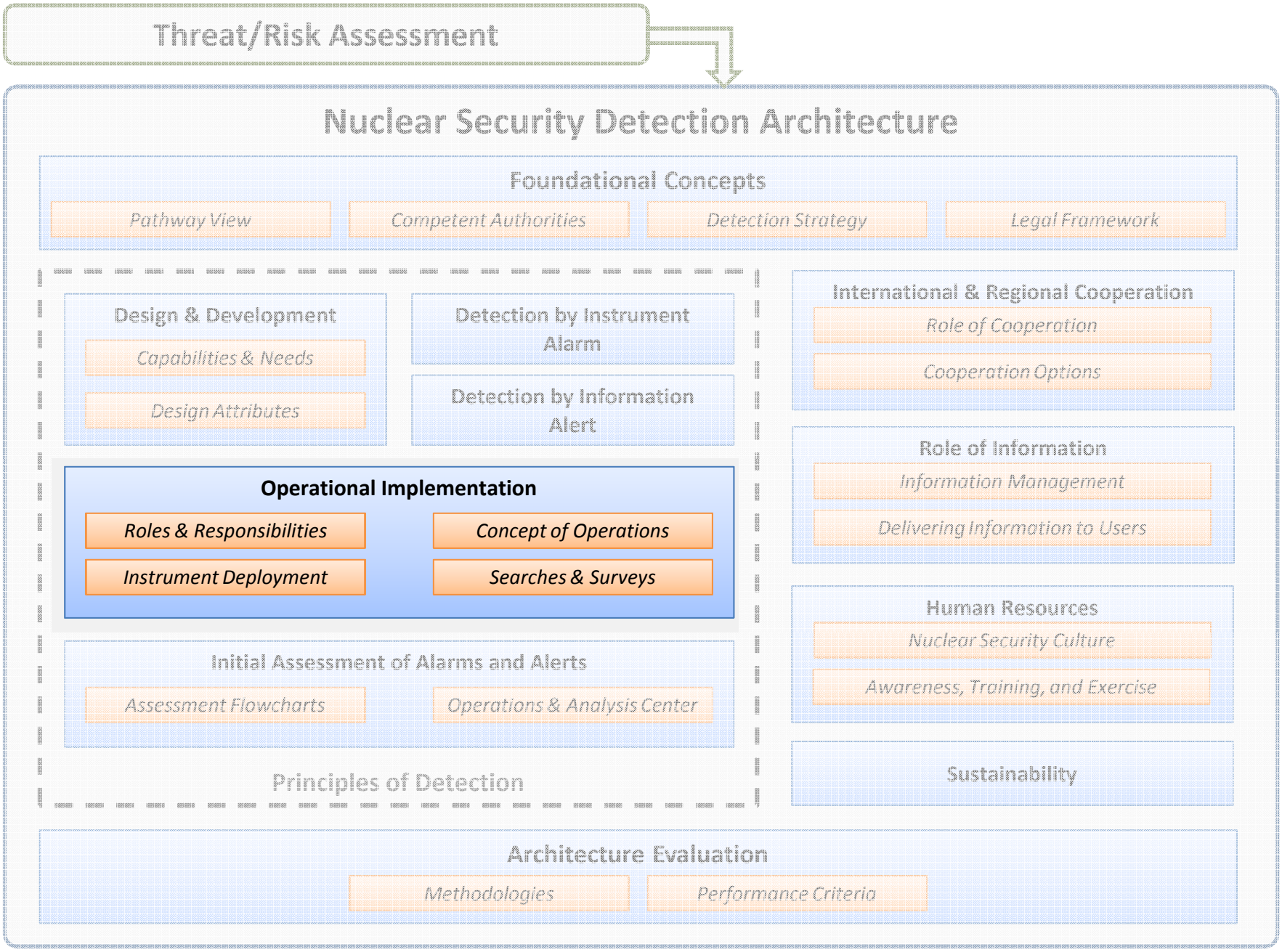
SAND2012-8137P

Operational Implementation of a Nuclear Security Detection Architecture

Nuclear Security Detection Architecture

Module H


Threat/Risk Assessment
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Module Objectives

This module will introduce concepts relevant to operational implementation of an architecture by competent authorities, including:

- Delegation of roles and responsibilities
- Instrument deployment plans
- Concept of Operations
- Radiation survey and search

The information presented in this module is relevant to checklist questions:
16, 17, 33, 49, 50, 53, 55, 56, 61, 62, 63, 64, 65, 73

Roles and Responsibilities

- At an operational level, and appropriate to their designated mission space, competent authorities should delegate roles and responsibilities for:
  - **Management** of detection-related functions
  - **Operations** related to detection activities
  - **Maintenance** of detection assets
- Where appropriate, these roles and responsibilities may be integrated within existing organizational structures

Management

- Management roles should be defined for all detection-related activities, including:
  - Operational planning
  - Operational command and control
  - Technical support and reach-back
- Management roles and structures should be clearly communicated to all relevant stakeholders
- Management roles for detection activities should be integrated with those in non-detection mission areas

Operations

- Operational personnel constitute the “front line” of the NSDA, implementing relevant procedures and operating detection technologies
- Detection roles and responsibilities will likely need to be balanced with non-detection mission space
- Example roles include:
  - Customs inspectors
  - Border guards
  - Airport security
  - Law enforcement
  - Site security (critical infrastructure and special events)

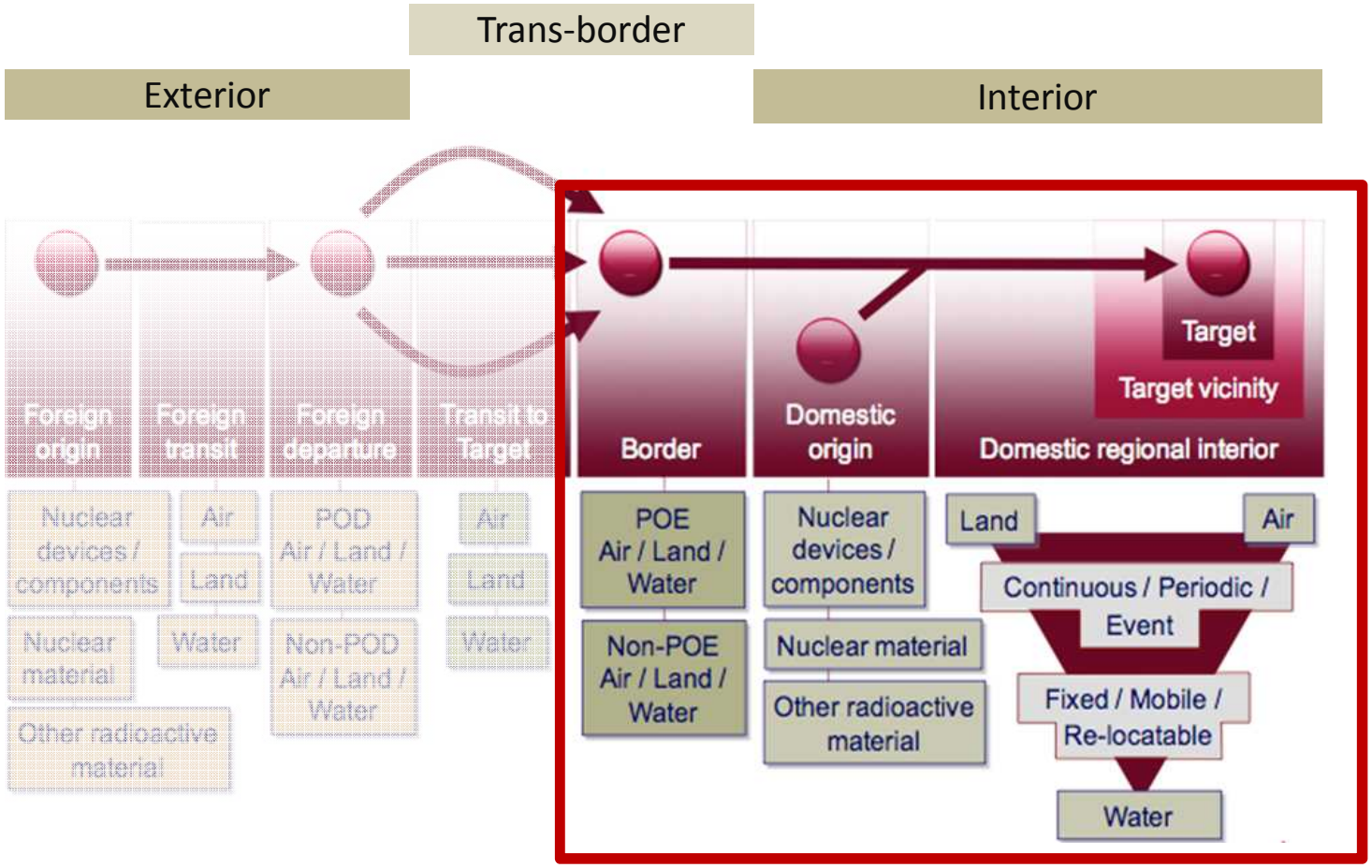
Maintenance

- Maintenance roles and responsibilities assure the sustainability of personnel, infrastructure, technology, and other detection-relevant assets
- Example roles include:
  - Training and evaluation
  - Personnel reliability
  - Infrastructure maintenance (e.g. electricians, IT support)
  - Detection instrument technicians

Instrument Deployment Plan

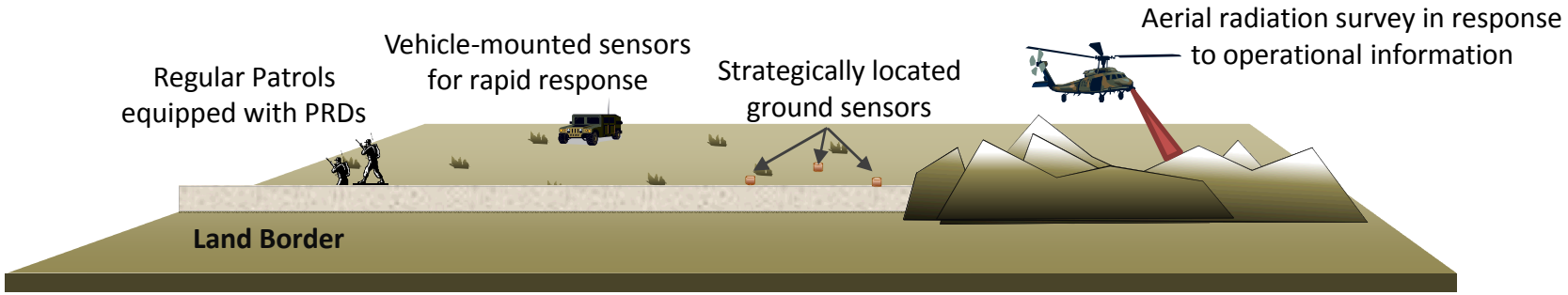
- Competent authorities should prepare instrument deployments plans for their respective areas of responsibility
- Deployment plans will vary according to the operational context, which might include:
  - Borders
  - Ports of entry
  - The interior
  - Strategic locations
  - Major public events
- In general, plans should specify:
  - The number and types of instruments to be deployed
  - The location of instruments to be deployed
  - Instrument lifecycle (acquisition, maintenance, calibration, replacement)
  - Personnel and resources needed to operate the instruments
  - Alarm assessment and adjudication procedures
  - Provision of supporting infrastructure

Pathways View of the Architecture



Instrument Deployment: Borders (between POEs)

- Borders between ports of entry – both land and maritime – present complex deployment challenges, including:
  - Large areas to be covered
  - Lack of supporting infrastructure
  - Harsh environments
- It may not be feasible (or desirable) to cover an entire border area with detection instruments
- Instruments can be integrated with regular patrol and screening operations to increase the probability of encounter



Instrument Deployment: Points of Entry

- Points of entry (POEs) provide choke points that facilitate more controlled and systematic screening
- Access control measures allow operators to control the flow rate and dwell time of traffic
- Instrument deployment should account for:
  - Layout of the POE
  - Volume and types of traffic to be encountered
  - Provision for mobile capabilities
  - Facilitation of legitimate commerce

Instrument Deployment: Domestic Interior

- Interior instrument deployment presents similar challenges to borders in terms of the area requiring coverage
- Instruments may be integrated with existing screening operations
- Deployment plans may also leverage existing traffic chokepoints
- Instruments may be deployed in the context of:
  - Routine law enforcement
  - Interior checkpoints
  - Traffic chokepoints
  - Regional commerce hubs
  - Response to operational information

Instrument Deployment: Strategic Locations and Major Public Events

- Strategic locations and public events present potential targets for malicious use of materials out of regulatory control
- Instrument deployment should be tailored to the specific characteristics of the location or venue
- Considerations include:
  - Site-specific threat and risk analysis
  - Identification of transit routes
  - Identification of key focal points and critical infrastructure
  - Integration with existing site security
  - Procedures and protocols for onsite alarm response and adjudication

Instrument Deployment Criteria

General criteria guiding the deployment of instruments should include:

- Threat and risk assessment
  - Types and quantities of radioactive material to be detected
  - Potential transit routes and screening locations
- Architecture design principles
- Capabilities of personnel to operate detection systems and assess/adjudicate incidents
- Stakeholder Impacts
  - Volume of expected traffic (pedestrian, vehicular, maritime, rail)
  - Financial and other resource requirements of different options

Radiation Survey

- There are many natural and human-made sources of radiation in the environment, including:
  - Cosmic radiation
  - Nuclear power plants
  - Building materials
  - Fallout from nuclear testing
- These sources may trigger false alarms; a radiation survey uses instruments to map this background radiation in a defined area
- A survey may be conducted in preparation for operational instrument deployment at:
  - Specific areas on a border
  - Points of entry
  - Critical infrastructure and special events

Radiation Search

- Activities used to detect, locate, and identify suspicious nuclear and other radioactive material out of regulatory control
- Most likely implemented in response to information alerts or to ascertain if a particular site is free of radioactive materials
- May be supported by mobile assets and “surge” capacities

Concept of Operations

- The Concept of Operations provides a broader, integrative operational framework to guide detection activities
- Should outline procedures and protocols necessary to address the full range of possible scenarios related to unauthorized movement of radiological and nuclear materials
- Should detail the functions and capabilities required for operational implementation, including:
  - Personnel roles and responsibilities
  - Technical assets
  - Command and control
  - Information (collection, management, analysis, dissemination)
  - Communication

Graded Response

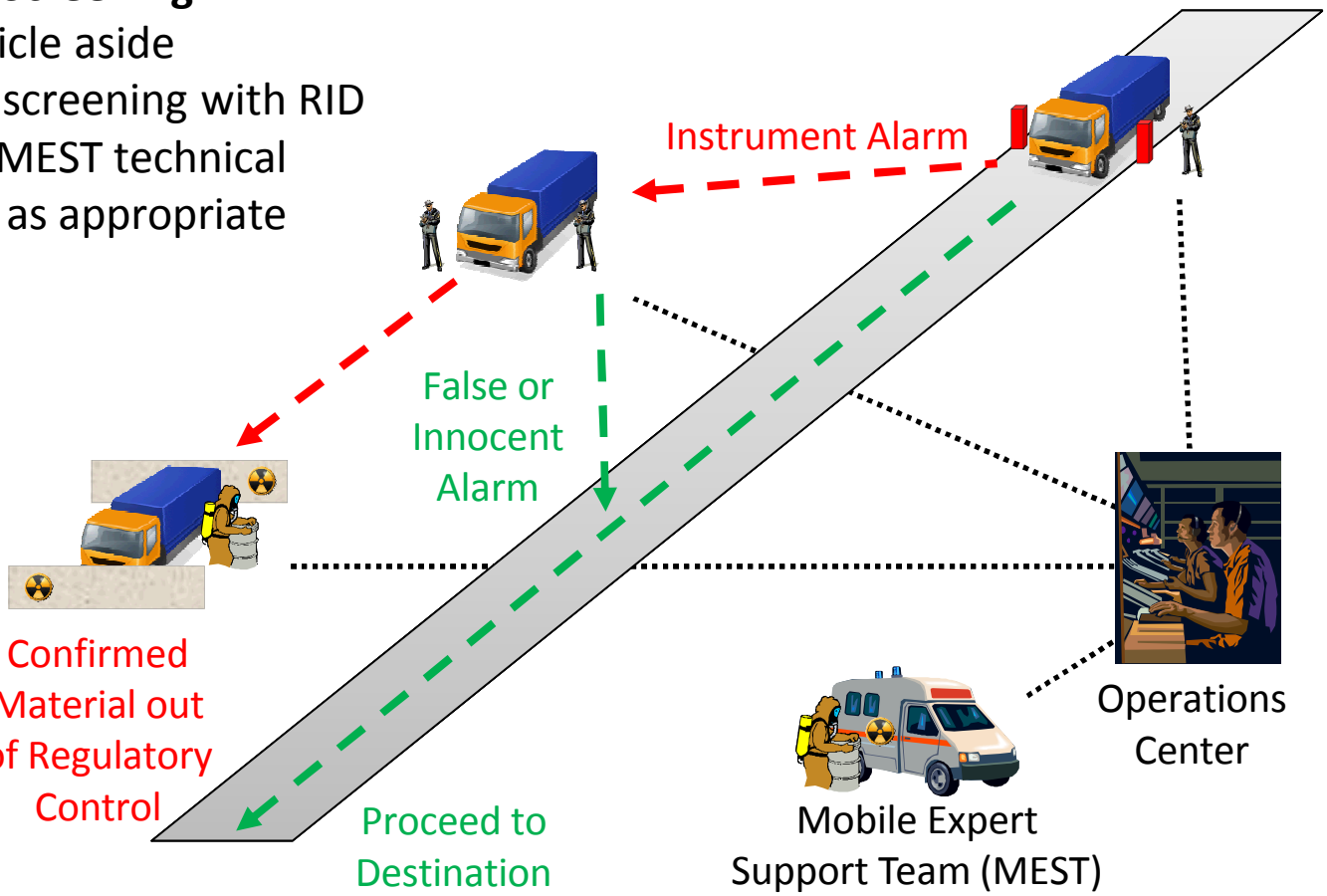
- Procedures and protocols outlined in the Concept of Operations should be graded according to the severity of the situation, including:
  - Credibility and immediacy of threat information
  - Type of radioactive material encountered
  - Imminent danger to human life or critical infrastructure
  - Known or suspected casualties from radiation exposure
- The Concept of Operations should additionally account for:
  - Appropriate radiation protection measures during assessment and response
  - Technical reach-back support

Example Concept of Operations

Primary Screening
- Portal monitoring at crossing
- Onsite officers with PRDs

Secondary Screening
- Pull vehicle aside
- Manual screening with RID
- Engage MEST technical support as appropriate

Isolation and Response
- Isolate vehicle
- Engage MEST support
- Characterize hazard
- Implement radiation protection measures
- Return material to regulatory control

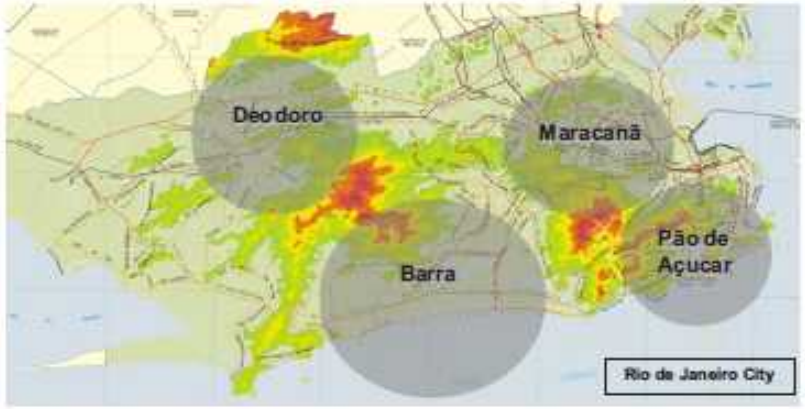


Case Study

2007 PAN AMERICAN GAMES

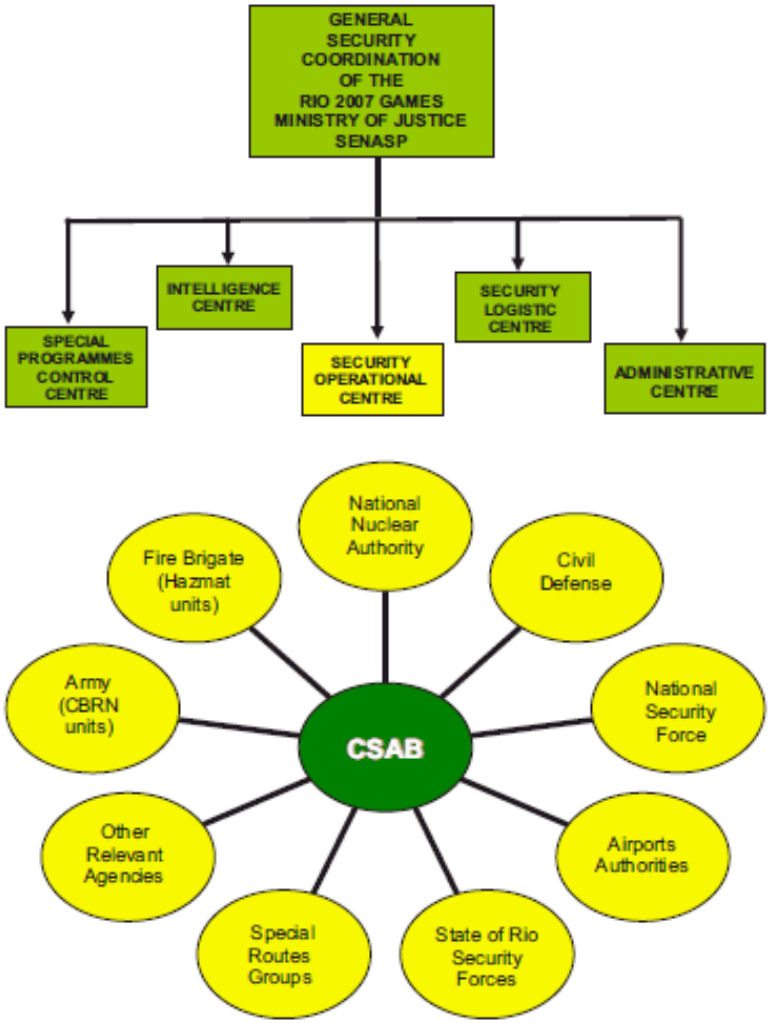
Detection Case Study: Pan American Games 2007

- Brazil hosted the 2007 Pan American Games in the city of Rio de Janeiro
- A large-scale public event including:
  - 8700 participants from 42 countries
  - 2 million spectators
  - 17 venues
- Security arrangements included 18,000 security personnel (federal, state, and municipal)
- Nuclear security measures were integrated into the overall event security plan, under unified command and control



Pan American Games 2007: Roles and Responsibilities

- All security activities under authority of the National Secretary for Public Security (SENASP)
- Security Operational Centre in Rio provided local coordination
- Nuclear security responsibilities performed by the multi-agency Bomb Security Commission (CSAB), with key stakeholders including:
  - National Security Force
  - National Nuclear Authority (CNEN)



Pan American Games 2007: Survey and Instrument Deployment

- All venues subject to a pre-event background radiation survey
- Instruments deployed at venues included:
  - PRDs for use in primary screening by security officers
  - RIDs for use in secondary screening by trained radiation protection professionals
  - Detection backpacks for use in radiation survey
  - Gamma search detectors for checkpoint vehicle screening
  - Vehicle-based gamma detectors for mobile response

Pan American Games 2007: Concept of Operations

- Strategy based on three graded "lines of defense"
- Mobile Expert Support Teams (MEST) available for reach-back technical assistance in response to nuclear security events, including:
  - Hazard assessment
  - Control of radiation exposure
  - Environmental assessment
  - Incident countermeasure recommendations
- Concept of Operations reinforced through pre-event training, drills, and exercises

1st Line (primary screening)

- Primary screening of all individuals and vehicles entering venues
- Security personnel equipped with PRDs

2nd Line (secondary screening)

- Secondary screening in the event of an instrument alarm
- All individuals/vehicles present at the scene scanned with RIDs by CNEN "triage team" to locate and identify the radiation source

3rd Line (isolation and response)

- If material of concern identified through secondary screening, authorities isolate the source and contact a Mobile Expert Support Team (MEST)
- MEST carries out assessment and any necessary response measures

Module H

DISCUSSION QUESTIONS

Discussion Questions

1. Operational roles and responsibilities will vary according to the context under consideration. Select one of the following potential architecture pathways. What roles and responsibilities should be delegated for management, operation, and maintenance of the architecture in this pathway?
   - Land point of entry (vehicular and human traffic)
   - Commercial seaport (cargo and passenger)
   - Commercial airport (cargo and passenger)
2. Instrument deployment considerations will also vary according to the context under consideration. Using the pathway selected in Question 1, what are different options for deploying instruments? How can architecture design principles be applied (including defense-in-depth and graded/balanced)?
3. What should be considered in a concept of operations for detection of suspicious material in this pathway, from initial screening to response and adjudication of a nuclear security event?