

DHS Office of University Programs USCG-Relevant Programs



Office of University Programs
Science and Technology Directorate

November 2010



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DHS Office of University Programs

- Programmatic Thrusts
 - Centers of Excellence
 - Education Programs
 - Minority Serving Institutions



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Centers of Excellence Congressional Mandate

Homeland Security Act of 2002:

“The Secretary, acting through the Under Secretary for Science and Technology, shall designate a university-based center or several university-based centers for homeland security. The purpose of the center or **these centers shall be to establish a coordinated, university-based system to enhance the Nation's homeland security.**”

(as amended)



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Developing ...

“A Coordinated University-Based System”

- Multi-COE, multi-division, -component, -disciplinary projects
 - Target cross-cutting areas of uncertainty and critical need
 - Integrating National Labs/others in joint COE projects
- Multi-national, multi-disciplinary workshops in U.S., EU, Asia
- Instituting transition plans for all COE project areas
- Integrating MSIs into COEs
- Transitioning COE students, scholars and fellows to DHS and Federal labs, industry, universities, foreign institutions
- Integrating Education with COEs and DHS Components



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Office of University Programs' Mission

Maximize DHS' return on
investment in university-based
research and education



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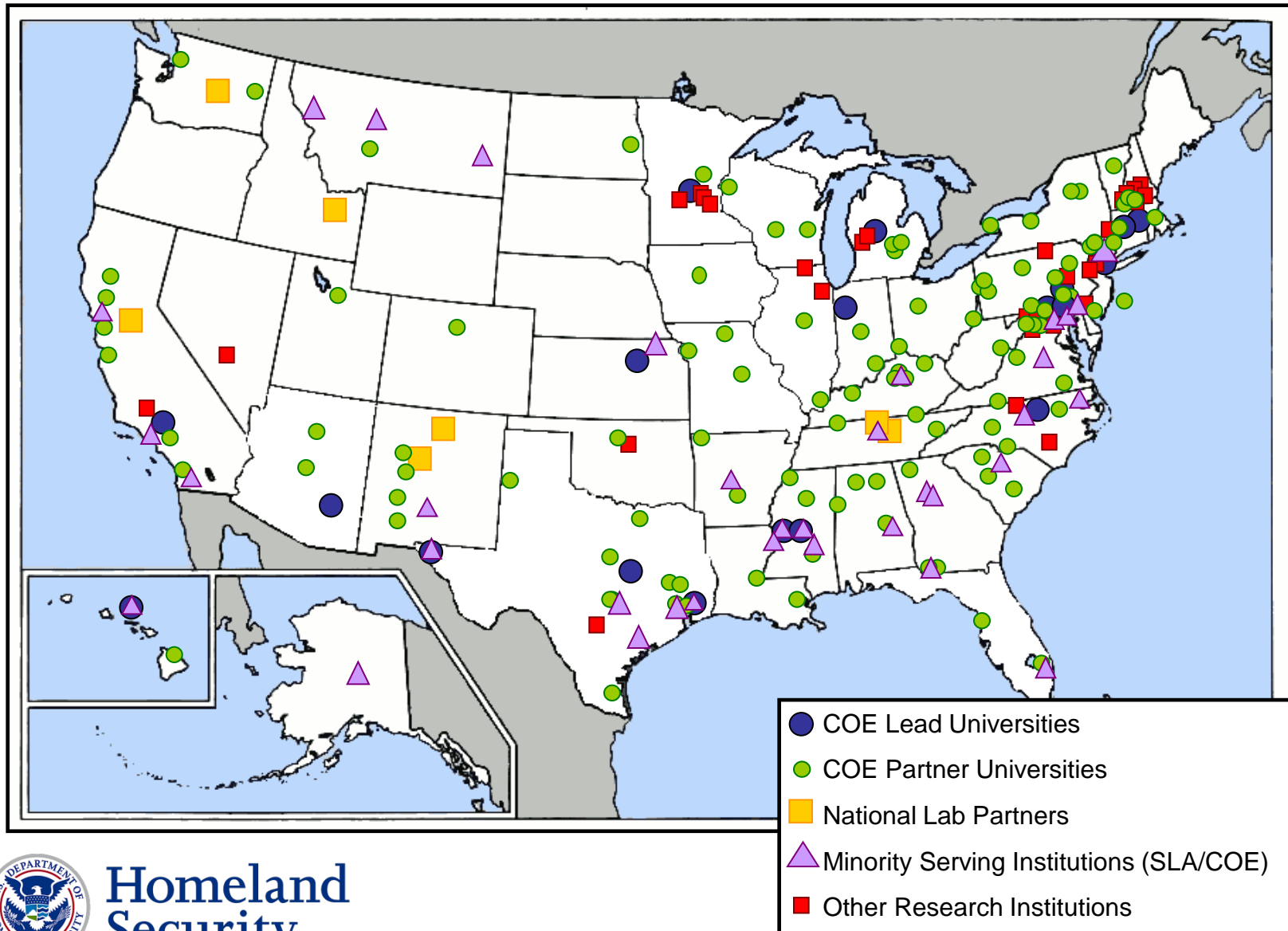
Guiding Principles to Maximize ROI Business Model

- Effective → Do the right work [quality products]
- Efficient → Do the work right [lowest cost]
- Enduring → Recoup the investment [returning customers]
- Equal Opportunity → Reflect America to Protect America
[build customer base for the future]



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The DHS S&T University Network



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12 DHS Centers of Excellence

1. Center for Risk & Economic Analysis of Terrorism Events (CREATE)
 - Lead: University of Southern California
2. National Center for Foreign Animal & Zoonotic Disease Defense (FAZD)
 - Lead: Texas A&M University
3. National Center for Food Protection & Defense (NCFPD)
 - Lead: University of Minnesota
4. National Consortium for the Study of Terrorism & Responses to Terrorism (START)
 - Lead: University of Maryland
5. Center for Advancing Microbial Risk Assessment (CAMRA)
 - Lead: Michigan State University, in Partnership with U.S. EPA
6. National Center for Preparedness & Catastrophic Event Response (PACER)
 - Lead: Johns Hopkins University
7. Center for Awareness and Location of Explosives-Related Threats (ALERT)
 - Research Co-Lead: Northeastern University
 - Education Co-Lead: University of Rhode Island



12 DHS Centers of Excellence

8. National Center for Border Security and Immigration (NCBSI)
 - Research Co-Lead: University of Arizona
 - Education Co-Lead: University of Texas at El Paso
9. Center for Maritime, Island and Port Security (MIPS) - meets Safe Ports Act
 - Maritime and Islands Co-Lead: University of Hawaii (CIMES)
 - Port Security Co-Lead: Stevens Institute of Technology (CSR)
10. Natural Disasters, Coastal Infrastructure and Emergency Management (NDCIEM)
 - Research Co-Lead: University of North Carolina at Chapel Hill (DIEM)
 - Education Co-Lead: Jackson State University (NDCIEM)
11. National Transportation Security COE (NTSCOE) – Required by HR-1
 - Research Co-Lead: University of Connecticut
 - Education & Training Co-Lead: Tougaloo College
 - Petro-Chemical Transportation Co-Lead: Texas Southern University
12. Command Control and Interoperability (C2I)
 - Co-Lead: Purdue University
 - Co-Lead: Rutgers University



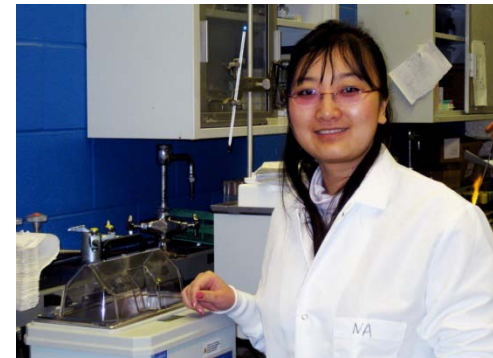
Potential USCG –OUP Engagement



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Working with OUP

- Write COE FOAs with a team
- Review COE proposals (Stage 2)
- Site visits (Stage 3)
- Internships for DHS Scholars and MSI Students
- Participate on COE Federal Coordinating Committees
- Participate in COE mid-term review panels



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Centers of Excellence - Mission Relevance to the USCG

- Strengthen maritime domain awareness and safeguard populations and properties unique to U.S. Island, remote/extreme environments. (MIREES)
- Evaluation of risks, costs and consequences of terrorism and to guide economically viable investments in homeland security. (CREATE)
- Human causes and consequences of terrorism that is directly relevant to homeland security policymakers and practitioners (START)
- Medical and public health preparedness strategies, response capabilities, and surge capacity. (PACER)
- Safeguard populations, properties and economies and improve community resiliency to the consequences of natural disasters, including hurricanes, floods, earthquakes, and wildfires (NCDIEM)
- Analyze, understand and apply diverse, diffuse, and distributed data on threats and manmade or natural disasters in the presence of uncertainty (CCI)
- Explosive materials formulation and characterization; investigation of mitigation materials and techniques; improved detection of high-energy materials and associated technologies; increased understanding of unconventional explosive threats; and continued algorithm development and sensor fusion strategies for improved threat detection. (ALERT)



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Centers of Excellence – Current USCG Related Projects

- Center of Excellence for Maritime, Island and Remote and Extreme Environment Security (MIREES)
 - Space Surveillance
 - HF Radar and Over-The-Horizon Surveillance
 - Nearshore and Harbor Surveillance
 - Design for Resiliency
 - Satellite Detection and Tracking of Ships
 - Coastal Radar Detection
 - Harbor Acoustics Monitoring
 - Decision Support Systems
- Center for Risk and Economic Analysis of Terrorism Events (CREATE)
 - PortSec - Port Security Risk Management and Resource Allocation
- National Transportation Security Center of Excellence (NTSCOE)
 - Sustaining Resilient Inland Waterways via Renewable Energy Project
 - Emergency Response via Inland Waterways Project



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Centers of Excellence – Current USCG Related Projects

- National Center for Zoonotic & Animal Disease Defense (ZADD)
 - Dynamic Preparedness Simulator (DPS)
- The National Center for Food Protection and Defense (NCFPD)
 - Consequence Management System
 - Freight Transportation Risk and Resiliency in International Food Supply Chains
- Center for Natural Disasters, Coastal Infrastructure & Emergency Management
 - Meteorological Modeling
 - Hydrologic Modeling System for Coastal Environments
 - Coastal Wave Surge Modeling
 - Application of ADCIRC Coastal Circulation Model for Predicting Near Shore and Inner Shore Transport of Oil from the Horizon Oil Spill
 - Hurricane Forecasting Methodologies



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Center for Risk and Economic Analysis of Terrorism Events (CREATE)

PortSec - Port Security Risk Management and Resource Allocation

The Problem – Two Competing Needs:

- **Protection** of the ports: Ports are a critical part of our Nation's infrastructure
 - Provide jobs (locally and nationally)
 - Support import/export business
 - Critical component of the Nation's supply-chain.
 - **They are major, high-value terrorist targets**
- **Economic viability:** goods *must* flow
 - Need to minimize interruptions to business, avoid increasing costs of doing business
 - **Excessively costly/disruptive protection causes economic harm to US, satisfies terrorist aims**

Challenges:

- **System of systems:** Ports and similar operations are composed of many different components
 - Makes risk assessment and management difficult
 - Difficult to model and analyze
- **Dynamic operations:** Constantly changing, both day-to-day and long-term



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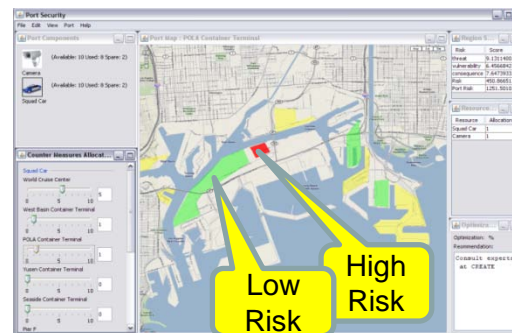
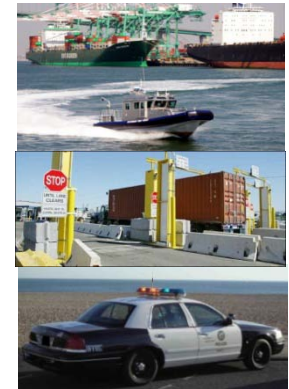


Center for Risk and Economic Analysis of Terrorism Events (CREATE)

PortSec - Port Security Risk Management and Resource Allocation

PortSec Solution: Two Modes

- **Tactical system** addresses daily security needs
 - Risk calculations based on collected intelligence
 - Continuously monitors for changes and recalculates assessed risk of attack to the port complex
 - Calculates attack risks, assesses port operations costs resulting from resource re-allocation to address risk
- **Initial prototype under evaluation at POLA/POLB**
- **Strategic system** addresses resource allocation and investment questions
 - Considers long-term picture of port operations (e.g., expansions)
 - Supports “what-if” cost-benefit analysis



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National Transportation Security Center of Excellence (NTSCOE)

University of Arkansas – Mack Blackwell Rural Transportation Center

- **Sustaining Resilient Inland Waterways via Renewable Energy Project**
 - Explore how renewable energy sources can be utilized to support inland waterway security and operations.
- **Emergency Response via Inland Waterways Project**
 - What are the emergency response capabilities of inland waterways?
 - What is the feasibility of providing emergency medical services via barge?
 - Which types of communities could benefit from such a service?



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Active USCG-COE Engagement



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Improving Port System Resiliency for the National Interest - May 2009

Objective:

- Identify the critical challenges to building resiliency of our Nation's port system as a whole
- Understand knowledge gaps to develop appropriate tools, models and methodologies for decision-makers to use in the future.

Organization:

- Participants: State, local and international stakeholders, port managers, academics and researchers, and other federal agency officials
- Focused initial efforts on a common understanding of resiliency
- Identified challenges to the port system from a national perspective based on a nationally significant scenario
- Identified failure modes, interdependencies with other systems, impacts on the global supply chain, and cascading effects of related system failure.
- Explored the relationship between individual (local/regional) port resilience and overall U.S. (national) “port system” resilience.

Outcome:

- Further develop the research needed to address future challenges by socializing the results with stakeholders with the goal of supporting future studies as appropriate.
 - Still TBD



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Arctic Research Workshop- September 2010

Objective:

- To explore and identify ways in which scientific research and development could improve the ability of the U.S. Coast Guard (USCG) to operate and carry out its statutory missions in the Arctic region.

Organization:

- Participation included state, local and international stakeholders, academics and researchers, and USCG and other federal agency officials
- USCG described existing challenges and capability gaps in the Arctic,
- Researchers reported on research projects underway to address these challenges
- Working groups - infrastructure, sensors, and communications - identified key areas where R&D could improve Coast Guard capabilities in Arctic
- Attendees brainstormed on research questions - virtual navigation aids, voice communications, consolidated climate and environmental data, and parameters for an Arctic response boat.

Outcome:

- The USCG and S&T have reviewed and prioritized research areas. Will follow up with requests for proposals from COEs.



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Transitioning Auxiliary Stations to Stations (Small)

Problem:

- Search and Rescue (SAR) Stations Operated by CG Auxiliary are no longer sustainable based on current staffing levels.

Objective:

- Determine if requirements dictate a presence, and change the designation of needed stations to Active Duty Station (Small).

Outcome:

- USCG (LANT-7) partnered with the DHS Center of Excellence VACCINE (Visual Analytics for Command, Control, and Interoperability Environments) at Purdue University.
- VACCINE provided SAR Case Data Visualization to better understand the impact of D9's unique AUXOP Stations.
- USCG made recommendations based on the next steps for evaluating transition from Auxiliary to Active Duty Stations



Great Lakes Economic Risk Study

Problem:

- The economic value of CG Prevention activities is unknown.
 - 15 major international ports and some 50 smaller, regional ports on the Great Lakes-St. Lawrence Seaway system
 - More than 60% of seaway traffic travels to and from overseas ports, (iron ore, coal, grain and steel make up about 80 percent of cargoes shipped each year)
 - Vital MTS that provides a link between the world marketplace and the industrial and agricultural heartland of North America.

Objective

- Quantify the value of CG Prevention activities and publish statistically defensible economic measures.

Outcome

- VACCINE engaged to provide visual analytics of data on boating and other incidents in the Great Lakes and development of a resourcing model projecting needs for Coast Guard ships and personnel.



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Boston Sector Deterrence Model

Problem:

- Currently no method of measuring the deterrent value of forces applied to executing PWCS patrols and scheduling.

Objective:

- Provide Sector schedulers with a tool to randomize patrols against weighted targets in order to maximize effectiveness while minimizing impact on operational forces.

Outcome:

- DHS Centers of Excellence at the University of Southern California (USC) – (CREATE) utilizing game theory to build complex algorithms, and
- Purdue University (VACCINE) developing data visualization interfaces
- To maximize PWCS patrol deterrence effects through randomization for use by any Operational Commander.



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Academic Maritime Risk Symposium

USCG/CREATE Maritime Risk Symposium, 16-18 Nov
University of Southern California, Los Angeles, CA

Purpose:

- Evaluate risk and economic consequence assessment methodologies and tools, assessment results, and policy implications and impacts, focused on the
- Maritime Domain.

Challenge:

- How can academia and government approach this issue together?



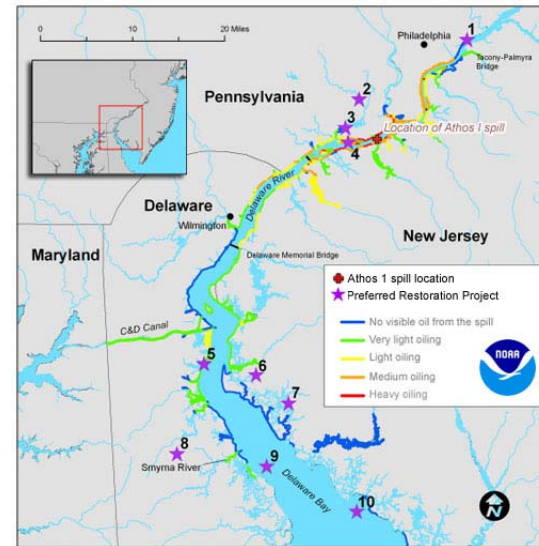
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Other USCG COE Engagement

- CCICADA (Rutgers) COE on advanced data analysis:
 - Tayfur Altioek is doing research/analysis for USCG on risk assessment for the Delaware River



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Future Engagement

- Basic Ordering Agreements (contracts)
<https://collaborate.st.dhs.gov/oup/boa/default.aspx>
- Modifications of Cooperative Agreements for Research (assistance agreements)
- Website and database of projects at:
 - www.hsuniversityprograms.org
- Educational Opportunities for DHS Staff
- Hosting COE Professors on Sabbaticals



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