Critical Issues in Detecting Smuggled Fissionable Material

Prepared for

Senator Marco Rubio

January 11, 2016

# Keeping Americans Safe from Domestic Nuclear Attacks

- Preventing terrorists from smuggling fissionable or radiological material to carry out an attack in the United States is a top national priority.

- Within the Department of Homeland Security (DHS), the Domestic Nuclear Detection Office (DNDO) is responsible for our capabilities to deter and detect terrorist nuclear attacks.
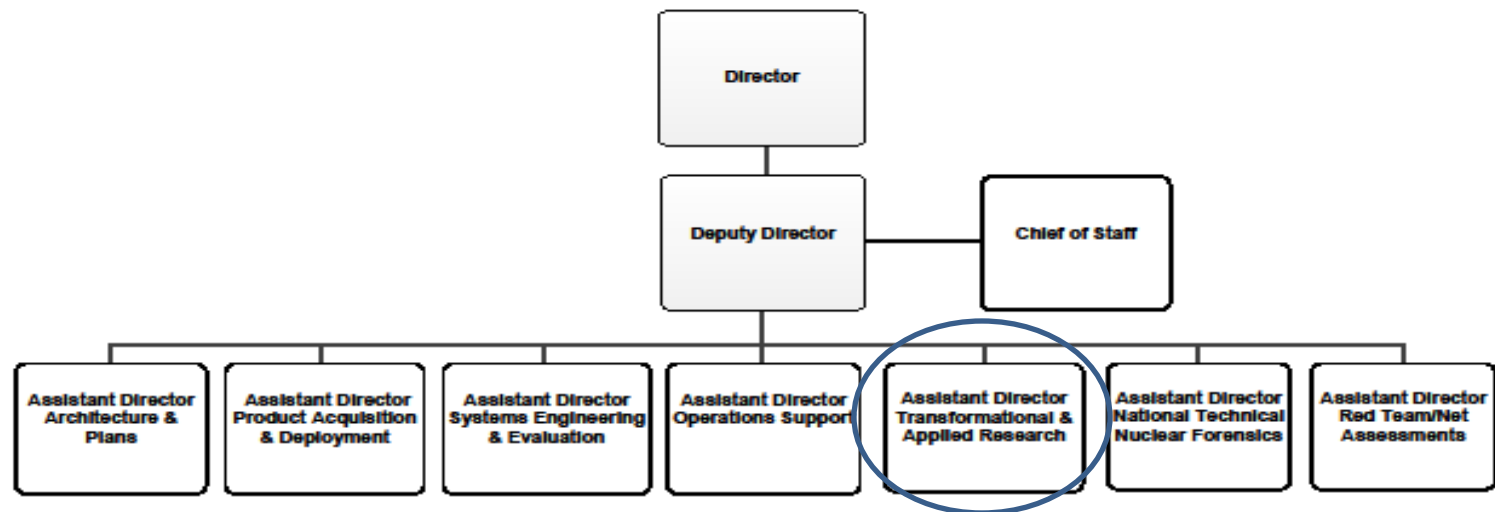
DHS Organizational Structure

U.S. DEPARTMENT OF HOMELAND SECURITY
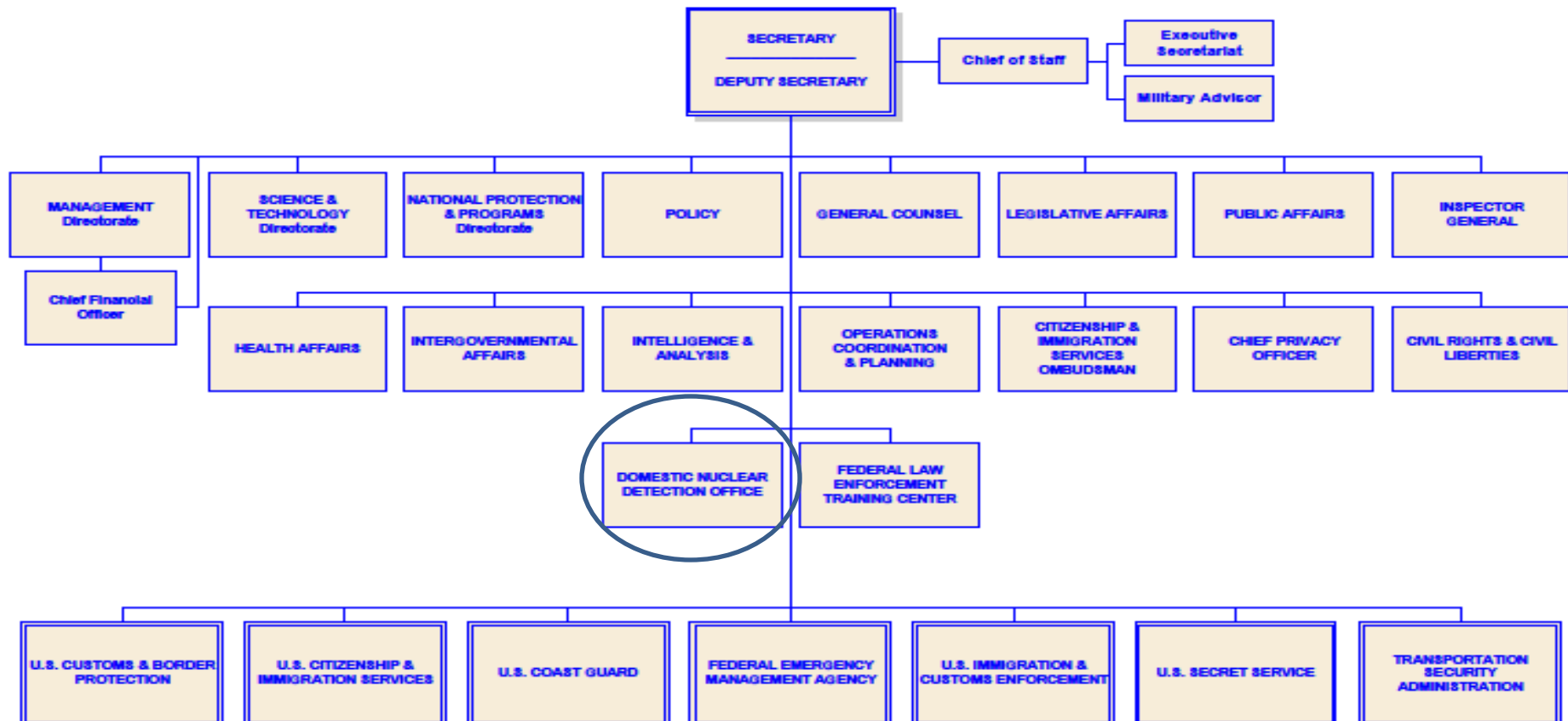
DNDO Organizational Chart

Domestic Nuclear Detection Office

Director

Deputy Director — Chief of Staff

- Assistant Director Architecture & Plans
- Assistant Director Product Acquisition & Deployment
- Assistant Director Systems Engineering & Evaluation
- Assistant Director Operations Support
- Assistant Director Transformational & Applied Research
- Assistant Director National Technical Nuclear Forensics
- Assistant Director Red Team/Net Assessments

DNDO Staffing

- DNDO is an interagency office comprised of staff from:
  - Department of Energy (9)
  - Department of Defense (11)
  - Department of Homeland Security (62)
  - Department of Justice/Federal Bureau of Investigation (6)
  - Department of State (1)
  - Nuclear Regulatory Commission (1)

DNDO Directorates

- ***Architecture and Plans Directorate*** - Determines gaps and vulnerabilities in the existing global nuclear detection architecture, then formulates recommendations and plans to develop an enhanced architecture.

- ***Product Acquisition & Deployment Directorate*** - Carries out the engineering development, production, developmental logistics, procurement and deployment of current and next-generation nuclear detection systems.

- ***Transformational & Applied Research Directorate*** - Conducts, supports, coordinates, and encourages an aggressive, long-term research and development program to address significant architectural and technical challenges unresolved by research and development efforts on the near horizon.

- ***Operations Support Directorate*** - Develops the information sharing and analytical tools necessary to create a fully integrated operating environment. Residing in the Operations Support Directorate is the Joint Analysis Center, which is an interagency coordination and reporting mechanism and central monitoring point for the Global Nuclear Detection Architecture.

- ***Systems Engineering & Evaluation Directorate*** - Ensures that DNDO proposes sound technical solutions and thoroughly understands systems performance and potential vulnerabilities prior to deploying those technologies.

- ***Red Team & Net Assessments*** - Independently assesses the operational performance of planned and deployed capabilities, including technologies, procedures, and protocols.

- ***National Technical Nuclear Forensics Center*** - Provides national-level stewardship, centralized planning and integration for an enduring national technical nuclear forensics capability.

Lack of a Global Nuclear Detection Architecture

- The DNDO is mandated to work with other federal agencies to develop a Global Nuclear Detection Architecture (GNDA).

- While DHS has spent nearly $4 billion on the GNDA, DNDO has yet to develop a strategic plan, as recommended by the General Accountability Office (GAO) in 2008.

- Later in this deck, it will be shown how DNDO failures have damaged the GNDA.
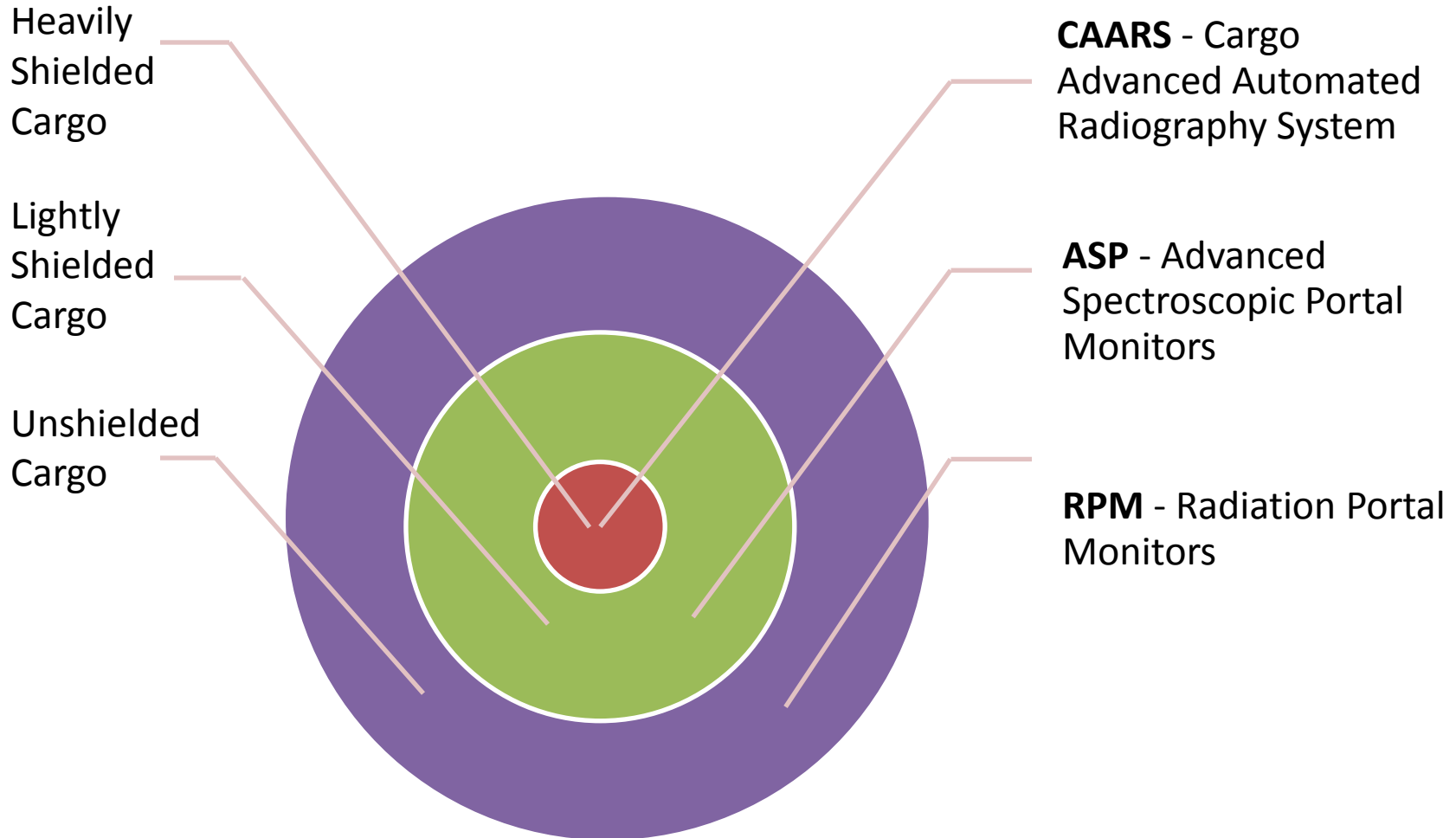
Nuclear Detection Architecture Structure

DNDO System Nomenclature Levels of Sophistication

Heavily Shielded Cargo

Lightly Shielded Cargo

Unshielded Cargo

CAARS - Cargo Advanced Automated Radiography System

ASP - Advanced Spectroscopic Portal Monitors

RPM - Radiation Portal Monitors

THUNDER ENERGIES

More Criticism of DNDO

- As part of its mission, DNDO conducts R&D on radiation and nuclear detection devices.

- However, DNDO has come under heavy criticism for its *Advanced Spectroscopic Portal Monitor* (ASP) (intended to replace *Radiation Portal Monitors)* (RPM) and Cargo Advanced Automated Radiography *System* (CAARS) programs.

Role of Customs and Border Protection (CBP)

- Also within DHS, Customs and Border Protection (CBP) has the lead for deploying, operating, and maintaining systems to detect nuclear and radiological materials entering the country through land borders, seaports, and other ports of entry.

- CBP, in coordination with DNDO, has deployed over 1,400 *Radiation Portal Monitors* (RPMs) at U.S. ports of entry.

Radiation Portal Monitors (RPMs)

- Most of the *Radiation Portal Monitors* (RPMs) are installed in primary inspection lanes through which nearly all traffic and shipping containers must pass.

- These monitors produce an alarm when they detect radiation coming from a package, vehicle, or shipping container.

Failure of RPMs and ASPs

- As of June 30, 2010, DNDO had spent $200 million trying to develop a new radiation detection technology – the *Advanced Spectroscopic Portal* (ASP).

- The ASP was intended to detect either unshielded or lightly shielded radioactive materials using current and next-generation RPMs.

Failure . . . (Cont.)

- The General Accountability Office (GAO) concluded that the ASP is only marginally better than existing RPM technology.

- GAO also believes the ASP may have drained resources from other programs like mobile, portable or hand-held technologies that could screen other types of inbound cargo or bulk shipments, like international trains and commercial aviation.

Failure of CAARS Program

- In addition, the *Cargo Advanced Automated Radiography System* (CAARS) was supposed to enable automatic detection of high density shielding of nuclear material.

- Development of the CAARS algorithms, a key component, did not advance enough to justify acquisition and deployment.

Failure . . . (Cont.)

- According to GAO, DNDO planned the acquisition and deployment of CAARS machines without realizing that they would not fit within existing primary inspection lanes at Customs & Border Protection (CBP) ports of entry.

- This occurred because DNDO and CBP had few discussions about operating requirements for primary inspection lanes at ports of entry.

Misleading Congress

- For FY 2009 - FY 2011, DHS justified annual budget requests to Congress by citing significant plans and accomplishments of the CAARS program, saying that CAARS technology development and deployment was feasible, even though DNDO had made the decision in December 2007 to cancel the acquisition of CAARS.

Pathetic "Progress"

- DNDO completed CAARS testing in March 2010. As of today:
  - Final test results for two of the three CAARS machines are not yet available.
  - No CAARS machines have been deployed.
  - CAARS machines from various vendors have either been disassembled or sit idle without being tested in a port environment,
  - CBP is considering whether to allow DNDO to collect operational data in a port environment.
  - Apparently, DNDO has no further acquisition plans since it was cancelled in 2007

Findings & Conclusions

- 28 GAO reports, plus two prestigious independent studies (National Academy of Sciences, American Physical Society), all highly critical of DNDO.

- CAARS scrubbed in 2008; ASP dropped in 2011, both due to failure.

- The U.S. Senate Committee on Homeland Security and Governmental Affairs accused DNDO of wasting 5 years and many millions.

- We are no safer (actually, *less safe*, given the rise of Isis and the Iran nuclear deal) from terrorists smuggling nuclear materials than on 9/11/2001.

Findings & Conclusions (Cont.)

- For nearly twenty years, both Republicans and Democrats in Congress and the White House have invested billions in putting in place a network of thousands of fixed and portable radiation detectors in more than fifty countries (GNDA).

- *National Defense Authorization Act for Fiscal Year 2016* (signed into law by President Obama on 11/25/2015) effectively cuts off funding and abandons partners across the world, after years of painstaking diplomacy, undermining our investment and reducing chances that existing detectors will continue to be used effectively.

Findings & Conclusions (Cont.)

- Why did Congress do this? Among the reasons:
  - Failure of DNDO to provide evidence to support investment in its failed technological experiments (CAARS, ASP, RPM, etc.)
  - Failure of DNDO to provide strategic direction for the GNDA
  - Multiple GAO and independent indictments of DNDO processes
  - DHS history of misleading Congress on detection

TARD Funding Programs

- The DNDO Directorate with the most funding authority is the *Transformational & Applied Research Directorate* (TARD).

- TARD offers four programs:
  - Exploratory Research Program (ERP)
  - Small Business Innovative Research (SBIR)
  - Academic Research Initiative (ARI)
  - Advanced Technology Demonstration (ATD)

ERP

- The Exploratory Research Program (ERP) sponsors studies to show feasibility through proof of concept demonstrations for identified GNDA gaps, especially transformational nuclear detection technology.

- ERP emphasizes low technical readiness level investigations and proof of concept demonstration projects in the $500,000 to $1 million range.

SBIR

- The Small Business Innovative Research (SBIR) Program, uses small businesses to meet R&D needs. The SBIR program supported 21 projects in 2012. Projects are funded in 3 phases
  - Phase I: Determine scientific and technical merit and feasibility of proposed effort. Phase I awards are up to $150,000 and no more than six months in duration.
  - Phase II: Continue R&D effort from completed Phase I. Awards are up to $1million and typically no more than two years duration. Funding is based upon results of Phase I and scientific and technical merit and commercial potential of the Phase II proposal.
  - Phase III: Not funded by SBIR, but by commercial interests.

ARI

- The Academic Research Initiative (ARI), which funds academic exploratory and basic research to stimulate many radiation detection sectors, is carried out in partnership with the National Science Foundation (NSF).

- The ARI budget was $18.2 million in 2011. This dropped to $5.2 million for 2012. The proposed 2013 ARI budget increased to $8.8 million.

ATD

- *The Advanced Technology Demonstration (ATD) Program* builds on technology concepts previously demonstrated under the Exploratory Research Program (ERP).

- ATD objectives are to develop and characterize technology in a simulated operational environment in order to generate performance data for cost-benefit decisions for transition to commercial system development and acquisition.

TEC Plan Moving Forward

- Recommend applying for SBIR Phase I Contract
  - Advance Contract cycles are early December & April, learn fate in 90 days. Chance of success for Phase I is 17%; Phase II 35%, Phase III 38%.
- SBIR RFP's issued December 2015 were totally irrelevant to technologies that might detect fissionable materials being smuggled into US.
- Recommend courtesy meeting with elected officials to call attention to these issues.

Thunder Energies Corporation Nuclear Division

Santilli has discovered an industrial means for synthesizing neutrons from Hydrogen. This discovery can be used to develop a device that protects us against nuclear smuggling.

Concluding Thoughts

- We anticipate that Santilli's technologies will be viewed by DNDO as controversial. The reason for rejection will be that Dr. Santilli's scientific work goes beyond Einstein's special relativity and shows the inadequacies of quantum mechanics.

- We are hoping that DNDO's SBIR program will encourage meaningful, innovative research rather than offer trivial opportunities for narrowly focused contracts.

General and GAO Reports

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[5] "The Global Nuclear Detection Architecture: Issues for Congress." Dana A. Shea, Specialist in Science and Technology Policy, Congressional Research Service, March 25, 2009

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Combating Nuclear Smuggling: DHS has Developed Plans for Its Global Nuclear Detection Architecture, but Challenges Remain in Deploying Equipment

http://www.gao.gov/products/GAO-12-941T
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Combating Nuclear Smuggling: Additional Actions Needed to Ensure Adequate Testing of Next Generation Radiation Detection Equipment

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Combating Nuclear Smuggling: DHS's Cost-Benefit Analysis to Support the Purchase of New Radiation Detection Portal Monitors Was Not Based on Available Performance Data and Did Not Fully Evaluate All the Monitors' Costs and Benefits
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Excerpts from DNDO Presentations on its Research Programs

APPENDIX A
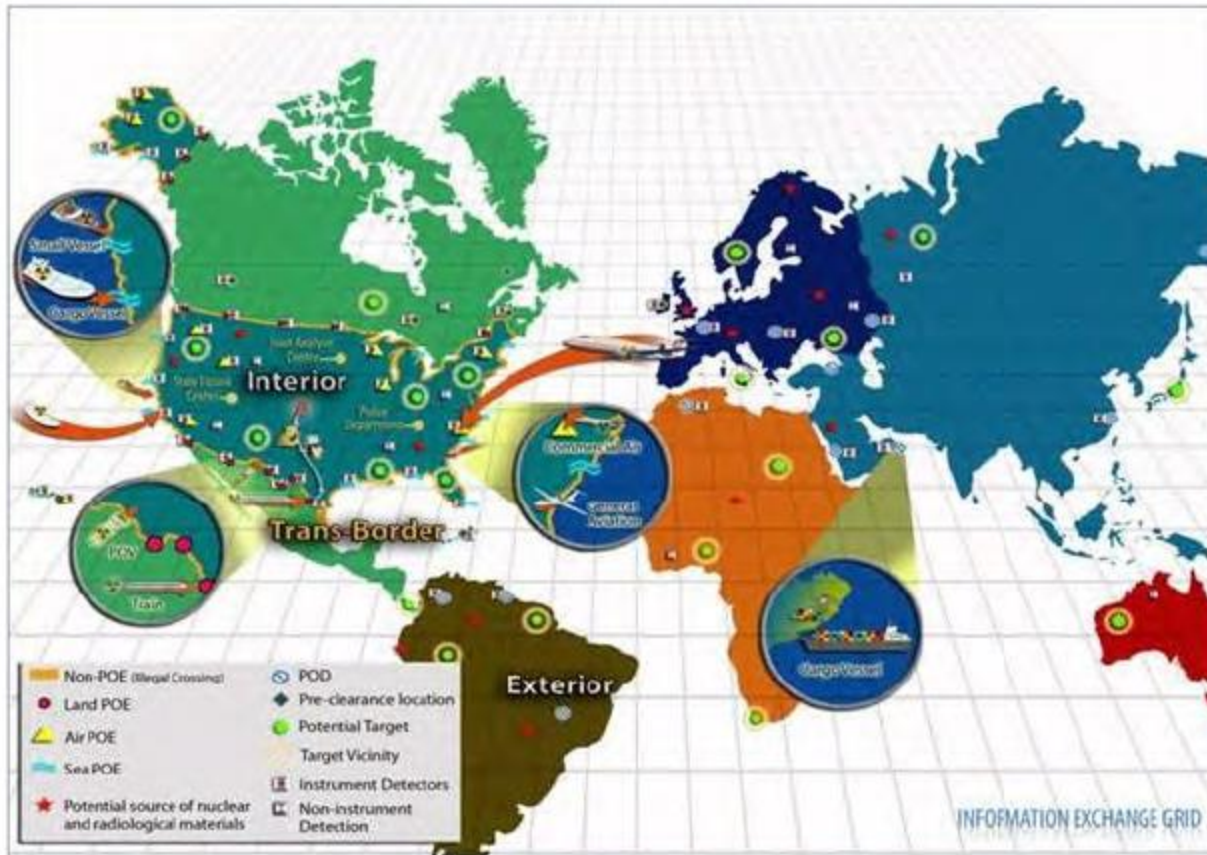
DNDO Mission and Objectives

The DNDO is a jointly-staffed, national office established in 2005 (NSPD 43/HSPD 14) for the purpose of improving 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 operation protocols to ensure that detection leads to effective response*

- *Conduct a transformational research and development program*

- *Provide stewardship of USG Technical Nuclear Forensics Center planning, integration and development*
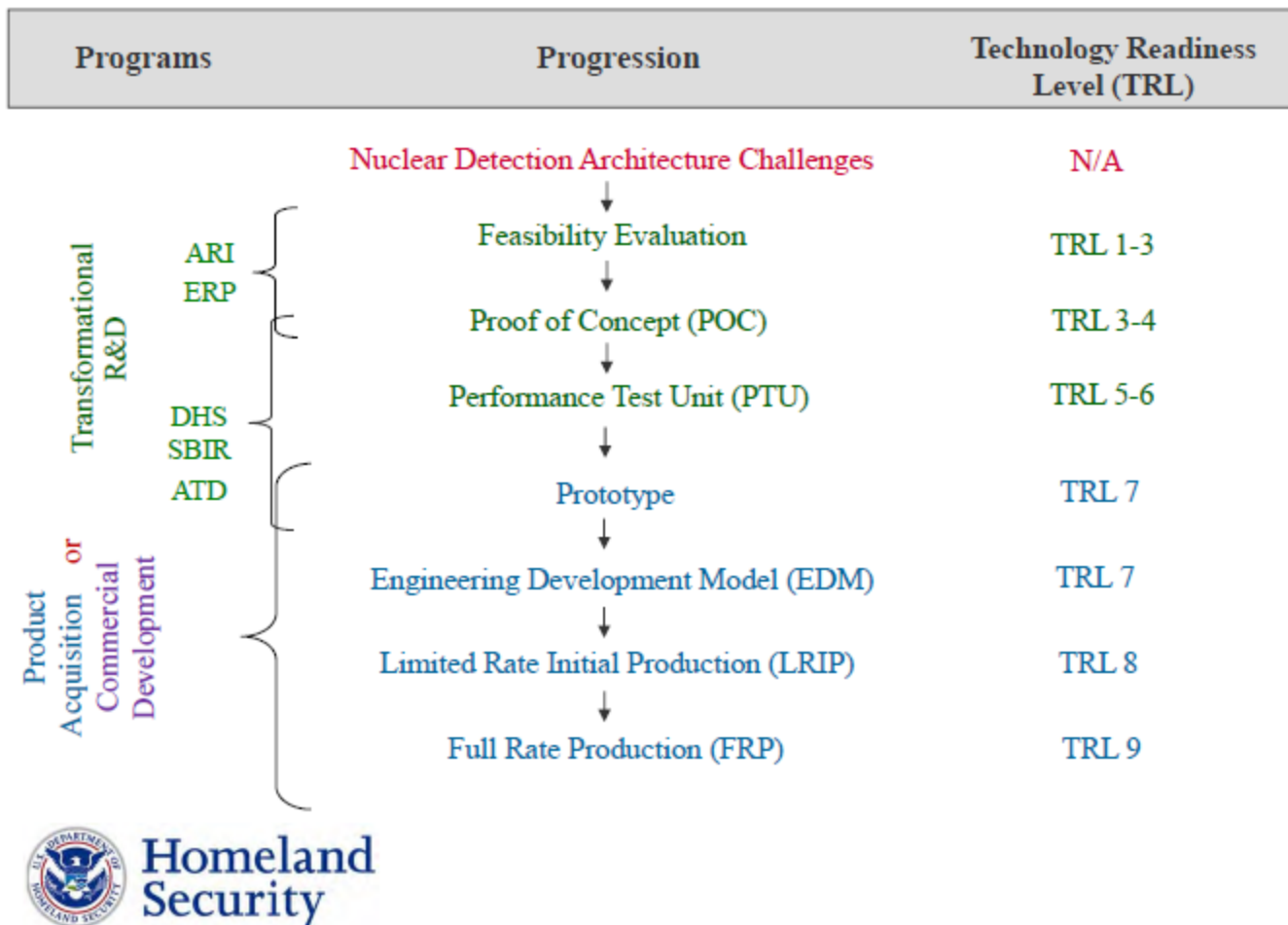
Homeland Security

Nuclear Detection Architecture Structure

R&D Program Progression
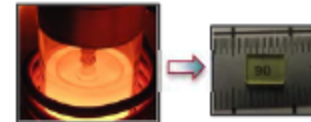
Programs	Progression	Technology Readiness Level (TRL)
	Nuclear Detection Architecture Challenges	N/A
ARI ERP	Feasibility Evaluation	TRL 1-3
	Proof of Concept (POC)	TRL 3-4
DHS SBIR ATD	Performance Test Unit (PTU)	TRL 5-6
	Prototype	TRL 7
	Engineering Development Model (EDM)	TRL 7
	Limited Rate Initial Production (LRIP)	TRL 8
	Full Rate Production (FRP)	TRL 9

Transformational R&D

Product Acquisition or Commercial Development
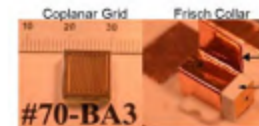
Homeland Security

Research Portfolios Highlights

Materials Research and Supporting Technology

- Advanced Scintillators: High energy resolution (2%), high stopping power, large size (2000 cm³), and low cost ($10/cm³)

- Advanced Semiconductor: High stopping power, high energy resolution (<1%) and/or production costs less than CZT

- Photomultiplier tube replacement technology

- Success: Commercialization of SrI2 and CLYC materials and detectors

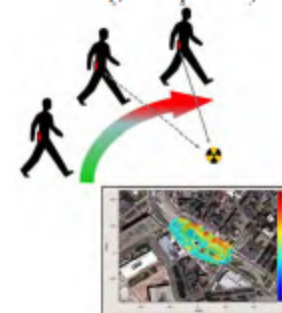## Neutron Detection Including He-3 Alternatives

- Near & long term alternatives to He-3 neutron detectors for portal, backpack, handheld, and personal applications

- Novel approaches for fast neutron detection and active interrogation

- Success: Two different portal systems sold commercially

Radiation Detection Techniques

- Novel approaches to Compton and coded aperture imaging for enhanced threat detection and localization

- Sensor fusion and machine vision to enhance gamma ray imaging and to enable target tracking

- Approaches to dual neutron / gamma imaging

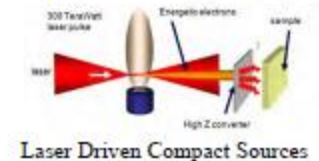- Success: Transfer of imaging technology to ARES and RAIN ATDs

First Czochralski growth of BaBrCl:Eu²⁺

#70-BA3

Different electronics for TlBr

Testing Backpack Systems

Smart Phone Integration

Homeland Security

Research Portfolios Highlights (cont.)

Shielded Threat Detection Techniques

- Enabling Components: Mono-chromatic photon sources for low dose scanning, compact accelerators for mobile systems, fast detectors
- Challenging scenarios: human-occupied vehicles, human portable systems
- Unique Signatures: gravity gradiometry, multiplicity
- Success: X-ray generators and automated threat recognition software being used in commercial radiography systems

Laser Driven Compact Sources

Algorithms and Modeling

- Advanced spectrum processing and nuclide identification algorithms
- Machine learning applied to alarm adjudication (CBP collaboration)
- Systematic mapping and modeling of background
- Improvements to modeling tools (MCNP-X) and front end interface (SWORD)
- Success: Computer based personnel training software

Nuclear Street View

Nuclear Forensics

- Signatures: Improving the information content of measurable data
- Methodologies: Improving the techniques to determine material processing histo age, geographic origins, transport pathways, and intended use
- Success: Forensics Signature Knowledge Capture Toolkit

Advanced Simulation and Visualization Training Software

Homeland Security

Knowledge Capture Toolkit

DHS SBIR Solicitation Information

- Through FY2014, two solicitations were released each year, generally in the early December and April timeframes

  - Pre-solicitation posted for 15 days prior to proposal submission open date

  - Posted on FedBizOpps and linked on the SBIR Program website

  - Direct contact permitted with topic authors during pre-solicitation period

    - Questions during the proposal submission phase must be sent to stsbir.proposals@hq.dhs.gov

  - 30 day proposal submission period

    - Proposals submitted at https://sbir2.st.dhs.gov

  - Selection notifications issued to all applicants within 90 days of solicitation close

Unsolicited proposals are not accepted

Key Web Sites and DHS SBIR Points of Contact

Key Web Sites

- www.dhs.gov
- http://www.dhs.gov/how-do-i/do-business-dhs

DNDO

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Program email and website:
stsbir.program@hq.dhs.gov
https://sbir2.st.dhs.gov

SBIR Help Desk:
dhssbir@reisystems.com, 703-480-7676

To report SBIR fraud, waste and abuse:
- Email: dhsoighotline@oig.dhs.gov
- Anonymous Hotline: 1-800-323-8603
- Fax: 202-254-4292
- Mail: DHS Office of Inspector General/Mail Stop 0305,
  Attn: Office of Integrity & Quality Oversight- Hotline
  245 Murray Drive SW
  Washington, DC 20528-0305

Successful SBIR Phase I Proposal to DHS

DO…

- ✓ Read the solicitations and follow **all** the instructions
- ✓ Ensure your proposal aligns with and responds to the scope of the topic description
- ✓ Obtain DUNs, CAGE, and SBA registration numbers prior to proposal submission
- ✓ Register in SAM, SBIR.gov, and the DHS S&T SBIR portal EARLY
- ✓ Follow the procedures for requesting clarifications/questions on research topics
- ✓ Clearly articulate the proposed innovation
- ✓ Provide a detailed and well-organized work plan
- ✓ Provide qualifications for key personnel, including the PI
- ✓ Pay attention to the requirements of the Commercialization Strategy

DO NOT…

- ✗ Submit proposals via email
- ✗ Submit duplicate proposals
- ✗ Ask the Program Office or topic author for guidance regarding whether or not your company should submit a proposal
- ✗ Request an extension
- ✗ Wait until the last minute to submit your proposal

MOST IMPORTANT DO's!!!

- ❖ Register early!
- ❖ READ, READ, READ the solicitation and topic description
- ❖ READ, READ, and RE-READ your proposal prior to submission

U.S. Department of Homeland Security

Small Business Innovation Research (SBIR) Programs

Science and Technology (S&T) Directorate
Domestic Nuclear Detection Office (DNDO)

2015 SBIR Road Tour

March 24th, 2015

Mitaire Ojaruega, Ph.D.
DHS SBIR Program
*Domestic Nuclear Detection Office*
U.S . Department of Homeland Security

Homeland
Security

Homeland Security Missions

- Preventing Terrorism and Enhance Security

- Secure and Manage Our Borders

- Enforce and Administer Our Immigration Laws

- Safeguard and Secure Cyberspace

- Strengthen National Preparedness and Resilience

DHS Percent of Total Budget Authority by Organization FY2015 President's Budget
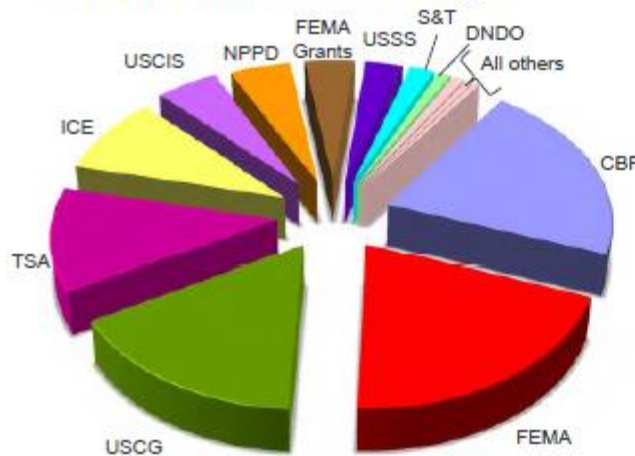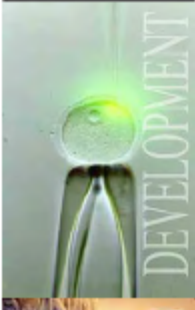

~ $60.919B in FY2015 across all organizations

Homeland Security

| Percent of Total Budget Authority by Organization, FY15 President's Budget	
Customs and Border Protection (CBP)	21%
Federal Emergency Management Agency (FEMA)	20%
U.S. Coast Guard (USCG)	16%
Transportation Security Administration (TSA)	12%
Immigration and Customs Enforcement (ICE)	9%
U.S. Citizenship and Immigration Services (USCIS)	5%
National Protection and Programs Directorate (NPPD)	5%
FEMA Grants	4%
U.S. Secret Service (USSS)	3%
Science and Technology Directorate (S&T)	2%
Department Operations (Dept. Ops)	1%
Federal Law Enforcement Training Center (FLETC); Office of Inspector General (OIG); and Office of Health Affairs (OHA)	1%
Analysis and Operations (A&O)	0.5%
Domestic Nuclear Detection Office (DNDO)	0.5%

DHS SBIR – A Three-Phase Program

	Phase I: Scientific and Technical Feasibility/Study	• Funded with SBIR funds, 33% may be outsourced • Not to exceed 6 months in duration • Up to an additional $5,000 per year may be proposed for Technical Assistance • $100,000 for S&T Directorate's SBIR • $150,000 for DNDO's SBIR
	Phase II: Full Research/R&D Prototype Demonstration	• Funded with SBIR funds, 50% may be outsourced • Generally 24 months in duration • Up to an additional $5,000 per year may be proposed for Technical Assistance • $750K for S&T Directorate's SBIR • $1,000,000 for DNDO's SBIR • Potential for additional $250,000 for Phase IIB • Potential for additional funds for CRPP award
	Phase III: Commercialization *(non SBIR funds)*	• Funded with private or non-SBIR government sources • No dollar or time limits • Size standards do not apply • For work that derives from, furthers the Phase I/Phase II effort, or brings to conclusion • Can be sole-sourced; competition determined in Phase I

U.S. DEPARTMENT OF HOMELAND SECURITY
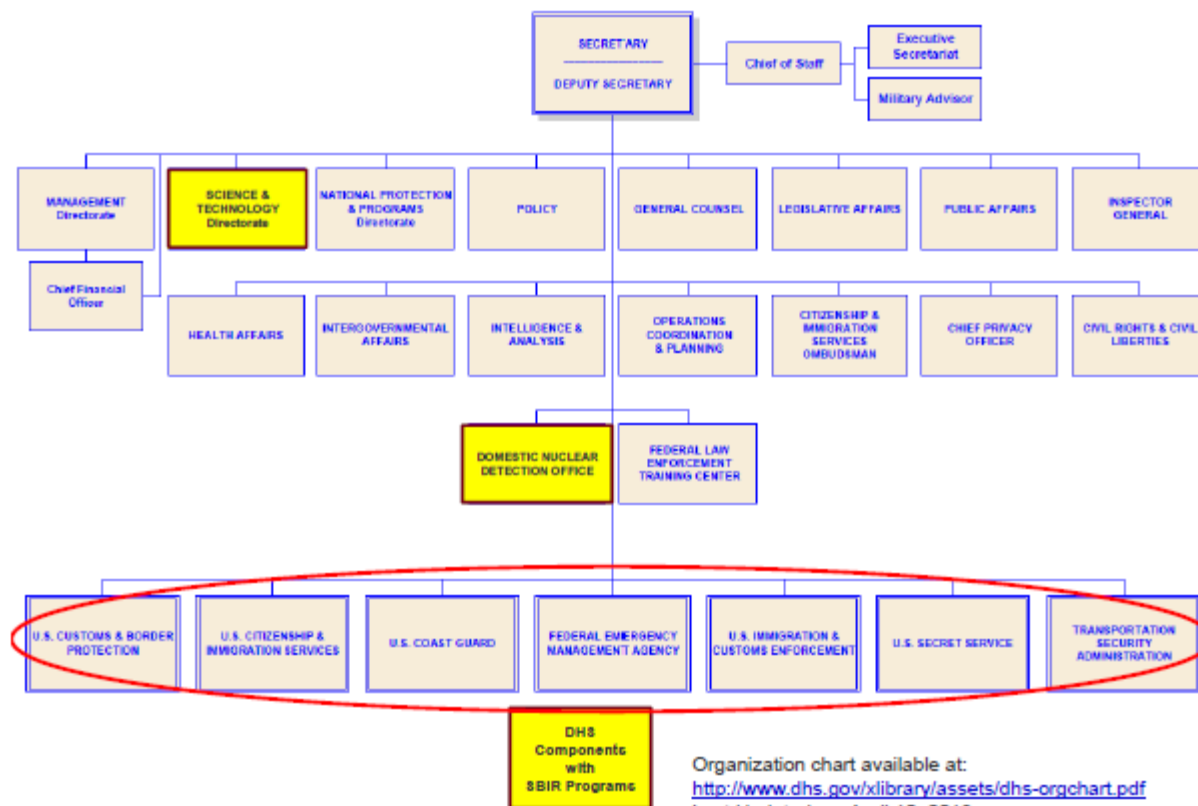
Organization chart available at:
http://www.dhs.gov/xlibrary/assets/dhs-orgchart.pdf
Last Updated on: April 10, 2013

DHS S&T Directorate Mission

Strengthen America's security and resilience by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise (HSE).

DHS S&T Directorate's First Responders Group

- **Support to the Homeland Security Enterprise and   First Responders Group (FRG)**

  - Engages first responders to better understand their needs

  - Develops innovative solutions to address their most pressing challenges, from small- to large-scale emergencies

  - Helps practitioners identify requirements for transition to use

Strengthen responders' ability to protect the homeland

HSARPA Technical Divisions

- **Borders and Maritime Security Division (BMD)** - Prevent contraband, criminals and terrorists from entering the United States while permitting the lawful flow of commerce and visitors

- **Chemical/Biological Defense Division (CBD)** – Detect and protect against, respond to, and recover from potential biological or chemical events

- **Cyber Security Division (CSD)** - Create a safe, secure and resilient cyber environment

- **Explosives Division (EXD)** - Detect, prevent and mitigate explosives attacks against people and infrastructure

- **Resilient Systems Division (RSD)** - Identify and analyze threats, enhance societal resilience, and integrate human capabilities in technology development. Strengthen situational awareness, emergency response capabilities, and critical infrastructure protection

Homeland Security

DNDO Mission and Objectives

The DNDO is a jointly-staffed, national office established in 2005 (NSPD 43/HSPD 14) for the purpose of improving 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 operation protocols to ensure that detection leads to effective response*

- *Conduct a transformational research and development program*

- *Provide stewardship of USG Technical Nuclear Forensics Center planning, integration and development*

Homeland Security

Transformational and Applied Research

Develop break-through technologies that will have a dramatic impact on capabilities to prevent nuclear and radiological terrorism through an aggressive and expedited R&D program.

What we do ...

- *Addresses* gaps in Global Nuclear Detection Architecture

- *Improves* performance, cost, and operational burden of nuclear detection and forensics technologies

- *Transitions* successful technologies to system development, acquisition, and deployment or commercialization

How we do it ...

- *Includes* industry, national laboratories and academia; encourage teaming

- *Coordinates* with intra/interagency R&D organizations (e.g., S&T, DOE, DOD, DNI)

- *Follows* a sensible process that provides the transparency and agility needed for expedited R&D

Homeland Security

Transformational R&D: Program Elements

- Exploratory Research (ER)
  - Driven by gaps and weaknesses in the Global Nuclear Detection Architecture (GNDA) and technical nuclear forensics
  - Investigate promising concepts to show feasibility through laboratory Proof-of-Concept (PoC) demonstrations
- Academic Research Initiative (ARI)
  - Conduct basic and exploratory research to stimulate innovation in many sectors while augmenting the ER
  - Create next generation of scientists and engineers
- Advanced Technology Demonstration (ATD)
  - Further develop technology concepts previously demonstrated under the ER or equivalent
  - Characterize Performance Test Units (PTU) in a simulated operational environment to assess technology transition potential
- Small Business Innovative Research (SBIR)
  - Strengthen the role of innovative small business concerns with federally-funded research and development
  - Augments the ATD and ER with 2-4 new topics a year
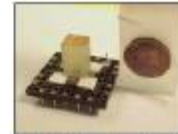
Homeland Security

TlBr Semiconductor

Cs_2LiYCl_6 (CLYC) Scintillator

SORDS Detector and Truck
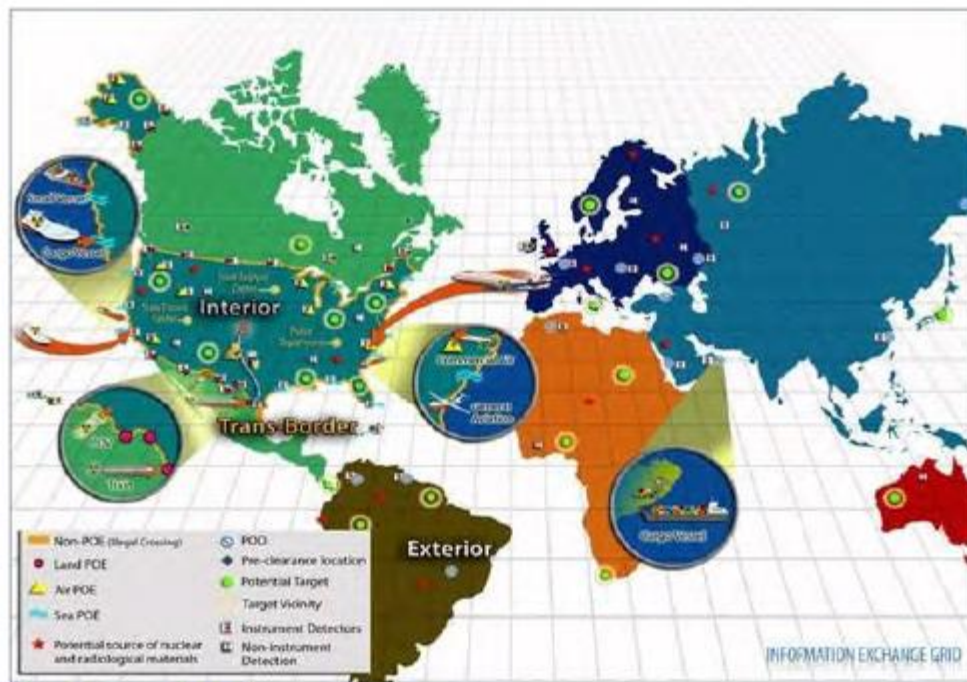

Tri-energy, intensity modulated x-ray generator

Nuclear Detection Architecture Structure

R&D Program Progression

Programs	Progression	Technology Readiness Level (TRL)
	Nuclear Detection Architecture Challenges	N/A
ARI ERP	Feasibility Evaluation	TRL 1-3
	Proof of Concept (POC)	TRL 3-4
DHS SBIR ATD	Performance Test Unit (PTU)	TRL 5-6
	Prototype	TRL 7
	Engineering Development Model (EDM)	TRL 7
	Limited Rate Initial Production (LRIP)	TRL 8
	Full Rate Production (FRP)	TRL 9

Transformational R&D

Product Acquisition or Commercial Development

Homeland Security

Research Portfolios Highlights

- **Materials Research and Supporting Technology**

  - Advanced Scintillators: High energy resolution (2%), high stopping power, large size (2000 cm³), and low cost ($10/cm³)
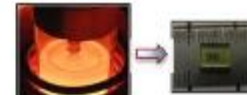
  - Advanced Semiconductor: High stopping power, high energy resolution (<1%) and/or production costs less than CZT

  - Photomultiplier tube replacement technology

  - Success: Commercialization of SrI2 and CLYC materials and detectors

- **Neutron Detection Including He-3 Alternatives**

  - Near & long term alternatives to He-3 neutron detectors for portal, backpack, handheld, and personal applications

  - Novel approaches for fast neutron detection and active interrogation

  - Success: Two different portal systems sold commercially

- **Radiation Detection Techniques**

  - Novel approaches to Compton and coded aperture imaging for enhanced threat detection and localization

  - Sensor fusion and machine vision to enhance gamma ray imaging and to enable target tracking

  - Approaches to dual neutron / gamma imaging
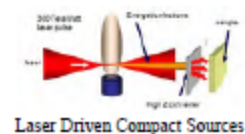
  - Success: Transfer of imaging technology to ARES and RAIN ATDs

First Czochralski growth of BaBrCl:Eu²⁺

#70-BA3

Different electronics for TlBr

Testing Backpack Systems

Smart Phone Integration

Homeland
Security

Research Portfolios Highlights (cont.)

Shielded Threat Detection Techniques

- Enabling Components: Mono-chromatic photon sources for low dose scanning, compact accelerators for mobile systems, fast detectors

- Challenging scenarios: human-occupied vehicles, human portable systems

- Unique Signatures: gravity gradiometry, multiplicity

- Success: X-ray generators and automated threat recognition software being used in commercial radiography systems

Algorithms and Modeling

- Advanced spectrum processing and nuclide identification algorithms

- Machine learning applied to alarm adjudication (CBP collaboration)

- Systematic mapping and modeling of background

- Improvements to modeling tools (MCNP-X) and front end interface (SWORD)

- Success: Computer based personnel training software

Nuclear Forensics

- Signatures: Improving the information content of measurable data

- Methodologies: Improving the techniques to determine material processing histo[ry], age, geographic origins, transport pathways, and intended use

- Success: Forensics Signature Knowledge Capture Toolkit

Laser Driven Compact Sources

Nuclear Street View

Advanced Simulation and Visualization Training Software

Knowledge Capture Toolkit

Homeland Security

15

DHS SBIR Solicitation Information

- Through FY2014, two solicitations were released each year, generally in the early December and April timeframes
  - ➢ Pre-solicitation posted for 15 days prior to proposal submission open date
  - ➢ Posted on FedBizOpps and linked on the SBIR Program website
  - ➢ Direct contact permitted with topic authors during pre-solicitation period
    - ❖ Questions during the proposal submission phase must be sent to stsbir.proposals@hq.dhs.gov
  - ➢ 30 day proposal submission period
    - ❖ Proposals submitted at https://sbir2.st.dhs.gov
  - ➢ Selection notifications issued to all applicants within 90 days of solicitation close

**Unsolicited proposals are not accepted**

DHS SBIR: Treated as a Federal Procurement

- Subject to the Federal Acquisition Regulations (FARs)

- Topics are determined by the government

- Announcements and solicitations published in FedBizOpps

- Federal employee review panels; source selection authority

- Firm-fixed price contracts issued for Phase I

- Cost plus fixed fee contracts issued for Phase II

  - Firm-fixed price contracts possible

  - Cost plus contracts subject to a DCAA audit

DHS issues contracts, not grants, for its SBIR awards

DHS SBIR Historical Conversion Rates, FY04 –FY14

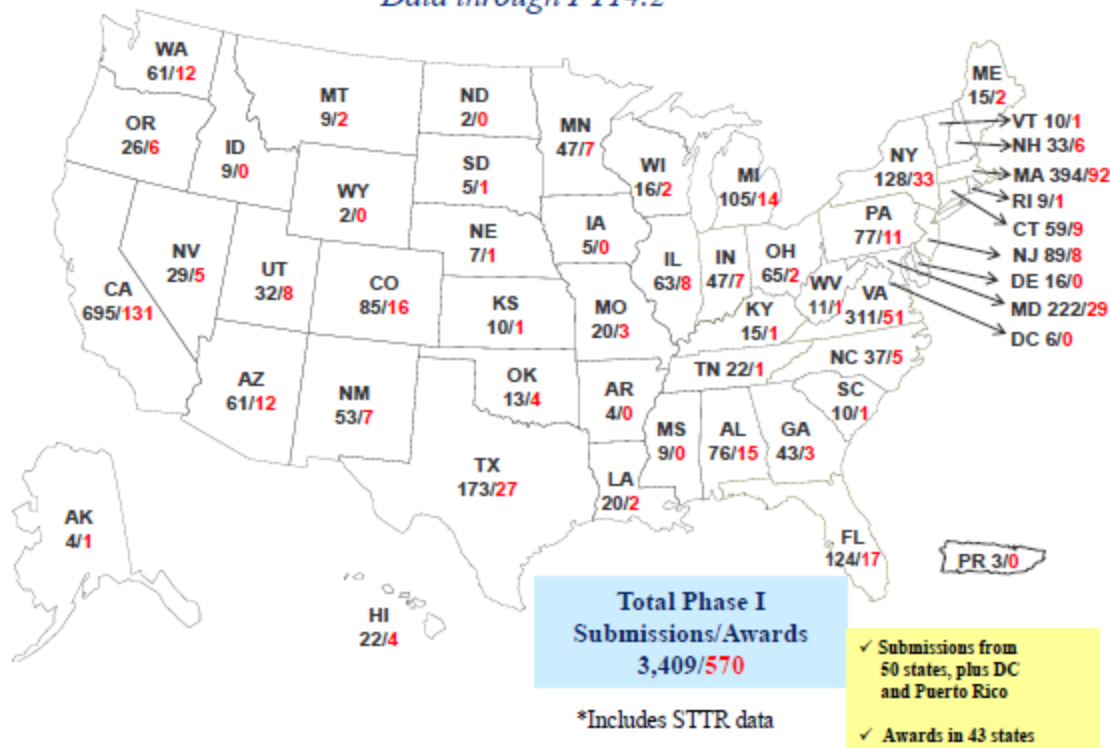- ~17% of the 3,409 Phase I submissions received awards
- Then, ~38% of Phase I awards received a Phase II award
- And ~35% of Phase II projects received Phase III funding
  - ~ $133M
    (includes DHS internal R&D funds; funding from other government agencies; product sales, licenses and private investments)
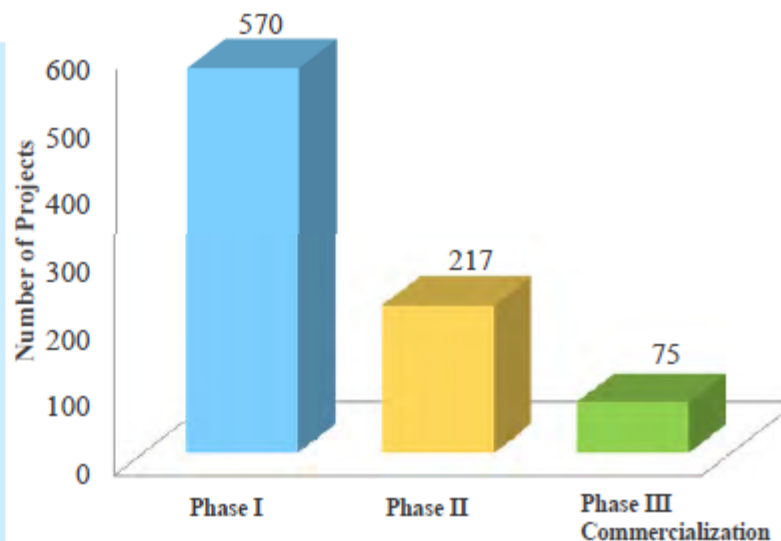
DHS SBIR is a highly competitive process; award recipients are moving towards commercialization.

DHS SBIR Phase I:
A National Perspective
Data through FY14.2*

WA 61/12

MT 9/2

OR 26/6

ID 9/0

ND 2/0

MN 47/7

ME 15/2

VT 10/1

NH 33/6

MA 394/92

RI 9/1

CT 59/9

NJ 89/8

DE 16/0

MD 222/29

DC 6/0

WY 2/0

SD 5/1

WI 16/2

MI 105/14

NY 128/33

PA 77/11

NV 29/5

UT 32/8

IA 5/0

NE 7/1

IL 63/8

IN 47/7

OH 65/2

WV 11/1

VA 311/51

CA 695/131

CO 85/16

KS 10/1

MO 20/3

KY 15/1

NC 37/5

AZ 61/12

NM 53/7

OK 13/4

AR 4/0

TN 22/1

SC 10/1

TX 173/27

LA 20/2

MS 9/0

AL 76/15

GA 43/3

AK 4/1

FL 124/17

PR 3/0

HI 22/4

Total Phase I Submissions/Awards 3,409/570

*Includes STTR data

✓ Submissions from 50 states, plus DC and Puerto Rico

✓ Awards in 43 states

Evidence that DHS SBIR-funded Technology has Helped Enable U.S. Small Businesses to be Successful and Profitable

- 384 small businesses in 43 states have received DHS SBIR funding

- 85 patents filed
  - 31 patents issued
  - 28 patents pending

- 40+ commercial products in the market *

- 30+ mergers and acquisitions

data from a 2013 survey (includes standalone products, active licenses, products with DHS technology incorporated)

Transitioning to Commercialization

- What kind of help can you expect from the DHS SBIR Program?
    - ✓ Commercialization Assistance Program funded by the DHS SBIR Program
        - ✓ commercialization workshop
        - ✓ targeted technology assessment
        - ✓ mentoring
    - ✓ Possible CRPP award; up to $300,000
    - ✓ DHS/NSF I-Corps ($50,000)
    - ✓ DHS "Shark Tank" pilot
    - ✓ Potential Phase III award using a mixture of government (non- SBIR) and private funds
    - ✓ Auto Harvest Foundation
    - ✓ Discretionary technical assistance ($5,000/year)

Homeland
Security
Science and Technology

Key Web Sites and DHS SBIR Points of Contact

Key Web Sites
➢ www.dhs.gov
➢ http://www.dhs.gov/how-do-i/do-business-dhs

DNDO

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202-254-7610

Mitaire Ojaruega
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Mitaire.ojaruega@hq.dhs.gov
202-254-7567

Program email:
dndosbir@hq.dhs.gov

S&T Directorate

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202-254-6768

Francis "Frank" Barros
SBIR Program Analyst
francis.barros@hq.dhs.gov
202-254-6966

Program email and website:
stsbir.program@hq.dhs.gov
https://sbir2.st.dhs.gov

SBIR Help Desk:
dhssbir@reisystems.com, 703-480-7676

To report SBIR fraud, waste and abuse:
- Email: dhsoighotline@oig.dhs.gov
- Anonymous Hotline: 1-800-323-8603
- Fax: 202-254-4292
- Mail: DHS Office of Inspector General/Mail Stop 0305,
  Attn: Office of Integrity & Quality Oversight- Hotline
  245 Murray Drive SW
  Washington, DC 20528-0305

Successful SBIR Phase I Proposal to DHS

DO…

- ✓ Read the solicitations and follow all the instructions
- ✓ Ensure your proposal aligns with and responds to the scope of the topic description
- ✓ Obtain DUNs, CAGE, and SBA registration numbers prior to proposal submission
- ✓ Register in SAM, SBIR.gov, and the DHS S&T SBIR portal EARLY
- ✓ Follow the procedures for requesting clarifications/questions on research topics
- ✓ Clearly articulate the proposed innovation
- ✓ Provide a detailed and well-organized work plan
- ✓ Provide qualifications for key personnel, including the PI
- ✓ Pay attention to the requirements of the Commercialization Strategy

DO NOT…

- X Submit proposals via email
- X Submit duplicate proposals
- X Ask the Program Office or topic author for guidance regarding whether or not your company should submit a proposal
- X Request an extension
- X Wait until the last minute to submit your proposal

MOST IMPORTANT DO's!!!

- ❖ Register early!
- ❖ READ, READ, READ the solicitation and topic description
- ❖ READ, READ, and RE-READ your proposal prior to submission