



**Homeland
Security**

Science and Technology

Explosives Division



Explosives Detection in Support of Air Cargo Security

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Science & Technology Directorate: Explosives Detection in Support of Air Cargo Security

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DHS S&T Mission

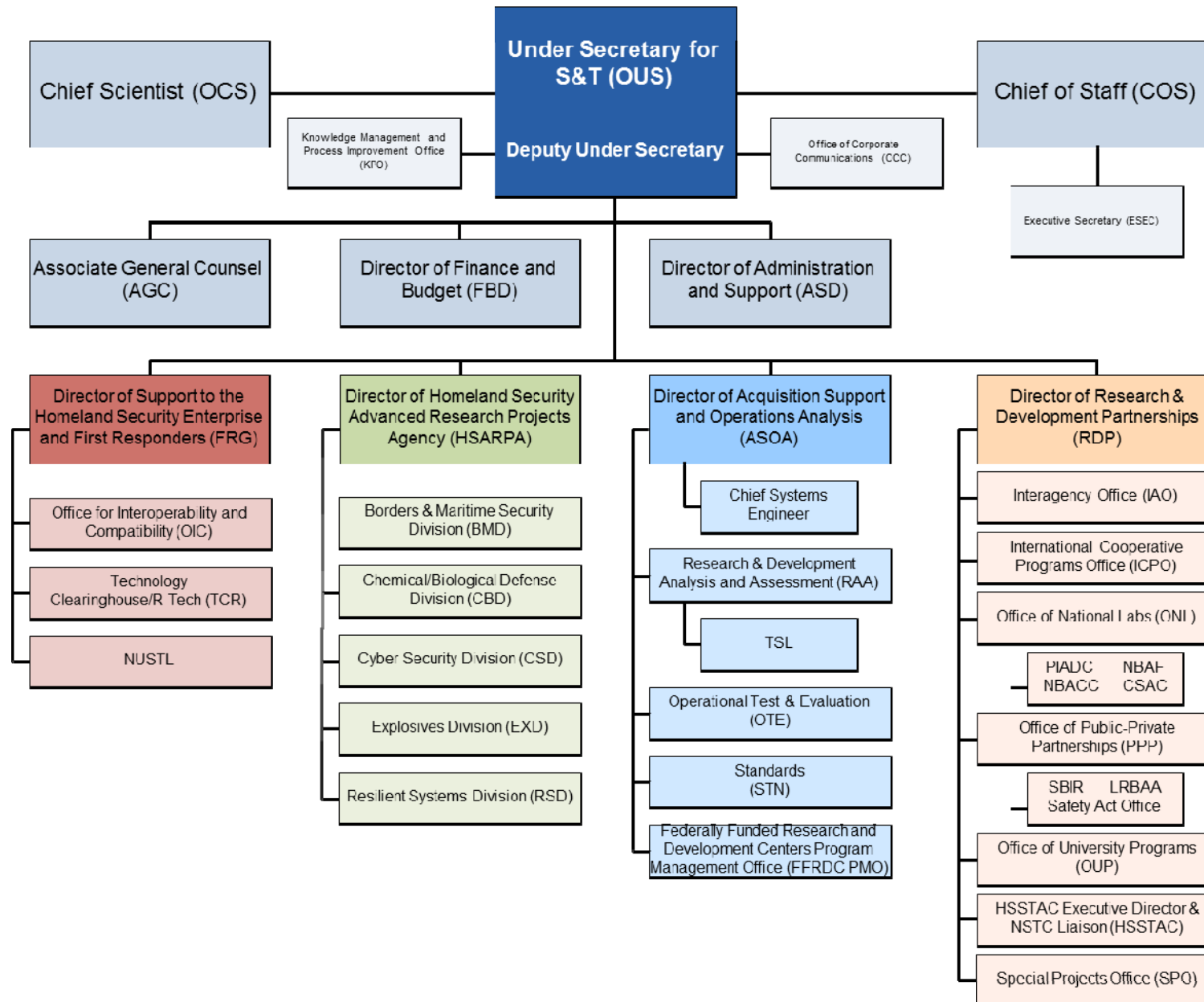
Strengthen America's security and resilience through knowledge





S&T Structure

Science and Technology Directorate



Explosives Division Mission

Mission: The Science and Technology Directorate Explosives Division promotes the development of effective techniques to protect our citizens and our country's infrastructure against the devastating effects of explosives by seeking innovative approaches in detection, and in countermeasures. It provides the concepts, science, technologies and systems that increase protection from explosives and promotes the development of field equipment, technologies, and procedures to interdict person-borne bombs, and car and truck bombs.

Customers:

- Transportation Security Administration
- Customs and Border Protection
- U.S. Secret Service
- National Protection and Program Directorate
- U.S. Coast Guard
- Federal, state and local first responders

Explosives Portfolio Structure

- **Aviation Security:** Checked baggage, check point, air cargo and canine operations.
- **Facilities Protection:** Facility checkpoints and perimeters.
- **Intermodal Security:** Protection of commuters and infrastructure in subway, maritime (ferries), and surface (buses and heavy rail) transportation.
- **Improvised Explosives:** Understanding the homemade explosive threat to improve detection technology and develop detection requirements.



Aviation Security R&D Plan



Aviation Security Technology Research and Development Strategy

March 2011



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- Joint TSA/S&T R&D Strategy developed in FY11
- Aviation security system operates in a dynamic risk environment - sudden change/terrorist adaptation
- S&T and TSA relationship
 - Promotes our ability to respond via coordinated investment in research, development, test, and evaluation
- TSA and S&T have developed a joint R&D strategy with goals for technology investments
 - Goals will guide the identification, evaluation, and management of R&D initiatives



Air Cargo Challenge

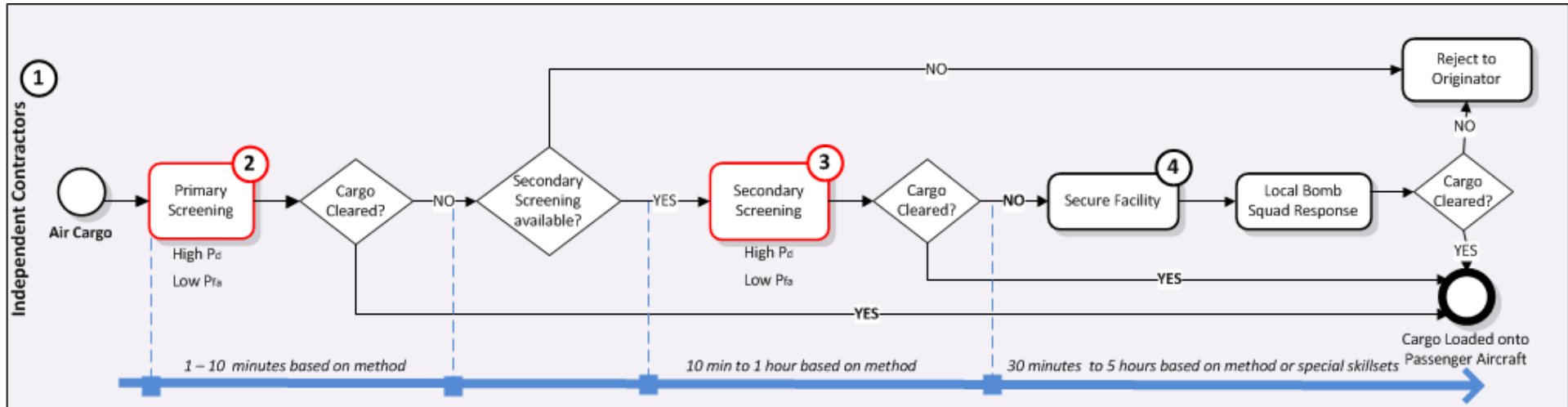


- Widely varying commodities
- Any size
- Warehouse cargo environment
- Independent screeners
- Chain of custody

In the US, approximately 12 million pounds of cargo are transported daily on passenger aircraft, and 95 percent of domestic passenger flights carry air cargo.



Op Context Chart (As Is)



1 Independent Contractors

- As of February 22, 2012 there were 1,100 Certified Cargo Screening Facilities (CCSF) sites not including airlines (1,200):
 - CCSP Indirect Air Carriers (IAC) sites = 520
 - CCSP Independent Cargo Screening Facility (ICSF) sites = 80
 - CCSP Shippers sites = 500

2 Primary Screening

- Facility conducts a 100% physical or non-intrusive examination employing: X-Ray, ETD, EMD, EDS, K-9 or other TSA approved method
- Palletized cargo which has not been screened must be broken down to individual pieces
- Alternative security measures are used for cargo which cannot be screened by TSA approved methods (e.g. medical, human remains, etc)
- Commodities/Containers can limit secondary screening options. If system generates an alarm for special cargo (e.g. human remains, 50 gallon drums, perishables, etc) and it cannot be screened via secondary screening, the cargo must be returned to the originator

3 Secondary Screening

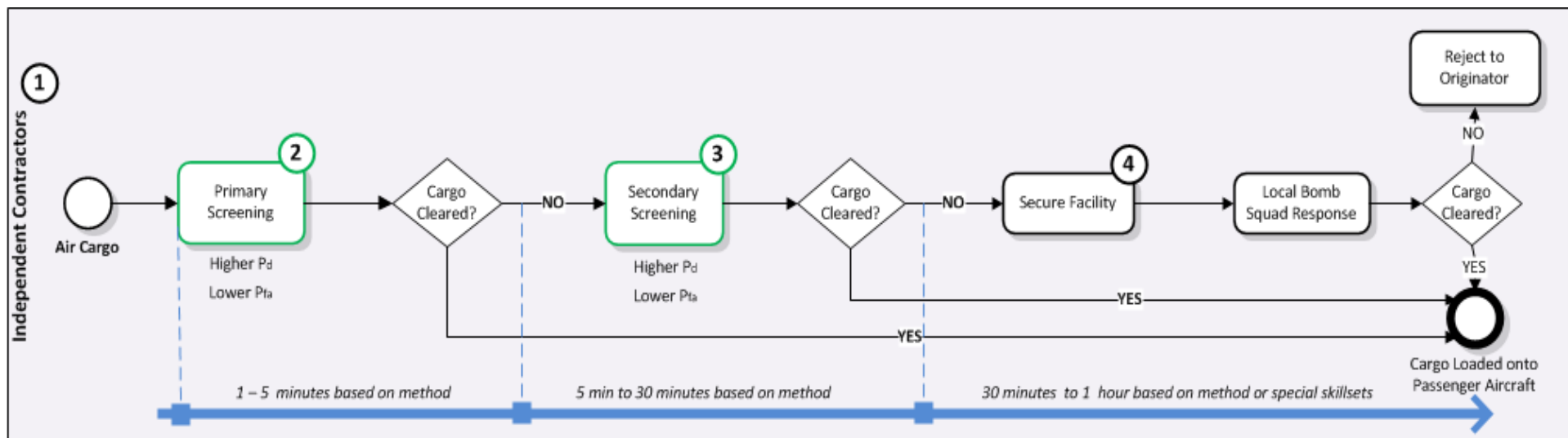
- Facility conducts alarm resolution with an alternative TSA approved method

4 Secure Facility

- In the event the cargo cannot be cleared thru primary and secondary screening, the facility must secure operations until the Local Bomb Squad responds and addresses the situation
- Cost/Impact can be high



Op Context Chart (To Be)



① Independent Contractors

- As of February 22, 2012 there were 1,100 Certified Cargo Screening Facilities (CCSF) sites not including airlines (1,200):
 - CCSP Indirect Air Carriers (IAC) sites = 520
 - CCSP Independent Cargo Screening Facility (ICSF) sites = 80
 - CCSP Shippers sites = 500

② Primary Screening

- Facility conducts a 100% physical or non-intrusive examination employing: X-Ray, ETD, EMD, EDS, K-9 or other TSA approved method
- Palletized cargo can be screened without breaking into pieces, providing greater throughput
- ETD improvements provide greater sensitivity and selectivity

③ Secondary Screening

- Facility conducts alarm resolution with an alternative TSA approved method
- Special technology available to screen special cargo (e.g. human remains, ultrasonic drum scanning, etc), avoiding rejecting cargo to Originator

④ Secure Facility

- Cost/Impact can be high

Capability Impact:

- Improved explosives detection performance (higher Pd, lower Pfa, greater HME selectivity)
- Additional approved screening methods eliminating the need for alternative screening measures for sealed drums, medical supplies, human remains, live animals and cargo containing hazardous materials.

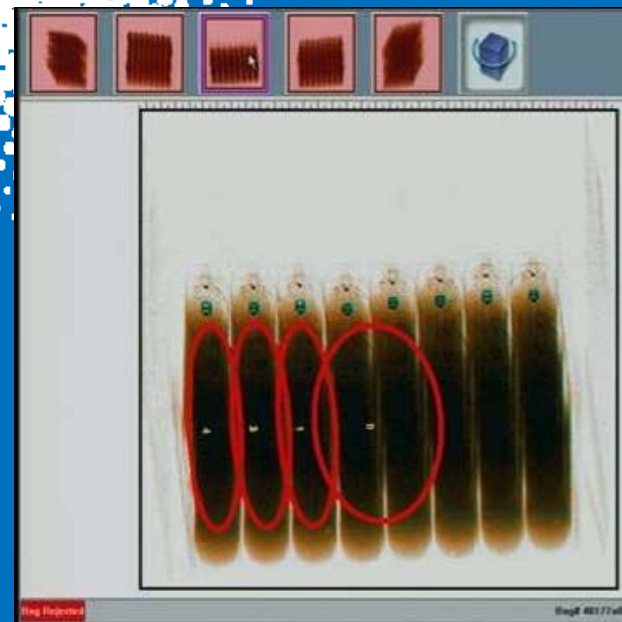
Air Cargo Program

Program Goals

Identify, develop, test and enhance ability of screening systems and operators to detect explosives and IED components within cargo parcels and pallets

Program Objectives

- Conduct laboratory and field assessments of COTS equipment to assist TSA in developing Qualified Technology List
- Develop and test prototype palletized cargo screening systems
- Transition mass spectrometer system
- Develop screener decision support tools
- Develop automated algorithms for break bulk cargo x-ray screening systems



Advanced Technology X-ray image of cargo shows possible threat areas circled by automatic detection





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