

Maritime and port security center focuses on cutting-edge R&D

A new Maritime Domain Awareness System will deploy advanced sensing and situation awareness technologies.

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As a maritime nation, it is critical that the US develops and deploys the most advanced port security technologies available. With that goal in mind, a major new project is under way at SRI International's National Center for Maritime and Port Security in St. Petersburg, Florida. The Center was founded to identify critical technology gaps and to develop, deploy, and test new technologies for use in the domestic and expeditionary port security environment. Established as a research partnership among private, academic, and port operations organisations, the Center is an important first step toward creating integrated, multidisciplinary approaches to securing our nation's ports.

SRI International, an independent, non-profit research and development organisation, leads a team that includes the University of South Florida, St. Petersburg College, Sarnoff, port operators, and technology providers. The Center's first major project is a five-year, US\$36.5 million contract with the US Naval Air Systems Command (NAVAIR) to demonstrate a Maritime Domain Awareness System (MDAS) incorporating a full range of advanced sensing and situation awareness technologies for improved US port security. Focused initially on the Tampa Bay area, a detailed needs analysis is already under way to determine risks and threats to maritime stakeholders.

A new perspective on port security R&D

The National Center for Maritime and Port Security was created to bring a new, comprehensive approach to port security. The Center is part of SRI International's marine technology programme. The programme is a unique partnership between SRI and the City of St. Petersburg, Pinellas County, State of Florida, and the University of South Florida.

Applying the diversity of SRI's and the Center's research and development (R&D) capabilities, the Center will develop cutting-edge technologies to improve maritime and port security in areas that impact the nation's safety, security, and economy.

With its inherent geographic diversity, including a large estuary, split bays, and channels, the Tampa Bay area is ideal for the project. Seven widely distributed ports support maritime operations, including tanker, freighter, barge, container, cruise ship, commercial fishing, and recreational boating. The subtropical climate permits tests and evaluations year-round.

The Center's comprehensive and integrated approach to maritime and port security includes the full complement of surface, subsurface, landside, and air assets within Tampa Bay's maritime domain. All components are integrated to fully identify stakeholder risks, needs, research, technology development, systems interoperability, testing, demonstrations, evaluations, and training.

A strategic and phased approach

The results of the needs analysis phase, which is currently under way, will trigger a gap analysis and an assessment to determine the technology and resource alternatives to address the gaps. In a real-world test bed, the Tampa Bay Maritime Domain Awareness

System will employ and assess sensors and software systems for security identification, detection, alerting, and dissemination tasks designed to give port operators an objective, independent appraisal of possible solutions.

In addition to integrating existing technologies and security systems, the Center will explore new technologies and commercial and government off-the-shelf products for inclusion in the Maritime Domain Awareness System. An Automated Identification System is already operating in the Tampa Bay maritime domain, providing ship location information to the Vessel Tracking Service located in the Tampa port and displayed at the US Coast Guard Sector St. Petersburg Command Center. Surface search radar, cameras, radiation detection portals, and access control/intrusion detection systems will all provide information feeds to the completed system.

The University of South Florida and National Oceanographic and Atmospheric Administration's Physical Oceanographic Real Time System is providing environmental information for the system. This oceanographic system provides up-to-date information on water level, currents, and meteorological data used extensively by port operations, pilots, and other stakeholders.

New technologies likely to be employed include underwater remotely operated vehicles for mine- or underwater-improvised explosive device detection, and the creation of a spatially referenced, bathymetric, three-dimensional picture of the bay's floor. This three-dimensional picture, once baselined with the current debris and objects sitting on the bottom of the bay, results in a viable reference point for responders to a mine or underwater improvised explosive device threat.

The Center will also use mobile robots for land and water bomb detection in a port environment. Change detection and anomaly alerts will be key features of the operating system to assist operation center watch-standers with monitoring the output from the various sensors and systems employed across their areas of responsibility. SRI's microelectromechanical systems (MEMS) laboratory in Largo, Florida will pursue the miniaturisation of sensors and power sources to reduce cost and to increase detection capabilities.

The Center will create a common operational picture, with the ability for user-defined operational pictures. The intent is to portray an operational display that can be tailored to depict the information required by each specific stakeholder while pulling information from a common source. Password protection and other appropriate security measures will ensure that only those organisations with permission to add, delete, or modify data have the ability to do so.

Dynamic and functional system envisioned

The first project demonstration, scheduled for early 2009, will integrate new and existing radar, cameras, and other local sensors, and will fuse this information with situational awareness database information to provide selected user-defined operational pictures. Subsequent demonstrations will integrate the automatic generation of anomaly-based alerts, begin the integration of



Remote operated vehicle for mine- or underwater-improvised explosive device detection.

new and existing sensors, and complete the system connectivity among all the stakeholders. Future goals include sensor testing, incorporation of the air picture, and enhanced automation.

Coordination with all stakeholders during the needs analysis and initial system development is critical so that any system developed for Tampa Bay provides interoperability for domain awareness systems being undertaken by the various stakeholder headquarters. Ongoing communication with the leadership of local Coast Guard and Customs and Border Protection staffs, and coordination within the Department of Homeland Security, will assure that viable solutions are fielded.

An immediate Center goal is the development of a Real-time Information Marine System. This system will meet the requirements of primary stakeholders to share key logistical information such as crew lists, law enforcement reports, berth assignments, actual ship arrival information, vessel details, and daily coordination information. Currently, this information is shared by fax, phone, and websites – tedious procedures that use up considerable time. The new system will integrate all required information over a web-based database that provides accurate, instantaneous updates while also generating necessary reports. The system will feature appropriate security protocols to allow entry,

modification, or deletion of information only by authorised users.

The logistics-focused first phase of the Real-time Information Marine System, to be completed in April 2008, will provide web-based access for Coast Guard, Customs and Border Protection, Port Authority, agents, and pilots. Major components will include the ability to retrieve and update electronic access to Ships Arrival Notification System (SANS) data, data visualisation, search capabilities, and semi-automatic logistics.

The second phase, to be implemented in August 2008, will address communications. Functions will include customisable reports, schedule generation, automatic workflow for logistics, and full reporting capabilities.

The final phase will provide integration with other port authority and pilot databases, update and polish display interface based upon user feedback, and explore integration of data sources such as radar and an automated identification system.

Through the completion of this project, SRI International and its National Center for Maritime and Port Security envision a dynamic, functional, Maritime Domain Awareness System that significantly enhances security for Tampa Bay and that has applicability in other US ports as they strive to improve their own port security environment.

ABOUT THE ORGANISATION

Silicon Valley-based SRI International is one of the world's leading independent research and technology development organisations. Founded as Stanford Research Institute in 1946, SRI has been meeting the strategic needs of clients for more than 60 years. The non-profit research institute performs client-sponsored research and development for government agencies, commercial businesses and private foundations. In addition to conducting client-sponsored R&D, SRI licenses its technologies, forms strategic partnerships and creates spin-off companies. SRI St. Petersburg is focused on research, development, deployment and commercialisation of technologies related to ocean science, the maritime industry and port security.

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