DHS University Programs:
Research, Education & Integration

From Science and Technology… Security and Trust

Homeland Security

University Programs

- Centers of Excellence
- Education Programs
- Minority Serving Institutions Programs
- Integration

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Centers of Excellence

- Original Research
- Aligned with S&T Divisions and Missions
- Taking Advantage of Universities' Capabilities
- From basic to applied research
- Full DHS spectrum from terrorist group formation to disaster recovery

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Centers of Excellence

- Center for Risk & Economic Analysis of Terrorism Events (CREATE)

  Based at the University of Southern California

- National Center for Food Protection & Defense (NCFPD)

  Based at the University of Minnesota

- National Center for Foreign Animal & Zoonotic Disease Defense (FAZD)

  Based at Texas A&M University

- National Consortium for the Study of Terrorism & Responses to Terrorism (START)

  Based at the University of Maryland

- National Center for Preparedness & Catastrophic Event Response (PACER)

  Based at Johns Hopkins University

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Centers of Excellence, cont.

- Center for Advancing Microbial Risk Assessment (CAMRA)
  Based at Michigan State University, in Partnership with U.S. EPA

- Discrete Science Centers (IDS-UACs)
  In Cooperation with the Institute Discrete Sciences, based Lawrence Livermore National Laboratory
  Rutgers University (Lead Center), University of Southern California,
  University of Illinois at Urbana-Champaign, University of Pittsburgh

- Regional Visualization & Analytics Centers (RVACs)
  In Partnership with National VAC at Pacific Northwest National Laboratory:
  Penn State University, Purdue University, Stanford University,
  University of North Carolina at Charlotte, University of Washington

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Realignment of Existing Centers to S&T Divisions

1. <u>Chemical/Biological</u>: Food, Agriculture, Microbial and Chemical Defense

a. National Center for Food Protection & Defense (NCFPD)
b. National Center for Foreign Animal & Zoonotic Disease Defense (FAZD)
c. Center for Advancing Microbial Risk Assessment (CAMRA)
Consolidated New Center in 2010

2. <u>Command, Control & Interoperability</u>: Information Analysis and Visualization

a. University Affiliate Centers to the Institute for Discrete Sciences (IDS-UACs)
b. Regional Visualization & Analytics Center (RVACs)
Consolidated New Center By End of Calendar Year 2008

3. <u>Human Factors</u>: Social, Behavioral and Economic Sciences

National Consortium for the Study of Terrorism & Responses to Terrorism (START)

4. <u>Infrastructure/Geophysical</u>: Emergency Preparedness and Response

National Center for Preparedness & Catastrophic Event Response (PACER)

5. <u>Operations & Analysis</u>: Risk, Economics and Intelligence Assessments

Center for Risk & Economic Analysis of Terrorism Events (CREATE)
Linked to the Homeland Security Institute (HSI)

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New Centers Beginning in FY 2008

COE for Explosives Detection, Mitigation and Response

COE for Border Security and Immigration

- *** Northern Forest Borders**
- *** Southwest Desert Borders**

COE for Maritime, Island & Remote/Extreme Environment Security

COE for Natural Disasters, Coastal Infrastructure and Emergency Management

COE for Transportation Security

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Alignment of New Centers

6. Explosives: Explosives Detection and Countermeasures
National Center for Explosives Detection, Mitigation & Response, National Transportation Security COE

7. Borders/Maritime: Border Security and Immigration
National Center for Border Security & Immigration –

* Northern Forest Borders
* Southwest Desert Borders

8. Borders/Maritime: Maritime, Island and Remote/Extreme Environments
National Center for Maritime, Island & Remote/Extreme Environment Security, National Transportation Security COE (Port and Cargo) Security

9. Infrastructure/Geophysical: Natural Disasters and Coasts
National Center for Natural Disasters, Coastal Infrastructure & Emergency Management, National Transportation Security COE

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COE Alignment

S&T DIVISIONS

Explosives	Chemical/Biological	Command, Control & Interoperability	Borders/Maritime	Human Factors	Infrastructure/ Geophysical
COE for Explosives Detection, Mitigation & Response	National Center for Food Protection and Defense — A Homeland Security Center of Excellence	**IDS-UACs**	***COE for Border Security & Immigration***	START	PACER — A Homeland Security Center of Excellence
COE for Transportation Security	FAZD Center — National Center for Foreign Animal and Zoonotic Disease Defense	**RVACs**	***COE for Maritime, Island & Remote/Extreme Environment Security***		***COE for Natural Disasters, Coastal Infrastructure & Emergency Management***
	CAMRA — Center for Advancing Microbial Risk Assessment	***Consolidated CCI Center***			***COE for Transportation Security***
	Consolidated Chem/Bio Center				

Operations & Analysis

Risk Sciences Branch & HSI Risk Determination

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CREATE Homeland Security Center

Research Area Alignment

S&T DIVISIONS					
Explosives	**Chemical/Biological**	**Command, Control & Interoperability**	**Borders/Maritime**	**Human Factors**	**Infrastructure/ Geophysical**
Explosives Detection, Mitigation and Response Transportation Security	Chemical Threats and Countermeasures Food and Agriculture Security; Biological Threats and Countermeasures	Communications and Interoperability Advanced Data Analysis and Visualization *Cyber Security*	Border Security Immigration Studies Maritime and Port Security Transportation Security	Social, Behavioral, and Economic Sciences Human Factors Aspects of Technology	Infrastructure Protection Natural Disasters & Geophysical Studies Emergency Preparedness and Response Transportation Security

Risk and Decision Sciences

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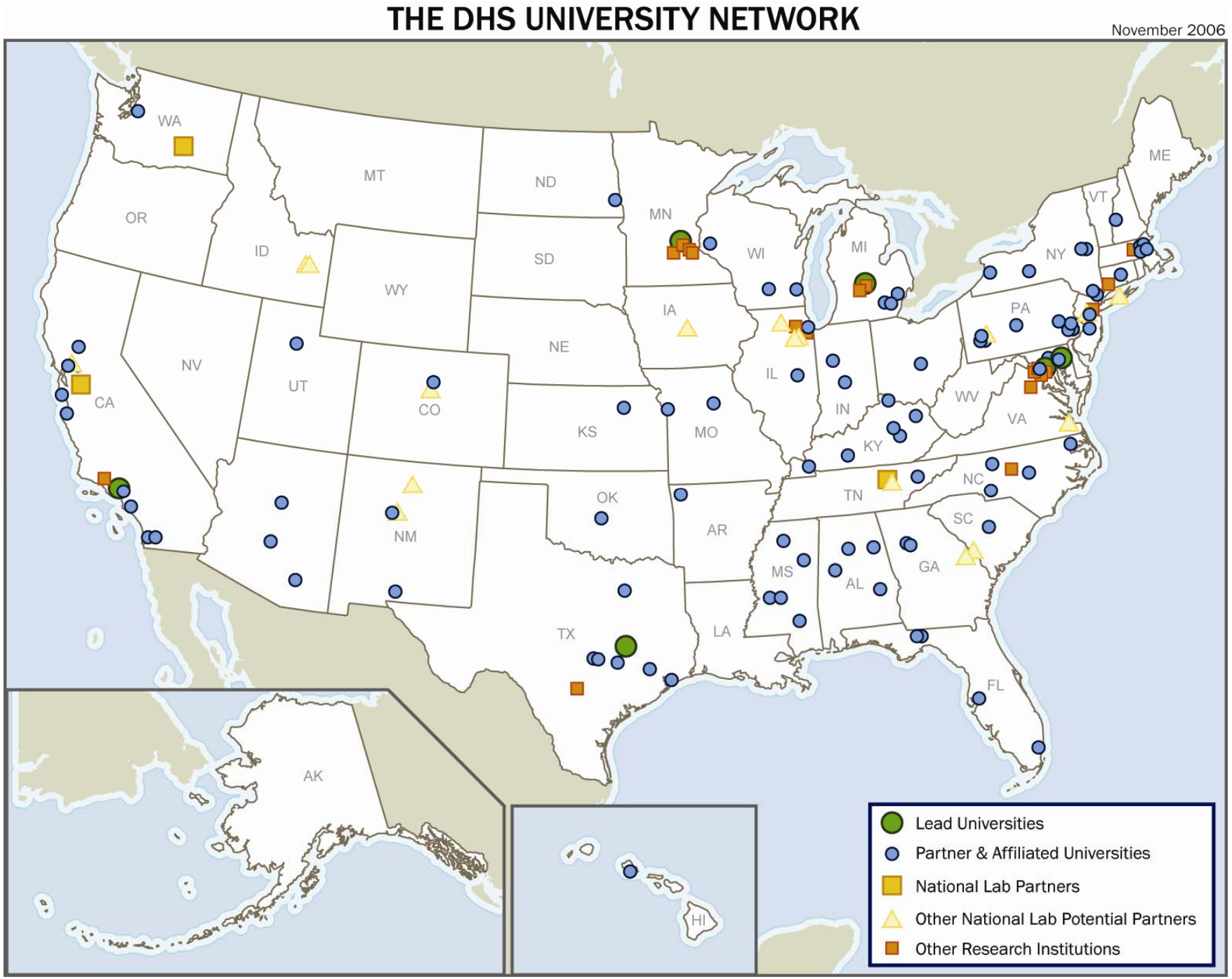
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Activities & Accomplishments: CREATE

- **Incident Commander/FireScope** helps train incident commanders for a large-scale urban disaster by providing extensive training and tactics without taking fire fighters off duty. *Users: Los Angeles Fire Department*

- **Risk-Based Resource Allocation Models.** Model to randomize patrols to foil terrorists and thieves, deployed at Ports of Los Angeles and Long Beach.

- **Terrorist Attack Prediction Tools** provide tabletop and war-gaming exercises with terrorism experts, intelligence analysts, risk assessment experts and economists leading to serious simulation games of high-risk terrorist attack scenarios.

Activities & Accomplishments: NCFPD

- **Rapid response analysis assessing food ingredients and products from China,** in response to the contamination of animal/pet feed. Study scope extended and expanded to include detailed analysis of the foods that are most restricted in terms of available substitutes.

- **Consequence Modeling System: Modeling of food system contamination events** for vulnerability assessment, intervention/countermeasure evaluation and awareness. CMS has been expanded to support the NBACC 2008 bioterrorism risk assessment and the FDA/USDA food contamination event models.

- **Sensor for rapid detection of chemicals and toxins**, showing promise as a rapid screen for ricin in complex foods, e.g., fruit juice. This would provide a means of in-plant screening for potential intentional contamination.

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Activities & Accomplishments: FAZD

- **Vaccines for Zoonotic Diseases** of economic and public health import, such as Rift Valley Fever (RVF) and Avian Influenza (AI) using modern recombinant technologies to incorporate genetic "markers" into RVF and AI vaccines. These are making it possible to distinguish vaccinated livestock from infected livestock.

- **Rapid Detection Tests** of Foot and Mouth Disease (FMD) to enable an emergency response program to eradicate the disease without massive culling of infected or exposed herds. These are rapid, accurate, inexpensive field tests that will distinguish between infected and uninfected animals at chute site within minutes.

- **Avian Flu Training for Early Responders Training** will avoid delayed detection and ineffective reactions. Flu School trains the trainers and provides training modules for use by extension agents, veterinarians, researchers and farmers. Sessions have been held in Texas, California, Minnesota, and in Africa, and are increasing in demand throughout the developing world.

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Activities & Accomplishments: START

- **Global Terrorism Database:** In May 2007, launch of Web interface, accessible to the public, for reviewing detailed information on approximately 85,000 domestic and international terrorist incidents since 1970. This will include the release of data files on all cases to the government homeland-security community.
- **Terrorism and Ethnic Political Violence:** This project completed collection data from 1980-2004 on 112 organizations that represent the interests of ethnic minorities in the Middle East. There has been rapid growth in the number of ethnic organizations in the Middle East, but the percentage of groups that use violence or terrorism has steadily declined with more reliance on electoral politics.
- **National Preparedness Survey:** A state-of-the-art survey examining public risk perception, beliefs about terrorism, and preparedness behavior. Interviews with over 3,300 respondents (including over-sampling in New York, Los Angeles, and Washington D.C.) to be completed in May 2007.

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Activities & Accomplishments: PACER

- **Agent-based model** of behavioral and economic responses to bioterrorism. This model utilizes innovative methods that can take into account real-world dynamics, such as poor information, irrational behavior, panic, and abruptly changing spatial patterns.

- **Models of critical factors** that influence decision-making in crises. These models will identify areas for improvement in real time for all levels of response planners and managers.

- **Wireless sensor network** for target recognition for critical event response. This technology will integrate information from multiple sources – wireless sensor networks with sensors, remote cameras and magnetometers - to provide decision makers with useful real time data in a catastrophic event.

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Activities & Accomplishments: CAMRA

- **Better models of the transport of pathogens in drinking water** distribution systems, verified through experimental tests at the University of Arizona Water Village.

- **Discovered determinant of infectivity of environmental contaminations,** associated with pre-existing immunity when exposed to environmental contamination.

- **Rapid risk assessment of recent passenger tuberculosis incident** modeled air movement in planes; placed boundary estimates on risks to passengers and general public

- **First framework for addressing epidemic risks from bioterrorist use of pathogens.** This promises to clarify how the extent of contamination and the number of cases generated translates into the probability and severity of epidemics.

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Activities & Accomplishments: Discrete Science Centers

- **Information extraction system** that can process ProMed-mail text articles about infectious disease outbreaks around the world and identify the diseases and victims being reported. This includes creation of a data set of 245 articles and answer keys, and new methods to create the information extraction system with minimal training.
- **WEB-based system that associates keyword(s) to geospatial datasets** such as maps, satellite and aerial imagery. This enables a user to input a keyword for which the system returns all related maps and images.
- **External Memory Algorithms** cluster is allowing researchers to develop and test fundamental algorithms for visualizing large graphs connecting entities of interest (such as people, organizations, places, events, documents, etc.) and rapidly identifying patterns in graphs that are too large to fit within a computer's main memory.

Activities & Accomplishments: RVACS

- **GeoDiscoverer:** a Raytheon-funded extension of Northeast VAC-developed tools for geographic contextualization of documents. Search engine integrates social networks with geospatial information, and focuses on identifying and mapping social networks represented in texts.
- **Pacific Rim RVAC has collaborated to integrate the tsunami simulation tools** with NEVAC visual situation monitoring and surveillance tools.
- **NEVAC implemented the FactXtractor that extracts entities, locations, concepts and times from text**. FactXtractor was used to create FEMARepViz, a tool that visualizes the daily situation report updates from FEMA.
- **Southeast RVAC has developed WireVis, a highly interactive visual analytics tool** developed with Bank of America to help detect suspicious activity, as well as possible money laundering among hundreds of thousands of wire transfers per day.

Education Programs

- Individual Scholarships and Fellowships
- Career Development Grants to Institutions
- Naval Postgraduate School Ph.D. Program in Homeland Security
- AAAS Fellowships at DHS
- Summer Internships
- Post-doc opportunities (FY 2008)
- International Science and Engineering Fair (ISEF)
- Pilots for Middle and High School STEM Education

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HS-STEM Education Focus Areas

- Explosives Detection, Mitigation and Response
- Social, Behavioral, and Economic Sciences
- Risk and Decision Sciences
- Human Factors Aspects of Technology
- Chemical Threats and Countermeasures
- Biological Threats and Countermeasures
- Food and Agriculture Security
- Transportation Security
- Border Security
- Immigration Studies
- Maritime and Port Security
- Infrastructure Protection
- Natural Disasters and Related Geophysical Studies
- Emergency Preparedness and Response
- Communications and Interoperability
- Advanced Data Analysis and Visualization
- *Potential: Cyber Security*

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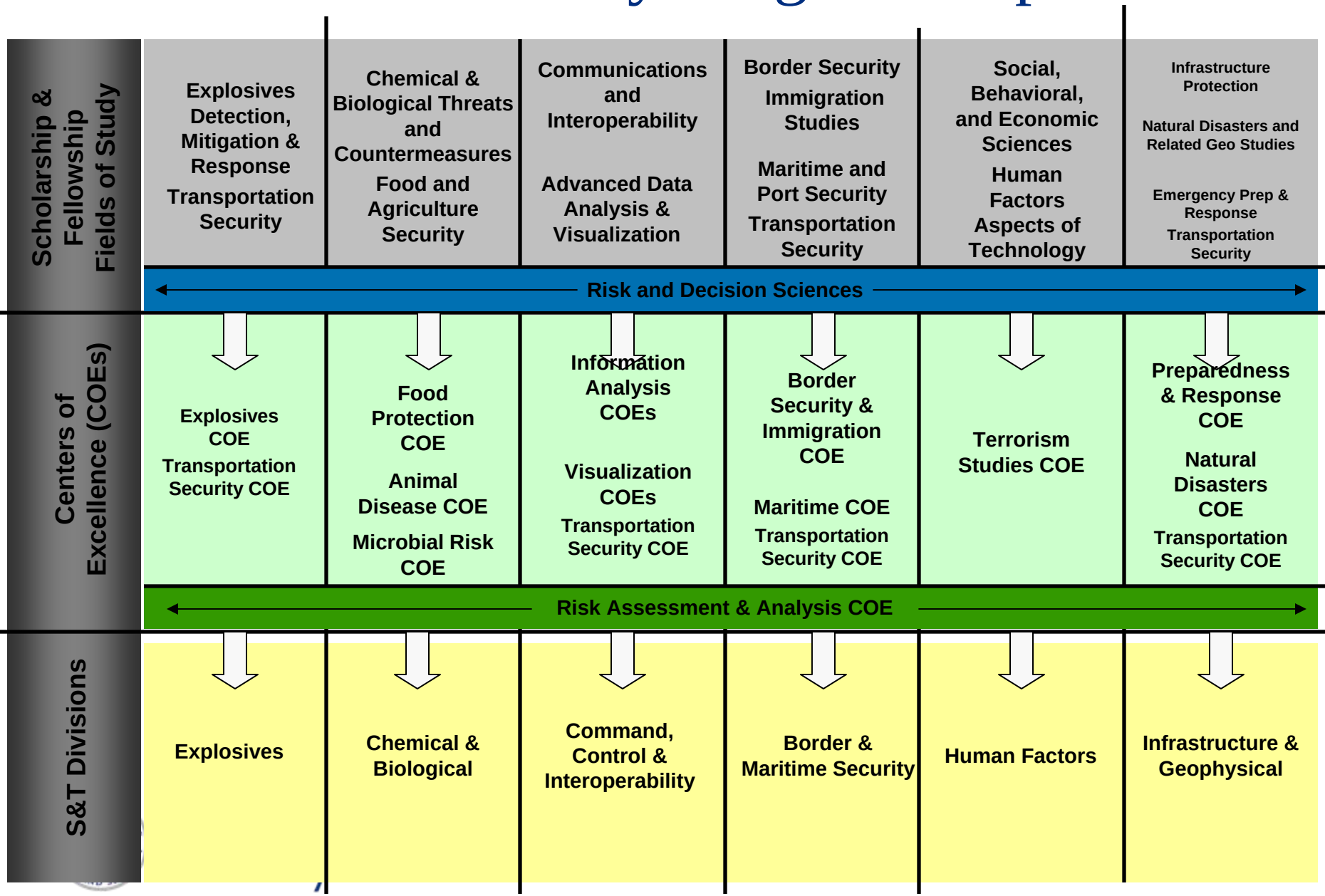
Future University Programs Pipeline



MSI Programs

- Leadership Development Grants
  - Minimum 60% scholarships and fellowships
  - Early career faculty support
  - Homeland Security-STEM curriculum development
- Summer Research Teams at COEs
- Summer Workshop on Teaching about Terrorism (pilot)
- Integration with COEs
- MSI Strategy in Development

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Integration Across the Board

- Multi-COE, Multi-Division, Multi-Disciplinary Projects
  - Target non-stovepipe areas of uncertainty and critical need
- Integrating Education with COEs and Division Focus
- Education linked to DHS CHCO
- Integrating COES with NPS Ph.D. program
- Integrating MSIs into COEs
- Transitioning COE students, scholars and fellows to DHS and Federal labs
- Instituting transition plans for all COE projects

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