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CNA: Integrating UAS to Enhance Public Safety Operations

As the adoption of unmanned aircraft systems (UAS) continues to increase, this technology is offering the opportunity for advancements in public safety operations; however, these opportunities are not without risk. CNA has a deep understanding of the complexities and challenges involved in implementing a new technology in local policing. We serve as the training and technical assistance provider for more than 250 law enforcement agencies, and many of the challenges they are facing are relevant to UAS use. In addition, we have extensive technical knowledge of UAS technologies and regulations gained through decades of working directly with the Federal Aviation Administration. With these combined experiences, CNA is uniquely able to support public safety leaders with data-driven decision-making to integrate UAS into public safety operations.

Port Security and Emergency Response

CNA was the analytic partner in Virginia's Port Security and Emergency Response (PS&ER) using Autonomous Systems (UxS) project, which focused on applying innovative UxS solutions to enhance the safety, security, and operational effectiveness of the Port of Virginia. This two-year collaborative effort advanced the use of autonomous vehicles from the conceptual stage to real-world demonstrations. The project partners included the Virginia Innovation Partnership Corporation (VIPC), Virginia's Homeland Security Division, Virginia's Department of Emergency Management (VDEM), the Virginia Institute for Spaceflight and Autonomy (VISA) at Old Dominion University (ODU), the Virginia Port Authority, and CNA Corporation.

For this project, CNA led a series of workshops to identify public safety and emergency response challenges and determine how UxS technologies could address them. The UxS requirements we identified were then used to solicit technology solutions for a live demonstration at the Port of Virginia. Five technology solutions from Virginia-based private sector companies were awarded funding for this purpose. They developed and demonstrated UxS solutions that could observe and detect public safety or emergency response events that would impact the port environment. Based on the outcomes of the demonstrations, CNA designed an integrated UxS solution that can improve the safety, efficiency, and reliability of routine and emergency port operations—ultimately enhancing port resilience in the Commonwealth of Virginia.

Drone as a First Responder Technology

CNA is at the forefront of leveraging innovative technology to enhance public safety. One of our latest initiatives focuses on examining the effectiveness of drones as first responder (DFR) programs in responding to calls for service as well as their implications for officer safety and risk mitigation. This cutting-edge research aims to inform the way law enforcement agencies utilize drones, providing them first-of-their-kind understanding of several hypothesized benefits of DFR programs, which have yet to be empirically demonstrated. These perceived benefits include situational awareness, operational efficiency, improved event outcomes, and enhanced evidence collection and contribution to formal charges being filed. This research expands on prior groundbreaking work conducted regarding the prediction of risk and

Figure 1. CNA generated an interactive GIS story map to demonstrate integrated UAS operations at the Port of Virginia

injuries to law enforcement based on information available to dispatchers. CNA not only addresses an emerging trend in law enforcement but also sets the stage for broader adoption of drone technology in public safety.

UAS Cybersecurity

The wide adoption of UAS has created a large attack surface subject to various cyber-attacks that can disrupt operations, such as spoofing and jamming. To secure these operations, CNA partnered with a small business technology vendor to win first place in the First Responder UAS Triple Challenge—Shields Up: Securing UAS Navigation and Control, offered by the Public Safety Communications Research Division of the National Institute of Standards and Technology. Through a series of live UAS flights, the CNA team demonstrated the real-world threat that cyberattacks pose to UAS operations if the attacks result in a loss of command and control. To counter these cybersecurity attacks, the CNA team developed a countermeasure system to protect the UAS before launch. The system uses a push-button approach to automatically update the vulnerable settings to secure the UAS against potential future attacks. The system identifies default settings that are often vulnerable to attacks on the UAS platform and sends reconfiguration scripts that update the settings to a more secured state. Specifically, the system creates an automated feedback loop that checks for UAS vulnerabilities, makes corrections, and informs operators of any modifications via email to ensure that public safety organizations safely launch and complete their missions with a secure UAS system. CNA brought this countermeasure system to the field by working with the UAS Unit at the George Mason University Police Department to mature this technology for direct use in public safety operations.

UAS Public Safety Workshops

Public safety organizations now realize the value of UAS; however, the regulatory environment can be a barrier too great to overcome. CNA hosts workshops that provide a unique opportunity to bridge the regulatory gap by gathering diverse stakeholders to tackle problems that can best be solved by the community. At these workshops, CNA's expert designers, facilitators, and evaluators ensure that state, local, tribal, and territorial (SLTT) goals and objectives are clearly stated, and they ensure that workshop participants work toward outlining a UAS integration concept of operations that covers the jurisdiction as a whole. Using realistic and plausible scenarios, a facilitator leads participants through a series of questions and challenges that generate ideas about how SLTT stakeholders might use UAS during day-to-day operations and also during disaster response.

About CNA

CNA is a not-for-profit analytical organization dedicated to the safety and security of the nation. With nearly 700 scientists, analysts, and professional staff across the world, CNA's mission is to provide data-driven, innovative solutions to our nation's toughest problems. It operates the Center for Naval Analyses—the Department of the Navy's federally funded research and development center (FFRDC)—as well as the Institute for Public Research. The Center for Naval Analyses provides objective analytics to inform the decision-making by military leaders and ultimately improve the lethality and effectiveness of the joint force. The Institute for Public Research leverages data analytics and innovative methods to support federal, state, and local government officials as they work to advance national and homeland security.

To learn more about CNA's work in UAS operations and technology integration, please contact Steven Habicht (habichts@cna.org).

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