Domestic Nuclear Detection Office (DNDO)

Detecting Nuclear Threats

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Mission and Objectives

DNDO was founded on April 15, 2005 with the signing of NSPD 43 / HSPD 14. It is a jointly-staffed, national office established to improve the Nation's capability to detect and report unauthorized attempts to import, possess, store, develop, or transport nuclear or radiological material for use against the Nation, and to further enhance this capability over time.

- Develop the global nuclear detection and reporting architecture
- Develop, acquire, and support the domestic nuclear detection and reporting system
- Characterize detector system performance before deployment
- Establish situational awareness through information sharing and analysis
- Establish operational protocols to ensure detection leads to effective response
- Conduct a transformational research and development program
- Provide centralized planning, integration, and advancement of USG nuclear forensics programs

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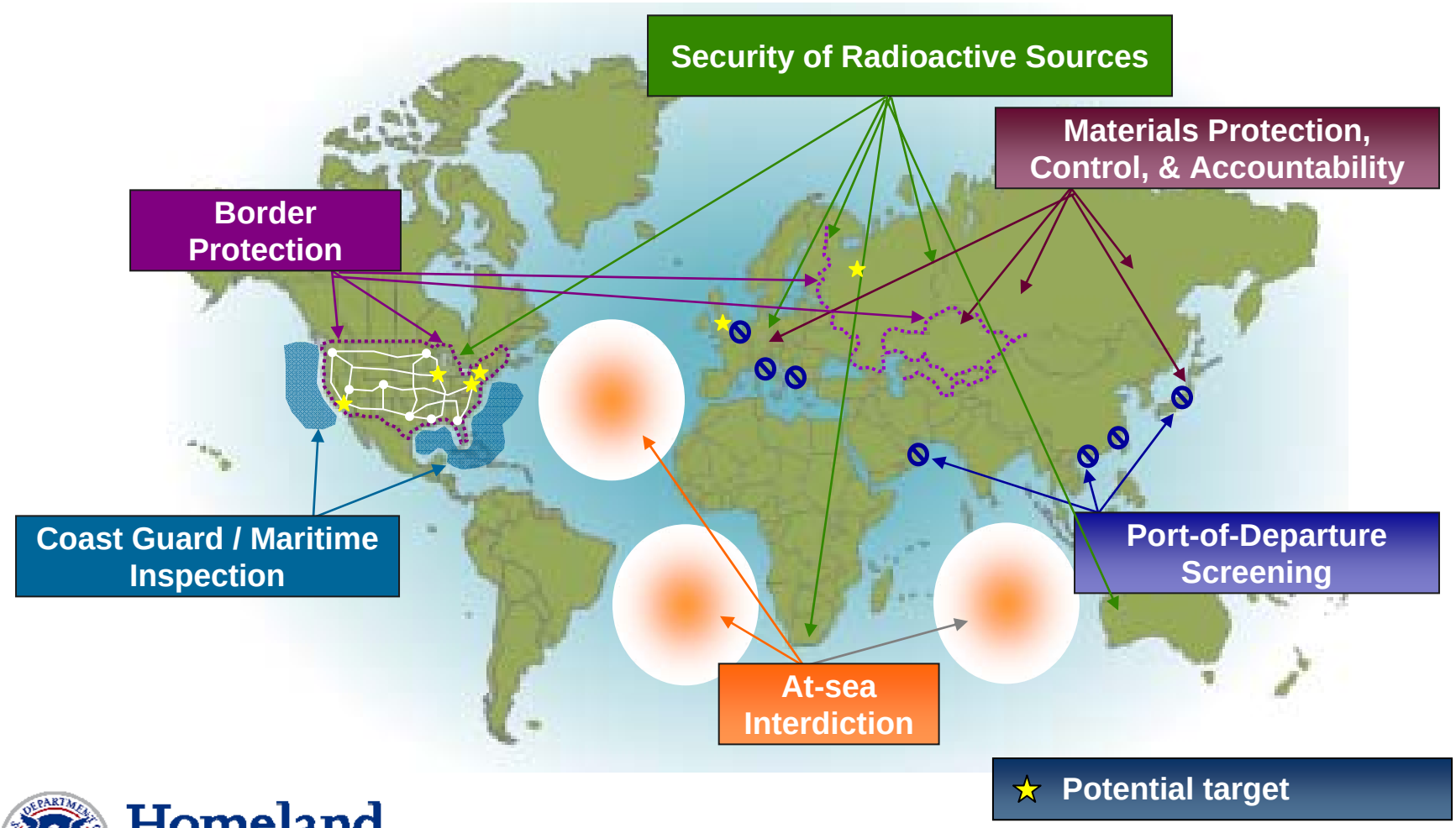
Global Nuclear Detection Architecture

A multi–layered, international system is crucial for the security of all nations



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Nuclear Detection Architecture

- **What is it?**
- A **time-phased** plan
- Supported by a disciplined **systems engineering approach**
- To **reduce the risk** from radiological and nuclear threats
- Key elements could include plans, organizations, equipment, training, exercises, communication/reachback mechanisms, operations support

- **Goals**
- Enhance detection and interdiction
- Enhance deterrence

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Threat Perspective

- **Strong evidence of terrorist interest in nuclear weapons and other WMD**
- **Adversary types**
  - Opportunistic, or
  - Intelligent and determined, i.e., highly sophisticated team, or
  - Somewhere along this “spectrum”
- Information incomplete, element of unpredictability/surprise
- Dynamic; evolving over time

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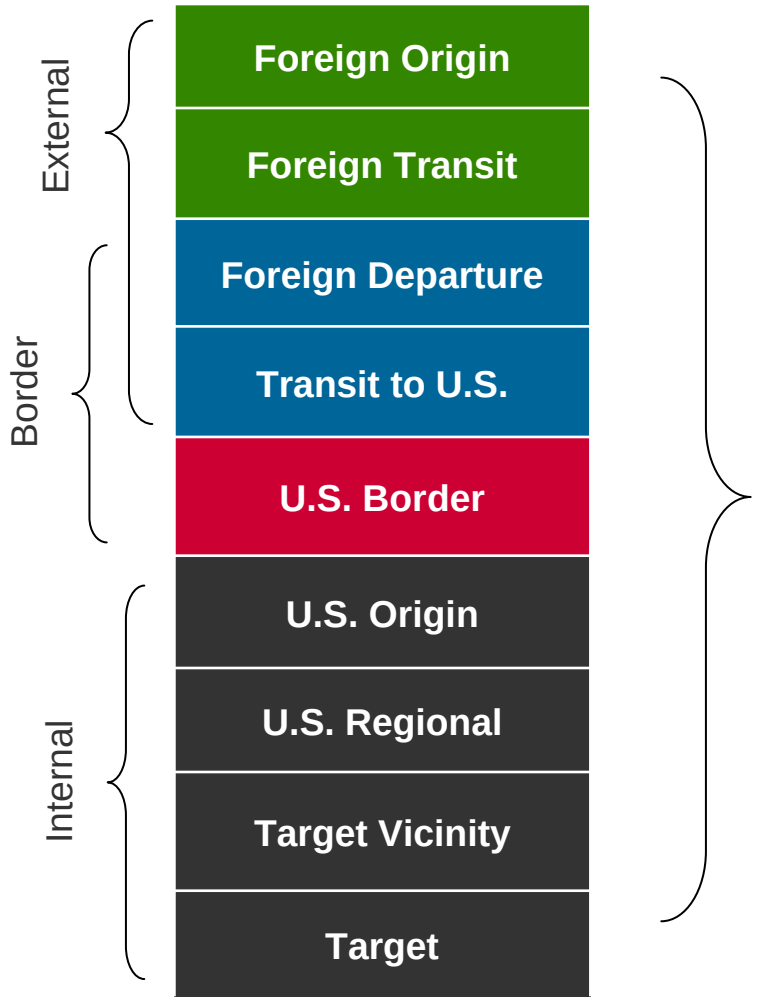
Architecture Structure: 9 Integrated Layers



Integration

Information fusion, technical reachback and intelligence analysis

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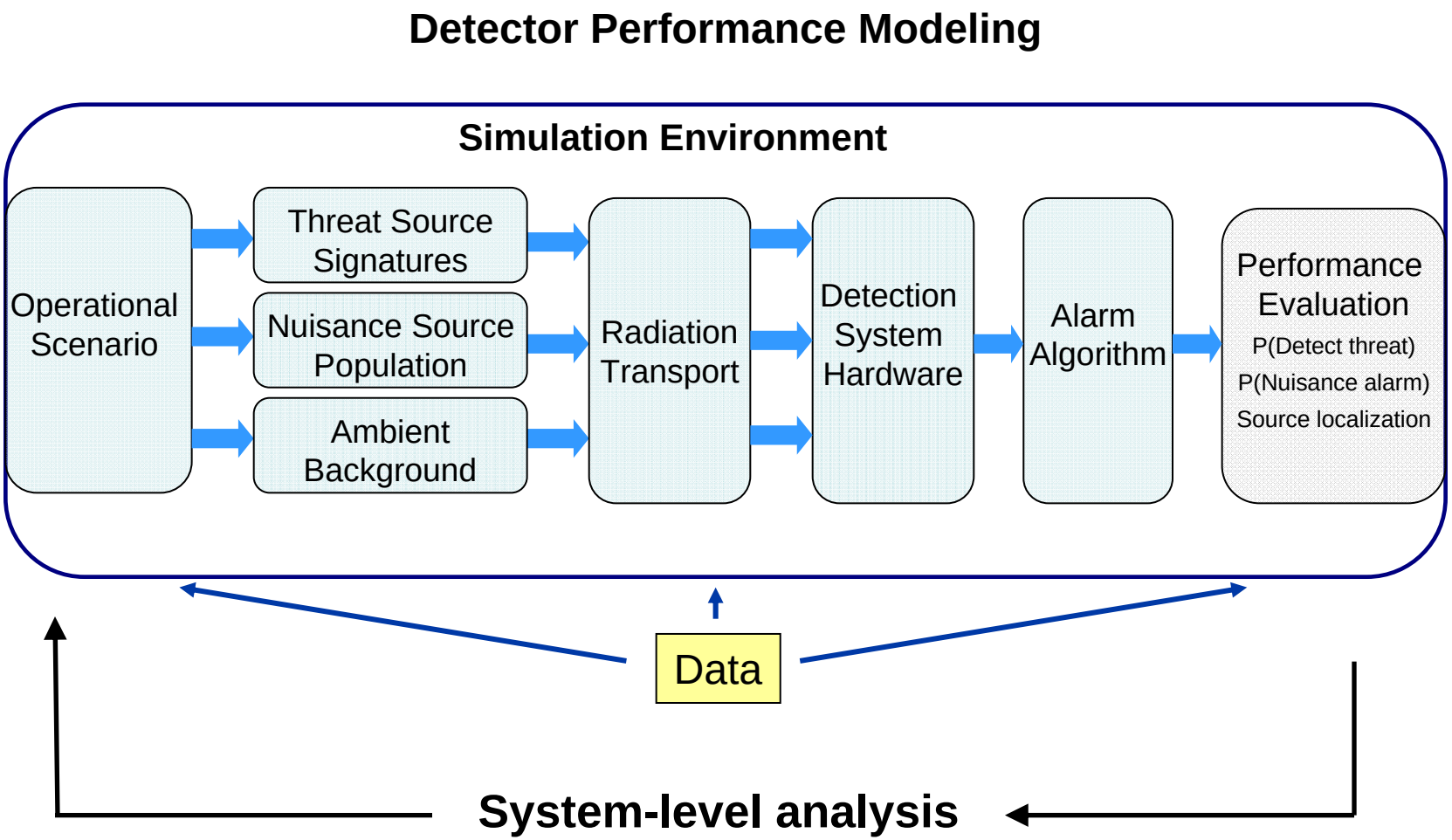
DMOA Approach for Radiation Detection Systems



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Tackling the Port Problem

- Customs and Border Protection (CBP) and DNDO have developed a joint deployment strategy
  - Deploying radiation portal monitors at seaports and land border crossings to enable CBP to eventually screen 100% of all container cargo entering the US
  - Developing advanced spectroscopic portal (ASP), which has been installed alongside other radiation portal monitors as part of the Secure Freight Initiative (SFI)
- The Secretary of Homeland Security has identified time-phased deployment goals for the Radiation Portal Monitor deployment program
- There remain Long Term Technology challenges in Port R/N Detection

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Addressing Long Term Technology Challenges

- Passive Detection
  - Materials with better energy resolution, larger size, lower cost, and increased efficiency – leads to lower false alarms, more ubiquitous systems
  - Innovative devices to exploit new techniques for improved signal to noise (eg, directional detectors, time correlation systems) – leads to larger standoff distances or possible passive detection of shielded SNM
    - Next generation hand-held detectors – leads to improved hand-held or belt-worn devices
    - Next generation fixed portals – leads to spectroscopic portals to discriminate threat from benign materials and directional detectors
- Active Detection – with emphasis on detection of shielded SNM
  - Innovative signatures such as nuclear resonance fluorescence, muon capture, photofission, and high-energy x-ray backscatter – leads to unique signatures to selectively and sensitively identify SNM
  - Next generation radiography systems – leads to non-intrusive inspection (NII) systems that have the same or better spatial resolution and penetration as current NII systems and also can detect the presence of high-Z or special nuclear material
- Algorithms and predictive knowledge, fusing multiple systems or information – leads to higher probability of detection with lower false alarm rate
- Nuclear Forensics – ramping up support in this area (within DNDO's Transformational R&D office)

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What are the Challenges? (More than just ports)

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Four essential Functions of Architecture

The Problem is bigger than just detection

- A successful architecture must:
  - Encounter the adversary
  - Detect the threat
  - Identify or classify the threat
  - Successfully Interdict

$$P_{success} = P_{encounter} \times P_{detection} \times P_{identification} \times P_{interdiction}$$

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Global R/N Detection Architecture: Challenges

- **Address bypass scenarios**
- **Defeat shielding/masking at POEs**
- **Don’t impede flow of commerce**
- **Layered approach essential**
- **Effective regional and international cooperation**

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Other Concerns

Maritime Detection

– To be successful, we must improve our ability to encounter potential adversaries, then detect & identify illicit radiological/nuclear materials

  - Improve targeting, information, and intelligence; build an effective data network

General Aviation Detection

– Implement an integrated, layered approach that reduces the risk of rad/nuc threats being illicitly transported on general aviation flights

– Inbound general aviation flights would undergo screening at gateway airports, far from targets

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Non-POE Detection—Concepts and Approaches

Boundary Defenses
- Fences
- Natural Barriers

Intrusion Detection
- Unattended Sensors
- Camera Systems

Patrol Operations
- Observation
- Response/Interdiction

Interior Checkpoints
- Traffic Screening
- Vehicle Inspection

1) Unattended Sensor Concepts

2) Vehicle-Mounted and Human-Portable Systems

3) Fixed and mobile RPMs for Permanent & Tactical Checkpoints

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Desired End State

A fundamental change in the way the United States counters radiological and nuclear trafficking.

CURRENT	FUTURE
Port-centric detection strategy	Multi-layered detection strategy
Passive detection systems	Integrated passive/active systems
Fixed architecture	Fixed/mobile/relocatable architecture
Federal efforts	Federal/State/local efforts
Locally operated detectors	Networked detectors
U.S. focused strategy	Global interconnected strategy
Targeted scanning	Comprehensive scanning
Primarily rad/nuc detection	All signatures detection

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Backups

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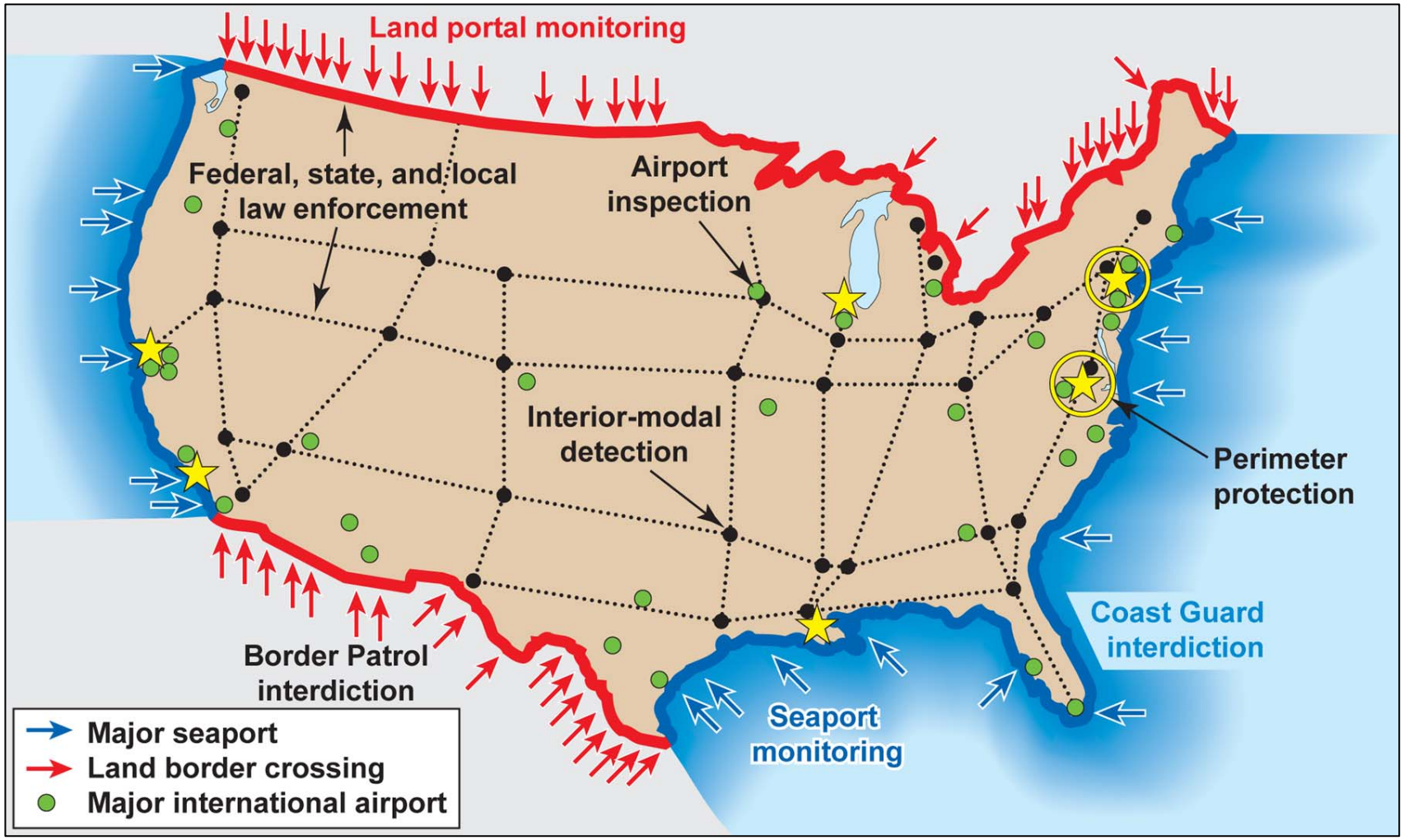
Domestic Architecture-Breadth and Depth



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Domestic Interior Program

Strategy:

- Enhance domestic detection capabilities through:
  - Training and exercises
  - Regional reachback
  - Pilot deployments
  - Program management handbooks

Program Activities:

- Complete Southeast Transportation Corridor Pilot (9 States and DC) with full scale exercise
- Evaluate Surge Program with Department of Energy (DOE)
- Develop statewide rad/nuc detection program in Florida
- Conduct 8th State & local Stakeholder Working Group meeting (Focus: Human portable detectors & small maritime craft)
- Continue training
  - Thousands of personnel trained to date

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Securing the Cities Initiative

Objective:

- Coordinated detection and interdiction of illicit R/N materials within the NYC region.
- Capability to respond to events and information.

Program Activities:

- Develop and implement technical and operational concepts for scanning operations
  - Mobile checkpoint
  - SUV-based detection operations
  - Maritime rad/nuc scanning in New York, New Jersey and Connecticut
- Develop regional command, control and communications capability
- Deploy rad/nuc detection equipment
- Continue training
  - Many thousands of personnel will have been trained by the end of this year
- Conduct regional exercises in 2008
- Planning for a full scale regional exercise in 2009

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