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Technical Collaboration in Radiological and Nuclear Risk Reduction and Consequence Management

Options for Discussion

Presented to

Defense Science and Technology Agency, Singapore

by

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Outline

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Background

- Sandia National Labs, supported by U.S. government agencies, has completed a number of collaborative rad/nuc projects with Singapore.

- Sandia and DSTA leadership, with the endorsement of various U.S. government program managers, has encouraged development of collaboration initiatives in the rad/nuc arena.

- Two potential areas of interest have been identified:
  - RDD Attack Consequence Management – discussed at the 3rd MINDEF-DTRA coordination meeting in Albuquerque, NM
  - Global Detection Architectures – discussions with the U.S. Domestic Nuclear Detection Office (DNDO)

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Objective and Groundrules

- **The objective of this briefing is to introduce candidate rad/nuc technical collaboration topics that have the following features:**
  - **Offer mutual benefit to both U.S. and Singapore**
  - **Build on programs and capabilities currently underway**
  - **Align with the program interests of potential U.S. sponsoring agencies**

- **Groundrules**
  - **Sandia attendees do not speak for the U.S. government.**
  - **Identification of options here does not imply willingness of the U.S. government to fund Sandia's participation.**

Area #1 – RDD Consequence Management - Context

- Growing U.S. stakeholder interest in response measures.
  - Department of Homeland Security (DHS) and major U.S. urban areas are developing RDD response protocols
  - Military (DTRA) and civilian (DHS-TOPOFF) exercises underway
  - Improvised nuclear device events of increasing concern
  - Projected growth in nuclear power plants increases need for emergency preparedness
- Response programs are not as mature or as well-funded as prevention programs in the U.S.
  - DTRA recognizes gaps (Dr. J. Tegnelia, 29 June 2007)
- Singapore commitment to realistic exercises and response capability development widely recognized.

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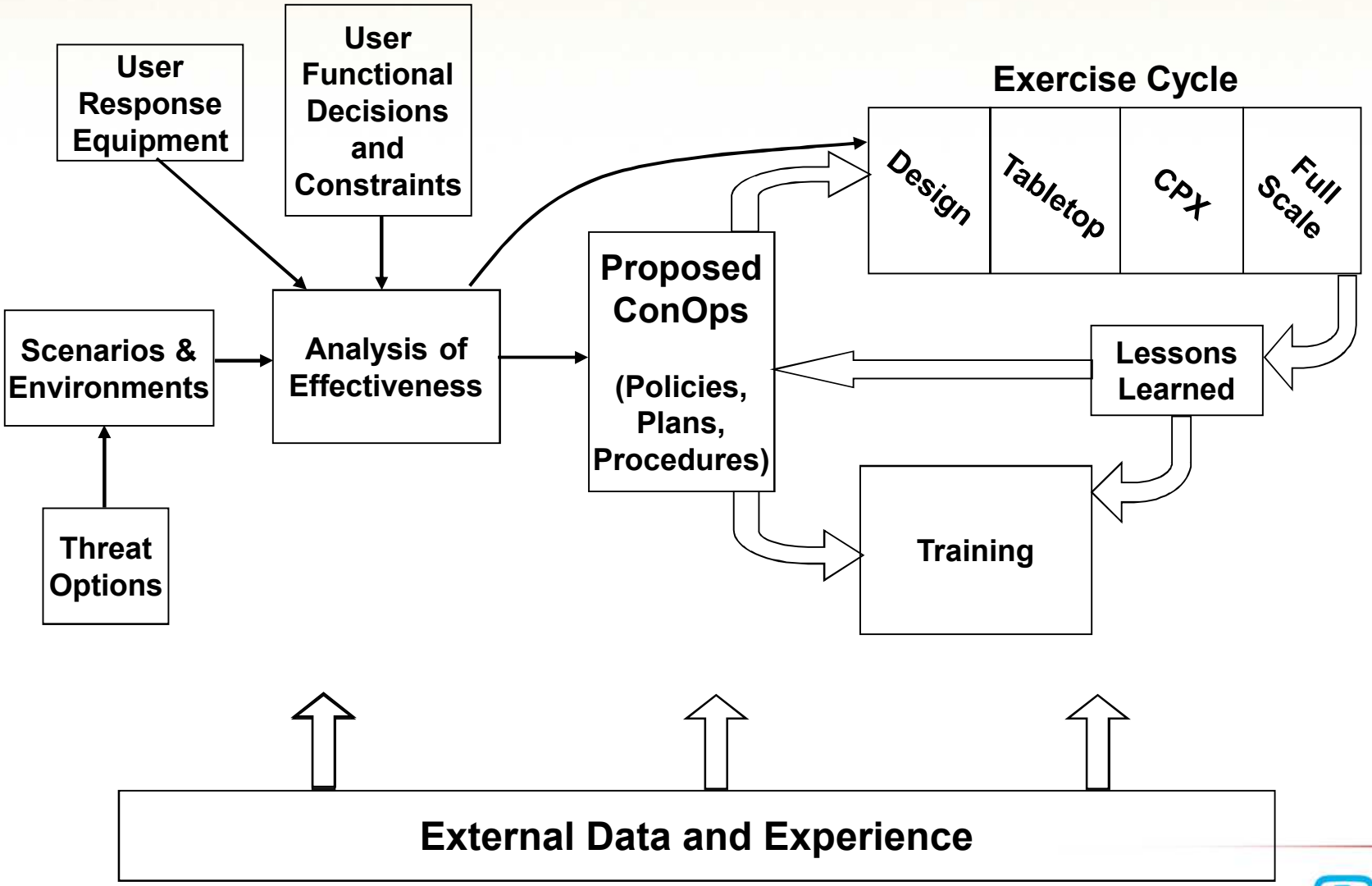
A RDD Consequence Management ConOps Development Process



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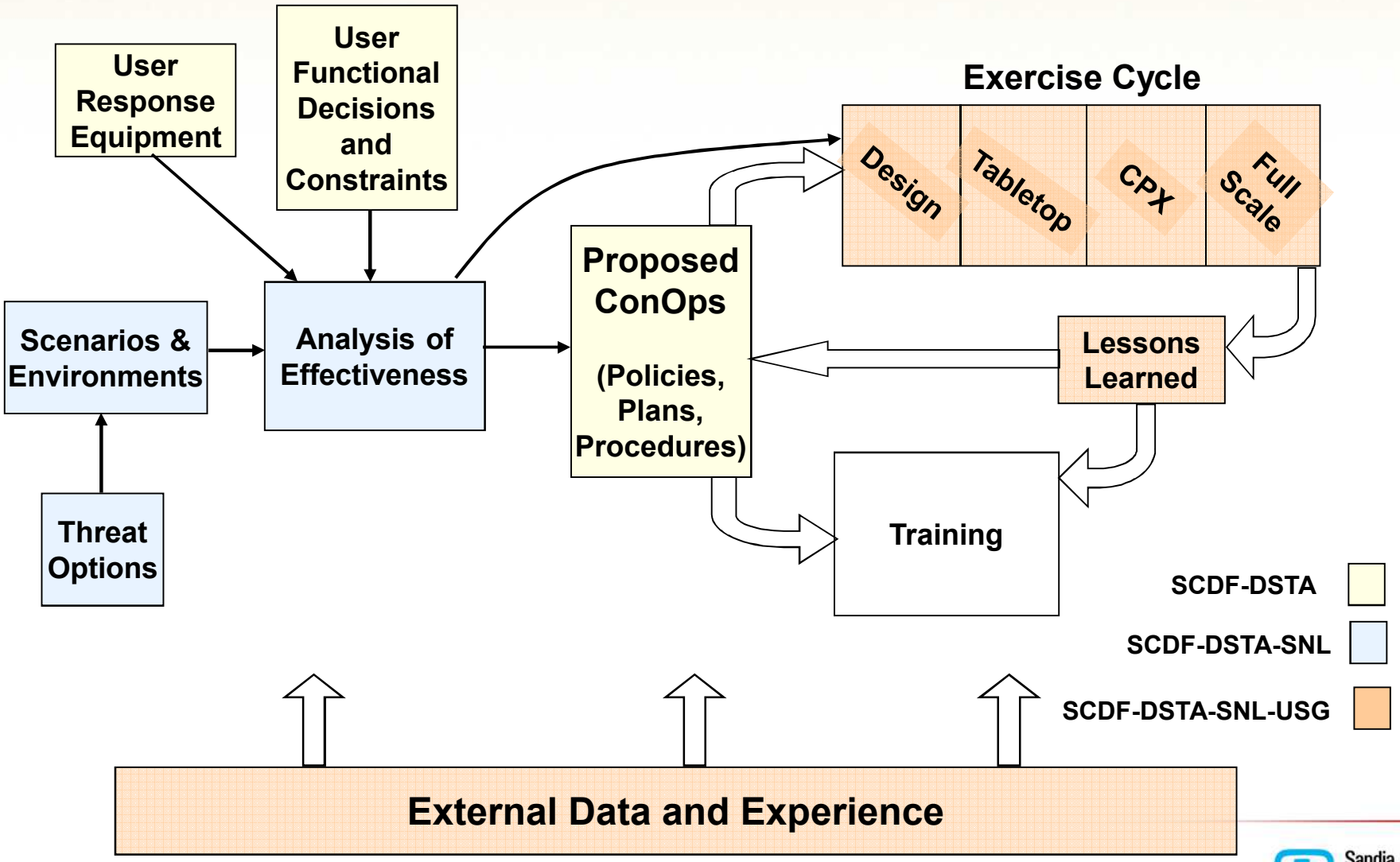
Possible Roles in the RDD ConOps Development Process



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Key Step – Identification of User Issues

- **Identification of principal user concerns in major functional areas is needed to focus analysis inputs, such as:**
  - **Attack alarm**
  - **Surveillance to define boundaries of contamination**
  - **Evacuation management**
  - **Personnel contamination assessment and decon**
  - **Facility isolation and protection**
  - **Public communication**
  - **Time-urgent area decon actions**
  - **Medical triage and therapeutics**
- **Lessons learned from broad base of U.S. exercises and analysis could be useful, but focused questions and responsive U.S. analysis team is needed.**

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Implementation Options for the Consequence Management Process

- A core ConOps analysis and exercise design team is a useful concept for promoting implementation.
  - Provides for continuity and responsiveness to user issues
  - Permits development of better knowledge of regional-specific issues
- U.S. government funding agency (DTRA/DOE/DNDO) would provide oversight of SNL and other U.S. contributors.
  - Would review analysis team task assignments and set levels of effort
  - Could redirect focus of the U.S. contributors
- U.S team members would seek to draw in existing data and information from other U.S. sources beyond the funding agency.
  - Will not always be possible to expedite cooperation and information from other U.S. government agencies
  - Direct participation by DSTA may be required

Other RDD Pre-attack Preparedness Options

- **Pre-attack Detection of Threatening Sources**
  - **Most moderately-shielded RDD sources are easily detected**
  - **Detection strategies for vulnerable entry points could be assessed (with potential application of Haystack solutions)**
- **Substitution of most dangerous sources in medical and industrial applications with safer alternatives**
  - **Review of substitution opportunities and costs could be pursued**
- **Physical security improvements for medical or industrial sources inside Singapore**
- **Post-attack consequence management measures should be balanced against pre-attack preparedness measures.**

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Area #2 – Global Detection Architectures - Context

- **The Domestic Nuclear Detection Office (DNDO) is increasing U.S. efforts in radiation detector R&D and deployments.**
  - **Developing new Advanced Spectral Portals for port screening**
  - **Increasing emphasis on detection outside of Ports-of-Entry**
  - **Significant programs in test, evaluation, and prototype system deployment**
  - **Establishment of reachback for detector alarm resolution**
  - **Developing operational information sharing processes**
  - **Seeking to implement a Global Nuclear Detection Architecture**

- **DNDO is leading U.S. efforts to understand performance of radiation detectors in screening diverse targets in operational environments.**
  - **Extensive data on detector performance**
  - **Growing understanding of naturally occurring radioactive material (NORM) signatures**

Maritime Screening

- DNDO is seeking more comprehensive screening of maritime traffic using mobile detector systems
- Smaller vessel screening is a growing concern
  - Understanding of exterior signatures
  - Detectors and ConOps to support boarding operations
- Other options
  - Special-application, standoff technologies
  - Long dwell, in-transit screening
- Current U.S. Coast Guard operations were summarized in the 2006 RDD Workshop

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Sandia's In-Transit Detection Program

- **Sandia is examining the possibility of in-transit detection of radioactive materials for DNDO.**
- **Strategy exploits the long time interval measurements and low maritime background levels present in ocean transit.**

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Reachback Support of Detection Operations

- **Widespread deployment of spectral detectors allows identification of NORM and radiological sources, but can lead to ambiguous interpretations.**

- **Secondary reachback by Lab analysts serves several functions.**
  - **Direct operational support for spectral interpretation**
  - **Understanding of NORM statistics**
  - **Development of training and guidance materials for detector operators**

- **Collaboration on reachback might ease the introduction of advanced spectral detectors.**

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Regional and Data Sharing Questions

- **One goal of DNDO is to promote the improvement of multi-national radiation detection capabilities.**
  - **How can Singapore work with other ASEAN and South Asia countries to enhance regional capabilities ?**
  - **Is there a way of coordinating regional radiation detector deployments and operations to address wide variations in needs and capabilities of S.E. Asian nations ?**

- **Rapid international sharing of detection information is seen by many as a valuable aspect of global detection architectures.**
  - **What detection information is reasonable to share, and with what timelines ?**
  - **Are there precedents with other collaborative programs that could provide insights into information sharing protocols ?**

Potential Benefits of Collaboration in Area #2

- **For the U.S.**
  - Wider deployment and effective ConOps for detection of radiation sources in transit along S.E. Asia commercial routes
  - Enhanced protection of U.S. assets, operations, and interests in the Singapore area
  - Development of international protocols for sharing of detection architecture information to encourage growth of regional capabilities
- **For Singapore**
  - Potential access to useful data generated in the U.S., including detector development and performance information, detection ConOps, and prototype deployment results
  - Tools and training to smooth the acquisition and employment of advanced, spectral, radiation detectors
  - Potentially greater direct data exchange regarding operational concerns
  - Greater security against illicit importation of radiological or nuclear materials

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Summary and Path Forward

- Promising options for collaboration in two principal areas of radiological and nuclear risk reduction have been identified.
- Prioritization of more specific tasks in desired areas is needed to permit joint descriptions of the work to Singapore and U.S. program managers.
- The Sandia team will introduce the highest priority pathways to appropriate U.S. government program managers.
- Frequent feedback on the status of these interactions will be shared with DSTA.