WMD Events and Other Catastrophes

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Key Points

- 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

- 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

Under Secretary for S&T
Deputy Under Secretary

- Support to the Homeland Security Enterprise and First Responders
  - Wendy Howe
    Director of Business Operations
    202-254-5816

- Homeland Security Advanced Research Projects Agency (HSARPA)
  - Adam Cox
    Deputy Director
    202-254-8800

- Acquisition Support and Operations Analysis

- Research & Development Partnerships
  - Herbie Hancock
    Deputy Director
    202-254-6909

- Lisa Sobolewski
  Small Business Innovation Research, Program Director
  202-254-6768
WMD and other Catastrophes

- 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

- 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 biothreats will increase as bioscience advances
BioFutures Project Findings

- 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
“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

Sources: Reuters, Wikimedia Commons
Three Near-Simultaneous Disasters

Magnitude 9.0

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

- 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

Psycho-Social Impact
(Fear, Societal Cohesion, Survival)

Existential

Minor Emergencies

Low

High

Disasters (big emergency)

State threatening
(ability of government to function/survive in doubt)

Catastrophes (really big emergency)

Low

High

Extreme

Extent of Damage (Life, Property, Economic)

Federal Lead

- 2001 Anthrax
- 2003 SARS
- 9/11
- Katrina
- 2009 Flu Pandemic
- Chernobyl
- Haitian Earthquake
- Spanish Flu
- Japanese Earthquake/Tsunami
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- Spanish Flu
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Progress since 2001

- 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)


- Recovery – still learning. Faster is better. Improved plans for post-bioattack, working on IND recovery.
Long-term Potential for Improved Biosecurity

- 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
The Long Road to Preparedness
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