Chemical and Biological Division

Anne Hultgren, PhD
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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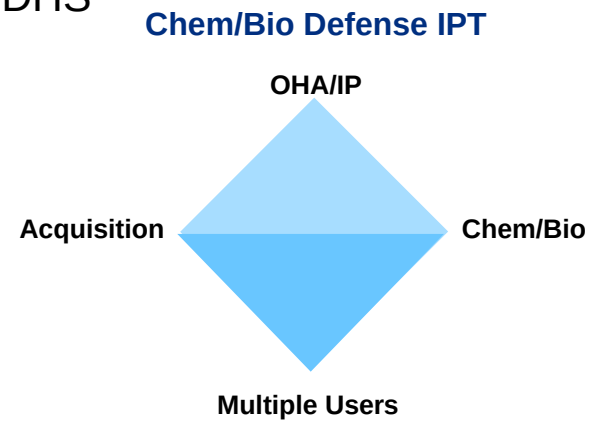
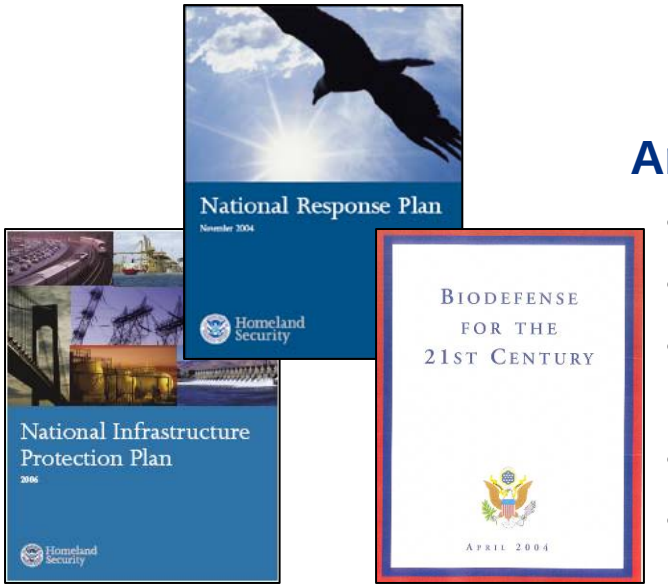
Where do our requirements come from?

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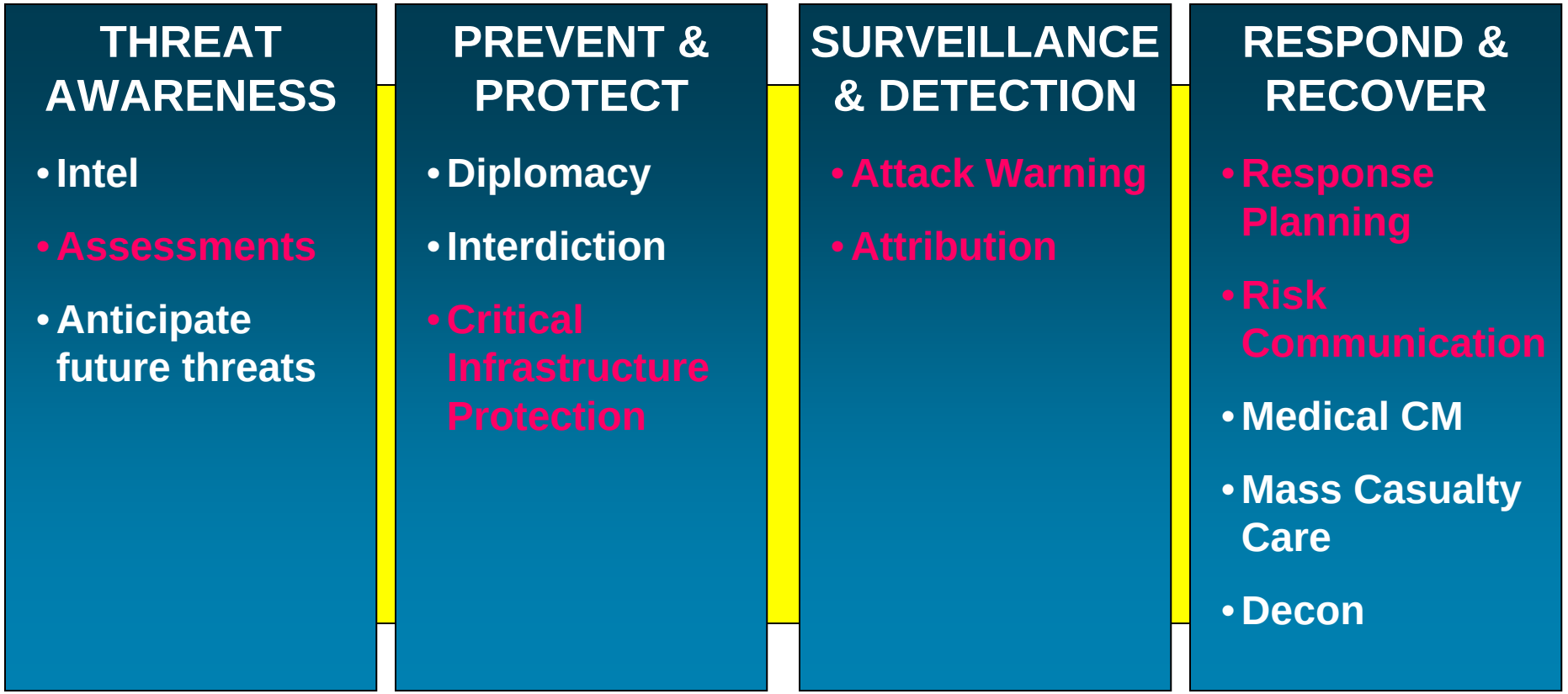
HSPD-10 lays out an integrated end-to-end biodefense strategy



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

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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

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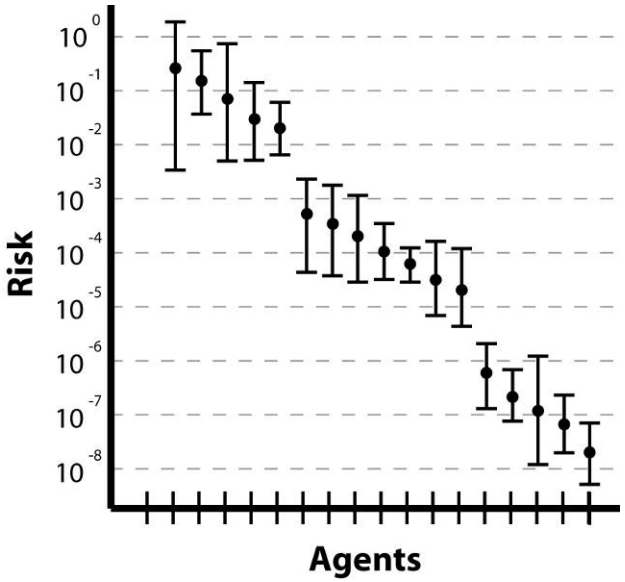
Risk assessments to guide national biodefense investments

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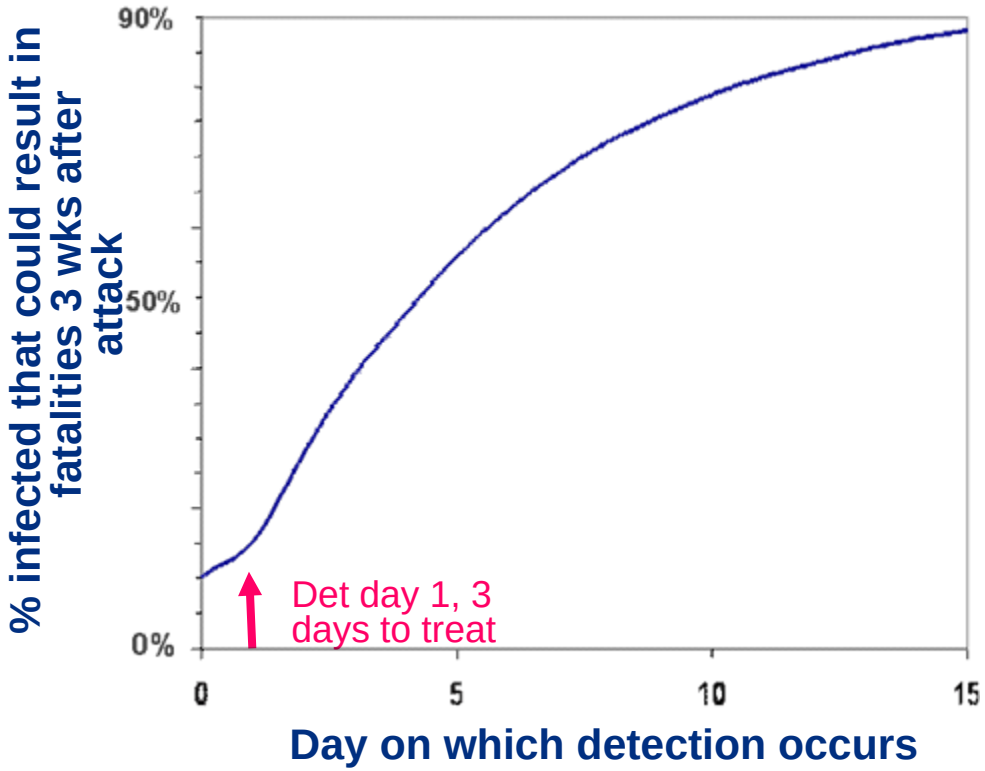
Early detection & treatment play a critical role in the biodefense strategy



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

FBADS
Food Biological Agent Detection Sensor

IBADS
Instantaneous Biological Agent Detection System

RABIS
Rapid Automated Biological Identification System

LBADS
Low-Cost Bio-Aerosol Detection Systems

Gen 3 Detection Systems

Bioagent Autonomous Networked Detectors
BAND

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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

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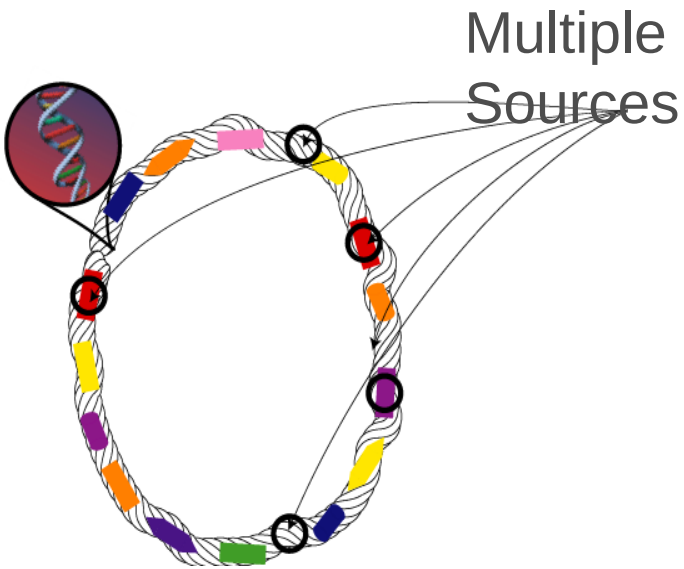
R&D to develop validated, ultra-high specificity bio-detection assays



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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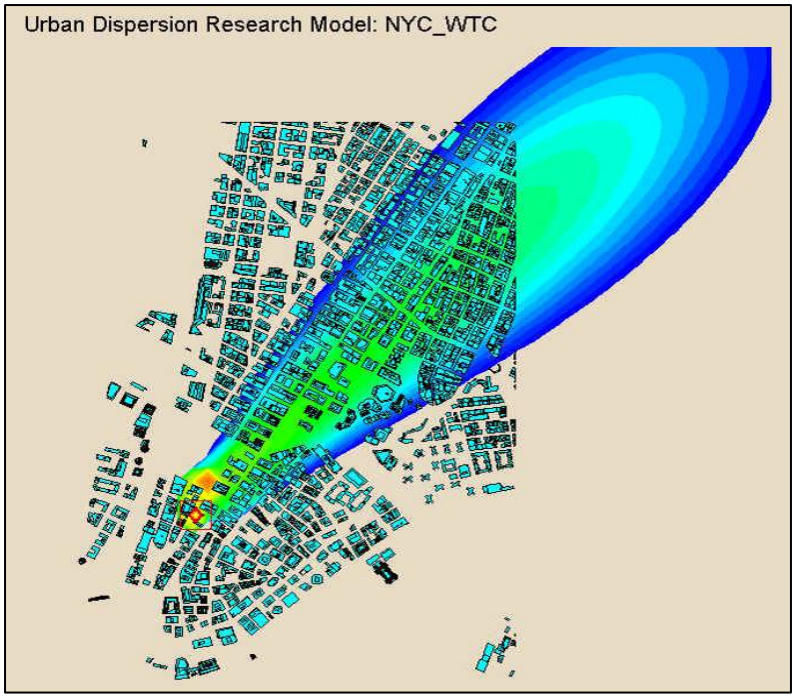
Systems approaches & decision tools to speed response & recovery



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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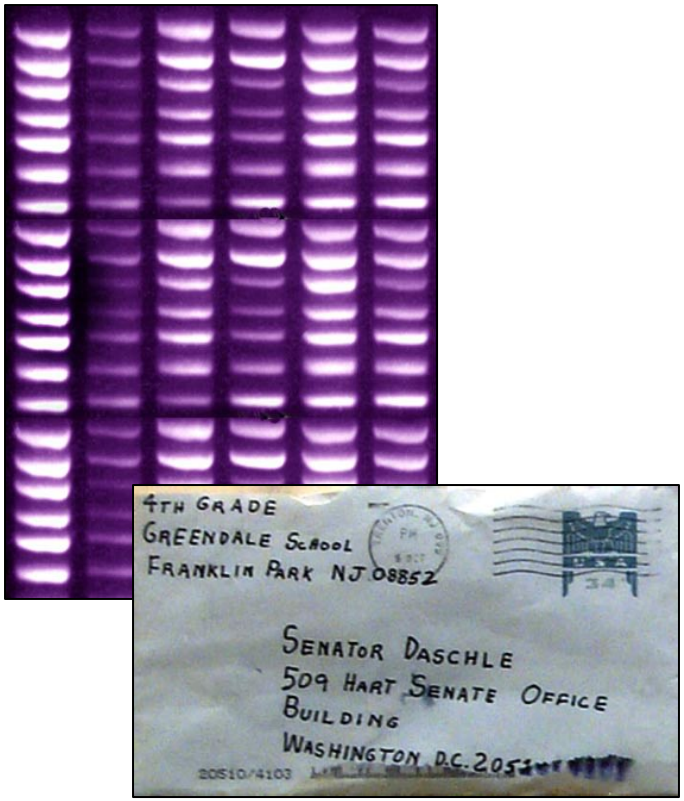
And forensic analysis to support attribution

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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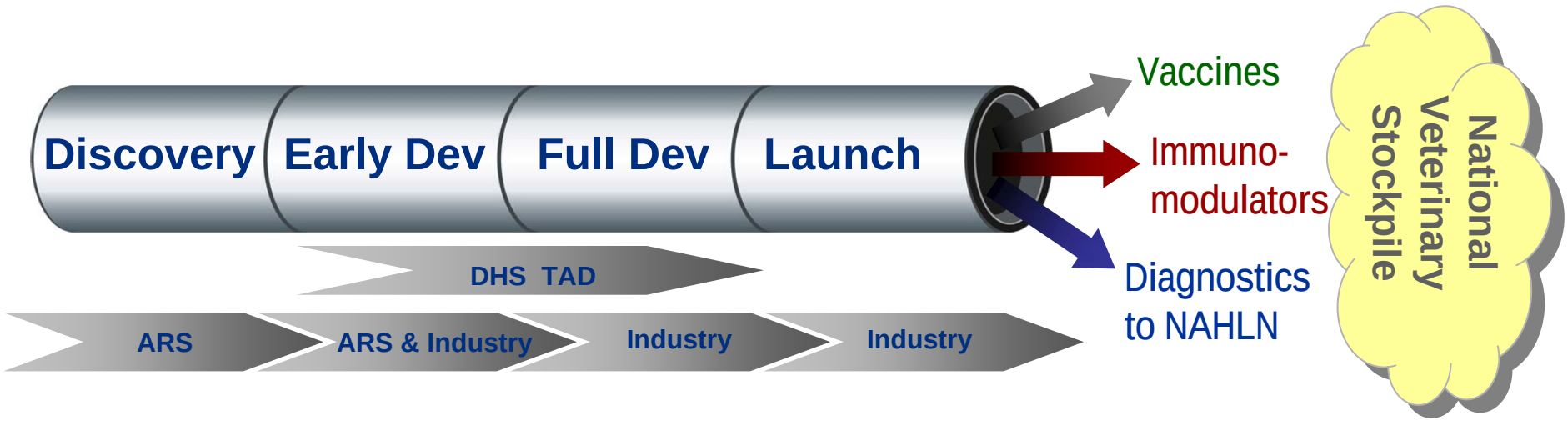
Defend against foreign animal diseases



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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