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PUTTING FIRST RESPONDERS FIRST

► Explosives ► Chemical & Biological ► Command, Control & Interoperability
► Borders & Maritime Security ► Human Factors ► Infrastructure & Geophysical

SCIENCE AND TECHNOLOGY



LOS ANGELES CONVENTION CENTER • LOS ANGELES, CA

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Chemical and Biological Division

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Program Manager

Chem Bio R&D Branch

Science and Technology Directorate

Department of Homeland Security

“Putting First Responders First”



Homeland Security

Science & Technology

Chemical and Biological Division Overview

Mission: to increase the Nation's preparedness against chemical and biological threats through improved threat awareness, advanced surveillance and detection, and protective countermeasures.

Key 5 year deliverables:

- Integrated CBRN risk assessments
- Anticipation of future & unconventional threats
- Chemical infrastructure risk assessment
- Fully automated Gen 3 BioWatch
- Integrated CBRN facility protection
- National lead for operational biological and chemical forensics
- Decision tools and veterinary countermeasures for Foreign Animal Diseases (FADs)



Current BioWatch collects air samples & analyzes them in LRN lab

IPT Co-Chairs: OHA, IP

DHS Drivers: OHA, IP, I&A, CBP, NPPD, PLCY, DNDO, Interagency Gaps

End-Users: HSC, HHS, FBI, USDA, IC, EPA, local public health, critical facilities

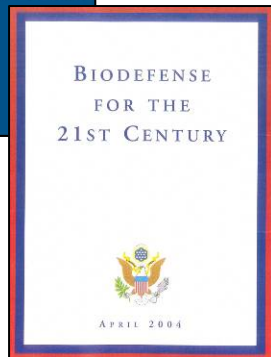
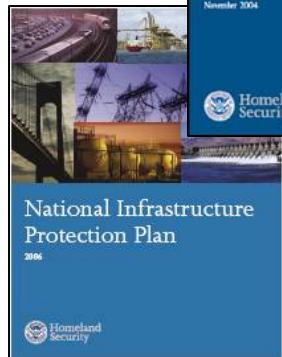
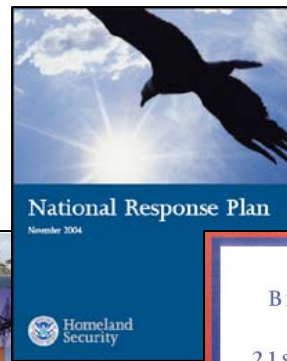
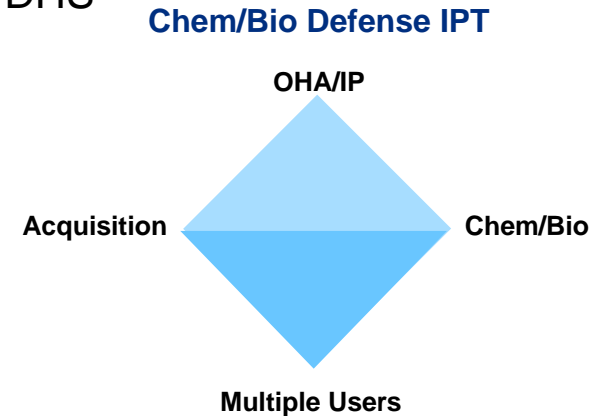


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Where do our requirements come from?

Directly from a Capstone Integrated Product Team (IPT)

- Co-chaired by DHS Office of Health Affairs (OHA) and DHS Infrastructure Protection (IP)
- Membership from other DHS operational arms
- Identified 50+ Capability Gaps for 2007



And they in-turn, base their requirements on

- Homeland Security Presidential Directives – 10, 7, 9, 18
- Congressional legislation & guidance
- National planning & implementation guidance – NIPP, NRP, NIMS, and the National Planning Scenarios
- Risk, vulnerability and mitigation studies
- Private, local, state inputs



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HSPD-10 lays out an integrated end-to-end biodefense strategy

THREAT AWARENESS

- Intel
- **Assessments**
- Anticipate future threats

PREVENT & PROTECT

- Diplomacy
- Interdiction
- **Critical Infrastructure Protection**

SURVEILLANCE & DETECTION

- **Attack Warning**
- **Attribution**

RESPOND & RECOVER

- **Response Planning**
- **Risk Communication**
- Medical CM
- Mass Casualty Care
- Decon

Essential four pillars of national biodefense



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Chem/Bio Division Programs and Managers

Program	Project	Program Manager
Bio Threat Awareness	Bio-Threat Characterization Center (BTCC)	Sandy Landsberg Mike Anderson Steve Bennett
	Bio-Defense Knowledge Center (BKC)	Dave Shepherd
Bio Forensics	National Bio-Forensics Analysis Center (NBFAC)	Bert Courtney
	Bio-Forensics R&D – Near Term	Pete Pesenti
Bio Response and Restoration	Systems Approaches for Restoration	Lance Brooks
	Operational Tools for Response and Restoration	Lance Brooks
Systems Studies and Decision Support Tools	Bio-Defense Net Assessments	TBA
	Systems Studies	Teresa Lustig



Chem/Bio Division Programs and Managers (cont)

Program	Project	Program Manager
Bio Surveillance R&D	BioWatch Generation 3 Detection System	Ed Rhyne
	BioAssays – Near Term	Matt Davenport Jim Anthony
	Detect-to-Warn: Triggers and Confirmers	Anne Hultgren
	Food Bio-Agent Detection System (FBADS)	Ed Rhyne
	National Biosurveillance Integration System (NBIS)	Sandy Landsberg
Foreign Animal Disease (FAD) Countermeasures	FAD Modeling – Near Term	Tam Garland
	FAD Vaccine and Diagnostics – Near Term	Tam Garland
	Joint Agro Defense Office (JADO)	Tam Garland

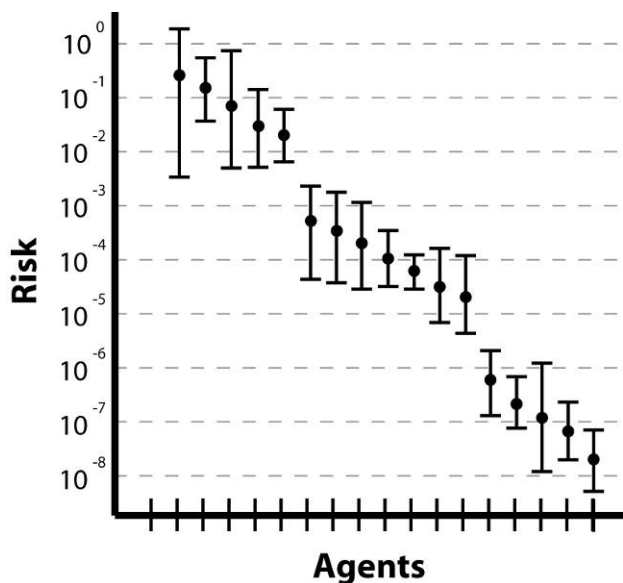


Risk assessments to guide national biodefense investments

Risk = threat x vulnerability x consequences

Goals:

- Risk assessment capability to inform National priorities
- Prioritize risks for various sorting parameters (e.g. by level of casualty or class of scenarios)
- Identify key vulnerabilities and knowledge gaps



Roadmap

- FY05:** 3 approaches; 28 agents; ~200 SMEs; ~900 citations
- FY06:** 'vetted' and delivered to HSC; used to guide BioShield Material Threat Determinations
- FY08:** extend to engineered & agricultural threats; add economic consequences
- FY08:** integrated CBRN risk assessment

Conduct lab experiments to close key data gaps



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NBACC provides scientific support for threat characterization



Biological Threat Characterization Center (BTCC)

- Conduct threat & risk assessments
- Close key gaps in 1st Gen agents
- Develop a strategy for 2nd Gen

National BioForensics Analysis Center (NBFAC)

- The designated lead national facility for bioforensic analysis

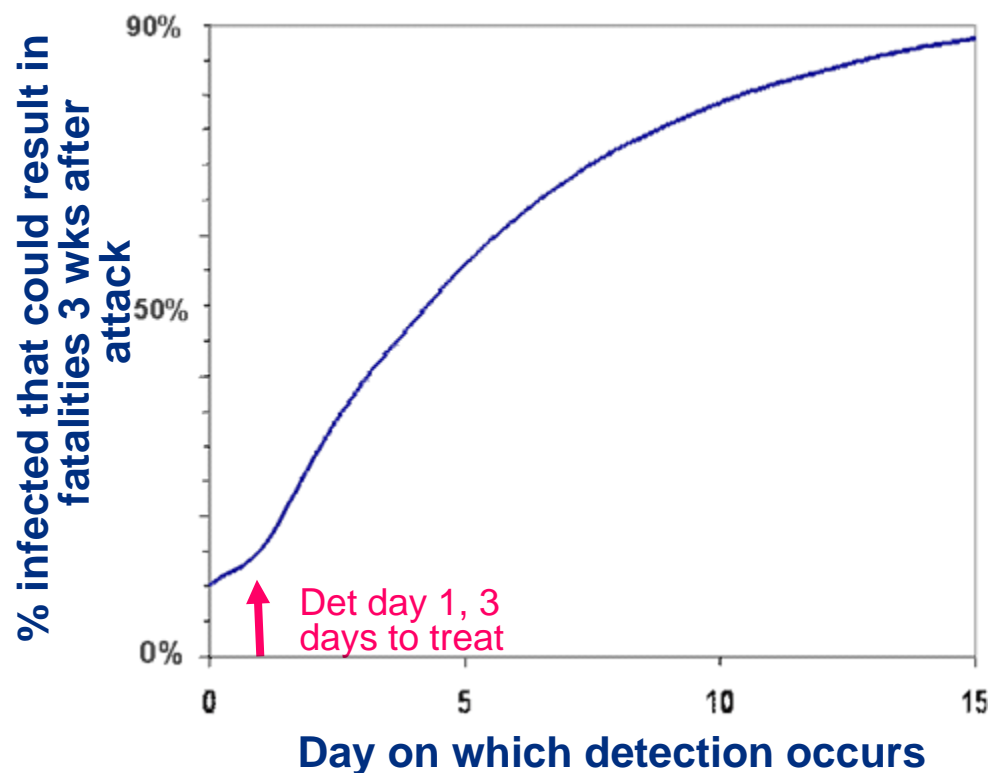
Biological Knowledge Center (BKC)

- Rapidly provide bio-threat management information and options



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Early detection & treatment play a critical role in the biodefense strategy



Detection & Characterization

- BioWatch
- BioSense
- NBIS

Medical Countermeasures

- SNS
- BioShield

Prophylaxis/Treatment

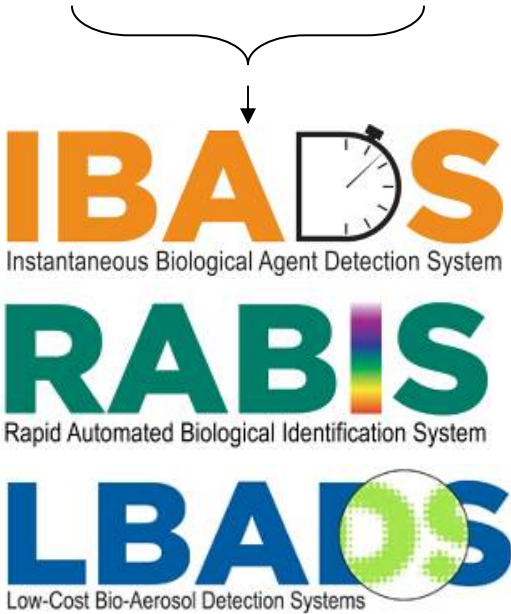
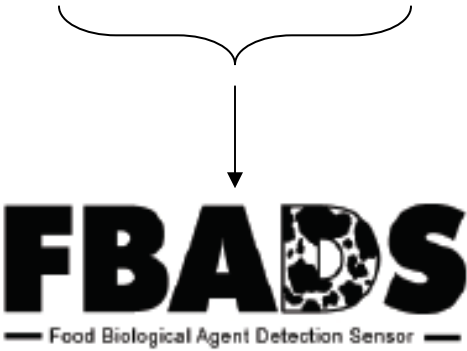
- Public Health grants
- Cities Readiness Initiative

Assumes 90% compliance and 3 days to prophylaxis



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Detection Paradigms and Timeline



Early detection to mitigate consequences



Gen 1 BioWatch (FY03):

- Operating in > 30 cities
- Detect in 12-36hrs
- Over 3M assays without a false positive

Gen 2 BioWatch enhancements (FY05-07)

- 4x increase in collectors in top 10 threat cities
- Critical transportation hubs & special events

Gen 3 BioWatch (FY09-12)

- Fully autonomous, analyzes at same site it collects – 3-6 times daily
- Cover a major portion of US population
- Detect a smaller attack than Gen 1
- Per unit operational cost < 25% of current system



R&D to develop next generation detection systems and assays

Diversify Engineering Challenge

- *Autonomous Multiplexed Micro-fluidic PCR*

Diversify Risk in Two Dimensions

Diversify Scientific Challenge

- *Broadband Approaches for Sequence Diversity*

Gen 3 Detection Systems

- Fully autonomous
- 20 agents (bacteria, viruses, toxins)
- Analyze every 3-6 hrs
- Better sensitivity & specificity than current BioWatch
- Per unit operational costs < 25% of current BioWatch

Major milestones/deliverables

FY05: estimated laboratory feasibility

FY06: develop & test lab prototype

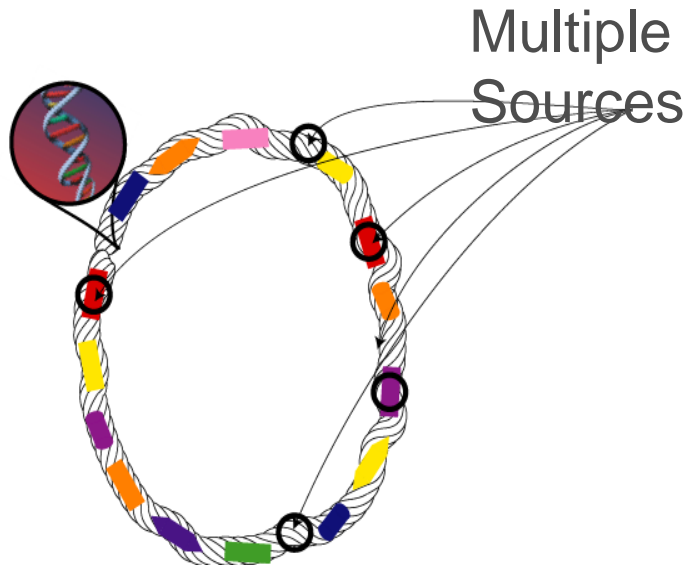
FY07: develop & test field prototype

FY08: pilot in 2 BioWatch cities



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R&D to develop validated, ultra-high specificity bio-detection assays



Goals

- Validated assays for Gen 2 & 3 BioWatch
- An operational capability to make high-confidence assays available for private sector and industry use
- Next generation assays for detecting enhanced and advanced threats

Roadmap

FY08: top 20 assays for Gen 2 BioWatch

FY08: initial set of Gen 3 assays

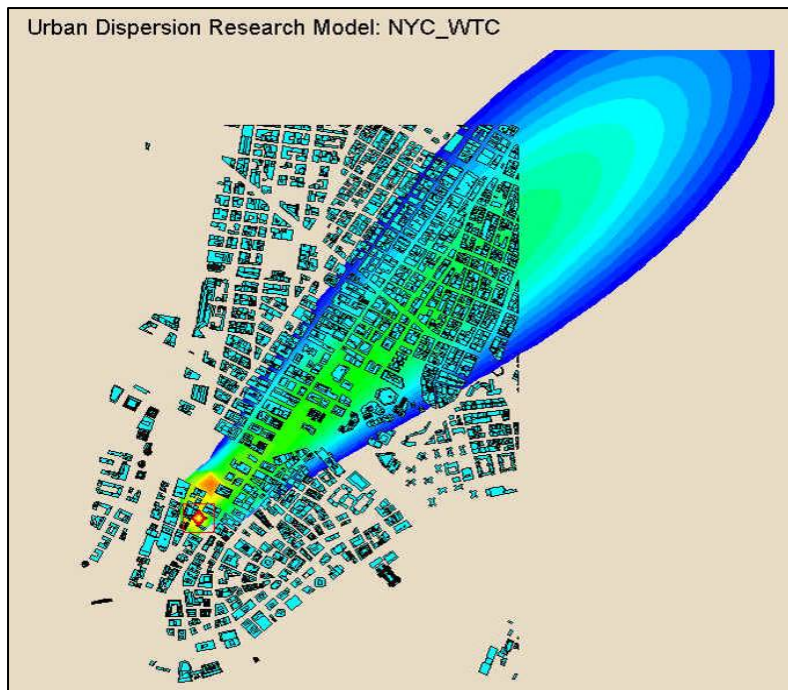
FY08: pilot the process for assays for private sector and industry use

FY09: initial operational capability for assays for private sector and industry use



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Systems approaches & decision tools to speed response & recovery



Goals

- Demonstrate systems approached to large scale urban decontamination & recovery
- Develop improved operational tools to support response & recovery

Roadmap

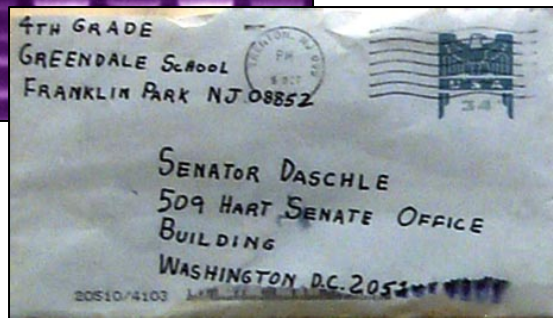
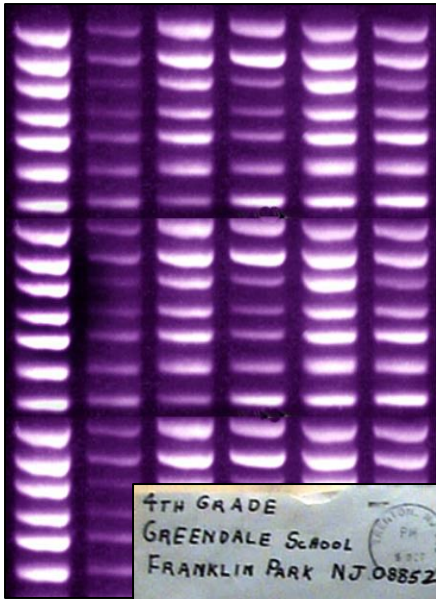
- FY07:** share results of Airport Restoration Demo thru a series of workshops
- FY07:** initiate wide area restoration demo (joint effort with DTRA & Seattle)
- FY08:** guidelines & protocols for bioagent sampling
- FY09:** 'demonstrate' wide area restoration
- FY10:** validated interagency sampling plan for anthrax



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And forensic analysis to support attribution

Attribution forms the foundation on which deterrence rests – (HSPD-10)



Goals

- National Bioforensics Analysis Cntr (NBFAC) designated lead facility for technical analysis
- Use biological, physical and chemical analysis to find out how & where agent was made

Roadmap

FY05/06: interim NBFAC operational and large operational case load

FY07: accredited by International Standards Organization (ISO-17025)

FY07: validated assays for top 20 agents

FY08: transition to the new NBACC facility

FY09: validated assays for the top 30 agents



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Plum Island is an integral part of the DHS & USDA strategy



Net assessment of the FAD threat

- Animals as aerosol generators;
- Viral stability/survivability

Assays & diagnostics

- National and international validation;
- Enhance diagnostics capacity (DDAP);
- New bioforensics capability



Vaccines and therapeutics

- Improve on current vaccines;
- Explore vaccine alternatives;
- Develop anti-virals

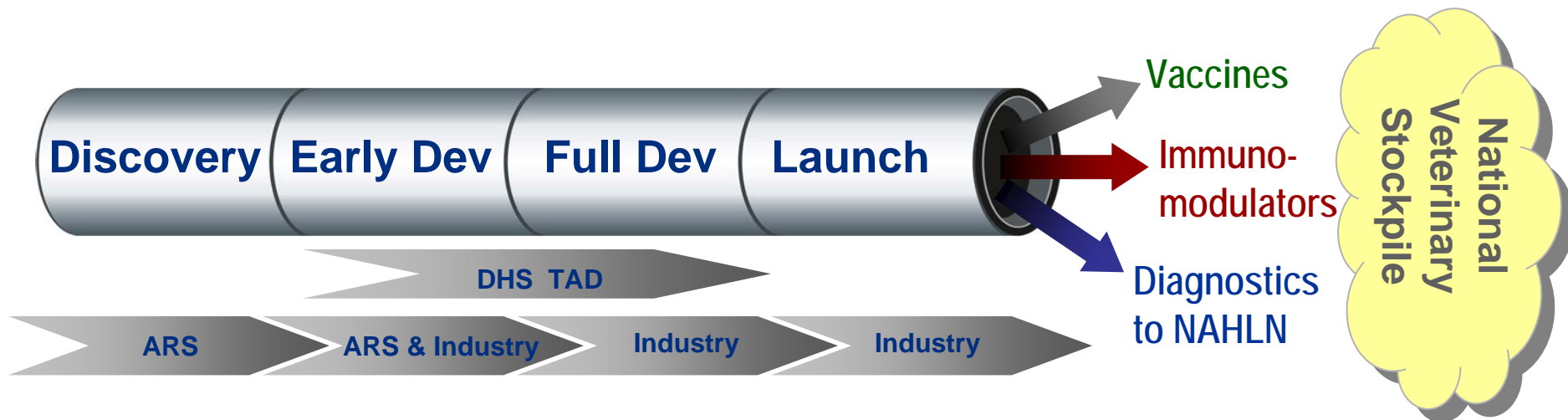


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Defend against foreign animal diseases



Develop & transfer high-throughput diagnostics



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In summary

S&T Chem-Bio efforts are part of a national strategy as reflected through the requirements of the DHS operational offices

We have already made a difference with first generation systems, e.g.

- Bio risk assessments to help prioritize national investments
- Developed and transitioned to operation bio and chem detection systems (BioWatch, PROTECT, RDCDS)
- Operational forensic capabilities
- Improved protocols and tools for protecting transportation facilities

We are currently developing the next generation tools & systems to meet DHS and National requirements





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