

# WMD Events and Other Catastrophes

2012 Joint CBRN Conference  
National Defense Industrial Association

March 13, 2012

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**Homeland  
Security**

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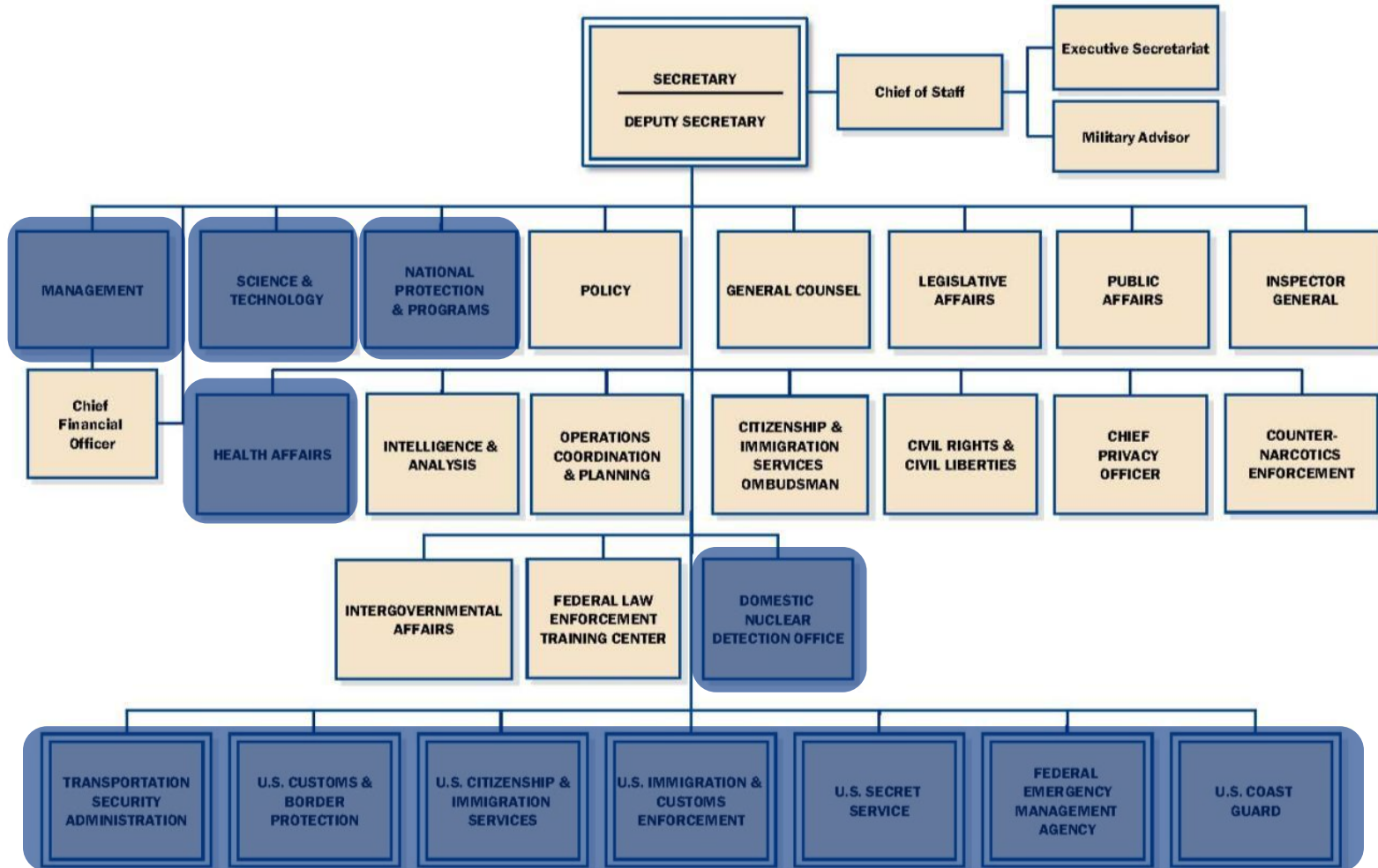
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# Key Points

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- S&T Directorate's roles and responsibilities
- Preparation for and response to WMD and other catastrophes
- Associated meta-challenges
- Biothreats and complex technical accidents

# DHS Organization

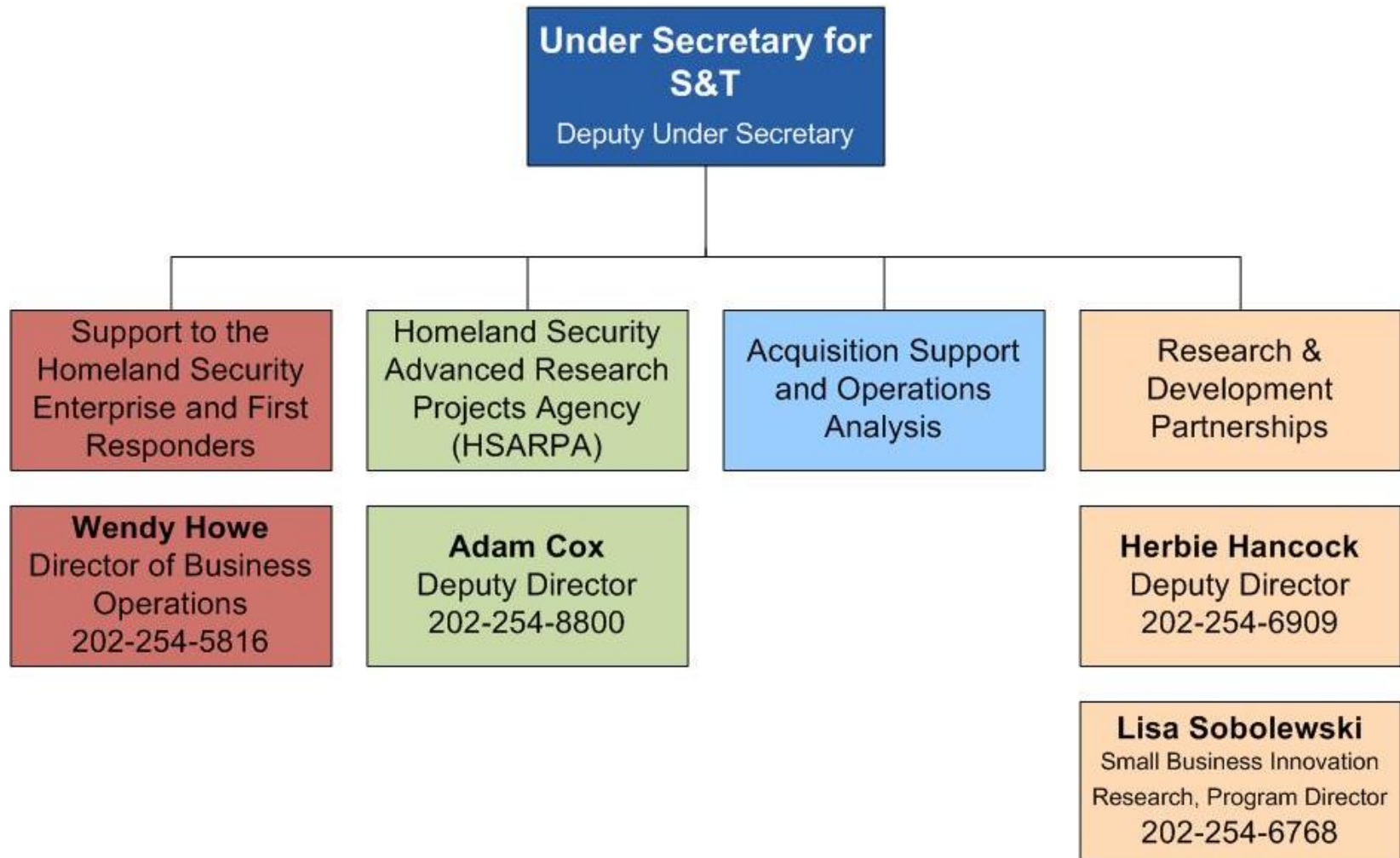


# S&T Value Proposition

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- S&T's contributions to the Homeland Security Enterprise will come from:
  - Creation of new technological capabilities and process enhancements
  - Cost savings due to technological innovation and analytics
  - Leveraging scientific and engineering expertise to achieve improvements in operational analysis, project management and acquisition management
  - Progressively deeper, broader understanding of homeland security technology priorities and capability gaps

# S&T Organization



# WMD and other Catastrophes

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- Deliberate biological attacks – human or agriculture targets
- Natural pandemic – influenza or emerging disease
- Improvised nuclear device – scale varies
- Big earthquake
- Big hurricane
- Cyberattack(s) on critical infrastructure
- Complex technological accidents

# Bioweapons are a Strategic Threat

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- Massively lethal, proven to work – with 1960s technology
- Essential materials, know-how cheap, widely available, dual-use: hard to track, easily hidden
- Attribution issue – Difficult for states to respond to attacks
- Reload potential: self-replicating organisms; risk multiple attacks
- Mitigation requires specific countermeasures quickly and in quantity
- Contagious disease introduces new dynamic
- Potency, diversity, and accessibility of biotreats will increase as bioscience advances

# BioFutures Project Findings

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- Biological manufacturing increasingly important
  - Computer power driving biosciences
- Bioscience ecosystem changing – China, India, Brazil are increasingly peer competitors to US, UK, EU
  - US still leads in patents and IP
- Economic and defense implications of outsourcing biology – pharma pipeline increasingly Asian
  - US losing expertise?
- Well resourced groups/nations have many options to do harm
- Entry barriers to bioscience, bioterror are low – traditional threat agents and agro attacks most feasible



# Complex Systems Fail Complexly

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**“In complex industrial, space, and military systems, the normal accident generally (not always) means that the interactions are not only unexpected, but are *incomprehensible* for some critical period of time.”**

– Charles Perrow, *Normal Accidents*, 1984



# Deepwater Horizon

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Sources: Reuters, Wikimedia Commons

# Three Near-Simultaneous Disasters

Magnitude 9.0



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Sources: AP, Reuters

# Catastrophic Events: Meta-Challenges in Preparation & Response

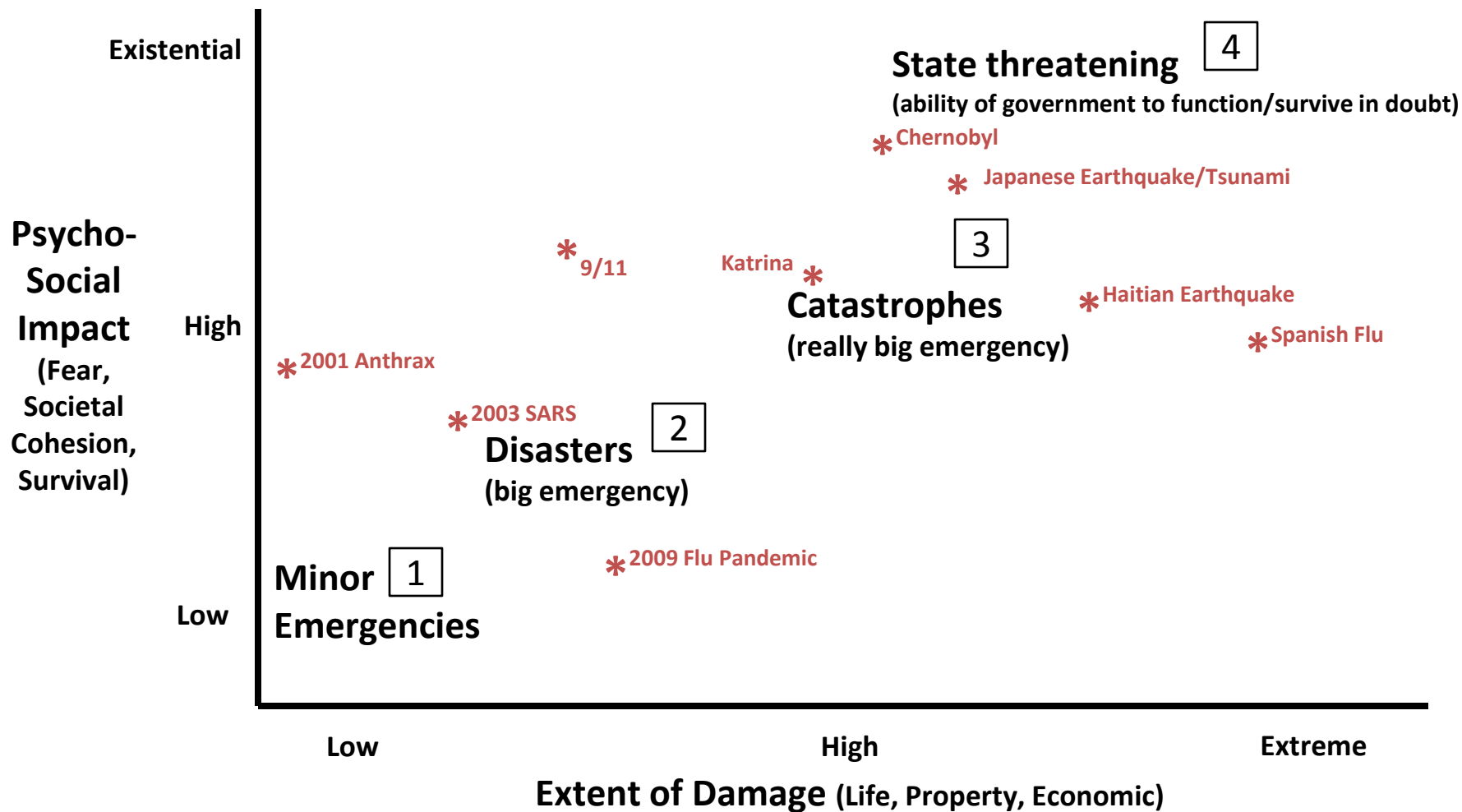
- Prevention/interdiction
- Reducing vulnerabilities
- Prediction
- Real-time detection, situational awareness
- Maintain public's trust and active support
- Mobilize and sustain whole-of-government effort

# More Meta-challenges

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- Engaging non-government actors
  - Experts, industry, operators
- Protecting, maintaining critical infrastructure and services
  - Caring for sick, injured, homeless
- Logistics, logistics, logistics
- Recovering faster
- Mitigating long-term impacts
  - Health, socio-economic, strategic
- **COMMUNICATIONS!**

# Dimensions of Emergencies



**Federal Lead** ← →

# Progress since 2001

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- Planning, preparation more advanced; moving towards model-based simulations, affordable exercises
- Significant progress towards interoperable communications among first responders
- Situational awareness – improvements in sensors, data feeds (electronic med records, fusion centers, Virtual USA), potential for social media alerts, reports.
  - Promise of pre-symptomatic and mass diagnostics (“pregnancy tests” for anthrax)
- Response – still local. Great variations across US. Limited surge capacity. Regional response capacity is evolving.
- Recovery – still learning. Faster is better. Improved plans for post-bioattack, working on IND recovery.



# Long-term Potential for Improved Biosecurity

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- Could reduce time to develop, manufacture new drugs, vaccines, diagnostics
- Focus diagnosis, treatment on host, not pathogen
  - Earlier diagnosis, generic treatments
- Need regulatory reform to keep pace with technology improvements – e.g. multiplex diagnostics
- Bioscience practice must incorporate professional sense of social responsibility
- Engaging public is a must – prohibitions on GMO in UK; bans on stem cell research in US





# Reality Check

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- All response is local! Feds will not arrive immediately and at some scales will be overwhelmed
- US health care system and 90% of critical infrastructure is in private hands
- What is appropriate investment in preparation for routine hazards vs. high consequence events of indeterminate probability?
- How can we educate and train responders and the public for rare events?
- How can we collaborate internationally more effectively?

**“... the salvation of this human world lies nowhere else than in the human power to reflect, in human modesty, and in human responsibility.”**

– Vaclav Havel, Washington, DC, 1990





# Homeland Security

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