

CBRN Threat Assessments

BioShield Stakeholders Workshop

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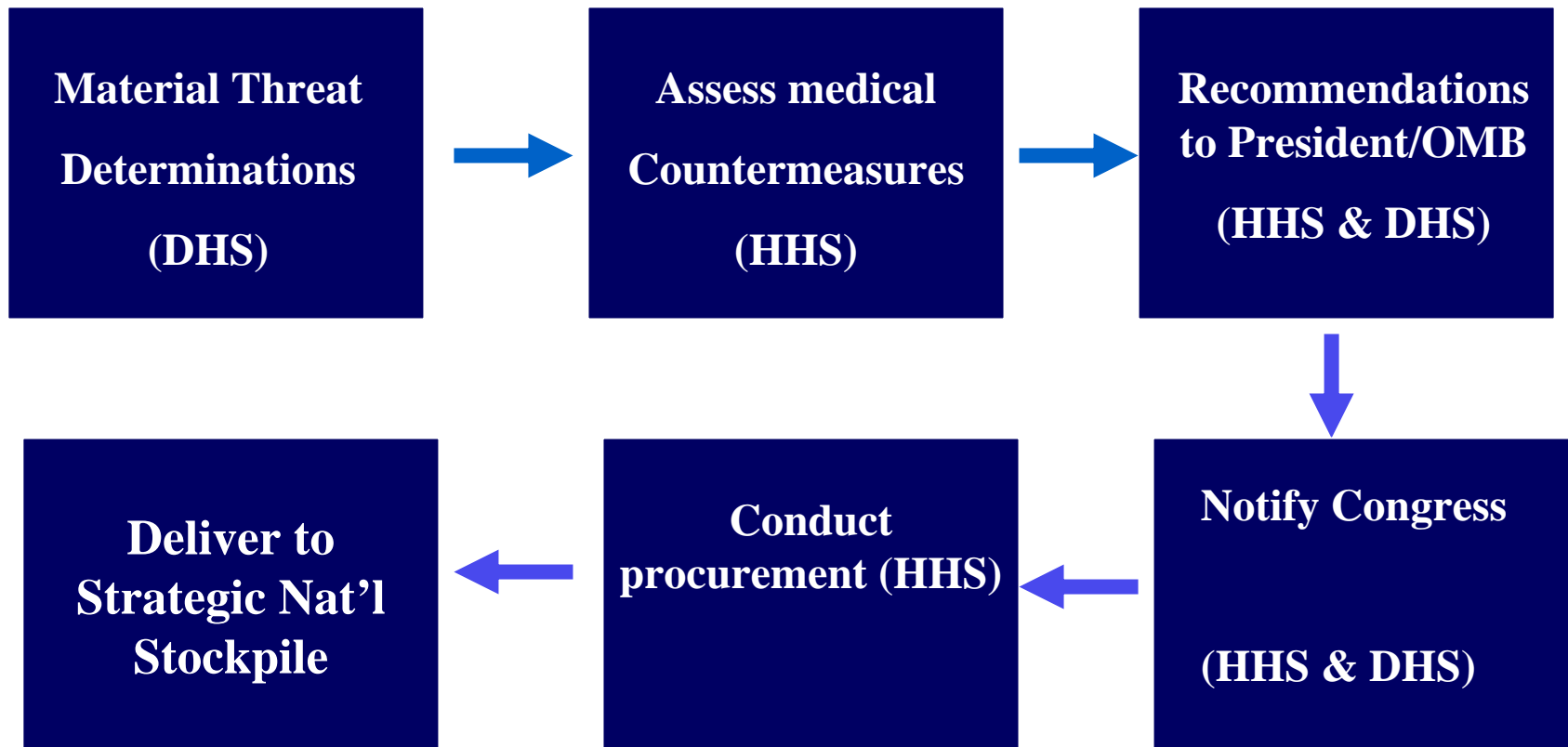
DHS, Science and Technology Directorate

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The BioShield process



Today's presentation will:

- Describe the approach to date
 - Develop plausible high consequence case for one agent at a time (MTAs)
 - Issuance of MTD, if warranted
- Describe the new approach
 - Conduct end-to-end risk assessment for broad range of agents and broad range of scenarios
 - Issue MTDs based on this risk broad risk assessment
 - Follow-up with Population Threat Analyses (PTA) to input into medical consequence modeling by HHS



Under Bioshield, DHS is responsible for Material Threat Determinations (MTDs)

- *Material Threat Determination*: a formal determination by the Sec DHS that an agent “presents a ...material threat...sufficient to affect national security”
- *Material Threat Assessments*: a set of plausible, high consequence scenarios used to:
 - Estimate the potential number of exposed individuals, their exposure levels, contaminated areas, and other ‘collateral effects’
 - Inform decisions on whether an MTD is warranted and/or to be used by HHS in informing assessments of the health impacts and requirements for additional medical countermeasures



MTAs focus on “plausible high consequence cases” and address:

- Intel information on capabilities and intent (DHS/OIA + IC)
- Scientific feasibility (DHS/S&T + broad range of SMEs)
 - acquiring material: finished product or seed stock
 - production techniques: equipment, protocols, skills
 - material produced: amounts, quality (wet/dry), shelf life
 - dissemination: efficiency; viability
- Representative scenarios
 - urban aerosol release; food contamination; water
 - vulnerabilities; release points, mechanisms; “natural” attenuation
 - consequences: exposure; reload concerns



MTDs and MTAs to date:

MTDs (4)

- Anthrax
- Botulinum
- Smallpox
- Radiological/Nuclear

MTAs & Special Studies ()*

Completed (6)

- Anthrax
- Botulinum toxin
- Plague
- Nerve agents
- Radiological mat'ls (RDD)
- Fissile materials/nuclear weapon*

In final review (6)

- Glanders
- Melioidosis
- Tularemia
- Typhus
- Viral hemorrhagic fevers
- Cyanide*



*Risk Assessments
in support of
“Biodefense for the 21st Century”*



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DHS is conducting risk assessments (RA) to guide national biodefense investments

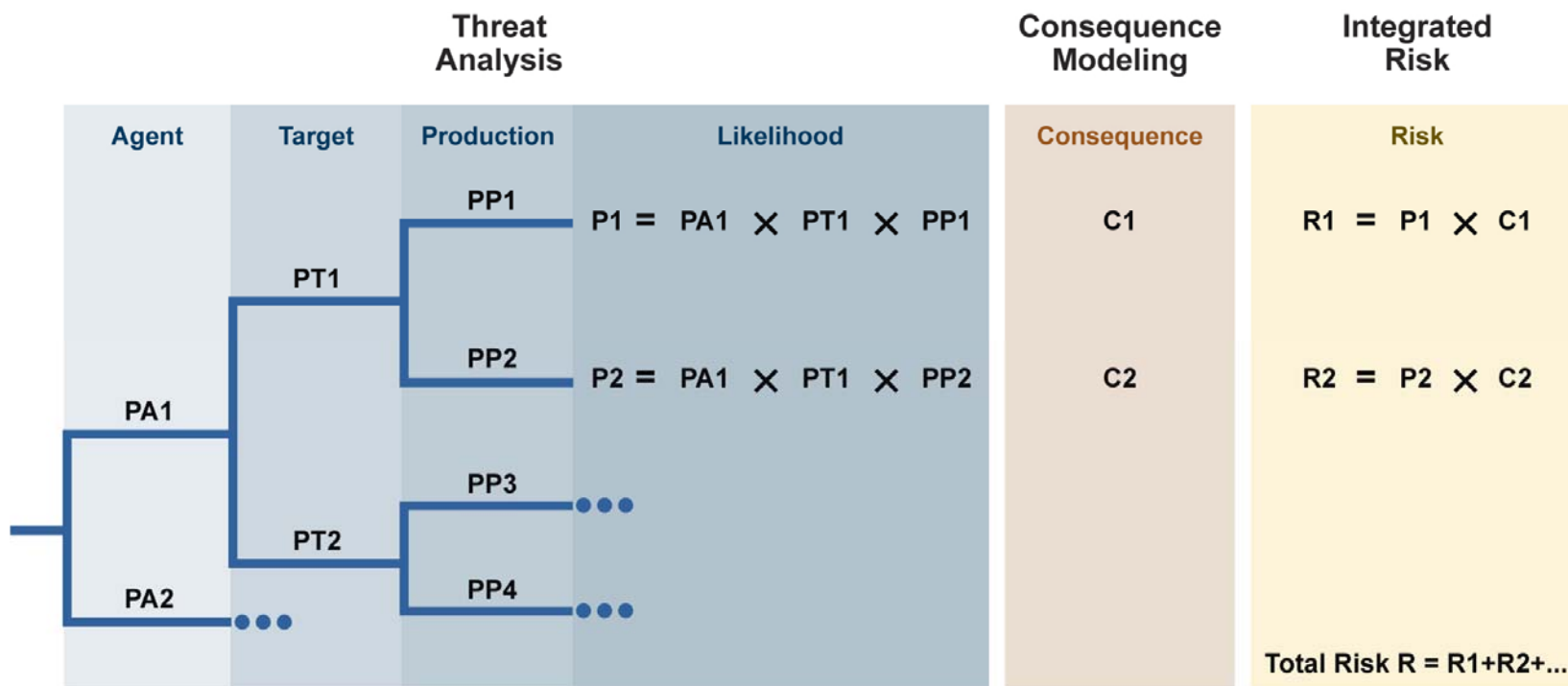
Risk = threat x vulnerability x consequences

- Prior assessments have tended to emphasize one of these three components
- DHS RA first, quantitative, end-to-end risk assessment
 - 28 bio agents of human concern; wide sampling of scenario space
 - Involving ~ 200 subject matter experts, > 500 articles
 - Community ‘vetted’ inputs: intel (IC), medical (HHS)
 - Captured and propagated uncertainties in the analysis
 - Conducted sensitivity studies for key inputs, assumptions
- Outputs
 - Prioritize risks for various sorting parameters
 - Identification of key vulnerabilities and knowledge gaps



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The biological threat risk assessment is anchored in a Quantitative Risk Analysis



- Ability to adjust parameters to address different questions
- Ability to query system at consequence level of interest



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Probabilities are estimated at each step along the attack pathway

Phase	Event Number	Event Heading
Agent/Target/Dissemination Selection	1	Initiation by Terrorist Group
	2	Target Selection
	3	Bioagent Selection
	4	Mode of Dissemination
Acquisition	5	Mode of Agent Acquisition
	6	Interdiction and Technical Failure to Acquire
Production and Processing	7	Location of Production and Processing
	8	Mode of Agent Production
	9	Processing Step A
	10	Processing Step B
	11	Processing step C
	12	Interdiction during Production and Processing
Transport and Storage	13	Mode of Transport and Storage
	14	Interdiction during Transport and Storage
Attack	15	Interdiction during Attack
	16	Potential for Multiple Attacks
Response	17	Event Detection

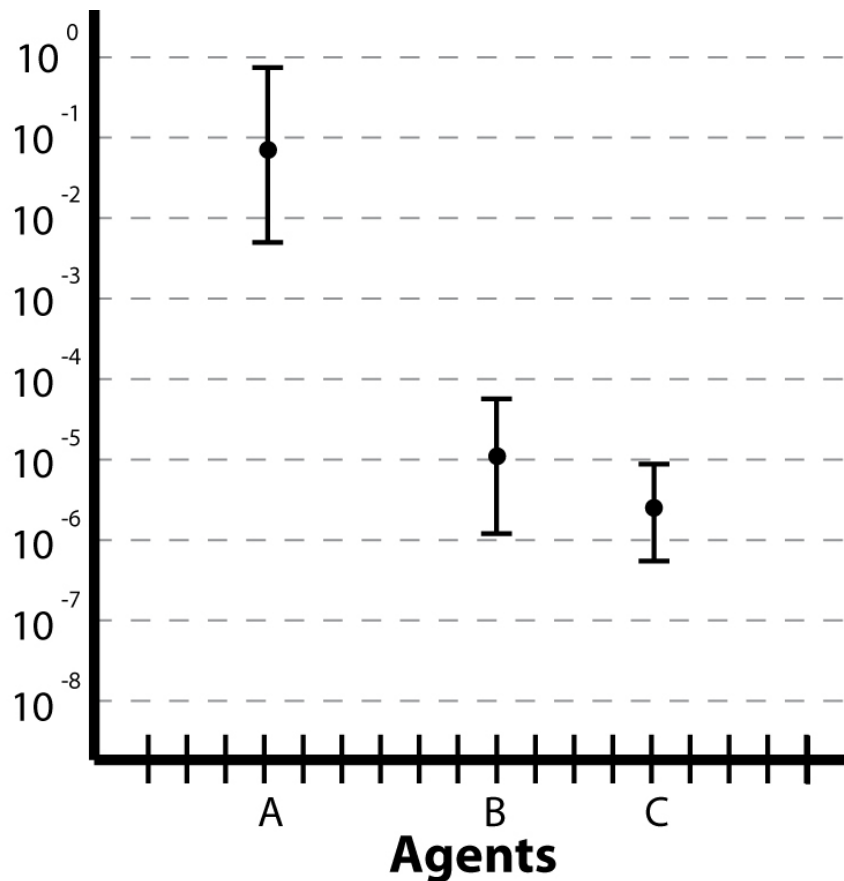
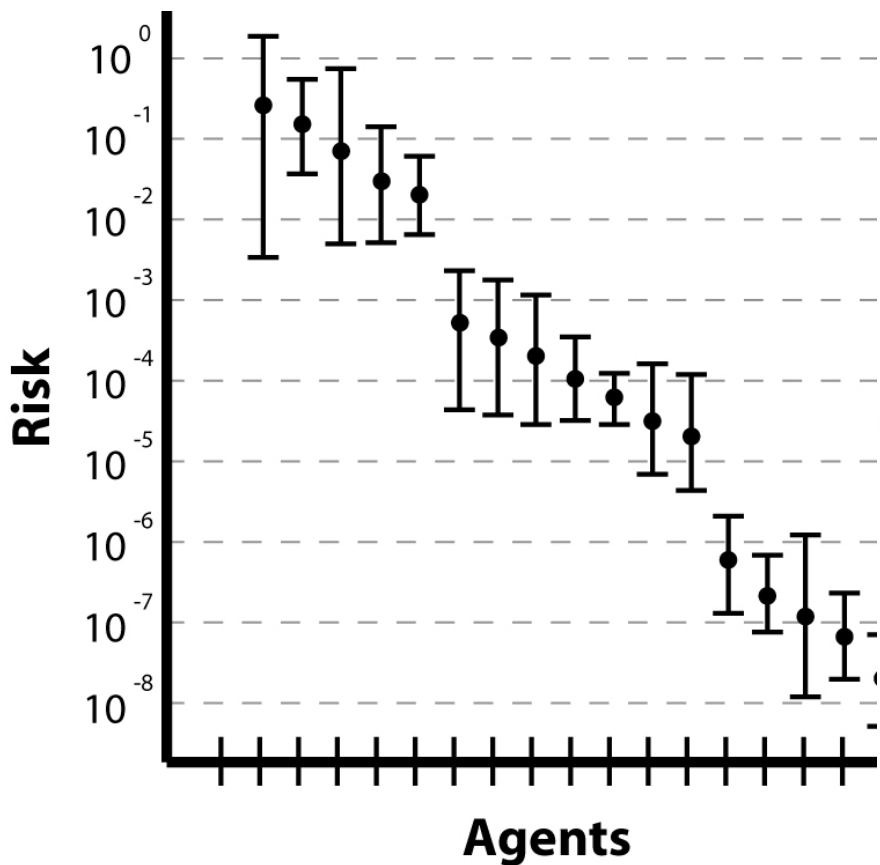


Each step has numerous branches for which additional probabilities are estimated

Event #	Event Heading	Branches
4	Mode of Dissemination (also determines wet or dry dispersal form)	Inhalation Targets
		4.1 Ground-level point release from stationary device A
		4.2 Ground-level point release from stationary device B
		4.3 Ground-level release from mobile device A (outdoor only)
		4.4 Ground-level release from mobile device B (outdoor only)
		4.5 Aerial release from mobile device A (outdoor only)
		4.6 Aerial release from mobile device B (outdoor only)
		4.7 Ground-level point release by method C
		4.8 Ground-level point release by method D
		4.9 Ground-level release by method E
		Other Targets – (food, water, human vector, or contact dissemination) Branch 4.1 has unit probability.



Biological threat agents can be prioritized by comparing relative risk



Based on these risk assessments

- DHS determined that N of the 28 agents pose a material threat
- DHS is now in the process of issuing MTDs for these agents
- Exposure tables have calculated for each agent for the same standard, plausible, high consequence scenario and provided to HHS
- These tables list the number of individuals exposed to: 5, 10, 30, 50, 100, 300, 500, 1,000, 3,000, 5,000 and 10,000 org of each agent

HHS will now model the medical effects & decide IF additional/new medical countermeasures are needed



Similar efforts are now underway for chemical agents

- MTAs

Completed

Nerve agent (sarin)

To be completed in FY07

Non-traditional agents

Pulmonary agents

Vesicants

Blood agents (cyanide)

- Chemical Threat Risk Assessments, covering broad range of agents & scenarios, will be completed by end of FY07
- In the interim, we will be guided by results of interagency working group that prioritized chem and rad threats.





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