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2016 Challenge Projects

Improving Cybersecurity in Small and Medium-sized Utilities

Project Objective-The American Water Works Association (AWWA) was selected to participate in the 2016 Challenge Program to educate water systems personnel to identify gaps in cybersecurity coverage, as well as inform about detailed steps to address the gaps to increase security and preparedness.

Achievements-The cybersecurity resources prepared through the Challenge Program continue to be supported and deployed in the water sector by face-to-face and eLearning platforms to more than 650 participants in Virginia, Texas, Michigan, Indiana, Alaska, the Pacific Northwest, the Rocky Mountain Section, North Carolina and Pennsylvania. Recent statutory changes require community water systems to, among other things, assess risk from cyber threats. As a result, the project team has updated the guidance, user tool and corresponding training materials to support utility compliance efforts and implementation of best practices in alignment with the National Institute of Standards (NIST) Cybersecurity Framework. Anyone can access the guidance and tool at www.awwa.org/cybersecurity. A new version will be fully deployed by mid-September 2019.

Future Opportunities-The training materials are available in a face-to-face format presented by AWWA. An eLearning module, *EL250 - Cybersecurity Guidance and Use Case Tool* has been integrated into AWWA's Utility Risk and Resilience Certificate Program and is a two-hour (0.2 CEU) course that can be purchased as an individual course for \$115/\$90 for members. AWWA has contributed a one-to-match of in-kind funds to advance the necessary upgrades to the resources, as well as utilized other federal funds from other federal agencies in support of the continued project effort.

Regional Coalition Secure Web Portal

Project Objective-Based on a proposal to create a three-part Web portal, ChicagoFIRST was selected to participate in the Challenge Program and delivered a secure Web portal used to plan before, store real-time data during, and provide a collaboration space after an emergency.

Achievements-The Regional Coalition Secure Web Portal has been utilized continuously since the Challenge project completion and now boasts approximately 110 users. The initial target users were the 30 critical infrastructure and key resource firms associated with the ChicagoFIRST Regional Coalition. Third-party collaborators include the Financial Services Information Sharing and Analysis Center (FS-ISAC), Department of Homeland Security's (DHS) Region V, Chicago's Urban Area Security Initiative (UASI) Fusion Center the Crime Prevention Information Center (CPIC), as well as state and federal law enforcement and emergency management agencies.

ChicagoFIRST's 30-member firms fund two full-time staff. The staff manages and operates the capability in conjunction with DHS and other government partners. The FS-ISAC provides



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funding for Regional Partnership Council (RPCfirst) staff, which maintains the capability for the other regional coalitions, and for the hosting of the public-facing Websites.

Future Opportunities-ChicagoFIRST has used Homeland Security Information Network (HISN) dashboards for the Chicago Marathon and July 4th Emergency Operation Center activations. RPCfirst has used these dashboards for east coast hurricanes, including Dorian in 2019. For Dorian, RPCfirst established two collaboration dashboards-one for general information on the financial sector's operational status from the Federal Reserve and US Treasury and another that included specific links to information on the state level due to the large number of states potentially impacted by the storm. The dashboards facilitate information sharing and collaboration in real-time and could prove beneficial in future events and natural disasters.

Building Regional Common Operating Picture for Disaster Resilience

Project Objective- This Challenge effort spans across all three years of the Challenge Program. The initial 2016 project was funded to develop a sensitive information sharing framework to be utilized during security/disaster response efforts by public and private sectors.

Achievements-The framework, originally called, 1Stopops was vetted in the first year and development began. At the conclusion of that original contract, All Hazards Consortium (AHC), the performer, had the legal framework implemented, the data set working group initiated, initial data sets identified, and a baseline of apps, Websites and data sets organized and packaged to initiate the sustainment model (e.g. 1StopOps) with the private sector.

The AHC determined areas where enhancements were needed to generate more users; (1) add more sectors and use cases, (2) identify more data sets, (3) form more partnerships, (4) enhance the technology for user identity vetting and validation, (5) enhance data security and organizations, and (6) improve the visual presentation of information.

Future Opportunities-AHC integrated the output of this project into its membership programs and service offering for information sharing to its members and partner organizations and leveraged its existing methodology which included development, test, exercise and operationalize during an incident. To further this effort, the team proposed an expansion and enhancement for the 2017 Challenge and was selected.

INGAA Automated Cyber Threat Sharing Information Sharing Network

Project Objective-The goal of this 2016 Challenge project, contracted to Interstate Natural Gas Association of America (INGAA) was to research and develop approaches to refine the INGAA Automated Information Sharing Network to benefit a diverse group of users in the public and private sectors by offering multiple end-point solutions for sharing natural gas cyber threat information.

Achievements-At the conclusion of this project, it was determined that the INGAA Automated Network was beneficial in demonstrating the value of cyber threat information sharing because



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of the ability to (1) to operationalize large amount of threat intelligence without manual or human interaction; (2) protect privacy and safeguard shared information; (3) to be used easily without risk to operational environments; and (4) to meet funding budget.

Future Opportunities- INGAA anticipated using the results of the project to develop an on-going assessment process to allow an expanded use of the tool either by a current Information Sharing and Analysis Center (ISAC) or by a new ISAC for the natural gas sector. To further this development, INGAA proposed an expansion of the project and was awarded a 2017 Challenge contract to continue the efforts by building critical relationships in the sector through educational outreach and by providing better measurement tools to the members.

Cyber Market Development Project

Project Objective-The Cyber Market Development Challenge project was funded to (1) develop and application for communities to have an attainable and sustainable community cyber structure delivering cyber services to reduce risk and (2) a market oriented business model that brings together supply and demand for cyber services.

Achievements- The project successfully launched the first university student club to promote crowdsourcing of cyber threat analytics that trained more than 100 students and generated letters of intent from an additional 20 university partners to incorporate CrowdWatch (C-Watch). In addition, approximately 20 trainers and cybersecurity firms planned sponsor partnership arrangements including several Information Sharing Analysis Organizations (ISAOs) and community groups such as community chambers of commerce.

Future Opportunities- During PyeongChang Olympics, the C-Watch generated daily open source intelligence reports which were delivered through the State Department to the Embassy in Seoul, as well as by the U.S. Olympic Committee. During the Women's World Cup, the C-Watch provided several alerts to the embassy in Paris and to the FBI CyWatch. These examples prove that the value of this Cyber Market Development project can range from universities to government, to international events. The possibilities are vast.

Handbook and Website for Healthcare and Public Health Leaders to Strengthen Risk Management and Resilience Due to Cyber, Physical and Human Threats to Critical Infrastructure Including and Electromagnetic Pulse (EMP) Event

Project Objective-Through this Challenge project, healthcare and public health leaders received a completed handbook and Website to strengthen risk management and resilience due to cyber, physical and human threats, including an Electromagnetic Pulse Event (EMP) to critical infrastructure.

Achievements- This project was presented at two meetings with subject matter experts from 19 countries who share information on Black Sky Hazards, an event that disrupts the normal functions of critical infrastructure. The team has been invited to participate in the next meeting in London, UK in 2020. Because of these events, the DHS Private Sector Critical Information



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Cross-Sector Council members who are the Chairs of the 16 critical infrastructure sectors and DHS leaders formed the first private sector Critical Infrastructure Black Sky Hazards Coordination Working Group to help DHS with the new Executive Order 13865 and the National Critical Function development.

Future Opportunities- The work formed joint collaborations between the project team the Society of Disaster Medicine & Public Health, International Council of Systems Engineering and InfraGard National Disaster Resilience Council to create models of resilient hospitals and microgrids. Resilient microgrids is also continuing through a Small Business Innovation Research (SBIR) commercialization project in partnership with the Wyoming National Guard and the General Services Administration.

Future partnerships are being pursued while the “Resilient Hospitals Handbook” is currently available for free download at <https://hospitalmicrogrid.com> and for purchase at the following websites for \$9.95:

www.amazon.com/Resilient-Hospitals-Handbook-Strengthening-Healthcare/dp/16339-16006.

Toolbox to Enable Risk-based Cross-sector Decision-making for Regional Critical Infrastructure Security and Resilience

Project Objective-Creating a process of disseminating limited resources for infrastructure security and resilience for the public and private sectors was the objective of this Challenge project.

Achievements- The project team conducted six regional workshops, a tabletop exercise, more than 50 smaller stakeholder meetings and 24 interviews to gather and implement requirements and validate outcomes. The final deliverables included a User Guide, an educational pamphlet and the assembled Toolbox (in Web-based electronic and document forms), which addresses the Presidential Policy Directives 8 (National Preparedness) and 21 (Critical Infrastructure Security and Resilience).

The InfoXchange network, formed through a Challenge Program collaboration, includes five communities of interests with thousands of stakeholder members, such as the California Water and Wastewater Agencies for Response Network (CalWARN), which alone has more than 1,000 member utilities across the state, and the Alameda County Operational Area, which serves the County’s stakeholders in 14 cities and more than 36 special districts. A healthcare coalition, a water utility, as well as research and academic institutions add more than 125 members.

Future Opportunities- The future opportunity for the project is having a regional “Operational Area Coalition” of dashboards linking the Bay Area’s more than 100 cities and 400 special districts. The proposed plan describes projected outreach to promote and share the InfoXchange with other regions and states. This effort is being undertaken by the Bay Area Center for Regional Disaster Resilience (BACRDR), San Jose Water Company, and other InfoXchange Core Team members.



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Creation of a National Crisis Event Response, Recovery and Access (CERRA) Process Standard

Project Objective-The 2016 CERRA project was selected to integrate multiple versions of the Joint Standard Operating Procedure (JSOP) into a master Crisis Event Response, Recovery and Access (CERRA) process standard to enable seamless interoperability by jurisdictions, agencies, Sector Coordinating Councils (SCCs) and industry partners during emergencies.

Achievements- During the period of performance for this project, the team focused on developing the beginning process of implementing (1) the migration of existing programs while (2) providing new programs a baseline for CERRA Framework implementation. In addition, there was an emphasis in outreach engagement, education and requirements gathering to define the process of implementation.

Future Opportunities-This initial CERRA effort generated interest in DHS throughout the sectors, which led to a second proposal being funded in the 2017 round of the Challenge.

Defense Industrial Base Human Resource Resiliency Through Two-way, Location-based Information Sharing

Project Objective-The Defense Industrial Base (DIB) project team proposed an information exchange and mobile location-based technology that protects employees through awareness of threat and incidents in an effort to speed their return to work to offer minimal disruption.

Achievements- DIB ASSIST, the technology funded in this project, incorporates watch center data and a smart phone app. Several companies have deployed the technology and was also used during Hurricane Harvey and Irma by the Communications and Energy Sectors for recovery efforts.

Future Opportunities-DIB ASSIST has been implemented in the new Unmanned Aerial Systems (UAS) ISAO to use in UAS operations in partnership with the Alabama Department of Transportation (DOT). All future AL DOT UAS operations must use the UAS ISAO with DIB ASSIST as the primary tool. Furthermore, additional sectors are being explored to expand operations in other sectors including Mining and Minerals ISAO and Maritime and Port Security. DIB is a part of the International Association of Certified ISAOs and is offering DIB ASSIST to the members.

Development of Multi-hazard Coastal Resiliency Assessment and Adaptation Indices and Tools for the Charleston, SC Region

Project Objective-The goal of this 2016 Challenge effort was to create multi-hazard resiliency tool for the Charleston, SC region after conducting a comparative analysis of the functionality, breadth and application successes for more than 24 available resiliency tools.

Achievements- The project involved more than 200 stakeholder representatives and built a portal to provide access to (1) a variety of on-line resources and (2) datasets and associated data



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products related to flooding and resilience in the greater Charleston, SC region. It also includes a number of real-time features. ChucktownFloods, the name of the public site, which is scheduled for public release in late 2019, has been designed to address the needs of three sectors: (1) small business and industry; (2) municipalities, and (3) neighborhoods.

Two stakeholder engagements have been held, reaching 98 stakeholder participants; one hackathon event, which solicited 29 participants; and a technical committee of 17 locally-based professionals from academia, government, state and federal agencies, and the private sector have contributed to this project. When ChucktownFloods is officially launched to the public, Website traffic will be monitored using built-in analytics. Further, users will have the capacity to submit written comments detailing their experience with the Website.

Future Opportunities- Although the ChucktownFloods Website has yet to be publicly released, the product aims to serve small business and industry, municipal governments, and neighborhood stakeholders in the Charleston, SC region. The Charleston metropolitan project area encompasses a population of more than 660,000 individuals and more than 43,040 business establishments distributed among 29 incorporated and five unincorporated communities. Beyond this preliminary service area, the Website infrastructure is designed to be adaptable to other coastal communities up and down the coast. With ChucktownFloods as a proof of concept for Charleston, the plan is to expand this platform in the short term to other South Carolina coastal counties.

To maintain the relevance of this resource, the Website will undergo regular and ongoing updates and review. The Charleston Resilience Network will manage the Website content. Through the open comment feature, the public can submit suggestions and report issues at any time. The possibility of offering a live feed to include current weather, traffic and flooding information is actively being pursued and plans to be wrapped up close to project completion. With the vision of expanding this platform to other South Carolina coastal counties and eventually along the Southeast U.S. coast, the impacts of this project are expected to increase tremendously.

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Ensuring Food Security Through Enhanced Data Availability and Decision Support

Project Objective-The purpose of this 2017 Challenge effort was to create business continuity system for producers in food and agriculture industry to have a standardized, electronic mechanism, known as AgConnect for sharing requested data with animal health officials in case of disease.

Achievements- The swine industry was the first to use the AgConnect software to help secure the pork supply and supported this effort financially. Requirements gathering, architecture design and data manipulation functions were vetted during the contracting process and lead to the dashboard and permissioned data access of AgConnect2.0.



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Future Opportunities-The swine industry was the first industry to propose enrollment into the system. It could be utilized by any national food animal production industry, which could result in substantive progress in closing the identified gap of ensuring food security.

Maritime Transportation System Cyber Resilience

Project Objective-This Challenge initiative was funded to develop a regional cyber incident resilience Concept of Operations (CONOPS) as well as reporting requirements for a reporting tool to benefit maritime transportation and port resiliency and recovery efforts.

Achievements- During the course of the project, it was determined that the CONOPS could benefit more than just maritime transportation. Pacific Northwest Economic Region (PNWER), the primary contractor on the project published the following sites and they were made available across all 16 critical infrastructure sectors. The CONOPS is entitled The Washington Cyber Situational Awareness COPOPS is available at https://www.regionalresilience.org/uploads/2/3/2/9/23295822/washington_cybersecurity_situational_awareness_conops.pdf and the Cyber Resilience Assessment Tool can be found by accessing https://www.regionalresilience.org/uploads/2/3/2/9/23295822/cybersecurity_survey_updated_v2.pdf.

These capabilities are being used by 36 organizations, both public and private, which include DHS Cybersecurity and Infrastructure Security Agency (CISA), the Department of Justice (DOJ) Task Force and the Federal Bureau of Investigation (FBI). The NW Warning Alert and Response Network (NWWARN) also utilizes the CONOPS bringing the capabilities to more than 2,500 vetted public and private members.

Future Opportunities- This initiative is sustained by PNWER and staffed by fusion center analysts as a way to ensure the private sector and critical service providers have a way to share information with local and state law enforcement. PNWER maintains the NW Warning Alert and Response Network and the Fusion Center provides staff to vet users and send/review messages. Pierce County Emergency Management has dedicated staff time and support to sustain their local CONOPS.

The capabilities can be applied to a multitude of events. The WA Fusion Center receives cyber incident reports on a regular basis and shares a monthly summary with members of NWWARN via email. For significant events, the Fusion Center communicates directly with organizations and members.

Expand/Enhance a Regional Common Operating Picture for Disaster Resilience

Project Objective- This project was funded to address issues in disaster resilience identified by the sector, more specifically how to enhance operational coordination, communication and



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decision-making with state, local and federal agencies before, during and after regional incidents or disasters that cause disruptions to the business and the supply chain.

How do we enhance our operational coordination, communications, and decision making with state/local/federal agencies before, during and after regional incidents or disasters that cause disruptions to businesses and their supply chains?

Achievements- With the 2017 project, the project team built upon the successful components of phase one; integrating several other Challenge projects outputs, enhancing trust via improved cyber/data security and creating a regional unity with operational entities (government and private sector) through data-driven, decision-making based processes, tools and apps.

Future Opportunities- A transition-to-use plan was presented in the 2018 Challenge proposal process and was selected based on this project's success of completing a proven process and strategy to be incorporated into the project from the very beginning. The AHC's model did shown that private sector participation in the initial electric sector brought on investments from large nationwide electric sector association (EEI), electric companies, banking companies as well as product enhancements by DHS Science and Technology (S&T), Federal Emergency Management Agency (FEMA), and National Oceanic and Atmospheric Administration (NOAA). Expanding to other sectors was the goal of the next AHC Challenge project.

UAS Damage Assessment for Recovery

Project Objective- Because the use of small, unmanned aerial systems (sUAS), or commonly known as drones is not well understood by the public and private sectors, this 2017 Challenge project was selected to develop a CONOPS to increase the acceptance of using sUAS to support critical infrastructure security and resilience around the country.

Achievements- The project successfully demonstrated four categories of infrastructure inspection application at the concluding workshop, including oil and gas, utilities, construction, and insurance. The applications are: (1) using drones for infrastructure inspections to reduce the need to put people in unsafe or unknown situations and make it easier and safer to assess damage, (2) the use of drones for precision agriculture which can be broken down into visual, multispectral, and remote sensing, (3) resource management to allow an overview of resources including inspecting land for invasive species and wildlife, monitoring wildfires, and observing other issues that cannot easily be detected or accessed from the ground, and (4) package delivery and urban mobility.

Future Opportunities- The project team was pleased with the outcome of the 2017 Challenge effort and pursued a proposal for the 2018 Challenge Program. The proposal was accepted and the team was awarded a second contract to develop plans, procedures and processes to collect and exchange infrastructure damage information obtained from sUASs.



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Real-time Awareness: Mapping Critical Healthcare Infrastructure Status During Emergencies

Project Objective-This 2017 Challenge project had support from the Healthcare and Public Health Sector to expand representation and participation in infrastructure and emergency management partnerships, refinement of a replicable process for collecting and mapping facility status information as well as the availability of critical healthcare information.

Achievements- The tool is accessed by more than 75,000 individual users each hurricane season, with an additional 30,000 during the remainder of the year. This includes emergency managers who import and visualize in their own Emergency Operations Centers (EOCs), public health partners, and patients/patient advocates. In addition to the direct pulls, more than 90,000 users access the data through Geographic Information System (GIS) tools and Application Programming Interfaces (API). To further address the national need to include mapping (and reporting) of pharmacy and facility status in the United States and US territories, there are more than 60,000 pharmacies and more than 4,000 dialysis centers, in addition to the other facility types added into the system.

Future Opportunities- The is maintained as a component of the operating budget of the contracting organization and has been used during a number of major activations, including the California wildfires and the major hurricanes of 2018, as well as for the duration of the movement of Hurricane Dorian in 2019 through the Caribbean and across the Eastern seaboard. As improvements are added, the successes of this project can be utilized exponentially in the future.

Cybersecurity Risk Management Education Assistance for Small Communications Operators (ISPs)

Project Objective-This 2017 Challenge project, executed by the National Telecommunications Cooperative Association (NTCA) was funded to help small telecommunications providers identify and mitigate cyber risks and recover from and respond to cyber incidents by providing instructional materials to help evaluate their current process.

Achievements- NTCA's Cyber Wise education program includes a variety of resources and training events, which were designed to meet the needs of more than 1,000 small communications operators within the communications sector. About 260 employees from small, rural broadband providers participated in the 2018 in-person Cyber Wise workshops and more than 150 participating in two Webcasts. In addition, 115 participants completed all the educational requirements to achieve formal recognition as Cyber Risk Managers and received certificates of completion from NTCA.

A survey of participants indicated widespread satisfaction with the program. After completing the workshop, 84% of participants reported that they had the tools they needed to adopt a risk-management approach to cybersecurity threats, and 98% agreed that after participating in the Cyber Wise program, they are better prepared to take actionable steps to manage their risks.



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Future Opportunities- A variety of resources are available to the community on NTCA's website, including the [sector-specific guidance](#) and the [NTCA Cybersecurity Bundle](#), developed through the program. In addition, an expansion of this effort was proposed in the Challenge Program in 2018 and was funded to execute a pilot project and a related research feasibility study for a new cyber-threat information sharing forum for small telecommunication operators.

Cyber Risk Management Tools for Nonprofits

Project Objective-This work began in 2017 and was selected again for the 2018 Challenge. The goal of the original effort was to increase the adoption rate of the NIST Cybersecurity Framework by providing specific guidance and basic cyber risk management tool to operationally lean nonprofits which greatly improves the capabilities of critical infrastructure participants that include nonprofits as part of their supply chain.

Achievements- The executive guide was transitioned-to-use as a way to gather leads to purchase an annual subscription to the budget and risk assessment tools to sustain research and overhead indefinitely.

In less than 90 days since the release, the guide produced 179 leads attributed to collaborating with NIST, which linked to the guide from the resources section of the main NIST Cybersecurity Framework Website.

Future Opportunities- Long term, the team is working with the Information Technology ISAC and the National Council of Nonprofits to develop go-to-market models. The original estimate of reducing sector risk by \$330 million was predicated on a 15 percent market penetration. However, talks with the North Carolina chapter of the National Council of Nonprofits indicate that approximately one-third of their members could be subscribers. Expanded to the larger market and other channels like the IT-ISAC could mean the project has the potential to reduce risk by more than \$660 million.

Expansion of Natural Gas Sector Information Sharing Capabilities: Continuity and Expansion of INGAA Automated Cyber Threat Information Sharing Network

Project Objective-As mentioned previously, the goal of this 2017 Challenge project, as determined from the outcomes of the 2016 project was to build critical relationships in the sector through educational outreach and by providing better measurement tools to the members.

Achievements-The project proved successful in raising awareness of the value of threat information sharing across the industry and increased represented participation from 36,000 miles to 60,000 miles and Interstate Natural Gas Association of America (INGAA) participation in Oil and Natural Gas (ONG) ISAC from 0 to 26. In addition, the 2017 project was able to negotiate a legal agreement and framework which helped to establish a trusted community, fulfilling the major goal of the 2017 expansion project.



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Future Opportunities- Because of the value this project brought to the ONG-ISAC, there were other contracts pursued with other Challenge participants, in particular, ThreatSketch to facilitate cyber threat information sharing. More organizations are considering establishing automated information sharing communities, which presents the future opportunity for a high level of integration and synergy along the natural gas value chain and would allow for enhanced information sharing across user groups. This allows future expansions to create the cybersecurity hardening of the natural gas pipeline system for both up- and down-stream systems by increasing participation in the platform, further assessing its value, and expanding the information shared through the ThreatSketch platform while demonstrating the benefits of collaboration with the Challenge Program.

Non-destructive Testing of Post-Tensioning Anchors in Concrete Dams

Project Objective-In the 2017 Challenge, Harvey Mudd College was selected to conduct performance-based field tests for evaluating the existing condition of post-tensioned anchors in a concrete dam. The testing procedures yielded requirements and specifications for instrumentation and diagnostic and reporting procedures.

Achievements- The outcome of this 2017 project resulted in proposing a testing procedure to (1) utilize a systems approach, identify frequency ranges where dynamic isolation of anchors occurs and take measurements of two anchors, which allows relative and absolute evaluations and compare results in the frequency domain and pattern-match to find ranges where the anchor characteristics are dominant; and (2) the measured anchor frequencies tabulated within these regions (3) use a simple model with the same physical parameters and an tension value to predict resonances in the same frequency regions and (4) Implement an algorithm to vary the tension value and find the closest match between the predicted model and measured performance-based testing (PBT) frequencies.

Future Opportunities- Given the result of this effort, the project was selected to continue in the 2018 Challenge to conduct further testing based on the proposed testing parameters.

Operationalizing a Nationwide Crisis Event Recover and Response Access (CERRA) Program

Project Objective-The 2017 CERRA Challenge project focused on four tasks: (1) maturing the key CERRA standard documents, (2) creating the core elements of the CERRA Clearing House-an administration component of the process, (3) conducting outreach, education and training to sectors and jurisdictions across the nation and (4) supporting joint DHS and council exercises of the CERRA efforts to validate the core concepts.

Achievements-CERRA is available to any jurisdiction in the US via the DHS CERRA Framework, and via at least three CERRA compliant program providers. To date, nine jurisdictions are using the CERRA approach and eight to 10 others are in some process of planning and/or implementation. These nine active programs have generated approximately 6,000 registered organizations and 54,000 registered response and recovery personnel.



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Future Opportunities-Each of the CERRA programs operate independently financially. Because government funds are not required, the extent of future use is not limited. For example, in 2018 the Virginia activated a CERRA program in response to Hurricane Florence, enrolling nearly 400 organizations and 13,500 personnel in a matter of days/week to provide evacuation, response, and recovery support. This effort has now been expanded state-wide by Virginia DEM (VDEM). Efforts such as this can easily continue nationwide.

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Safeguarding Patients by Enabling Accelerated Government and Utility Response through Real Time Data Sharing of Hospital Generator Status During Disasters

Project Objective-This 2018 Challenge project involved a comprehensive research and development initiative that was funded to address the problem associated with the partial or complete loss of emergency power at hospitals by creating a prototype that shares real-time emergency power system status reports with government and utilities.

Achievements- The prototype has been tested for not only hospitals but also large dialysis centers, large skilled nursing facilities, water systems and waste water treatment plants, that automatically or manually report the status of facility generators. The developed Power PIONEER dashboard tool includes synthesized data from eight different technology providers that allow emergency managers to decrease the amount of time needed to get non-working generators back running at critical healthcare facilities.

Future Opportunities- The project team has been interviewed by *The Health Facility Management Magazine*, which has a subscription of more than 36,000 and is a partner of the American Society of Health Engineering Network. Currently, the dashboard service providers collectively have contracts with emergency management and public health agencies in all 50 states, as well with FEMA and other federal agencies.

Cyber Risk Management Toolkit for Small Government Entities

Project Objective-This work began in 2017 and was selected again for the 2018 Challenge. The long-term goal of the 2018 project was to reduce small government entity crimes by 80 percent. More than 600 small governments were surveyed to identify necessary information regarding pricing and budgetary capacity for cybersecurity with a goal of having 1,000 small government entities utilizing the budgetary planning tool.

Achievements- The toolkit includes the following: (1) a Cyber-Risk Management Strategy - a white paper guide for small government executive leaders that serves as an on-ramp to the NIST Cybersecurity Framework; (2) a Strategic Cyber Risk Assessment - a data-driven, turn-key tool that uses cyber-crime statistics to model threat scenarios and project potential losses. The tool will generate a concise report to guide budget distribution and set priorities among multiple



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threat categories, and; (3) a Cybersecurity Budget Sizing Tool- a tool to help small government entities determine what a right-sized, right-fit cybersecurity budget should be.

Future Opportunities- The target audience for this tool is leaders of small governmental entities who typically do not have significant amounts of time to dedicate to determining appropriate allocation of funds for cyber security, such as the North Carolina League of Municipalities. Another potential partnership identified is AT&T to develop cybersecurity resources for the Texas. Since the number of questions is reasonably small, the interface is very intuitive, and the data requested seems to be data that most, small governmental entities have readily available, the future of this capability is even more promising.

Biopolymer-Stabilized Earth Materials for Resilient and Adaptable Infrastructures

Project Objective-The goal of this project was to create a new practice to increase the resiliency of the national earthen infrastructures using biopolymers.

Achievements-The following results were yielded from the research: A biopolymer with two types of clay fillers; montmorillonite clay and halloysite clay were used for the study, as these two are commercially available at a competitive cost. The report presents the general index properties of the two base soils and includes a presentation and discussion of the sample preparation and testing methods used. The project concluded with a degradation report and a final comprehensive report made available through Stoney Brook University to the DHS Dams Sector.

Future Opportunities-The transition-to use plan of this project will be achieved through the innovative partnership between SBU and U.S. Army Engineer Research and Development Center (ERDC). SBU and ERDC will actively seek further funding to implement the proposed biopolymer-soil stabilization in federal and non-federal earthen dams and levees. The identified potential funding agencies include U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, U.S. Department of Transportation, and state and private agencies operating and maintaining earthen dams and levees.

Building Disaster Resiliency by Leveraging Critical Healthcare Supply Chain Information

Project Objective-Heath Industry Distributors Association's (HIDA) project is innovative because there is currently no mapping framework or formal method of communication that the Office of the Assistant Secretary for Preparedness and Response (ASPR) or other public agencies can access during a disaster to see where their private sector healthcare distributor partners are located and what supplies they have available. Toward that end, this project was funded to achieve (1) collecting information from stakeholders to build a map of the nation's distribution centers with data on location, storage capacity, emergency contact information and critical product inventory; (2) enhance the federal government's ability to respond to an emergency event and coordinate with other agencies via visibility of the private sector's medical distribution centers; (3) develop a viable methods to continue updating and maintaining this online map in the future.



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Achievements- HIDA members and federal partners have identified two products – needles and IV solutions – to collect commercial inventory information for the mapping tool, which was generated from 13 distribution companies representing more than 100 locations and 80% of the national distribution market. Manufacturers of these products have also been involved to provide appropriate product descriptions. Stakeholders expressed beneficial calculations that will capture accurate inventory information for federal partners, for example, how to capture inventory levels with flu and without.

A product work group was formed that developed a template for the collection of product inventory data. The template includes data fields for product number, product description, annual monthly average of quantity and annual monthly average of days of sale inventory (days on hand). The tool can provide federal partners a national aggregated number for each data field identified above for each individual products to that includes almost 40 types of needles and 15 intravenous (IV) solution product lines in real-time.

Future Opportunities- The tool is operational for the Department of Health and Human Services, Office of the ASPR and training is available through them and HIDA. The future opportunities of this capability grow as the content is always current, as it is updated quarterly and could be expanded with more products.

Condition Assessment Procedures for Concrete Dams with Post-Tensioned Anchors

Project Objective-The completion of this project concludes the condition assessment for concrete dams with post-tensioned anchors for the Challenge Program. The objective was to have final guidelines to conduct an anchor condition assessment and guidelines for developing a baseline condition of a post-tensioned concrete gravity dam.

Achievements- This effort concluded with 192 tests conducted and an additional 42 anchors tested since 2016. Specifically, this phase of the project resulted in accuracy of the testing procedures improving from a 10% range in error to 3%. Current users of the capability include: Engineering Innovations; U.S. Army Corps of Engineers, which has the largest inventory of concrete dams in the U.S.; Seattle City Lights, Southern California Edison and the Center for Energy Advancement through Technological Innovation (CEATI), which is an international organization that supports more 130 dam owners. The list of current users represents a major portion of all the U.S. and Canadian dam owners.

Future Opportunities- All current users (CEATI, Seattle City Light Southern California Edison and the USACE) expect that the PBT procedures will become the foundation of health monitors, surveillance and monitoring programs and defining performance indicators for validation of numerical analyses. The use of these procedures will prevent further dam failures such those that occurred at Wanapum and Orville Dams, where costs of repairs to these two dams exceeded \$500M. Further testing is planned for 2020.



Challenge Program Successes

REVIEW/PREVIEW

...great achievements, future opportunities

Synchronized Situational Awareness Using Unmanned Aerial Systems (UAS)

Project Objective-The 2018 Challenge efforts focused on creating an advisory committee to develop protocols for information sharing with emergency management and other government decision-makers for post-disaster damage assessment, response and recovery.

Achievements-At the conclusion of the 2018 effort, approximately 450 public and private stakeholders participated in workshops in Washington, Idaho, Montana and Oregon. The workshops also generated 150 volunteers to be a part of the state's user group. Based on the interest of the CONOPS, private sector UAS vendors have offered to provide resources to help cover future costs of meetings.

Future Opportunities-In September of 2019, there was a drill that included Olympic Pipeline, Washington Emergency Management Division and the National Guard. The National Guard is showing interest in the effort by offering their resources and possible future collaborations.

Small Telecommunications Operator Information Sharing Study and Pilot Project

Project Objective-As an add-on to NTCA's 2017 project, this work was funded to execute a pilot project to include a research feasibility study for a new cyber-threat information sharing forum for small communications operators.

Achievements- Forty-four small, facilities-based communications network operators volunteered to participate in the pilot and provide critical feedback to the association on the development of an information sharing platform built to meet their unique cybersecurity needs, in exchange for access to a variety of tech platforms, tools, curated reports, and collaboration opportunities with other network operators. These 44 small operators provide broadband to approximately 518,924 subscribers. One-hundred percent of pilot participants provide communications services to at least one critical infrastructure provider, and many provide service to additional anchor institutions, including a K-12 school or library (95% of participants); energy provider (84%); a public safety answering point/call center, police, fire or EMT provider (93%); a state or local government agency (98%); a hospital or critical healthcare facility (86%); or a military facility (16%). In their rural and remote area, the small communications operator is often the only telecommunications and/or IT provider for the local community.

Future Opportunities- In the future, a long-term sustained information sharing capability could be made available to the entire critical infrastructure sector, including more than 1,000 small communications operators. For example, in the event of a large-scale physical or cyber issue that impacts the communications sector, an information sharing forum designed to meet the unique needs of smaller operators would be extremely useful to encourage communications and collaboration with these smaller providers, and connect them with the larger network of private, federal, and state and local government resources.



Challenge Program Successes

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Location Detection of Rogue Base Stations / IMSI Catchers

Project Objective-The objective of this project is to discover tangible and actionable steps that can be used by mobile service providers and other appropriate users to protect the mobile communications critical infrastructure from rogue base stations.

Achievements- The team utilized the dataset derived from previous research to develop, confirm, and refine detection signatures of rogue-based station activity. The team has developed a proposed decision tree algorithm that will continue to be tested and refined during the lab-based and real-site testing. The final product of this work is a white paper documenting research, analyses, and results of the testing.

Future Opportunities- The project team anticipates that the paper will be free, public and available for download through the University of Washington.

Convenience Store and Fuel Retailer Emergency Preparedness: Resilience for the Last 50 Feet

Project Objective-This 2018 Challenge project was funded to do the following for 153,000 plus convenience stores and retailers that sell 80% of the gas, 50% of all bottled water and operate one-third of ATMs in the event of an emergency: (1) assess existing resilience educational materials in order to select and adapt messages that are appropriate to convenience companies and stores with more than 2.5 million managers and employees; (2) implement messages in diverse media best suited to the unique environment of convenience stores; (3) monitor the utilization and adoption of educational messages in those media in pilot tests, and; (4) report finding to the NACS leadership to sustain the resilience educational program as an official National Association of Convenience Stores (NACS) member service.

Achievements- The plan, job aids, and training videos are currently available on the NACS website in two forms. A NACS-branded version supports the 80,000 smaller independent store owners which are downloadable by anyone at no cost. An open-source version that can be edited is available to NACS members as a NACS member service. The Web address is www.convenience.org/disasterplan. To date, 170 downloads have occurred, representing approximately 20,000 stores. Fifty of those downloads could be attributed to the recent Hurricane Dorian as they occurred within hours of the publication of an article in the *NACS Daily* newsletter reminding members of the free availability of the materials.

Future Opportunities- The materials funded by the 2018 Challenge are now a NACS member service. Their availability is maintained by NACS through the NACS Website and a new Disaster Preparedness Web page offering the materials (free but requiring sign-in). Funding is through general NACS member dues.



Challenge Program Successes

REVIEW/PREVIEW

...great achievements, future opportunities

Phase 2: Expand/Enhance Regional Common Operating Picture for Disaster Resilience

Project Objective- This third contract for this work was awarded in 2018 and was funded to focus on developing closer operational planning and coordination between the National Infrastructure Coordinating Center (NICC) and the All Hazards Consortium's (AHC) private sector operated Sensitive Information Sharing Environment (SISE) and the associated AHC's SISE Working Group. This coordination improved joint development of strategies and plans enhancing agreements, standards, data sets, technical processes and connections to organize and share information faster, increase decision maker confidence in specific data sets, create common federated agreements to use information, and address specific use cases in both disaster management and active shooter scenarios.

Achievements- The Regional Common Operating Picture (RECOP), now with more than 760 registered users, is currently available and has been used in every major hurricane and many large regional incidents in the eastern U.S. since 2017. The SISE is accessible via a free registration process online at <https://www.siseusa.org>. The initial target audience was electric sector utilities and their contractors, along with multiple state emergency management agencies. Today this audience has grown to a national audience of government agencies, industry, trade associations, academia, and other non-governmental organizations.

The RECOP was used in 2017 for hurricanes Harvey, Irma, and Maria in support of expediting power restoration and private sector resource movement within the United States, Puerto Rico, and the US Virgin Islands.

Specifically, the RCOP served as the only live, interactive, cross-sector operational focused dashboard to coordinate all 50 states and hundreds of electric sector companies in the mobilization of resources to support power restoration in Puerto Rico after Maria.

Future Opportunities- This capability reduced many of the normal delays to almost nonexistent levels and was recognized by the industry as a best practice in electric sector coordination with multiple states. Since these capabilities span across the nation and in every sector, use in future events and incidents is guaranteed.