**MSC Research Update**  
*July 2019*

**FAU develops Predictive Port Resilience Tool.** MSC research partners from Florida Atlantic University (FAU) and Embry-Riddle Aeronautical University recently completed a year-long project to develop a modeling and simulation-based framework to predict the consequences of disruptions on regional port networks due to hurricane events. The tool was developed to support the U.S. Coast Guard, port facility operators and community planners, among others to enhance the regional preparedness of ports to extreme weather events.

The effort utilized archival Nationwide Automatic Identification System (NAIS) and Department of Transportation (DOT) data for resilience analyses of the coastal ports affected by Hurricane Matthew in 2016. Port operations leading up to Hurricane Matthew and observed losses in system functionality during and following the storm were used to quantify the impact on six case-study ports using a time dependent performance analysis. Utilizing a VISSIM platform and Monte Carlo simulations, the research team developed baseline data and simulations for each of the six ports and then created a hybrid model to connect port system activities from both the waterside and landside. The Predictive Port Resilience Tool will be hosted at the FAU Freight Mobility Research Institute and made available for use by the U.S. Coast Guard and community planners. To review the complete FAU project report, please visit the MSC website at [https://www.stevens.edu/research-entrepreneurship/research-centers-labs/maritime-security-center/reports-publications](https://www.stevens.edu/research-entrepreneurship/research-centers-labs/maritime-security-center/reports-publications).

**End-user feedback results in enhancements to SMART.** MSC research investigators from Purdue University conducted a series of first responder interviews to gather feedback on the usability and effectiveness of the team’s Social Media Analytics and Reporting Toolkit (SMART). In use by law enforcement agencies, including police departments, U.S. Coast Guard (USCG) Sectors and fusion centers since 2017, the tool allows end-users to monitor and visualize social media channels, conduct trend analysis, and cluster and categorize messages by topic in an effort to enhance first responder situational awareness and intelligence around local, state and national events. As part of an MSC sponsored project, the Purdue team surveyed first responders who had been introduced to and/or worked with SMART since the tool’s inception. All interviewees were active members of either law enforcement or the USCG. Interviews were conducted over video calls or in-person. Feedback from the survey reported that SMART has been used during a number of national events, including the Presidential Inauguration in 2017, the State of the Union 2017/2018/2019 addresses, as well as USCG maritime events and extreme weather events (e.g. hurricanes), but that several limitations with the tool and with social media in general exist. In particular, the majority of social media data is not geotagged, making it difficult to determine the context of the message, or is unavailable due to privacy settings or lack of clarity on policies. Further, due to the vast amount of social media data and textual limitations such as misspellings or slang, gleaning relevant information is difficult.
In response to the feedback received, the research team have updated the training material on SMART, and determined that for successful transition for independent use by USCG, the following additional steps would be beneficial: (1) creating short training videos for introduction of each feature and for several use case scenarios; and (2) creating Standard Operating Procedures (SOP) material and documentation of the process to get approval for use of SMART for different situations. To read the complete project report on the SMART project, please visit the MSC website at: https://www.stevens.edu/research-entrepreneurship/research-centers-labs-maritime-security-center/reports-publications

USCG, CBP, DHS I&A and S&T stakeholders attend student research presentations. Student participants in the MSC’s 2019 Summer Research Institute presented their research outcomes in an annual event held on July 25, at the Stevens Institute of Technology campus in Hoboken, NJ. Attendees included MSC homeland security stakeholders from the USCG, CBP Field Operations at the Port of NY/Newark, CBP New York Laboratory, DHS Office of Intelligence and Analysis, and the DHS Science and Technology Directorate (the Office of University Programs and the National Urban Security Technology Laboratory). The annual event provides a forum for DHS professionals to interact and connect with college-level STEM students conducting homeland security-focused research.

This summer’s projects featured the development of a computer dashboard that can be used by USCG Sector NY to conduct trend analysis and risk management based on incident data, the prototype development of a UAS deployable buoy system, the creation of a computer simulation game that can be used to assess resource allocation strategies of drug traffickers, and the development of recurrent neural network models for detecting anomalous vessel behavior, among other projects. Copies of the student research presentation slides can be found on the MSC website at: https://www.stevens.edu/research-entrepreneurship/research-centers-labs-maritime-security-center/reports-publications.

MSC summer research students receive 1st and 2nd place recognition at the 2019 DHS COE Summit. MSC 2019 Summer Research Institute students, Tristan Goers and Danielle Dobbs were each awarded among the first and second place teams to compete in the DHS Center of Excellence (COE) Summit Student Grand Challenge event, held last week at George Mason University in Arlington, VA. Similar to a hackathon, but without an emphasis on coding, the COE event challenged five multidisciplinary teams of students to identify an emerging threat to homeland security posed by Unmanned Aerial Systems (UAS) and to develop a strategy to counter it. The student teams were given 24 hours to develop their approaches to the problem and were then asked to pitch their concepts to a team of seven DHS S&T judges. Leveraging work completed in the SRI, Tristan’s team, the Blue Team, won the challenge by proposing an automated drone integrated information system to detect and classify UAS. Danielle’s team, the Purple Team, came in second, with a proposal to develop a drone-based Mid-Infrared (MIR) laser induced thermal imaging system to detect drones carrying drugs across the border. Both Tristan and Danielle received gift card prizes and were awarded certificates by Mr. William Bryan, the Senior Official Performing the Duties of Undersecretary of DHS S&T. Copies of the student team presentation slides will be made available on the COE Summit website shortly at: https://cina.gmu.edu/conference/coe-summit-2019/students/.