

World Congress on CBRNe Science & Consequence Management

Thinking About Countering Biological Warfare (BW)

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Biological Warfare History

Biological Warfare (BW) key data points ...

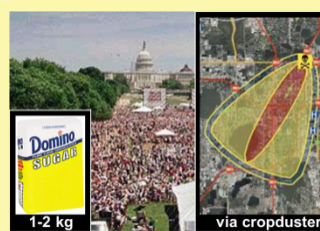
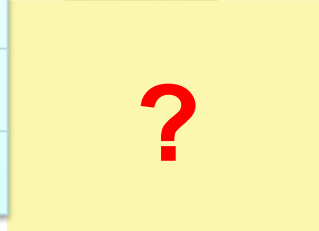
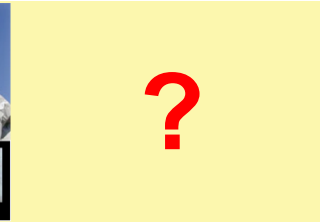
- The antiquities
- Japanese Unit 731
- U.S. and Soviet BW programs
- <25 nations have had BW programs ... today?
- Bioterrorism?



Bioterror Scenarios (from National Security Council Staff) ...

2001 Anthrax Attacks

Number that received antibiotic treatment	30,000
Number of illnesses	22
Number of deaths	5
Decontamination	6 Buildings
Direct Economic Cost	>\$1 B



Aerosol Release

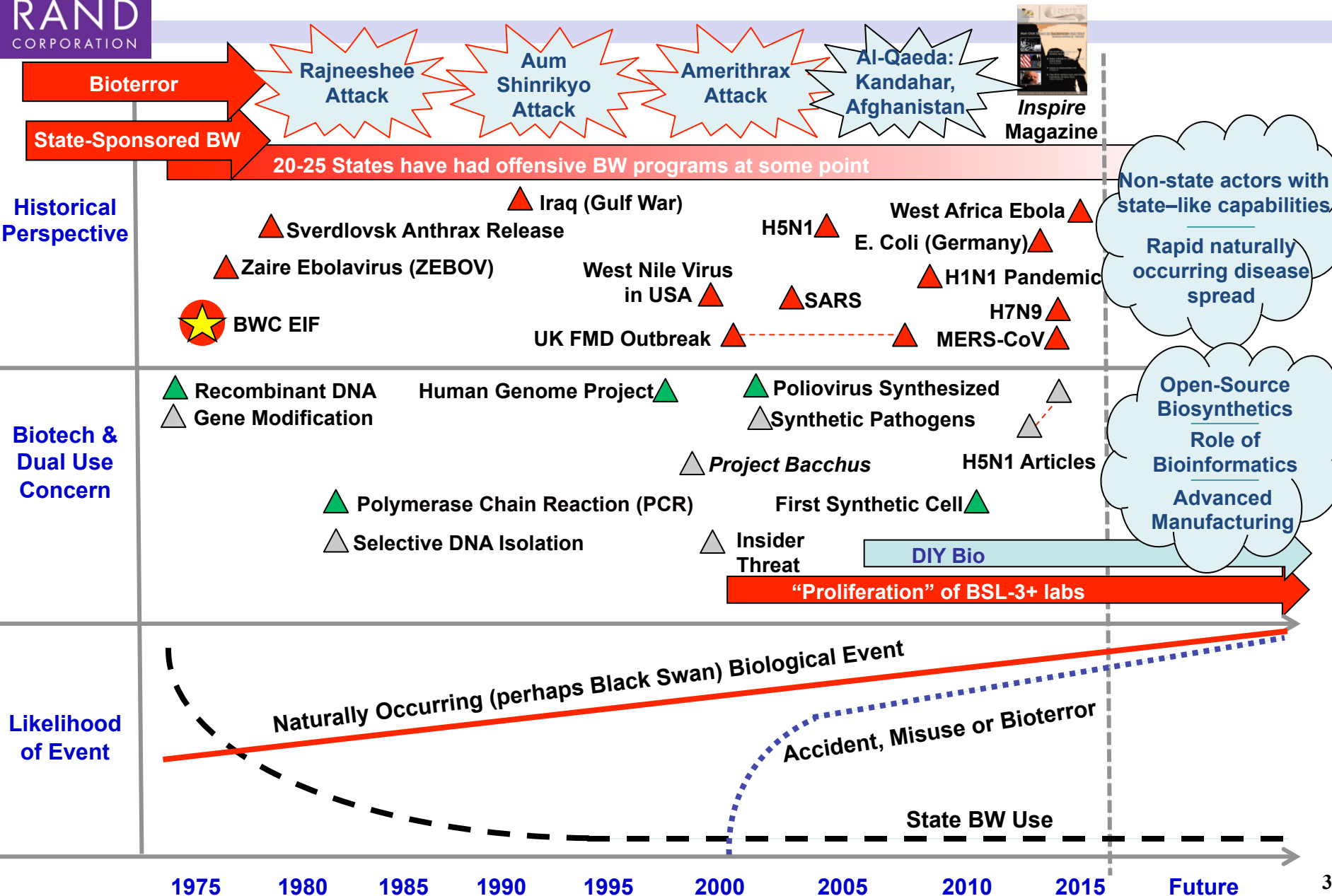
Number that will need antibiotic treatment	1.9-3.4 M
Number of illnesses	~450,000
Number of deaths	~380,000
Decontamination	City wide
Projected Economic Cost	>\$1.8 T

Issues

- Biotechnology rate of change and availability
- Level of preparedness as demonstrated by recent response capability

Instructive to look at the 40 years from the BTWC to the present

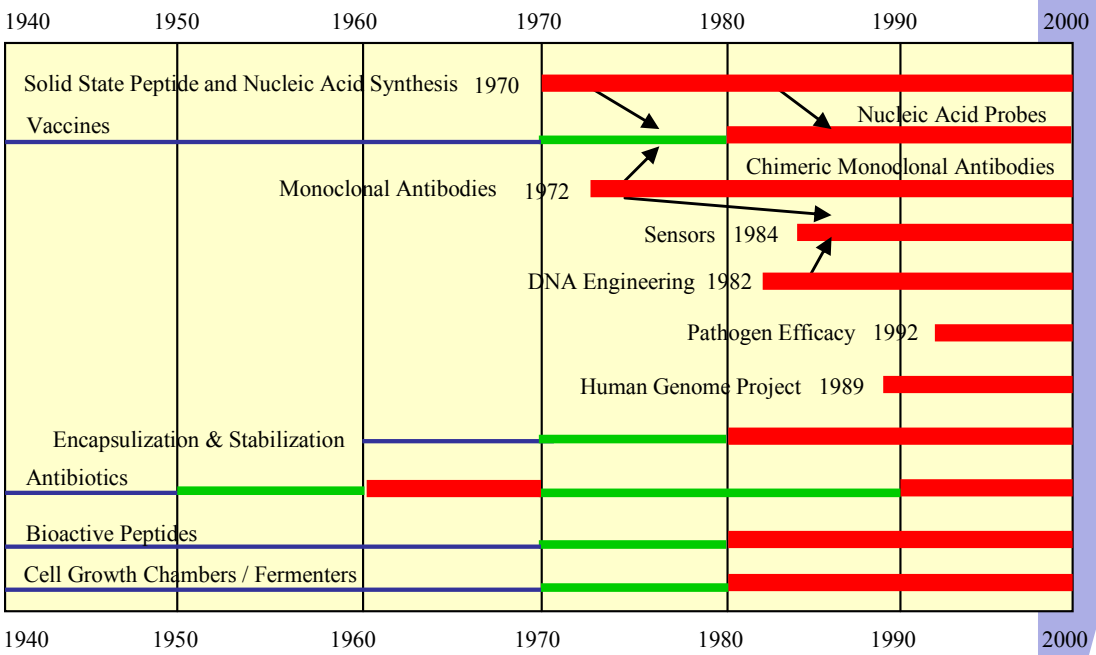
The Changing Nature of the Biological Threat



Emerging Biotechnology Trends

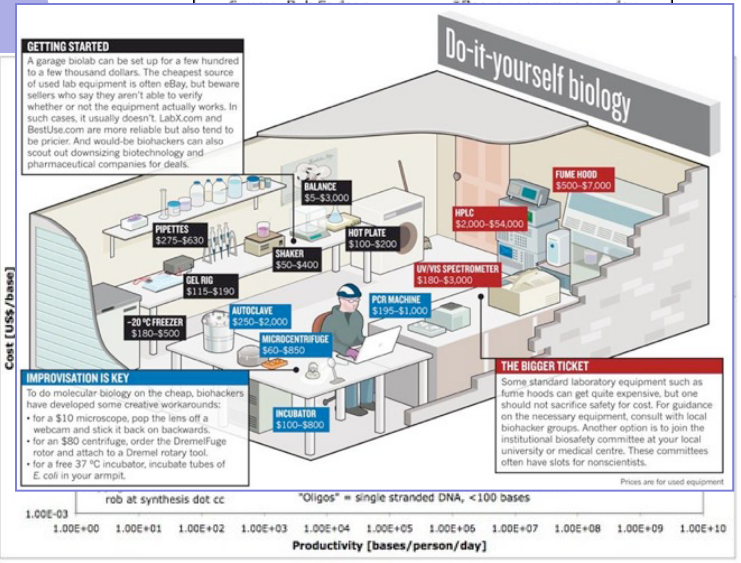
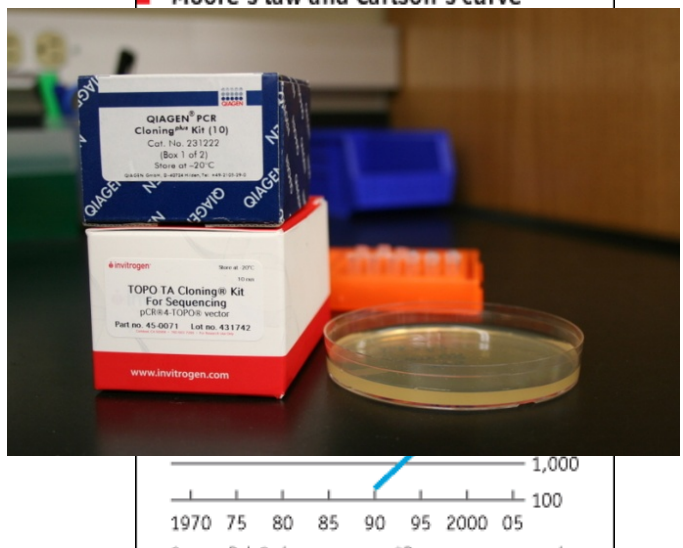
Congressional Office of Technology Assessment (1994)

(Height of line indicates rate of development – time to double) 5 yr 1 yr 6 months
 (Arrows show enabling technology) →



These technologies are now the building blocks for today's biotech ...

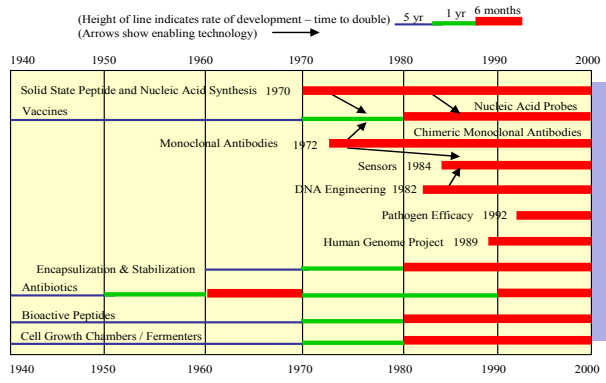
Moore's law and Carlson's curve



Emerging Biotechnology Trends

The Past

Congressional Office of Technology Assessment (1994)



The Present

New Biotech

- ENCODE ← Encyclopedia of DNA Elements
- DIY Bio
- BioBricks & iGEM
- Neighborhood labs



Synergistic Capabilities

- Nanotechnology
- Information technology
- Advanced manufacturing
- Neuropharmacology



Biotech Culture

- From Art & Science to an Industrial Process
- Biotech Democratization

The Future

The promise of personalized medicine

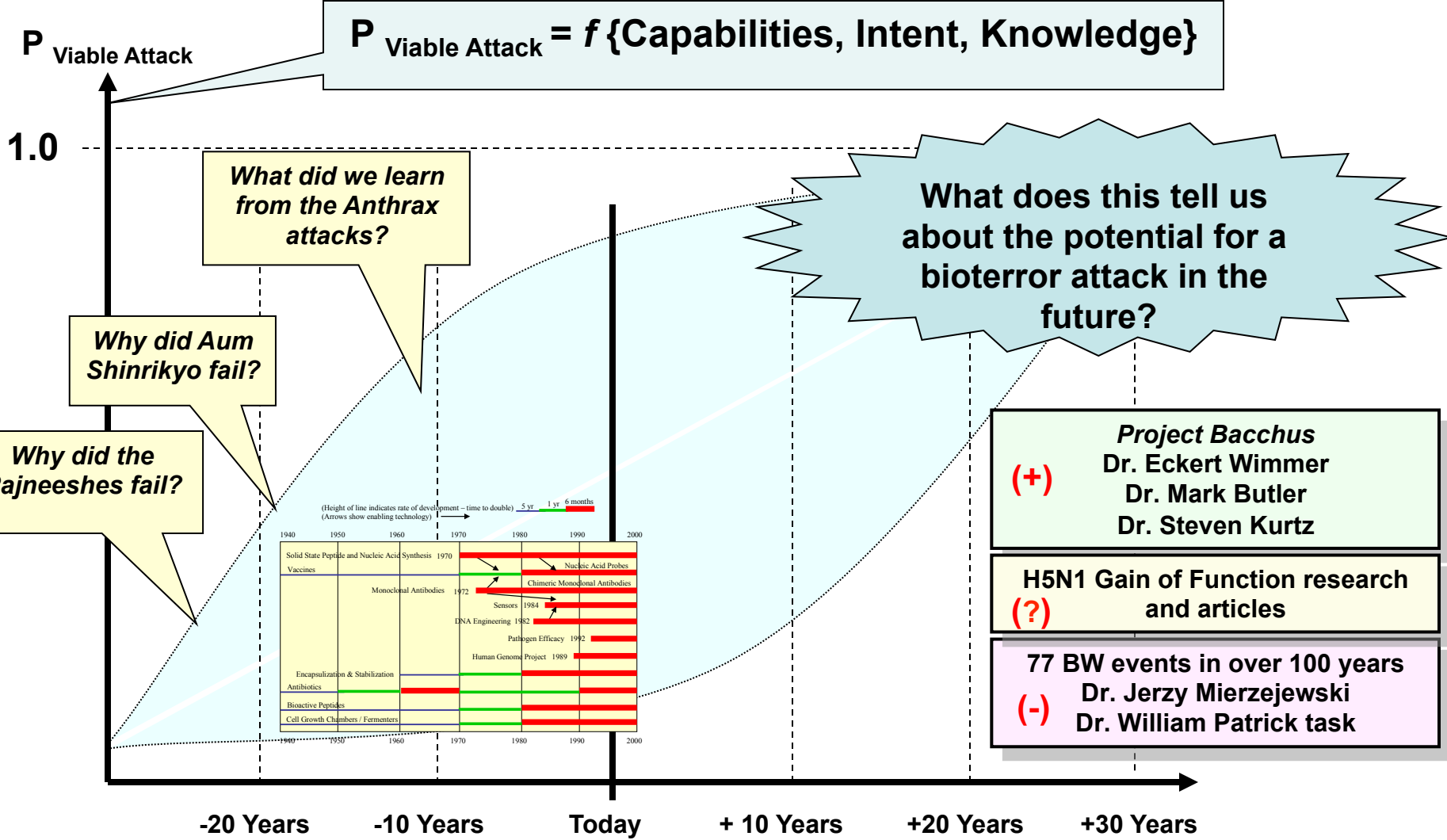
Impact on longevity and quality of life

Changing the nature of disease

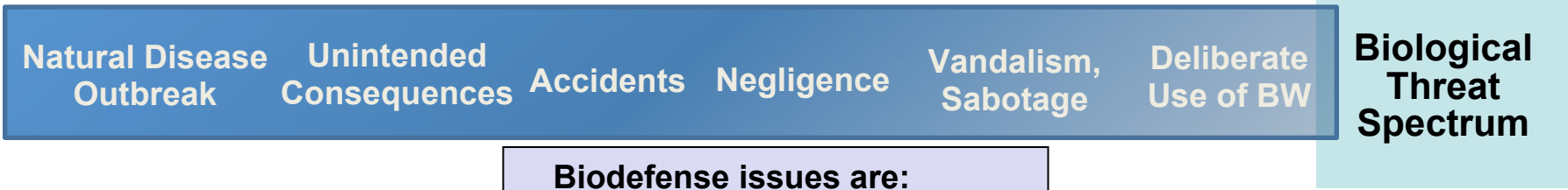
Morale & ethical issues?

Do we want to halt or slow developments in these areas?
Could we slow these types of technologies?
Which are BW specific capabilities?

Ease of Developing Bioterror Potential



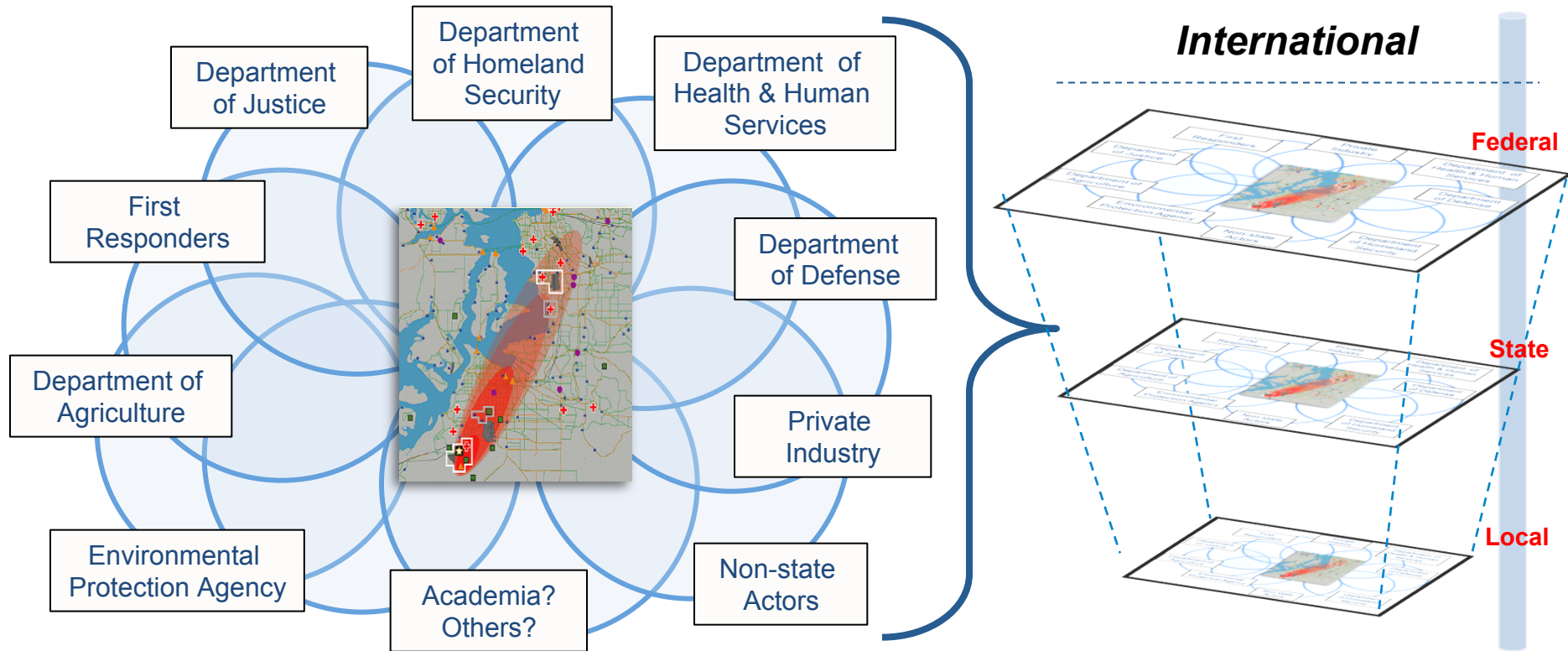
Biodefense for the 21st Century



- Biodefense issues are:**
- International & Interagency
 - Complex & Multidisciplinary
 - Inherently dual use

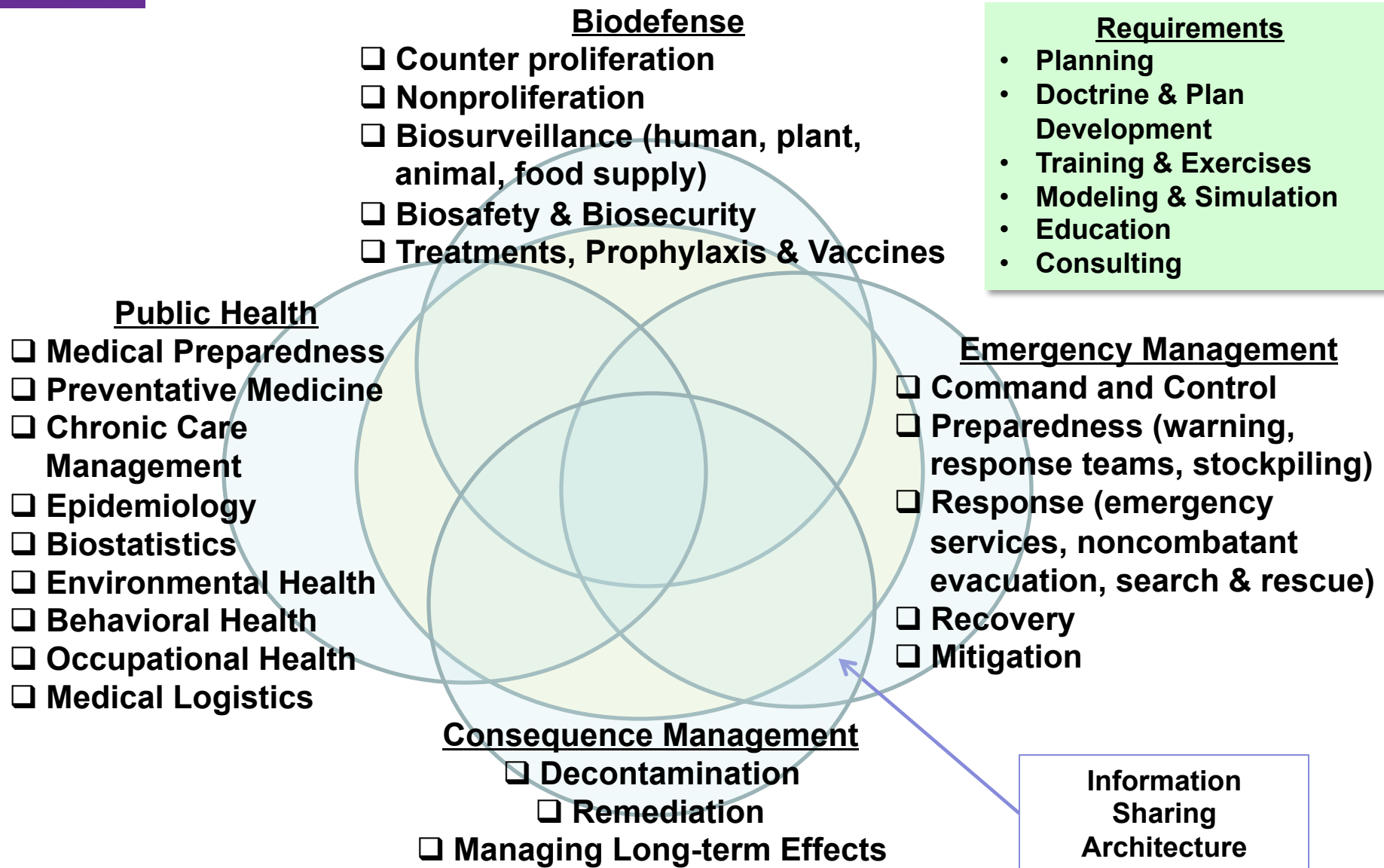


The Complexity of Developing a Comprehensive Approach to Biodefense



Biodefense ...

A Multidisciplinary Undertaking

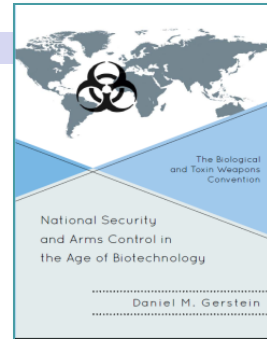


Global Health Security Agenda Objectives

To accelerate progress toward a world safe and secure from infectious disease threats in partnership with other nations, international organizations and public and private stakeholders, the Global Health Security agenda seeks to:

- **Prevent Avoidable Epidemics** including naturally occurring outbreaks and intentional or accidental releases by:
 - Preventing the emergence and spread of antimicrobial drug resistant organisms and emerging zoonotic diseases and strengthening international regulatory frameworks governing food safety
 - Promoting national biosafety and biosecurity systems
 - Reducing the number and magnitude of infectious disease outbreaks
- **Detect Threats Early** including detecting, characterizing, and transparently reporting emerging biological threats early through real-time biosurveillance, by:
 - Launching, strengthening and linking global networks for real-time biosurveillance.
 - Strengthening the global norm of rapid, transparent reporting and sample sharing in the event of health emergencies of international concern
 - Developing and deploying novel diagnostics and strengthen laboratory systems
 - Training and deploying an effective biosurveillance workforce
- **Respond Rapidly and Effectively** to biological threats of international concern by:
 - Developing an interconnected global network of Emergency Operations Centers and multi-sectoral response to biological incidents
 - Improving global access to medical and non-medical countermeasures during health emergencies

Ten Reasons Why the BTWC Matters



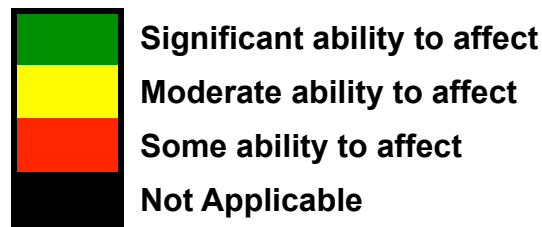
1. ... Eliminates an entire class of dangerous weapons
2. ... Provides an unequivocal norm against the use of biological weapons
3. ... Provides an international forum concerning biological defense issues
4. ... Has an important economic dimension
5. ... Is gaining more importance as spectrum of potential biological threats grows
6. ... Provides a forum for coordinating preparedness and response capabilities against a spectrum of biological threats
7. ... Relates directly to public health, environment, food security and biodiversity
8. ... Provides direct linkages to international security mechanisms
9. ... Relates to dual use capabilities in a way that no other arms control treaty does
10. ... Requires implementation of the Convention from international organizations to the individual

Thinking About Countering Bioterror: Two-Sided Analytical Construct

HLS \ BW Step	Prevent	Protect	Respond	Recover
Acquire			[Black Cell]	[Black Cell]
Process				
Weaponize				
Scenario Development (Planning)				
Deployment				

Prevention & Protection ... anticipate, preempt, detect and deter threats

Response & Recovery ... coordinated, comprehensive response & mount a swift and effective recovery effort



Potential Measures

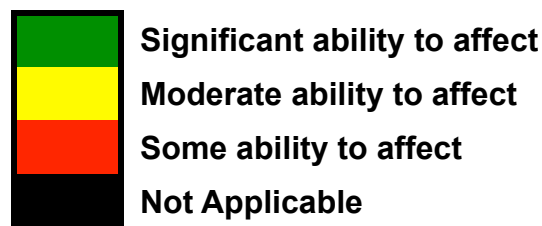
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Potential Measures

- National laws, policies and regulations for dealing with biological select agents and toxins (BSAT)
- Biological Weapons Convention (BWC)
- Intelligence & risk assessments
- Nonproliferation initiatives
- Interdiction of material and equipment

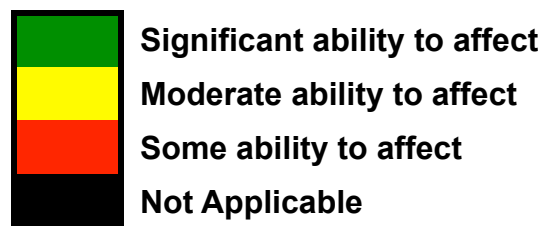
- Australia Group and Wassenaar
- Export control
- Biosafety and biosecurity for labs
- Personnel reliability programs
- Customs inspections
- Controlling knowledge of certain sensitive information

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Scenario Development (Planning)	Moderate ability to affect	Significant ability to affect	Not Applicable	Not Applicable
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Potential Measures

- Deterrence of terrorists & use of intel
- Develop and exercise non-proliferation and counter-proliferation regimes
- Enhance security (including HEPA filters) for key buildings and critical infrastructure
- Vaccines for populations against potential/likely BW pathogens

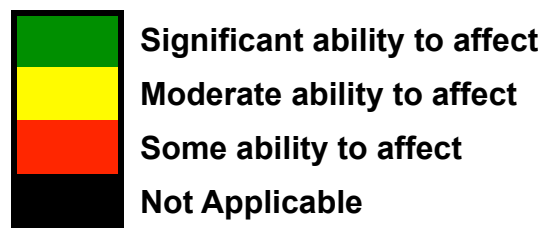
- Adherence to “One Health” concept
- Develop a biosurveillance capacity
- Demonstrate preparedness
- National stockpiles of vaccines, prophylaxis, medical countermeasures and equipment
- Employ real-time point-of-care diagnostics
- Conduct training & exercises

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Potential Measures

- Response & logistics planning
- Public awareness campaigns incl notifications
- Ensure cross-responders communications
- Medical Countermeasures (MCM) incl vaccines
- MCM distribution
- Characterization of the pathogen
- Understand the extent of the attack

- Mass casualty care & medical capacity
- Treatment of psychological casualties and managing “worried well”
- Long-term casualty care
- Forensics, attribution and response
- Decontamination
- Reestablish non- and counter proliferation

Conclusions

- Historical Perspective ... biological weapons are very dangerous, strategic weapons**

- Biotechnology ... evolving so rapidly that we are seeing the potential for state-like capabilities available to non-state actors**

- Preparedness & Response ... not yet ready for a significant biological attack**

- The Way Forward ... a systems approach to developing international and national biodefense capacity**