such inefficiencies caused delays and prevented FEMA from being able to quickly scale up and sustain the increased workloads and information sharing required to respond to major disasters. Until FEMA provides the IT systems and capabilities needed to meet the demands posed by emergency management, timely response and recovery from disasters will be hindered, increasing the risk of delays in providing disaster assistance and grants.

#### BACKGROUND

FEMA is the Federal coordinator to prepare for, prevent, respond to, and recover from domestic disasters and emergencies. FEMA is responsible for saving lives, protecting property, and protecting public health and safety in a natural disaster, act of terrorism, or other man-made disaster. To support its mission, FEMA had a budget of approximately \$15.5 billion for fiscal year 2018. This represented 22 percent of DHS's overall budget of more than \$70 billion.

Within FEMA, the Office of the Chief Information Officer (OCIO) is responsible for providing the critical IT infrastructure and systems to support the agency's response and recovery missions. FEMA has over 90 operational systems used to provide support across multiple programs. For example, FEMA personnel rely on the following mission-critical systems to accomplish its mission:

- Logistics management systems such as the Logistics Supply Chain Management System (LSCMS) and the Logistics Information Management System (LIMS III);
- Response and recovery systems such as the National Emergency Management Information System (NEMIS), the Emergency Management Mission Integrated Environment (EMMIE), and the web-based Emergency Operations Center (WebEOC);
- Mitigation and preparedness systems such as the Non-Disaster Grants Management System (ND-Grants) and Mitigation Electronic Grants (eGrants); and
- Mission support systems such as the Web Integrated Financial Management Information System (WebIFMIS).

Despite the crucial role of technology, FEMA's IT systems historically have not fully met mission needs. Major disasters over the past number of years exposed numerous limitations in FEMA's IT infrastructure and system capabilities. We have conducted a series of audits from September 2005 to the present addressing FEMA's use of IT to support its mission operations.

#### LONG-STANDING IT DEFICIENCIES IMPEDE FEMA MISSION OPERATIONS

Despite the importance of IT for FEMA's mission, we have identified numerous problems with FEMA's IT systems and infrastructure. As early as September 2005, we reported that system improvements and additional IT user support were needed

to better support response and recovery operations.<sup>1</sup> In December 2006, we identified significant challenges to FEMA establishing strategic IT direction and defining the requirements for system modernization.<sup>2</sup> Further, in May 2008, we reported that FEMA's logistics information management systems did not provide complete asset visibility of disaster goods, such as commodities and property, from initial shipment to final distribution in disaster areas.<sup>3</sup>

#### SYSTEM INTEGRATION ISSUES

More recently, our 2011 and 2015 audit reports on FEMA's IT disclosed that FEMA's outdated mission-critical systems could not fully support emergency mission operations.<sup>4</sup> The audits concluded a lack of integration among FEMA's IT systems was impeding a number of FEMA's essential operational functions, including logistics management, asset management, and financial management. Examples of the lack of integration among the various types of systems include:

- **Logistics Management Systems:** FEMA's multiple logistics systems were not integrated and could not support its end-to-end supply chain process. FEMA had not integrated the systems used in its property inventory and supply chain processes, which resulted in fragmentation of data across multiple logistics systems. Specifically, the property management system, LIMS III, and the supply chain management system, LSCMS, were not integrated. Most commodities, such as IT equipment and furniture, were tracked in both systems, with staff performing the same functions in each system. Also, the information in LIMS III was not timely or accurate because data was not automatically shared between LIMS III and LSCMS as commodities were shipped. Given this, users had to manually enter data in LIMS III to close out orders. Moreover, because the shipment did not show up in LIMS III until FEMA personnel received the shipment, personnel manually updated LIMS III as shipments were received. Consequently, the processes for shipping and receiving was labor-intensive and redundant. As mandated by Congress in 2005, FEMA developed LSCMS to enable a timely and effective response to disasters and real-time visibility over shipments of emergency supplies.<sup>5</sup> We reported in 2014 that FEMA's supply chain management system may not be effective during a catastrophic disaster. We found that FEMA did not properly plan and document acquisition requirements and may not ever meet critical performance requirements, which can impair its ability to efficiently and effectively aid survivors of catastrophic disasters. Our 2014 report contained 11 recommendations, two of which remain open.<sup>6</sup>
- **Personnel and Property Management Systems.**—FEMA had not integrated systems to support personnel and property management functions needed to assign IT equipment at disaster sites. As we initially reported in 2005, FEMA's personnel deployment system and its property management system, LIMS III, did not support effective or efficient coordination of deployment operations.<sup>7</sup> Given the continuation of this issue, FEMA employees completed a number of steps to manually check in and obtain property, such as IT equipment, at a disaster site. We concluded that until an effective link between the personnel and property management systems was established, FEMA faced additional work due to inefficient management of property and personnel.
- **Financial and Acquisition Management Systems.**—FEMA's ability to track and manage disaster-related funds was hindered by the fact that the financial system and the acquisitions system were not integrated. Combined, these systems handled 80 percent of budget disaster funds. However, each system operated on a different technical platform, with financial data updates sent to each system

<sup>1</sup>*Emergency Preparedness and Response Could Better Integrate Information Technology with Incident Response and Recovery* (OIG-05-36).

<sup>2</sup>*FEMA's Progress in Addressing Information Technology Management Weaknesses* (OIG-07-17).

<sup>3</sup>*Logistics Information Systems Need to Be Strengthened at the Federal Emergency Management Agency* (OIG-08-60).

<sup>4</sup>*Federal Emergency Management Agency Faces Challenges in Modernizing Information Technology* (OIG-11-69); and *FEMA Faces Challenges in Managing Information Technology* (OIG-16-10).

<sup>5</sup>*FEMA's Logistics Supply Chain Management System May Not Be Effective During a Catastrophic Disaster* (OIG-14-151).

<sup>6</sup>Additionally, we have an on-going review examining to what extent FEMA managed and distributed commodities in the Commonwealth of Puerto Rico in response to Hurricanes Maria and Irma.

<sup>7</sup>*Emergency Preparedness and Response Could Better Integrate Information Technology with Incident Response and Recovery* (OIG-05-36).

at different times. As a result, the two systems were operating without synchronized data, and field office employees manually tracked and reconciled funds that were allocated across different disaster activities. Additionally, manual steps were required to deobligate excess funds after requisitions were completed. Although this step should be done automatically, personnel performed manual deobligations that totaled \$21 million for fiscal year 2020 disaster funds.

- *Grants Management Systems.*—A lack of integration was most notable in FEMA's nine different systems used to support the agency's grant programs, each developed independently to support a specific type of grant. These systems did not enable Grant Managers to monitor FEMA activity across grant programs, as managers had to access one system at a time to search for open grants and compile the results. One region created its own tool for tracking information across FEMA's various grant systems. The numerous unintegrated grant systems also created complexity for grant recipients, such as States, who need to access multiple systems to process grant awards and request payment.
- *Grants/Financial Management Systems Interface.*—FEMA personnel were also unable to detect duplicate grant submissions, due to the lack of integration between the grant systems and the agency's main financial system, WebIFMIS. FEMA personnel manually entered information from the grant system into WebIFMIS at certain stages in the grant process. Similarly, the preparedness grant system, ND-Grants, did not fully interface with WebIFMIS, resulting in the need to manually enter information to complete and close out a grant in both ND-Grants and WebIFMIS. Given these limitations, according to regional staff, if a State were to suffer multiple disasters, one person could apply for assistance for each of the different disasters and not be identified. Further, the inability of enterprise systems to accurately transmit grant information between certain systems can result in grantees receiving incorrect notices that they are not in compliance with grant requirements, which has resulted in delays in making grant funds available.
- *Collaboration Systems.*—FEMA's primary watch and response collaboration system, WebEOC, was not integrated with agency systems used to request immediate short-term emergency response assistance. Instead, FEMA personnel entered information into WebEOC, which processes and tracks the mission assignment requests, and entered the same information into the financial approval system used to process mission assignments, and WebIFMIS. Likewise, the FEMA WebEOC was not integrated with the WebEOC used by State emergency operation centers, resulting in an inefficient manual process to update WebEOC with information from the State centers about on-going disasters. Specifically, a region had to send FEMA staff to a State emergency operation center to review the State's information. If a State's request for assistance was submitted in the State system, a FEMA staff member printed it out and manually entered the same data into the FEMA WebEOC.

#### LACK OF REQUIRED SYSTEMS FUNCTIONALITY

The lack of system integration as well as other system deficiencies resulted in personnel engaging in inefficient, time-consuming business practices on a daily basis. For example:

- One region created 30 Excel spreadsheets to have the information needed to report on disaster spending by States in response to Congressional requests. In addition, field personnel created their own tools, such as spreadsheets and databases, to fill the gaps from enterprise system limitations.
- FEMA personnel could not simply retrieve a standard report from NEMIS that contained a grant applicant's entire record. Instead, grant personnel accessed numerous different screens in NEMIS and compile the results.
- Reports in EMMIE could only be prepared for one disaster at a time. To obtain information across several disasters, personnel accessed and retrieved a report for each individual disaster and manually combined the data into one report. In addition, one grant specialist said that none of FEMA's non-disaster grants systems were able to generate reports listing open, closed, or expired grants collectively.
- FEMA did not have an electronic capability for the States, its foremost external partners, to use when requesting assistance during disasters. Instead, to request Federal assistance from FEMA, States used a paper Action Request Form. After the form was faxed, FEMA personnel entered request information into a tracking system that was intended to track the request through disposition.

- Although NEMIS eGrants was supposed to be an electronic system of records, it did not have a closeout module. Without a closeout capability, FEMA personnel relied on paper forms and manual data entry to finalize grants in the system.
- Officials in FEMA's Mitigation Directorate said they relied on a paper-based application process for the Hazard Mitigation Grant Program. As a result, according to FEMA's Mitigation office, an average of 100 to 200 paper applications received during each disaster, had to be manually entered into the system.

#### IT DEFICIENCIES ATTRIBUTABLE TO FEMA IT MANAGEMENT CHALLENGES

We attributed FEMA's long-standing system deficiencies to numerous challenges involving insufficient IT planning and governance agency-wide.

- *Planning.*—In 2011, we reported that FEMA had not performed the necessary planning activities to guide its IT modernization efforts.<sup>8</sup> As a result of our follow-up audit in 2015, we reported that FEMA had developed numerous IT planning documents but had not yet executed them, in part because of the frequent turnover in the CIO position within the agency. FEMA had six different individuals, either appointed or acting, serving in the CIO position over the previous 10 years. For this time period, the average tenure of the FEMA CIO was about 15 months. Without a comprehensive, agency-wide IT strategic plan, the OCIO lacked a clear end-state vision to coordinate and prioritize modernization initiatives across program offices. Without such a plan, the OCIO and its customers focused on immediate needs, rather than addressing the long-term modernization efforts necessary to improve out-dated, legacy IT infrastructure and systems.
- *Architecture.*—FEMA had not completed its efforts to develop a complete agency-wide architecture that can be used for decision making to guide and constrain investments and to provide a blueprint for IT modernization. Without a comprehensive baseline architecture, the OCIO was hindered in guiding IT investments toward a standardized and integrated environment. The OCIO had not yet completed the baseline architecture due to staffing and funding shortages.
- *Systems Inventory.*—The FEMA OCIO did not have an understanding of existing IT resources and needs throughout FEMA. Specifically, FEMA did not have a complete inventory of its systems to support disasters. Instead, numerous separate inventories were maintained throughout the agency and were not shared. OCIO personnel estimated that the number of FEMA's systems across all regional offices ranges from 90 to as high as 700.
- *Decentralized IT Funding.*—The manner in which IT programs receive direct funding for operations each year contributed to decentralized IT development practices. Specifically, FEMA program and field offices developed IT systems independent of the OCIO without oversight or guidance. Developing new systems on the network without OCIO involvement created concerns as to whether systems would operate effectively, meet security standards, or contain redundant IT functionality already in place. For example, one directorate spent approximately \$7.5 million developing an IT system which was ultimately unable to meet FEMA's security requirements. Although the OCIO had developed a standard systems life-cycle practice to be used for all IT projects, the process has not yet been institutionalized throughout FEMA.

The decentralization of IT funds and development also has been a major obstacle to effective management of FEMA's IT environment. During fiscal year 2010, FEMA spent \$391 million for agency-wide IT needs; however, OCIO's spending of \$113 million accounted for only 29 percent of that total IT spending. The program offices spent the remaining \$278 million, comprising the majority of the agency's IT-related spending. In fiscal year 2018, OCIO spending was \$164 million, comprising 40 percent of the agency's total IT budget of \$396 million.

Efforts to modernize and integrate the agency's critical mission support systems had been put on hold due to Department-wide consolidation plans, and lack of funding. For example, FEMA was not able to plan or fund asset management or financial systems upgrades while DHS officials were identifying a Department-wide asset management solution. Also, funding for critical enhancements and upgrades to logistics management systems and financial systems had decreased over the preceding years. FEMA was also hamstrung by the increasing costs of software upgrades for its 20-year-old technologies.

<sup>8</sup> *Federal Emergency Management Agency Faces Challenges in Modernizing Information Technology* (OIG-11-69).

- *Agency-wide IT Governance.*—FEMA struggled to implement effective agency-wide IT governance. FEMA instituted an IT Governance Board (ITGB) in February 2012; however, the board’s functioning proved ineffective and it eventually stopped holding meetings. In addition, ITGB struggled to make decisions on FEMA-wide IT initiatives. For example, the Consolidated Appropriations Act, 2012, allocated \$13.662 million for FEMA to modernize IT systems.<sup>9</sup> One of the main initiatives undertaken by the ITGB was to decide which projects should receive this funding. However, the process ITGB implemented to solicit, evaluate, and select candidate IT projects was unsuccessful. ITGB did not use the results obtained from this process because members did not concur with the scoring results.
- *CIO Authority.*—FEMA had not implemented effective agency-wide IT governance, in part, because the CIO still did not have sufficient authority to effectively lead the agency’s decentralized IT environment. As we reported in 2011, the OCIO’s budget still accounted for only one-third of the agency’s total IT spending, with the FEMA program offices accounting for the remaining two-thirds. As previously stated, the OCIO’s fiscal year 2014 IT spending was approximately \$170 million of \$450 million for the entire agency.

#### RECOMMENDATIONS

To address the IT system and management issues identified in our 2011 reports, we made a number of recommendations to the Chief Information Officer in the following areas:

- Develop a comprehensive IT strategic plan,
- Complete and implement a FEMA enterprise architecture,
- Establish a comprehensive IT systems inventory,
- Establish an agency-wide IT budget planning process and obtain agency-wide IT investment review authority, and
- Establish a consolidated modernization approach for FEMA’s mission-critical IT systems.

We closed these 2011 recommendations based on FEMA’s quarterly reports to us on corrective actions taken.

Further, in 2015, we recommended the FEMA CIO finalize key planning documents related to IT modernization and execute against those planning documents, fully implement an IT governance board, improve integration and functionality of existing systems, and implement agency-wide acquisition, development, and operation and maintenance standards. Of the 5 recommendations from the 2015 report, 4 remain open. We closed 1 recommendation regarding implementing an IT governance board based on documentation that FEMA provided.

#### FOLLOW-ON AUDITS TO DETERMINE PROGRESS IN FEMA’S IT MANAGEMENT

As we periodically do, we conducted a verification review in December 2017 to assess FEMA’s efforts to address our 2015 report recommendations. Congressional interest, as well as our analysis of the compliance updates, indicated a need for further review to determine the adequacy of FEMA’s efforts to resolve our open recommendations. Since the publication of our report in 2015, FEMA has provided 6 compliance updates on its efforts to address our 5 report recommendations.

However, we found during our January and February 2018 review fieldwork that FEMA had made limited progress in improving its IT management and had not taken steps to adequately address our recommendations. Many of the issues we reported based on our prior audits dating back to 2005 remained unchanged, adversely impacting day-to-day operations and mission readiness. Especially disconcerting, our recent work revealed that the justification that FEMA provided to support our closing the recommendation to implement an IT governance board was misleading and FEMA had not truly met the intent of the recommendation.

Given these deficiencies, we suspended our verification review and issued a Management Alert.<sup>10</sup> The Management Alert indicated that, given competing priorities, the CIO had removed the funding and staff resources needed to effectively address our report recommendations. The Management Alert also stated we would initiate a more comprehensive audit regarding FEMA’s IT management approach, with the objectives of assessing the extent to which FEMA has implemented IT management practices mandated for Federal agencies, and identifying challenges to ensuring

<sup>9</sup>Public Law 112–74.

<sup>10</sup>*Management Alert—Inadequate Progress in Addressing Open Recommendations from our 2015 Report, “FEMA Faces Challenges in Managing Information Technology”* (OIG–18–54).

FEMA's IT systems adequately support disaster response mission operations. We began our current audit work in May 2018.

As part of our on-going audit, we seek to identify and assess any challenges, impediments, or constraints associated with the ability of FEMA's IT systems to adequately support day-to-day mission operations. We are assessing FEMA's approaches and outcomes related to key IT management practices, including IT strategic planning, governance, budgeting, and acquisitions. Last, we are following up on specific issues identified in our previous reports on FEMA's IT management. To date, the audit team has conducted numerous interviews with FEMA personnel across all program offices. The team has also traveled to FEMA's field offices in Houston, TX and Austin, TX to learn about specific IT-related challenges that FEMA personnel experienced during their response and recovery efforts for Hurricane Harvey. We expect to issue our final audit report early in 2019.

#### CONCLUSION

IT systems play a vital role in supporting FEMA's response and recovery efforts. Slow progress in addressing long-standing IT issues can hamper disaster response efforts and result in wasted money, continued ineffective systems, and inefficient processing. Having reliable and efficient IT systems and infrastructure is critical to support disasters that typically occur from year-to-year, as well as the increased disaster relief efforts in the wake of the 2017 hurricane season. To date, Congress has appropriated about \$49.5 billion to FEMA's Disaster Relief Fund for these recovery efforts.

Strong IT leadership direction is needed to stop this pattern and ensure corrective actions to overcome the IT management challenges once and for all. Improvement is essential—for the sake of the taxpayer, FEMA IT users, first responders, and disaster victims. Our on-going audit is aimed at emphasizing this need for positive change. We will advise you on the results of our on-going work once completed.

Mr. Chairman, this concludes my testimony. I am happy to answer any questions you or other Members of the subcommittee may have.

Mr. DONOVAN. Thank you, Mr. Kelly. The Chair now recognizes the gentleman from New Jersey, Mr. Payne, in any opening statement that he may have.

Mr. PAYNE. Thank you, Mr. Chairman. I appreciate your indulgence and welcome the witness, and, you know, as usual, I would like to thank you for holding this hearing to address the technology and innovation in disaster preparedness. Damage from the 27 disasters broke records and made last year the costliest year of disaster-related damage in American history.

I hope to hear from—well, I did hear from the witnesses, and maybe I didn't. I mean, about how you are taking the lessons learned from the 2017 hurricane season and investing in technologies that will be pushed out to communities. Now more than ever, communities are facing mounting threats from extreme weather patterns.

We are seeing where climate change is having a direct impact on the strength and frequency of storms, as such we must all take measures to ensure that life-saving preparedness technologies are developed and pushed out to the Federal, State, and local leaders. For these reasons, I am dismayed that the FEMA 2018–2022 strategic plan failed to mention climate change, and given the record-breaking year we saw for natural disasters.

Additionally, I was disappointed when FEMA's 2017 hurricane season after-action report failed to mention climate change, when we saw Hurricane Harvey produce a historic 60 inches in rainfall and back-to-back Hurricanes Irma and Maria devastated the Caribbean. I hope to hear from the witnesses today about how you are using climate change research to push for advances in preparedness technologies.

It is not good to have conversations about technologies here in Washington, DC when people on the ground do not have access to those technologies. FEMA noted many of their shortcomings in response to Hurricane Maria in the 2017 hurricane season after-action report. One such shortcoming that needs to be addressed today is how to get these technologies to the people that need them the most.

That way, well before a Category IV or V storm hits communities, they will have been made aware of the helpful preparedness technologies that are available and that we discuss here in Washington, DC. I am particularly interested in hearing from Deputy Inspector General Kelly about past audits in FEMA's technologies that the Office of Inspector General has performed throughout the years.

I would like to thank the witnesses for participating in today's hearing, and I was glad to hear their opening statements, and I look forward to hearing from all of you about the progress that has been made with technologies and preparedness. With that, Mr. Chairman, I will yield back the balance of my time.

[The statement of Ranking Member Payne follows:]

STATEMENT OF RANKING MEMBER DONALD M. PAYNE, JR.

JULY 25, 2018

Damage from the 2017 natural disasters broke records and made last year the costliest year for disaster-related damage in American history. I hope to hear from the witnesses today about how you are taking lessons learned from the 2017 hurricane season and investing in technologies that will be pushed out to communities.

Now, more than ever, communities are facing mounting threats from extreme weather patterns. We are seeing where climate change is having a direct impact on the strength and frequency of storms. As such, we must all take measures to ensure that life-saving preparedness technologies are being developed and pushed out to Federal, State, and local leaders.

For these reasons, I was dismayed that FEMA's 2018–2022 Strategic Plan failed to mention climate change, given the record-breaking year we saw for natural disasters.

Additionally, I was disappointed when FEMA's 2017 Hurricane Season After-Action Report failed to mention climate change, when we saw Hurricane Harvey produce a historic 60 inches in rainfall and back-to-back Hurricanes Irma and Maria devastated the Caribbean.

I hope to hear from the witnesses today about how you are using climate change research to push for advances in preparedness technologies.

It is not any good to have conversations about technologies here in Washington, DC, when people on the ground do not have access to those technologies.

FEMA noted many of their shortcomings in response to Hurricane Maria in the 2017 Hurricane Season After-Action Report. One such shortcoming that needs to be addressed today is how to get these technologies to the people that need them the most.

That way, well before a Category IV or V storm hits a community, they will have been made aware of helpful preparedness technologies.

I am particularly interested in hearing from Inspector General Kelly about past audits in FEMA's technologies that the Office of Inspector General has performed throughout the years.

I would like to thank the witness for participating in today's hearing. I look forward to hearing from all of you about the progress that has been made with technologies in preparedness.

Mr. DONOVAN. Thank you, Ranking Member. I will recognize myself for 5 minutes for questioning. But first, I would like to address the after-action report that you are talking about and knowing that we are talking here about technology and preparedness the purpose

of that. What was some of the findings that you think that you—were needed or could be needed in the future after analyzing what has happened in the 2017 season?

Is there technology to help us prepare better? Is there something that Congress needs to do to help you, to help our Nation to be prepared better for the upcoming seasons and the seasons going forward? I would also like to ask you as a second question about artificial intelligence and the use of technology and artificial intelligence.

I know some of the mapping and modeling may have been deficient in the past, and now with new innovative ways of us predicting and preparing, is any of that technology useful to you in your efforts?

Mr. KANIEWSKI. Thank you, Mr. Chairman. Yes, as was referenced, we did learn a lot of lessons from the 2017 hurricane season. The 50-page after-action report is a very blunt self-assessment about what, some of things we did right and some of the things that we need to improve in the future.

As I mentioned before, we think in the emergency management world it is very important to be transparent about those lessons. So, I am happy to hit a couple of those lessons specifically for you, logistics, logistics bedeviled us both in the early, the immediate aftermath, by getting commodities, supplies, and equipment particular to Puerto Rico and Virgin Islands during Hurricane Maria.

Shipping everything by sea and by air was a huge challenge, it wasn't something that FEMA had faced before. Normally, we can truck in supplies even across State lines, it's not a problem. But the logistics network and the supply chains associated with that, not just at FEMA, and not just emergency management agencies, but the private sector.

That's going to get to my second point which is critical infrastructure. Critical infrastructure sectors are absolutely essential to provide those services that you and I need as Americans, that disaster survivors need as Americans immediate after—in the immediate aftermath of a disaster.

Those supply chains, those logistics, and the ability for those private-sector companies to get the power back on, or water, or the hospitals back on-line, a lot of those responsibilities fall within the private sector. We at FEMA acknowledge now that we need to be more supportive of the private sector, No. 1, and No. 2, more integrated with.

Then No. 3, let me mention staffing. I think I am quoting Administrator Long and one of his previous Congressional testimonies where he said, "By the time Maria hit, we were tapped out." We were—we simply did not have the number of personnel necessary to effectively respond to three concurrent catastrophic complex catastrophes last season, but it was something like we had not seen before.

But in the future, we realize we do need to be prepared for these things. So on staffing, we made great use of the DHS Surge Capacity Force for the first time, where we leveraged thousands of personnel not only from DHS, but throughout the entire Federal Government. I think moving forward, we could leverage technology for

that as to get the word out quickly about what specifically we need, what type of critical skills we could use.

In the case of Maria, we needed bilingual staff. So if you were a Spanish speaker, we wanted you, but it might have been hard to reach those particular individuals throughout the entire Federal Government, other than doing what you can imagine we did, which is send out e-mails saying, if you speak Spanish, and if you want to serve your country, and deploy to Puerto Rico and the Virgin Islands, we want you. Want you to help us.

Ironically, one last mention. Ironically, technology was a hindrance for us in Puerto Rico, because remember without power and communications, we couldn't use our traditional—method of registering disaster survivors for aid with an iPad or other electronic devices like a computer.

We had to go back the old way, we had to get paper out of the store rooms and put them on clipboards and deploy volunteers and members of the Surge Capacity Force to go door-to-door to register people for aid with pen and paper. That ironically as it sounds was an innovation, going back to paper, because we did not have a functioning communication system that would enable us to connect to the internet in Puerto Rico and the Virgin Islands.

Mr. DONOVAN. I only have a few moments left, just for some of our colleagues, Don and I come from the northeast, he from New Jersey and me from New York, so we don't experience things like tornadoes that are less predictable. Hurricanes we see days in advance, we don't know what path they are going to take, but we kind-of know where the hurricane territories are. So, knowing that allies but—and I visited Puerto Rico 2 weeks after the storm and then 3 months after the devastation.

I saw the remarkable recovery was going to take a long time, but saw the remarkable devastation 2 weeks after the storm had hit. Knowing that Spanish-speaking communities are in this pathway again, knowing that places with poor infrastructure, my understanding is a lot of the infrastructure in places like Puerto Rico were built in the 1950's.

Since we are talking about preparedness, are we taking any measures to be prepared for the nine—2018 season and 2019 season, the 2020 season? Again, my question will be to all you, because I think with three of us you probably ask a second round of questions, is what can we do, we all lawmakers, you are the boots on the ground, we need to assist you, what is it that Congress could do to help you make your job more efficient and more effective?

Mr. KANIEWSKI. Well, Mr. Chairman, first on preparedness, I was so glad to see the title of this hearing was build a culture of preparedness, and the fact that that aligns with our goal No. 1 of our strategic plan shows our shared interest in this issue. I think now is the right time to have a conversation with the American public to say, "Listen, FEMA is not a first responder."

FEMA cannot be there in the minutes, hours, and sometimes days following a disaster. We are asking you, the American public, to take responsibility and be prepared, be prepared now in the traditional ways that we have talked about for many years. Listen, *ready.gov*, and other ready initiatives have been around since the

DHS's inception, it was a result of 09/11 where we said citizen preparedness is important.

But what we feel that FEMA is we need to take this is step further. No. 1, we have to have open and honest conversations about this, that FEMA is not a first responder, that you need to be prepared. But we—at the same time, we can't scare the American public and just tell the American public you need to be prepared without providing specific guidance.

So, if you go to *ready.gov* you will see particular protective action guidance for a number of different scenarios. Ask these kind of questions, and I often do this in my public speaking engagements, is to ask the audience how many know CPR or how many know how to shut off the water or gas to your home? How many know just to check on your neighbors, especially those neighbors that have special needs? Very few hands go up.

Now second, something, this might seem kind-of strange coming from someone at FEMA, but we as Americans need to be better financially prepared. Did you know that 44 percent of Americans can't put their hands on \$400 that they might need in an emergency? Forty-four percent, nearly half of Americans don't have that much cash on hand.

We need to make sure that Americans are financially prepared, and that includes insurance and of course I have a self-interest here on flood insurance. I think every home should have flood insurance because every home can flood. Do not pay attention to the line about 1-in-100-year flood-plain. Do not pay attention to your—frankly to those that advise you, you don't need flood insurance because you are outside. We are partnering with nontraditional audiences like the realtors to say “We need you to tell your clients that just because they are not in a flood zone doesn't mean they don't need flood insurance.”

It shouldn't be, “Don't worry, new homeowner, you are going to save some money each month because you don't have to have flood insurance. You are not required to have that by law.” The conversation should be any home can flood. Again, some self-interest here, *floodsmart.gov* which by the way was recently updated and a great example of how FEMA is embracing technology, if you haven't seen *floodsmart.gov* recently, I encourage you to do so. But the best time to buy is when it is dry.

It takes 30 days for a policy to take effect. I hope every American knows that they need insurance. It is not just flood insurance by the way. Many Americans are sorely underinsured. As your family grows, as you add new furniture or even an addition on your home, make sure that your insurance is keeping up with your life because if you are underinsured and you lose everything, you are going to have a very, very hard time recovering.

Mr. DONOVAN. Thank you, sir. I remember when New York City after the 2003 blackout started civilian emergency response teams teaching civilians to do things that were not dangerous but—so we didn't have to use first responders to direct traffic and things like that.

The Chair now recognizes the gentleman from New Jersey, Mr. Payne.

Mr. PAYNE. Thank you, Mr. Chairman.

I think you made some very good points with respect to FEMA not being a first responder. But in anticipation of your resources being needed, I think there are a lot of areas where you could have done better. Knowing that this situation, this circumstance was around the corner, I don't understand how in some areas we plan for the worst and then other areas, we just kind-of "Well, we know something is coming, but we didn't expect it to be that big." I mean, I would think in these circumstances, you try to plan for the worst.

I think that almost every instance should be looked at as a Category IV or V and then you ramp down as you don't need as much resource. So, that would just be something I would point out. One of the points that really stuck in my mind was when just after the circumstance, we were in the middle of it and there just happen to be an article that former Secretary Clinton was quoted on, and she said, "Well, I would have had the ship Comfort ready." Then that is when the Government got involved and got the ship ready which just took another 2 weeks to get ready and ramp up.

Why wouldn't you have that within 2 or 3 days of being ready on the circumstance? Secretary Clinton, she is retired now but she just mentions it in an article and then that was the impetus of it being used, but that is for another day.

Now, let us see. Administrator Kaniewski, in the 2017 hurricane season after-action report, FEMA indicated did not properly take into account the factors that would make it difficult for Puerto Rico to withstand a major hurricane. FEMA also admitted that it did not anticipate the logistics demands as you stated associated with the response activities on the island. Now that FEMA has identified these shortcomings, do you believe the agency has the tools necessary to respond appropriately should a similar disaster strike Puerto Rico?

Let me just say, I give a lot of credit for you admitting where some of the shortcomings were, where a lot of times get that part of it. So, I commend you on that a bit. So, could you respond, please?

Mr. KANIEWSKI. Thank you, Ranking Member.

Yes, much of what you mentioned aligns directly with Goal 2 in our strategic plan which is enhancing the Nation's catastrophic readiness. So, just as the same that Goal 1 said individuals need to be prepared and FEMA needs to be prepared to assist, Goal 2 says FEMA's role should really be in our view focused on catastrophic events.

We estimate that probably 80 percent of events could be best managed at the State level. What we call Federally-supported, State-managed, locally-executed disasters could be the new norm going forward for potentially up to 80 percent of disasters. Now, all of those would still be funded by FEMA, by the Federal Government, but we believe that the State is best positioned to manage their own response and recovery, and for FEMA to fill in the gaps in those responses to play a much larger role in those 20 percent of truly catastrophic disasters just like Hurricanes Harvey, Irma, Maria, and the California wildfires.

I think what many people also forget is that last year, prior to Hurricane Maria, FEMA had not only Hurricanes Harvey and

Irma, but we had 30 other disasters even prior to Hurricanes Harvey where FEMA personnel were deployed all around the United States. The lesson we learned of course is that created huge staffing challenges for us when the really big one hit with Hurricane Maria.

So, we had to reallocate staff and resources from all over the country, including from Texas and Florida to Puerto Rico and Virgin Islands. That was a huge challenge. So, going forward, what we are doing is making sure that, No. 1, we have more prepositioned personnel and assets and frankly, as a result of the busy hurricane season we had and the open recovery effort, the on-going recovery efforts in those four areas, we now have personnel prepositioned there for this hurricane season. So, personnel are there, thousands of FEMA personnel are prepositioned in those likely hurricane-prone areas.

We have also pre-deployed far more commodities this year. The way we did that was we increased the level of contracts that we had and deployed—again, in Puerto Rico alone, we have 7 times the amount of commodities there today than we did before Maria hit. Now, that is not because we ran out of commodities last year. It is because we could run out in the future if something even worse were to hit.

So, we need, to your point, to not just plan for a bad day, but a really bad day. Today, I am confident that because of their updated plans and procedures and because of the additional personnel and commodities and equipment that is pre-deployed to those likely hurricane-prone areas that we are better prepared. Finally, I will say that we exercise those plans. So, just this spring and for National exercise, National-Level Exercise 2018, we simulated a hurricane striking in the mid-Atlantic. To your point, it was a Category IV hurricane.

It gave us the opportunity to test many of those plans and procedures, some of which are brand-new. Some of which now engage the private sector in a way that we hadn't before and we did that in an exercise so that now we can be better prepared for a real-world event for the hurricane season this year.

Mr. PAYNE. OK. Thank you. OK. I am way over my time.

So, I yield back, Mr. Chairman.

Mr. DONOVAN. Thank you.

The Chair now recognizes Mrs. Lesko.

Mrs. LESKO. Thank you, Mr. Chair, and I have 5 minutes and I have three questions. So, hopefully we can answer all three.

The first question is actually addressing Mr. Kelly's comments and the question is actually for Mr. Kaniewski. I would like you to respond to his assessment that the IT infrastructure in FEMA is outdated and needs to be fixed and what is your response?

Mr. KANIEWSKI. Well, first of all, many of those IG reports that were mentioned, FEMA concurred with and we have embraced those findings and are doing our best to implement them. I will also note that, as the inspector general noted, these are problems that have existed since at least 2005 and so, we can't fix them overnight, but we are putting personnel and resources toward fixing them.

We have taken some immediate actions. We have changed our leadership in CIO. I think that sends a strong signal that we are doing things differently now and we are focusing like I said time—our time of the leadership team as well as the personnel and resources on fixing some of those challenges.

Mrs. LESKO. Thank you. Do you have a time line on what you are doing? Or, actually, since we don't have time, if you could just email it maybe to the committee and then they can email it to me.

My next question actually has to do with, since I am from Arizona, we have wildfires. In fact, I think it was about 5 years ago the Yarnell Hill Fire killed 19 Prescott hotshot firefighters. I was wondering what—this is to any of you, how do you work with States like Arizona to help mitigate these wildfires?

Mr. KANIEWSKI. I will go first with one quick answer which is first of all, I am a former firefighter paramedic and I understand the devastation that can be caused by wildfires. But, yes, it has been—one, it has been several busy wildfire seasons and we at FEMA realize that we need to do more than respond to wildfires.

A recent innovation is that for Fire Management Assistance Grants, those grants that we give out quite regularly to those areas hardest hit by wildfires that pays for response to those wildfires, reimburses State and local governments for their responses. We are now adding a mitigation component. In fact, we have added a mitigation component.

So, for each of those Fire Management Assistance Grants, we are not just reimbursing for the cost of response. We are helping to make an investment in those local communities to lessen the impact of future wildfires.

Mr. COTTER. I might add that we are working with the State of California in particular on software that would allow all the people involved in the firefighter community to understand the situation real-time. In particular for fire lines breached that people know to rally back and what point to, that may be they are using land mobile radios in the communication, voice may not be clear, and in sync communication using a software package and assist and maybe leave it to my colleague from PSCR to talk about the deployable comms piece of that which could have been very important in Yarnell.

Mr. ORR. Certainly. Thank you. Our laboratory is in Colorado and obviously, we are dealing with several very large fires right now as well. So, that is a very important topic for us. All the areas that I listed whether it would be analytics, enhanced user interfaces like heads-up displays, mission-critical voice-over-broadband or location-based services, every single one of those areas would be useful on the fire ground of a wild land fire.

The area that Dan mentioned related to deployable is an area of research we are doing actually on behalf of DHS and Dan's group in S&T which is focused on the ability to use a self-contained LTE network in a box probably about this big and is the entire LTE network all deployed in a box about that big and we are looking about—taking a look at the ability to deploy that on a drone so that in the middle of a wild land fire where there is no infrastructure and no capability to drive in a truck, you would be able to put up a completely self-contained LTE network with all the mapping,

the data transfer, the voice communications, wherever you want it and it would be able to follow you wherever you went.

So, those kinds of applications I think would be fantastic to be able to deploy on a fire ground whether it would be in the wild land or an urban setting.

Mr. KELLY. From the IG's perspective, we concur with the deputy administrator. Hazard mitigation grants if well-managed can be very effective and it actually prevents the disaster or the effects of the disaster before that actually occurs.

Mrs. LESKO. Thank you. Thank you.

I think I have run out of time. Do we have time for one more question, Mr. Chair? OK. Are we? Well, OK, thank you, Mr. Chair. I do have one last question.

I have a constituent who has an idea on communications for law enforcement and for preparedness. So, what is the best way for an entrepreneur person to transfer their information to you? Should they just—I get your cards and tell them to call you or what is the best way to do this?

Mr. KANIEWSKI. Speaking on behalf of FEMA, we have an industry office that does just that, that liaises with industry including entrepreneurs for their ideas. We also realize we need to do a better job of engagement. We hope to soon have a private sector portal on our website. So, this can be done electronically and that is something that we are aiming to do very soon.

Mr. COTTER. Similarly, in Science and Technology we have industrial engagement liaisons, certainly can provide that information as follow up. Also depending in the type of technology he wants to offer, we have open procurement requests for industries, small businesses to apply to.

Mr. ORR. So, at PSCR, we—I would encourage somebody to go to our website. We have a newsletter that alerts people to opportunities for funding whether it is grants or prize challenges. I do think our use of open innovation prize challenges allows us to provide funding to entities and people who might not normally be in the normal grant loop or procurement loop for the Federal Government. So, it does allow for a new way to interact with all kinds of innovators that are out there that have great ideas to help solve these issues.

Mr. KELLY. If those actions don't work, your constituents should submit a hotline complaint to our hotline because there are some ways of getting things done also.

Mrs. LESKO. I like how you think. All right, thank you very much.

I yield back. Well, I took extra time.

Mr. DONOVAN. That is all right. We will take it from you in the next round.

Mr. Orr, that was an incredible, insightful thing you spoke about, this box on a drone in wildfires. It sounds like something that may have been taken advantage of in Puerto Rico when the technology was down, too, that you could have this hotbox, whatever you call it.

Can you describe—in your testimony, you are talking about other awards, one at the university in New York City, Homeland Security division in New Jersey received some of your awards. Can you

tell us about some of the projects that are out there and if there is some kind of time frame on them?

Mr. ORR. Absolutely. I would be happy to. One, we know we have a lot of work to do in a fairly constrained period of time at PSCR. The funding we were given from the 2012 Act that created the FirstNet and also funded our activities from the auction funds provided the time line on it of 2022.

So, we have a lot of work to do in a short period of time. Although we are doing a lot of the key measurement science inside of our labs, we also know we need to get as many researchers as possible looking at this from around the country and around the world. So, as I said, we have already released over 40 grants and over \$40 million to address all the issues I talked about. So, we have got grants in mission-critical voice and it is academia and industry that are part of these.

We have got grants in analytics. We have got grants focused on location-based services. We have got grants focused on enhanced user interfaces for the future first responders. So, we are addressing all the areas that I have talked about. Most of the grants on average are 2 years because we want a turnaround on these grants and have enough time to then iterate and do another one or two iterations on grants and prize challenges from the results from the first.

So, most of them are 2 years. Some of them are 3 if they were to an academic institution and then there was a PhD-related researcher that needed 3 years as part of their PhD program. But most are 2 years and they are covering our entire swath of areas.

Mr. DONOVAN. Thank you.

Mr. Cotter, I did visit New Steel, remarkable work that they are doing there. Can you tell me what other needs you may have from Congress besides our local support to advance the technology that New Steel is working on?

Mr. COTTER. Yes, sir. Thank you very much for your support. Really, that has been wonderful. It certainly has enabled us to keep doing what we are doing. I might just like to mention that much of what you have seen and certainly appreciate the work for the New York City regional and local first responders, I also like to stress that New Steel really has a National presence and we have done work in 41 States, 306 cities across the Nation.

They have trained over 2,000 different first responders around the community, just an amazing amount of work. Just recognizing that they are not just a New York City asset, they are truly a National asset for us.

Mr. DONOVAN. Thank you.

The Chair now recognizes Mr. Payne.

Mr. PAYNE. Thank you, Mr. Chairman.

Let us see. Deputy Inspector Kelly, in my review of the FEMA's 2017 hurricane season after-action report, I was struck by how many of the findings were problems that we have had and heard of before as identified by your office. I have been on this subcommittee for 6 years now, 3 terms. I have had 3 different Chairpeople. This has been the best one who has stayed the longest.

But, specifically, I noted that FEMA staffing challenges, coordination with State and locals and asset visibility were issues your office flagged many years ago. Now, have you had a chance to review the after-action report? If so, what are some of the issues that continually come up and have yet to be addressed?

Mr. KELLY. Ranking Member, yes, I did have the opportunity to review the after-action report. I thought it was very thorough. Some of the things that you identified there, both staffing issues and logistics problems are things that we have harped on in the past.

In September 2016, we issued a report on FEMA's qualification system, their staffing system. They were supposed to have basically 11,000 reservists or temporary workers to surge for disasters. At the time that we did the audit, they had less than half of those individuals on board. So, they had basically a deficiency of half of the people that they thought they needed to respond to disasters.

I noticed in the after-action report, they showed what appeared to be some progress in increasing the number of staff associated with that program. But they were far below what they needed. I think in years like 2017, it shows the problems with not having the staff on board. Now, in FEMA's defense, there are a number of challenges for them to get the staff that they need, many of which are beyond their controls. When you have a strong economy, it is very difficult to get people to give up their jobs to take on a part-time job. Maybe they need some legislative fixes to help work in that area.

Another area on logistics that you addressed, we have found problems with their integrated systems. The deputy administrator emphasized the Federally-funded, State-managed, and locally-executed mantra that FEMA has which is a very good mantra, we strongly support that. But to have that work effectively, to be good stewards of the tax dollars, FEMA needs to have integrated systems that the State and local communities can tap into.

We understand that they have significant problems actually getting information from FEMA because of the firewalls that have been set up, and that poses significant challenges to those who are trying to respond to the disasters.

Mr. PAYNE. OK. Thank you.

To the point that the deputy administrator was making in terms of people being bilingual and all, it would appear to me from the area that we come from, there were people that have that common interest in seeing things happen there with our large Puerto Rican community and Caribbean community in those areas to even go on local TV to say, "We need people to volunteer." There are people that had a natural interest in what was happening to family members and what have you that a little promotion in that area.

People were coming to my office all the time saying, "Well, how can we help? What can we do? We want to be helpful." To know that you were looking for people like that would be helpful in the onset, to your point about many of the FEMA's public-facing technologies for preparedness require a certain level of means, tech savviness, and literacy.

For example, the preparedness information on *floodsmart.gov* or information being sent through the FEMA app all require a certain

level of technology knowledge that not everyone has. How is FEMA's preparedness message reaching populations with limited access to technology? I have some of the most affluent constituents in New Jersey and some of the poorest. So, everybody as a State does not have the same means. How do you address that, sir?

Mr. KANIEWSKI. Well, thank you. Yes, thank you, inspector general, for his, I thought, very insightful and balanced comments about the challenges we face.

Just as an overall statement, I will say that you don't want to look at AAR in isolation. You want to look at the AAR in tandem with our strategic plan. They really are linked documents. AAR is where we think we can improve and the strategic plan is where we want to go in the next 5 years.

So, first on the issue of staffing, yes, we do face many challenges in recruitment, in retention of our disaster reservists. You may not know this, but our reservists are not treated the same way legally as the reservists in the armed forces. They don't have a status that allows them either to become a full-time employee. There is no career path there. No. 2, if they are to leave work, if there is a disaster and they leave work, there is no protection on them being able to return to their jobs. So, there are a number of challenges in addition to what you heard.

As far as getting volunteers in the immediate aftermath of a disaster, I agree, we definitely want to leverage the volunteer base. That is generally done through the nongovernmental organizations. FEMA can't welcome volunteers on as easily. We have that reservist program, right, and that would take some time to get on board. But in the immediate aftermath, the best thing that someone can do if they want to help in a disaster is go to a nongovernmental organization.

If you say, "I am not sure which one to go to" or "Which one is the best based on my interest or my expertise?", the answer is NVOAD. Now, that is an acronym for the National Volunteer Organizations Active in Disaster. Would you believe today at FEMA headquarters is our voluntary partnership day? So, today, we are showcasing all of these volunteer organizations we are working with and strengthening those bonds with those organizations, so they can bring on volunteers. They can provide specialized resources.

As far as other employees, how we can leverage those with a particular interest, I think we can all agree. Those that have the most interest in their recovery are the disaster survivors themselves. I am very proud to say that today, FEMA is one of the largest employers on Puerto Rico. We have I believe 1,500 local hires that are managing not only our recovery programs, but managing their recovery for the future.

Now, to your point about not everybody having access to technology, I agree. We know that there are always be a segment of the population that we can't reach via technology. So, no matter how much we go on Twitter, or how much we post on the website, we have to have relationships on the ground. Now, for FEMA, that might mean our regional offices. It might mean our joint field offices. So, anybody in the disaster site can go to our joint field office and get some one-on-one assistance.

But in addition, we are working with the NGO community and I want to mention one in particular, which is Operation HOPE. Operation HOPE has an unbelievable mission. They are out there educating people on financial literacy. We have partnered with them. We have developed an emergency financial first aid kit to help those that do not have the financial literacy, help them prepare for a disaster, help them prepare for any emergency that they might have.

If you ever want to see an inspiring story, look at John Hope Bryant, the founder of that organization. I am going to use a plug here for our prep talk series, I don't know if anybody has heard of that. But think of it as like a TED Talk for emergency management. This has been very popular and John Hope Bryant himself did one of our first prep talks. So, you can find that on-line. I think that message really resonates with me and it reminds me every day that we need to make sure that we are helping everyone, every American, not just those with access.

Mr. PAYNE. Thank you.

I will yield back, Mr. Chairman.

Mr. DONOVAN. The Chair recognizes Mrs. Lesko for any questions she may have. You are their favorite Member.

For not only your testimony and not only your patience with us today, but also to your service to our Nation, there is a lack of understanding sometimes of what everyone's role is. Sometimes, there is a lack of understanding, not from the people on this committee, but other Members of Congress what your role is. So, what you have shared with us today is insightful.

Know that you have our support and please again—no one answered my question, but we are lawmakers. Sometimes we make laws that aren't as effective as the people who need to use them would wish them to be. So, this communication that we have doesn't end here today. Let us know how we could help you protect our communities.

The Members of the subcommittee may have some additional questions for the witnesses. We ask that you respond to those in writing. Pursuant to the committee rule VII(D), the hearing record will remain open for 7 days.

Without objection, the subcommittee stands adjourned.

[Whereupon, at 3:51 p.m., the subcommittee was adjourned.]



## A P P E N D I X

---

QUESTIONS FROM RANKING MEMBER DONALD M. PAYNE, JR. FOR DANIEL KANIEWSKI

*Question 1a.* In its 2017 Hurricane Season After-Action Report, FEMA admitted it did not have situational awareness of the damage inflicted by Hurricane Maria. Three days after the storm, FEMA and Puerto Rico had not begun water and wastewater assessments and “communications challenges inhibited reporting of road outage assessments.” A week after the storm hit, FEMA still did not have information on the status of “24 of 52 wastewater treatment plants or 37 of 69 hospitals.”

Is there technology to improve FEMA’s situational awareness after a catastrophic natural disaster?

*Question 1b.* If so, what is it?

*Question 1c.* Is FEMA exploring such technology?

*Question 1d.* Beyond technology, what more can FEMA do to improve post-disaster situational awareness?

Answer. In the immediate aftermath of Hurricane Maria, critical lifelines across Puerto Rico were unavailable or severely affected, including power, communications, and transportation. Specifically, the lack of viable means of communication impacted the Commonwealth’s ability to gain situational awareness across the island. The Governor and the Puerto Rico Emergency Management Agency (PREMA) were unable to communicate with the 78 mayors, municipal emergency managers, and first responders. This lack of communications reduced the ability to receive damage assessments and reports of key impacts, and threatened State and local continuity of government. FEMA rapidly deployed communications equipment and its Mobile Emergency Response Support (MERS) teams to help establish contingency communications networks across the island, including delivering satellite phones to each municipality, which helped improve communication and reporting.

Further, Federal, State, and local responders had to conduct in-person assessments of many key lifeline-enabling infrastructure, including hospitals and water treatment plants. Emergency Support Function (ESF)–8 (coordinated by Health and Human Services) and ESF–10 (coordinated by Environmental Protection Agency) led Federal support to assess and identify requirements to stabilize their associated lifelines. However, many areas were isolated due to road closures, and owners and operators of the facilities faced the same communications challenges experienced by the municipal governments. In the initial weeks of the incident, various response teams, including FEMA’s National Urban Search and Rescue Response System’s Task Forces, conducted assessments of hospitals and other critical infrastructure to determine status and key requirements and share their findings with the appropriate entities. Transportation and power limitations complicated efforts to conduct assessments, but a lack of resilient and redundant communications infrastructure was the major limiting factor in gaining situational awareness.

To prevent a complete communications failure following a large-scale incident in the future, State and local governments, and owners and operators of critical infrastructure should focus their efforts on building redundant means of communication, including emergency communication. For example, high-frequency radio would likely be one of the few forms of available communications following a catastrophic incident. The Federal Government can emphasize the importance of preparedness, continuity planning, and contingency communications capabilities for State and local constituents. FEMA’s grant programs provide funding mechanisms for State and local governments to procure critical preparedness equipment, and can be used to build organic contingency communications capabilities for the State and local governments and first responders.

FEMA is also making strides to improve situational awareness and reporting across the response lifelines (transportation, communications, power/fuel, food/water/shelter, safety and security, health and medical, and hazardous materials). FEMA is partnering with the National Protection and Programs Directorate (NPPD)

to leverage steady-state public-private coordination mechanisms across the 16 critical infrastructure sectors during response operations. National-level reporting mechanisms will provide a means to receive status updates and requirements from industry and infrastructure owners and operators, aimed at improving reporting and situational awareness, unity of effort, and operational prioritization. To institutionalize these improvements, FEMA is revising the National Response Framework to focus response toward the stabilization of critical lifelines and establish a new Emergency Support Function-14 (Cross-Sector Coordination).

Establishment of an interoperability operational framework allowing for voice and data exchange (e.g., IP-based gateways) between varying communications technologies and networks such as HF communications, satellite communications, and commercial wireless broadband/WiFi and cellular pending degree of infrastructure damage and wide-spread nature of natural disaster. Increased alignment with commercial communications providers in the area of the natural disaster to determine (via provider network management systems) which cell sites may still be operational with sufficient backhaul and power (including assessing battery life).

Build a shared Federal LMR network in PR and the U.S. Virgin Islands (USVI) to support assigned, dedicated channels for participating Departments, Agencies, and Components (D/A/Cs), augmented with dedicated interoperability channels in Federally-assigned very high frequency (VHF) and ultra-high frequency (UHF) bands. A network designed to carry voice and LMR data traffic, and expand to include other technologies as needed, and accommodate participation from local, territorial, and Commonwealth subscribers.

*Question 2.* In the aftermath of Hurricane Maria, several large-scale tech companies like Facebook, Tesla, and Google came to Puerto Rico to assist with emergency response and rebuilding efforts. How does FEMA plan to better leverage and coordinate with the private sector for short- and mid-term technology needs for future disasters?

Answer. Technology integration and innovation in disasters has been a reality during this historic hurricane season. The FEMA Private-Sector team comprised of approximately 60 staff across HQ, Regions, and deployed staff managed the integration of the business community into response and recovery across not just the three largest disasters in Texas, Florida, and Puerto Rico but nearly 30 other disasters including the fires in California. Given the scale of these incidents, the maturation of emergency management within the business community, and continued integration of the private sector into government operations, innovation in disasters continues well into recovery. At the height of response, FEMA was directly coordinating with more than 1,200 National businesses daily including key technology and innovation leaders who helped support affected States and survivors.

Through the National Business Emergency Operations Center (NBEOC) FEMA coordinates with business, industry, and infrastructure owners and operators, which had more than 800 National members at the time of Hurricane Maria, including technology companies of various scale, capabilities, and maturity. FEMA currently has nearly 40 signed coordination agreements with technology companies including: Arc Aspicio, Airbnb, Amazon, CenturyLink, Cisco TacOps, Dbi Services, Digital Global Systems, Dun & Bradstreet, Esri US, Everbridge, Excel Technologies, Facebook, Google Disaster Response, Hughes Network Systems, Humanity Road, Icloud, Information Technology Disaster Resource Center, Intel, SABER, Lyft, MIT, M2Catalyst, MapR Federal, Microsoft, Microsoft Philanthropies, MutuaLink, Nextdoor, Oracle, Plum Laboratories, SABER, Sprint, Siemens, Twitter, Uber, Verizon, World Wide Technology, Zillow Group.

Since 2015, the Tech Sector Collaboration Program effort has been aligned closely with the NBEOC as part of the National Response Coordination Center (NRCC) where these companies and non-governmental organizations, such as Information Technology Disaster Resource Center (ITDRC) and Humanity Road, are aligned in response operations.

During Hurricane Harvey, program members along with additional technology companies held daily conference calls in addition to normal NBEOC calls for more specific tech issues based on the situation. This consistent collaboration resulted in Cisco and ITDRC assisting San Antonio Food Bank in 10 affected neighborhoods with data connectivity so they could assist Harvey survivors in registering for Disaster Unemployment Assistance while also providing connectivity for donation management warehouses in Texas. In a combined effort, Dell, Google, Cisco, DISH, and Ruckus provided network infrastructure, internet backhaul, and computer hardware for evacuation shelters in Dallas, Austin, Houston, and in surrounding areas, along with Intel's coordination with the American Red Cross.

These efforts made an impact. Humanity Road provided situational reporting areas of approximately 8.7 million people. The team monitored and relayed urgent

needs where Twitter traffic averaged 6.5 million tweets daily to first responders. They had a team of 50 volunteers from 8 States and 7 countries with an additional 13 translators from Translators without Borders. Humanity Road volunteers supported the public with information needs, as well as the Army National Guard and U.S. Coast Guard with a rescue map containing more than 1,000 requests for rescue which informed rescue operations.

During Hurricane Irma, ITDRC provided assets and volunteers to provide voice and internet connectivity for the county Emergency Operations Center enabling several departments in the city of Marathon, Florida to coordinate response as well as in the various Florida Chambers of Commerce and Florida Department of Law Enforcement. Additionally, they equipped the AmeriCorps teams with their technology in TX, Florida (FL), Puerto Rico (PR), and the U.S. Virgin Islands (USVI), as well as providing technology resources to National and regional nonprofits such as Team Rubicon, Red Cross, Catholic Charities, and Toolbank. Humanity Road co-located with FEMA in Big Pine Key, FL supporting local response through situational awareness reporting and staffing a resource information center for 2 weeks. Also, the mobile app Gas Buddy provided data to the Florida Department of Emergency Management and FEMA as part of supply chain stabilization for fueling in Florida to reduce lines and address shortages.

During the first week of Hurricane Maria response, FEMA for the first time established the Puerto Rico Business Emergency Operations Center in the Joint Field Office (JFO) to ensure clear coordination with the private sector for supporting business continuity, industry solutions, and infrastructure restoration aligned with various sectors. This helped ensure, for example, that the Puerto Rico Chief Information Officer's request for fielding of Project Loon to Google was appropriately coordinated. In another innovation, Tactivate, an entrepreneurial expeditionary team working with the Puerto Rico Offices of Family Services and local authorities, enabled data connectivity allowing more than \$250,000 in electronic transactions within remote communities so survivors could access their assistance funds and increase their personal resilience. In both cases, FEMA supported the efforts of the Puerto Rico government and the technology companies, only coordinating where needed as opposed to directing efforts. The director, private sector met with a multitude of companies not limited to Tesla, Google, ESRI, Microsoft as well as the Puerto Rico technology incubator Paralel 18 and other Silicon Valley firms.

In other post-Maria operations, ITDRC, DISH, Datapath, Sprint, Google, and Dell volunteers pooled resources to provide 40 notebooks to the USVI to register survivors for assistance. Through the collective efforts between PR Emergency Management Agency, DISH, and ITDRC in response to an urgent need, the companies collaborated with HughesNet to donate a satellite establishing internet connectivity for the only operating pharmacy in Cabo Rojo providing medicines to more than 49,000 citizens. Intel also provided drone expertise for locating survivors and damage assessment efforts in PR following successful deployment training for immediate response needs in the Mexico City earthquake. Today, Microsoft continues providing data visualization for the Governor of Puerto Rico's *status.pr* website and supporting NetHope and other partners in the Caribbean providing pallets of solar panels and batteries to support TV White Space emergency connectivity sites. Currently in Puerto Rico, FEMA is working with private sector to coordinate opportunities to jointly bury fiber with PREPA, PRASA, and transportation. This allows the carriers to save time and resources where trenching is already occurring or where vaults are being built on new roads. Through the "sector-based" recovery model, agencies are coordinating with the private sector (both telecom and broadcasters) to develop the generation and distribution of wireless and emergency alerting.

Overall, during the 2017 hurricane season, the NBEOC received more than 10,000 inquiries, offers of capabilities, and several pitches from technology companies. FEMA is currently developing a new effort to collect, filter, and evaluate the feasibility of these unsolicited offers for potential use and provide innovations to the agency and the emergency management enterprise for consideration. This will be jointly managed by the Office of the Chief Procurement Officer and the Private Sector Division in the Office of Response and Recovery.

The lessons learned from the historic 2017 hurricane season and the complexities presented by a dynamic threat and hazard environment make clear that private-sector operational integration is essential based on the systemic interdependence and disconnects which can be addressed supporting community economies Nationally. As a result, FEMA requested and received authorization from the Secretary of Homeland Security to update the National Response Framework (NRF) and develop Emergency Support Function-14.

ESF-14 will create an integrated, designated, formal response coordination mechanism that will allow greater insight into the needs for business resumption, infra-

structure restoration, and other private-sector-enabling activities which can shift systems from disrupted to sustainable operations. This will improve precise information sharing between Government and the private sector based on information requirements and stabilization indicators collaboratively developed that will accelerate response and recovery. And most importantly from a technology implementation perspective, greater actionability for issues, concerns, and complex challenges requiring sustained collaboration to stabilize the incident.

Recent coordination with the technology community includes, but is not limited to:

- NLE18 (May 2018): NBEOC Members in active exercise planning and conduct: Amazon, Cisco TacOps, DBi Services, Dun & Bradstreet, Everbridge, Humanity Road, ITDRC, Microsoft, MIT, MutuaLink, Nextdoor, Plum Laboratories, SABER, Uber.
- Airbnb (May 2018): Engagement with Individual and Community Preparedness Division on community engagement around hurricane preparedness.
- White House (May 30, 2018): Facilitated tech sector participation for White House Office of Science and Technology's "Improved Information Sharing for Whole Community Disaster Response" Workshop.
- Zillow (June 2018): Engagement with FIMA Risk Management Division to promote awareness of flood zones and using data.
- Private Public Partnership Conference (July 24–25, 2018): Hosted a Technology Integration Workshop with the DHS Private Sector Office as well as tabletop exercise and operational coordination including Airbnb, Amazon, CenturyLink, IBM, Nextdoor, Siemens, Twitter, and Verizon.

Last, the Private Sector Division was moved from the Office of External Affairs to the Office of Response and Recovery. The Division is being resourced to contribute to private-sector integration across community lifelines and retool the Tech Sector Collaboration Program to expedite the potential use of technologies during disasters including aligning with existing capabilities or crises response efforts of the tech community. This process will include working with DHS Science and Technology and the DHS Private Sector Office.

FEMA's Tech Sector Collaboration Program is only one way that technology-driven capabilities can be used in disasters. Some companies seek collaboration only with certain non-governmental organizations or on their own, instead of coordinating with FEMA. While the program is not designed for individuals, we do guide those volunteers to the Volunteer Organizations Active in Disasters and other proven partners such as the Information Technology Disaster Resource Center (ITDRC). Technology integration and volunteerism in disasters will continue, and the FEMA Private Sector Division will continue to support these efforts.

*Question 3.* According to FEMA's recently published After-Action Report, the 2017 "hurricanes and wildfires collectively affected more than 47 million people—nearly 15 percent of the Nation's population." Given these statistics, it is likely that close to 10 million of these affected individuals should have been provided with the civil rights protections of equal access to emergency services and programs. Given the thousands of disaster-related deaths and the disproportionate impact of the disasters on countless people with "chronic health conditions" and disabilities, why is it that the FEMA After-Action Report doesn't make any mention or provide any recommendations for improvements in meeting its disability civil rights obligations?

Answer. FEMA is committed to serving all survivors, including survivors with disabilities and other access and functional needs and did during the 2017 hurricane season. The final chapter of the After-Action Report (AAR), on Mass Care to Initial Housing Operations, focuses specifically on areas where FEMA can improve services to all survivors, including those with disabilities and other access and functional needs. FEMA describes how the implementation of the Direct Lease program may have better served survivors with disabilities and other access and functional needs. As noted on page 45 of the AAR:

"Due to the shortage of available housing resources to accommodate the large number of survivors requiring housing assistance, FEMA developed a new Direct Lease program. This program facilitated survivor access to property not typically used for temporary housing, such as corporate lodging or vacation rentals. In addition, Direct Lease can be a potentially safer option for displaced families with access and functional needs compared to a manufactured housing unit."

In addition, the AAR provides recommendations to improve service to all citizens inclusive of survivors with disabilities and other access and functional needs. For example, page 47 of the AAR mentions that "State and local governments are best positioned to determine housing options for their citizens, with support from the Federal Government." On page 48, the AAR further recommends that:

“Federal housing assistance can be adapted to build SLTT capacity to manage disaster housing programs on behalf of their citizens . . . Changes should offer State, local, Tribal, and territorial partners the flexibility to provide housing options that work for their citizens. The goal will include an expeditions and smooth transition for survivors from immediate to mid- to long-term housing solutions.”

*Question 4.* How is FEMA carrying out its responsibility for ensuring that Emergency Support Function No. 8 is carried out in compliance with disability civil rights obligations throughout disaster response and recovery?

Answer. FEMA deploys Disability Integration Advisors to each Joint Field Office to support response and recovery efforts, as well as to the National Response Coordination Center (NRCC) and Regional Response Coordination Centers (RRCCs). These advisors provide the Federal Coordinating Officer, NRCC and RRCC leadership and incident management organization with situational awareness, advice, and guidance to ensure people with disabilities have equal access to all programs and services across the disaster life cycle. FEMA mission assigns the Department of Health and Human Services (HHS) to lead the Federal Government’s support to public health and medical response during Presidentially-declared Emergencies and Major Disasters. HHS is the coordinating agency for Emergency Support Function (ESF)–8, Public Health and Medical, as well as the Health and Social Services Recovery Support Function. The Disability Integration Advisors provide ESFs, including ESF–8, with required support in the form of counsel and advice based on lessons learned from prior disaster responses. Under its mission assignment, FEMA delegates decision making authority to HHS on specific disability civil rights obligations with regard to public health and medical response and recovery.

*Question 5.* What is FEMA doing to ensure that Federal funds expended throughout disaster response and recovery are provided in compliance with obligations to ensure that disaster-impacted individuals with disabilities are provided equal access to emergency services and programs in the most integrated setting appropriate, as required?

Answer. The Federal Emergency Management Agency (FEMA) and the State, Tribal, or territorial government receiving Federal disaster assistance (Recipient) enter into a FEMA-State Agreement (FSA) or FEMA-Tribe Agreement (FTA) that requires the Recipient to comply with non-discrimination assurances under Title VI of the Civil Rights Act of 1964 and Section 504 of the Rehabilitation Act of 1973. Both of these Acts prohibit discrimination in programs receiving Federal financial assistance. Section 504 specifically states that “. . . no person, by reason of her or his disability, shall be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by any Executive agency . . .”.

In addition to the FSA/FTA, FEMA promotes this non-discrimination requirement through information provided to disaster survivors with the opportunity to file a complaint in instances of perceived discrimination. Fliers and other information posters are published in all languages related to the demographics of the disaster impacted area, in multiple accessible formats, and distributed through numerous media outlets to reach the broadest possible disaster survivor audience.

The FSA assurances also support FEMA programs guidance to recipients in providing equal access to all applicants. This guidance is set forth in the Individuals and Households Program Unified Guidance (IHPUG) which outlines program delivery considerations for applicants for assistance with disabilities and other individuals with access and functional needs, those with LEP, those residing in insular areas, and Tribal governments.

FEMA ensures equal access to eligible services and programs for all applicants with disabilities and other individuals with access and functional needs. FEMA provides all of the following:

- Accessible communication for applicants who are deaf, hard of hearing, or have a speech disability. Applicants should call 800–462–7585 for TTY or 800–621–3362 for 711 or VRS.
- Access to DRCs that comply with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act, which include wheelchair ramps, accessible restrooms, and accessible paths of travel from the parking lot and throughout the facility, as well as multi-lingual signage and technology to address a variety of access and functional needs.
- Alternative formatted materials in large print and Braille.
- American Sign Language interpreters and/or Communication Access Real-time Translation (CART) at public/community outreach events and field staff

equipped with tablet computers that can access Video Relay Interpreting (VRI) for applicants who use American Sign Language.

- Assistance for applicants who are having difficulty understanding the registration process, denial letters, or the appeal process.

Disaster Recovery Centers:

- Disaster survivors may apply for assistance in person at DRCs in or near their communities. DRCs are usually opened quickly after a disaster for a limited period of time. They are accessible and equipped to accommodate disaster survivors who need disability-related communication aids. FEMA staff can assist with completing registrations or checking their application status. FEMA coordinates with the State, territorial, Tribal, or local government to establish DRC locations.

The FEMA Office of Equal Rights (OER) monitors recipients providing assistance to disaster survivors to ensure there are no barriers to access and participation by persons with disabilities. Where relevant factors trigger concerns about the effectiveness of non-discriminatory recipient program delivery and access, OER conducts reviews to assess the recipient's procedures and offer technical assistance to promote voluntary compliance as required by the applicable regulations. Also, OER is responsible for processing complaints of discrimination from disaster survivors that allege discrimination in participation or access in the programs receiving Federal disaster assistance.

*Question 6.* How is FEMA monitoring the use of billions of preparedness, disaster relief, recovery and hazard mitigation funds it expends and provides to grantees, sub grantees, contractors, sub-contractors and other recipients of Federal funds in compliance with its obligations under Section 504 of the Rehabilitation Act of 1973?

Answer. The Federal Emergency Management Agency (FEMA) and the State, Tribal, or territorial government receiving Federal disaster assistance (Recipient) enter into a FEMA-State Agreement (FSA) or FEMA-Tribe Agreement (FTA) that requires the recipient to comply with non-discrimination assurances under Title VI of the Civil Rights Act of 1964 and Section 504 of the Rehabilitation Act of 1973. Both of these acts prohibit discrimination in programs receiving Federal financial assistance. Section 504 specifically states that “. . . no person, by reason of her or his disability, shall be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by any Executive agency . . .”

The FEMA Office of Equal Rights (OER) monitors recipients providing assistance to disaster survivors to ensure there are no barriers to access and participation by persons with disabilities. Where relevant factors trigger concerns about the effectiveness of non-discriminatory recipient program delivery and access, OER conducts reviews to assess the recipient's procedures and offer technical assistance to promote voluntary compliance as required by the applicable regulations. Also, OER is responsible for processing complaints of discrimination from disaster survivors that allege discrimination in participation or access in the programs receiving Federal disaster assistance.

The Civil Rights Unit of OER reviews grant applications and grant awards, conducts site reviews and desk audits of recipients, conducts compliance reviews where relevant factors determine compliance reviews should be conducted, and provide technical assistance when recipients are not providing effective program guidelines and practices that ensure compliance with Section 504 of the Rehabilitation Act of 1973. The Civil Rights Unit also processes complaints of discrimination against recipients filed by disaster survivors, contractors, or other persons that allege denial of access and participation in recipient programs and activities.

FEMA ensures the use of preparedness funds it provides to recipients are expended in compliance with obligations under Section 504 of the Rehabilitation Act of 1973 by including this as one of the DHS Standard Terms and Conditions on each award and by requiring that all grant recipients certify compliance with the Rehabilitation Act of 1973 by submitting Standard Form (SF)-424B, Assurances for Non-Construction Programs, or SF-424D, Assurances for Construction Programs, as applicable, before FEMA awards funds to the recipient:

1. The DHS Standard Terms and Conditions for various fiscal years are available at <https://www.dhs.gov/publication/fy15-dhs-standard-terms-and-conditions> require that all recipients comply with Section 504:
  - a. Rehabilitation Act of 1973 Recipients must comply with the requirements of Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. §794), as amended, which provides that no otherwise qualified disabled individuals in the United States will, solely by reason of the disability, be excluded from partici-

- pation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.
2. Grant applicants must also certify compliance with Section 504 when signing the standard assurances form(s) of SF-424B (non-construction programs) or SF-424D (construction programs), which are available <https://www.grants.gov/web/grants/forms/sf-424-family.html#sortby=1>. In SF-424B, compliance with Section 504 is stated in paragraph 6, and in SF-424D, compliance with Section 504 is stated in paragraph 10. The paragraphs on both forms require the recipient to comply with all Federal statutes relating to nondiscrimination, including Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of a disability.
  3. Complaints received concerning compliance with Section 504 of the Rehabilitation Act of 1973 are investigated and referred to OER. Under 44 C.F.R. § 13.43 for awards to States, Tribes, and local governments before December 26, 2014, 2 C.F.R. § 215.62 for awards to institutions of higher education, hospitals, and other nonprofit organizations before December 26, 2014, and 2 C.F.R. § 200.338 for awards to all non-Federal entities on or after December 26, 2014, FEMA has the authority to take certain enforcement actions for noncompliance with a term and condition of the award. Such remedies include imposing specific conditions, withholding payments, withholding further awards, and disallowing costs.

QUESTIONS FROM RANKING MEMBER DONALD M. PAYNE, JR. FOR DANIEL M. COTTER

*Question 1a.* To what extent is S&T working to develop technologies to address the threat posed by unmanned aerial systems over public areas?

Answer. DHS is in need of new legislative authority to counter the growing threats and potential misuse of Unmanned Aircraft Systems (UAS). The most effective technologies for countering malicious uses of UAS conflict with Federal laws enacted long before UAS technology was available for commercial and consumer use. Specifically, DHS needs Counter-UAS (CUAS) authorities to detect, track, and mitigate threats from small UAS before further UAS integration actions by the Federal Aviation Administration (FAA). DHS cannot develop and operate many types of CUAS technologies without these authorities.

Current law prohibits the use of most Counter Unmanned Aircraft Systems (UAS) technology to detect, track, and mitigate threats. As you are aware Chairman McCaul recently introduced H.R. 6401 that would provide DHS and DOJ with narrowly-scoped authorities to counter UAS. DHS greatly appreciates the Chairman's efforts to close this important authority gap.

Although we are prohibited from developing kinetic or electronic mitigation solutions, in the mean time, S&T developed the Counter-Small UAS Advisory and Review Toolkit (C-SMART), which is a suite of computer models and analysis tools that can be used to optimize the sensor layout and overall architecture of a CUAS system being deployed to protect people and/or critical infrastructure. To date, C-SMART has been used to support National Special Security Events, such as the Presidential Inauguration, and others with high Special Event Assessment Rating, such as the Super Bowl. The C-SMART technology is a modeling tool and does not violate the problematic statutes. C-SMART also supports FAA and TSA in assessing the vulnerability of airports to malicious drones and the associated cost and level of protection by counter-drone capabilities.

Given the wealth of commercially available off-the-shelf solutions (COTS), S&T focuses on testing and evaluating COTS in settings that are relevant to homeland security in order to advise DHS operating components while guiding industries' development efforts. S&T provides upgrades to existing capabilities using mature technologies, while leveraging Department of Defense and Department of Energy investments to incubate new technologies against future threats, such as advanced algorithm to reduce false alarms for urban sensors or safe-eye laser imaging detection and ranging.

S&T is working with a DHS operational component to create an urban testbed. This testbed will serve both as an interim operational system and as a testbed to assess the efficacy of various detection, tracking, identification, and mitigation for CUAS technologies. This effort also ties into the work NASA Ames is doing for the Federal Aviation Administration on a UAS Traffic Management system.

*Question 1b.* Are there statutory obstacles to addressing this threat?

Answer. DHS is in need of legislative authority to counter the growing threat posed by unmanned aircraft systems (UAS). Specifically, DHS needs Counter-UAS (CUAS) authorities to employ certain types of technology deemed more effective to detect and track small UAS and mitigate malicious small UAS. Without this man-

date, DHS is unable to develop and operate many types of CUAS technologies. Pending legislation, S. 2836, the *Preventing Emerging Threats Act of 2018*, would provide DHS the ability to develop the necessary technology and deploy it in support of our identified missions to mitigate the range of threats from small UAS. With approval of this authority, Congress would reduce risks to public safety and National security, will help to accelerate the safe integration of UAS into the National Airspace System (NAS) and ensure that the United States remains a global leader in UAS innovation.

In normal security situations, law enforcement personnel can establish protective measures to protect people and property from mobile threats—that is simply not the case with drones as they are able to access areas that people, cars, or other mobile devices cannot. Moreover, the most effective technologies for countering malicious uses of UAS conflict with Federal laws, such as the Wiretap Act and the Pen Trap and Trace Statutes, enacted long before UAS technology was available for commercial and consumer use. Additionally, State and local law enforcement are generally responsible for protection of local events and mass gatherings, but neither has authority to use CUAS technologies to counter potential threats. A provision included in S. 2836 would allow DHS or DOJ to provide assistance, within available resources, when requested by the State Governor or Attorney General. We believe this is an important aspect of our continued coordination with State and local law enforcement partners

*Question 2.* How does S&T collaborate with the Small Business Administration (SBA) to provide support to small businesses in order to develop quality manufacturing practices and procedures to insure mission-critical products are placed in the hands of the first responder community?

Answer. The DHS SBIR Office does not collaborate with SBA in the area of providing support to small businesses in order to develop quality manufacturing practices and procedures. However, S&T does provide small businesses with test and evaluation support at its laboratories and testbeds through cooperative research and development agreements (CRADAs) to ensure that their manufactured technologies meet the technology requirements of DHS components. In addition, S&T provides access to commercialization support to help small business performers improve their chances of success in the public sector arena and ensure that mission-critical products can be manufactured and made available in the marketplace.

QUESTIONS FROM RANKING MEMBER DONALD M. PAYNE, JR. FOR DERECK R. ORR

*Question 1.* Please describe how NIST is working with FirstNet to ensure the success of the network.

Answer. NIST's Public Safety Communications Research Division (PSCR) has benefited from a partnership with FirstNet, beginning in 2012. NIST PSCR and FirstNet have collaborated to identify their research portfolio. Additionally, prior to 2016 (when spectrum auction funds became available to NIST), PSCR performed research specifically for FirstNet. Since the auction funds became available, PSCR regularly meets with FirstNet to provide information on key research findings; updates FirstNet leadership on a bi-monthly basis at the Federal Partners Meeting; utilizes FirstNet's Public Safety Advisory Committee (PSAC) members as subject-matter experts for research and testing; funds participation of FirstNet's PSAC members in PSCR's annual stakeholder meeting; and invites FirstNet participation in grant and prize challenge development, including serving as judges and selecting officials.

Additionally, as required by the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. 112-96), NIST ensures the development of a list of certified devices that meet appropriate protocols and standards for access to, use of, or compatibility with the Nation-wide Public Safety Broadband Network (NPSBN) that FirstNet and AT&T build and maintain. This requirement is carried out by the PSCR of the NIST Communications Technology Laboratory.

*Question 2.* How does NIST-PSCR collaborate with the Small Business Administration (SBA) to provide support to small businesses in order to develop quality manufacturing practices and procedures to insure mission-critical products are placed in the hands of the first responder community?

Answer. NIST PSCR currently does not have any collaboration with the Small Business Administration to provide support in developing quality manufacturing practices. PSCR works with the first responder community to advance public safety communications technologies by accelerating the adoption and implementation of the most critical communications capabilities. NIST PSCR also works to ensure that the public safety community can more effectively carry out their mission to protect

lives and property during day-to-day operations, large-scale events, and emergencies.

*Question 3a.* Have prototypes of the “network-in-a-box” device shown operational ability in water trials similar to that of a flood scenario where individuals are isolated in their communities?

*Question 3b.* If so, what were the results?

*Question 3c.* If not, are plans under way to conduct such trials and provide results?

Answer. The “network-in-a-box” prototype is an early stage research project and has not been deployed in any operational or trial situations. PSCR is still performing laboratory tests to understand applications and capabilities. However, our vision is that the network-in-a-box will be a useful tool for many natural disaster scenarios such as fire grounds, flood areas, and earthquake zones.

QUESTIONS FROM RANKING MEMBER DONALD M. PAYNE, JR. FOR JOHN V. KELLY

*Question 1a.* By FEMA’s own staffing models, they are roughly 4,000 staff members short of their target staffing number for incident workforce personnel. Your office has reviewed FEMA’s workforce challenges multiple times.

Beyond some of the more obvious issues with personnel shortages (staff exhaustion, low morale, etc.) what are some of the other issues associated with low staffing?

Answer. In September 2016, we reported the following reasons contributed to poor performance and low morale in FEMA:

- FEMA does not adequately assess Reservist performance following each deployment;
- FEMA does not consistently provide all Reservists with job-related training opportunities between deployments;
- FEMA does not adequately communicate with Reservists;
- FEMA does not adequately manage its Reservists’ performance and professional development; and
- FEMA does not offer its Reservists employment protection (longevity), which limits FEMA’s recruitment pool of employees.

We made 4 recommendations to FEMA in our September 2016 report (OIG–16–127–D). Of the 4 recommendations, 1 is closed, 2 remain resolved pending corrective actions, and the recommendation to develop and implement a workforce readiness strategy remains unresolved.

*Question 1b.* Have you looked at or are you reviewing FEMA’s current initiatives to recruit and retain incident response staff?

Answer. Our office is currently conducting an on-going audit to determine if FEMA’s deployment and management of the DHS Surge Capacity Force (SCF) is effective in accomplishing its mission during disaster operations. The SCF is a voluntary program to supplement FEMA’s disaster workforce. Following a large-scale disaster, with approval from the DHS Secretary, FEMA deploys designated non-FEMA Federal employees from every department or agency in the Federal Government to support its response and recovery efforts. The SCF volunteers leave their regular agency and job to deploy for up to 45 days to a disaster location with severe conditions. We estimate the audit to be final in spring of 2019.

We also understand that GAO is currently conducting a broad review into FEMA’s Workforce Management.