



# MEDICAL PRODUCTS FOR PUBLIC HEALTH EMERGENCIES

GEORGE W. KORCH, JR. PHD  
ACTING ASSISTANT SECRETARY

National defense industry association  
CBRN Conference  
15 August 2017

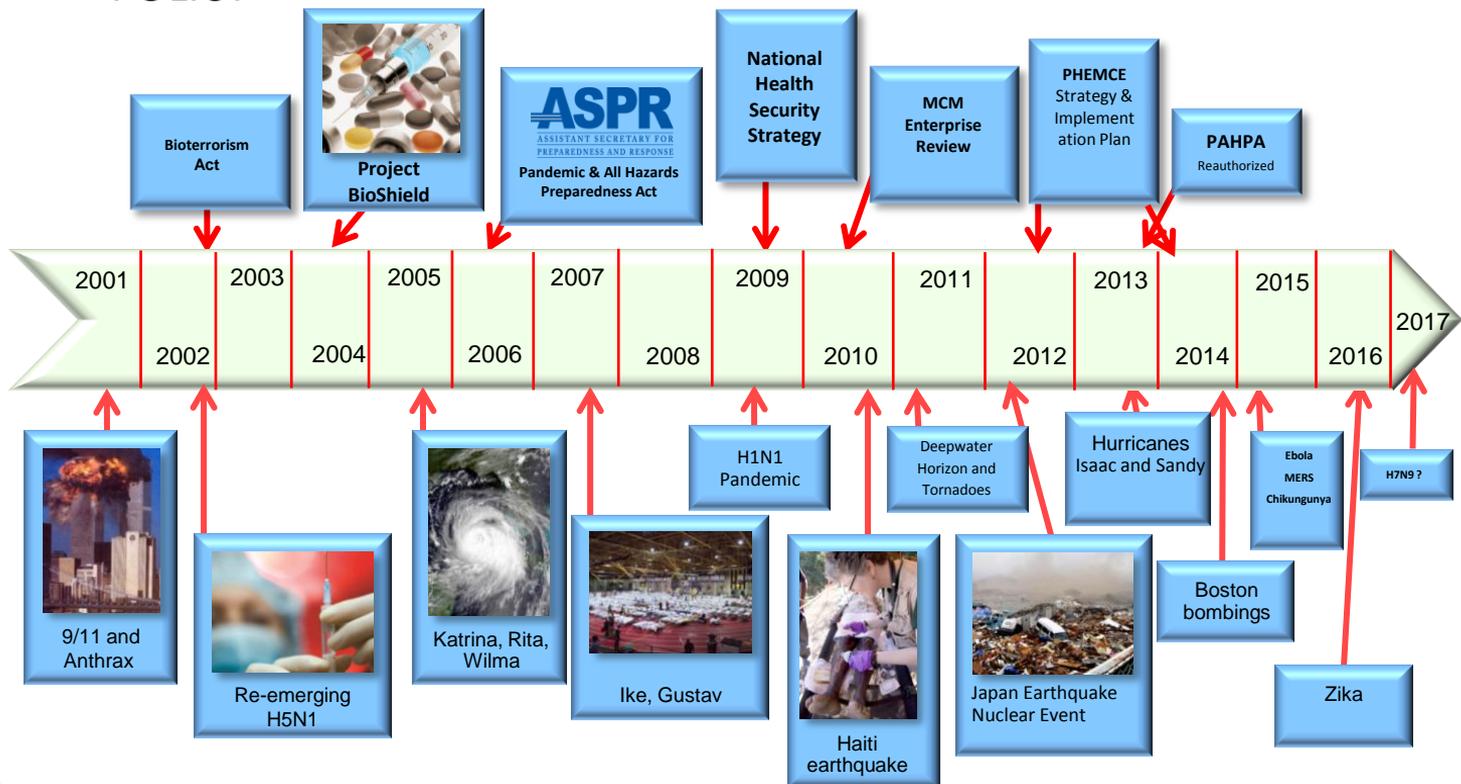
# ASPR brings together policy, science, and emergency operations



*Resilient People. Healthy Communities. A Nation Prepared.*

# Major Events Prompt Policy Changes

## POLICY



**EVENTS** *Resilient People. Healthy Communities. A Nation Prepared.*

# All-Hazards Principle & Life Cycle Management Perspective



*Resilient People. Healthy Communities. A Nation Prepared.*



# Operational Response to Events

All sizes  
expected and unexpected



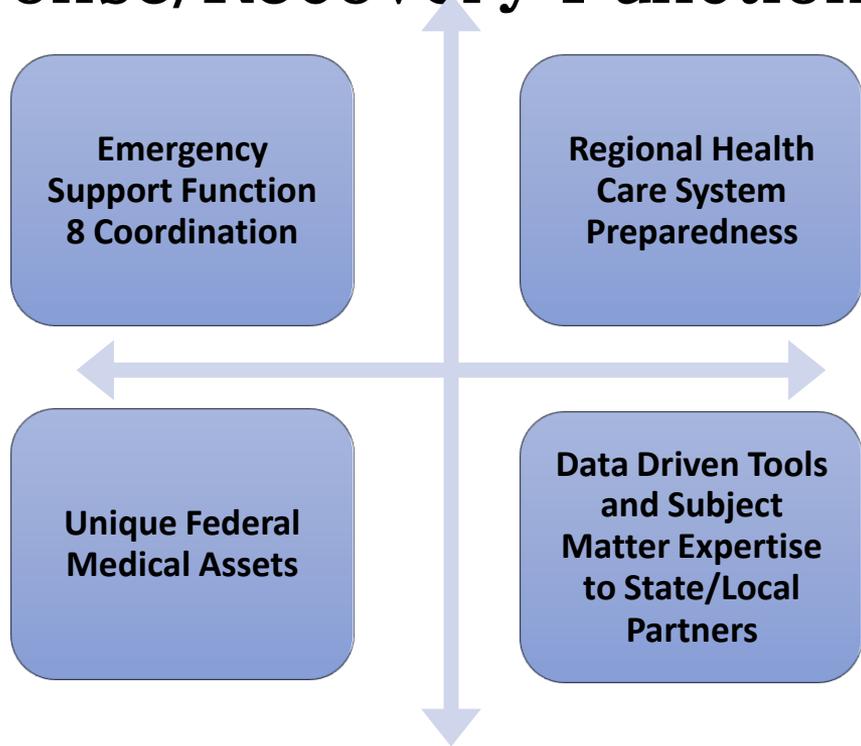
# Office of Emergency Management (OEM)

ASPR/Office of Emergency Management (OEM) manages a comprehensive Emergency Management Program (EMP) for the ASPR and administers and executes responsibilities to prepare for, respond to, and recover from threats and hazards that impact public health, healthcare and emergency medical services.



*Resilient People. Healthy Communities. A Nation Prepared.*

# OEM Coordinates Public Health and Medical Emergency Response/Recovery Functions



*Resilient People. Healthy Communities. A Nation Prepared.*

# OEM's Response Resources are Unique

## 24/7/365 Secretary's Operations Center (SOC)



HHS is the primary federal agency and federal coordinator of Emergency Support Function #8 (Public Health and Medical Services). The HHS SOC is the coordination hub during responses and facilitates all information between state/local and federal partners.

## EXTENSIVE RESOURCES AND LOGISTICS



OEM's Logistics facilities are able to manage and coordinate medical equipment, caches and other assets to provide resources at a moment's notice. There are 9 HHS Logistics Facilities located strategically across the nation.

## THOUSANDS OF MEDICAL PROFESSIONALS



NDMS Teams provide medical, veterinary, and mass fatality support to communities when impacted by a disaster. There are over 5000 NDMS intermittent employees in over 70 teams located across the nation.

# OEM Promotes Preparedness and Resilience at a Community Level



*Resilient People. Healthy Communities. A Nation Prepared.*

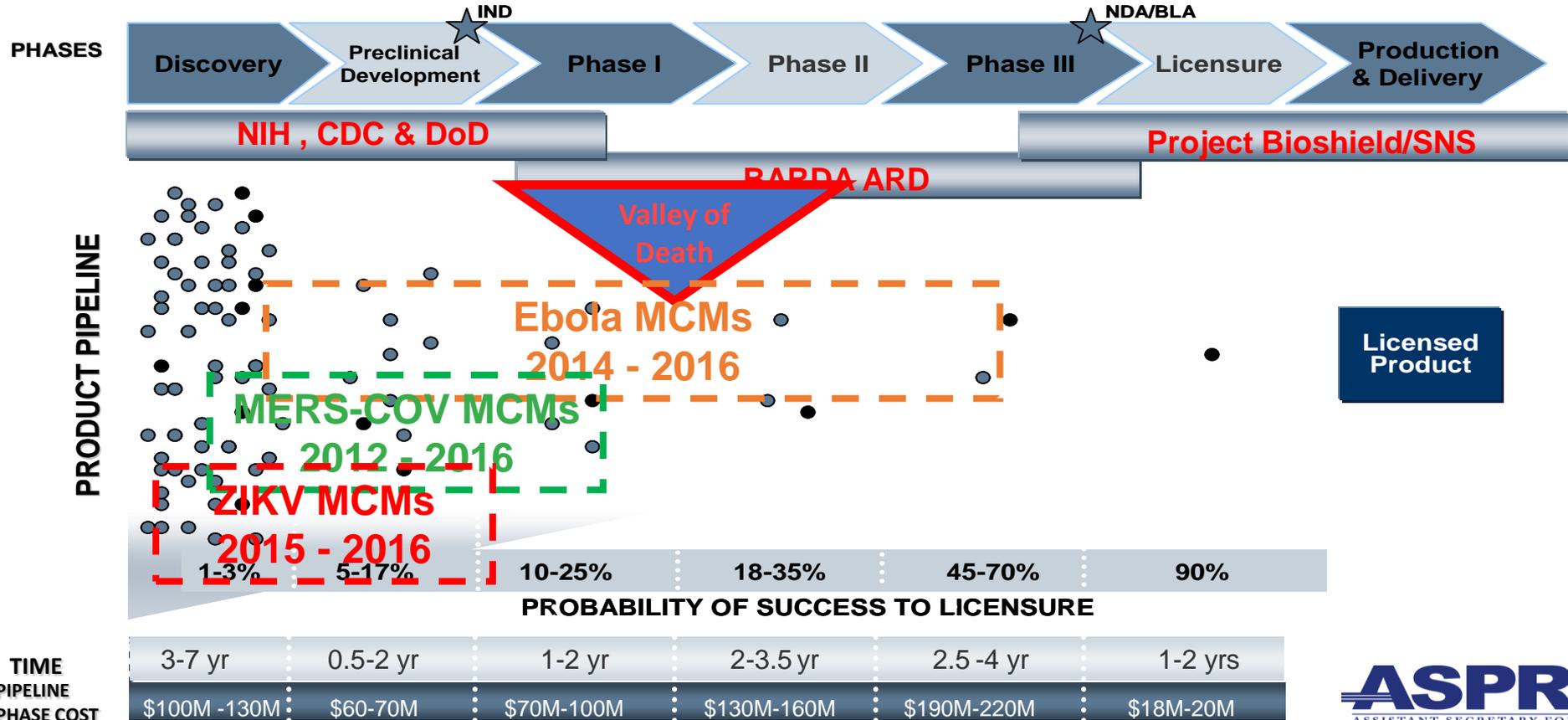


**Medical Product Development:  
Biomedical Advanced Research and  
Development Authority**

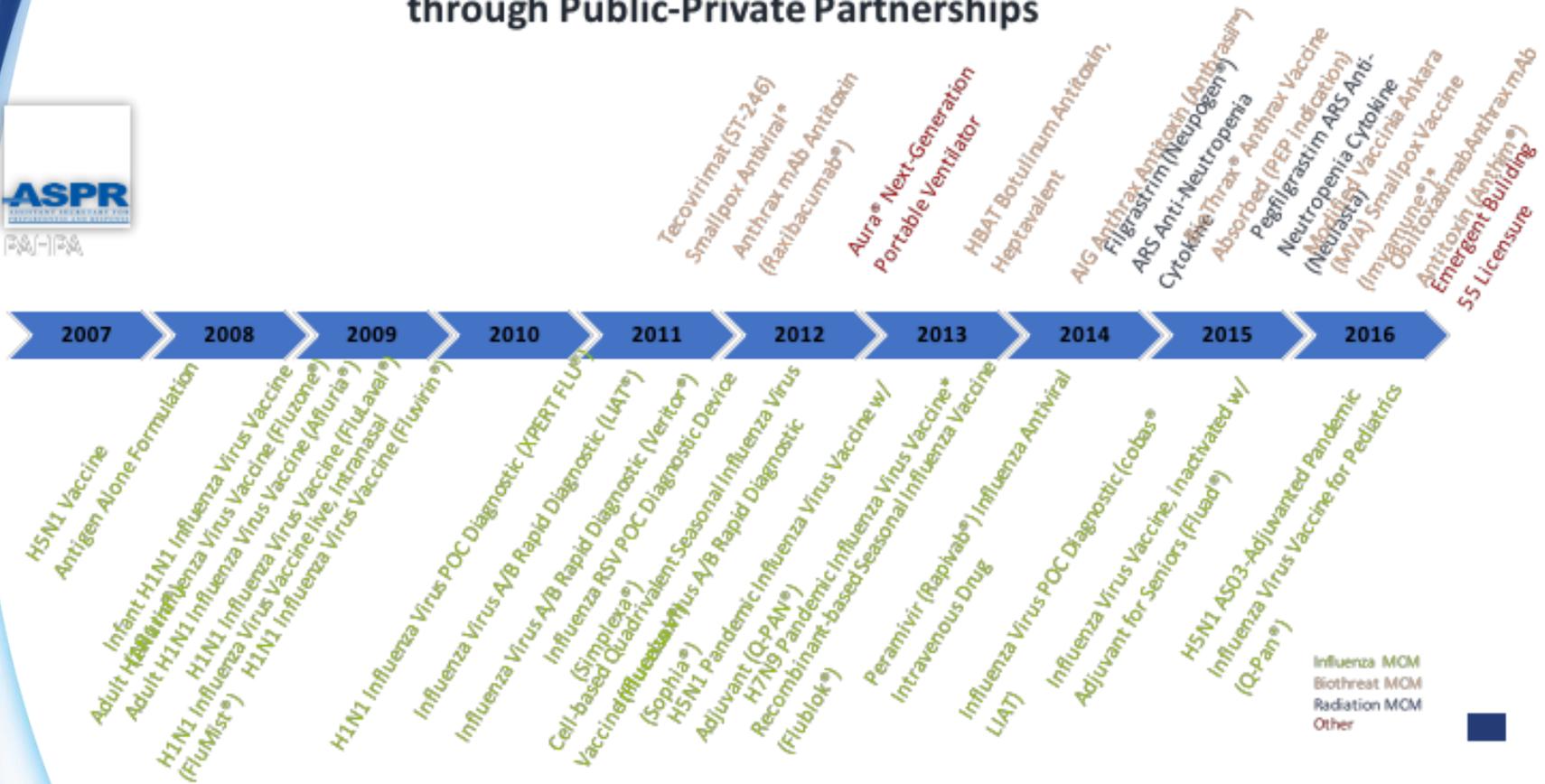
**and**

**Public Health Emergency Medical  
Countermeasures Enterprise**

# Vaccine & Drug Development: Expensive, Risky, and Lengthy

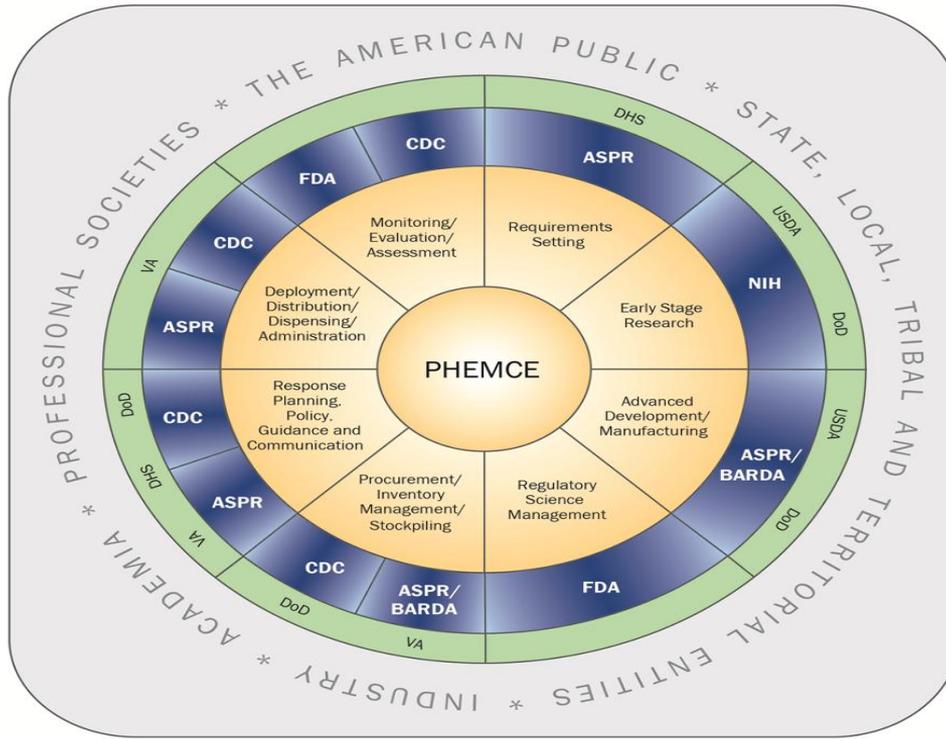


# An impressive track record of success through Public-Private Partnerships



Tecovirimat (ST-246)  
Smallpox Antibial\*  
Anthrax mAb Antitoxin (Raxibacumab\*)  
Aura\* Next-Generation Portable Ventilator  
HBAT Botulinum Antitoxin, Heptavalent  
AIG Anthrax Antitoxin (Anthraxasim)  
Filgrastim (Neupogen)  
ARS Anti-Neutropenia Cytokine  
Absorbed (PEP Indication) Pegfilgrastim ARS Anti-Neutropenia Vaccine (MVA)  
Immunylene\*  
Obiltoxizumab  
Anthrax mAb Emergent Building

# Public Health Emergency Medical Countermeasures Enterprise Lead Roles



## Key

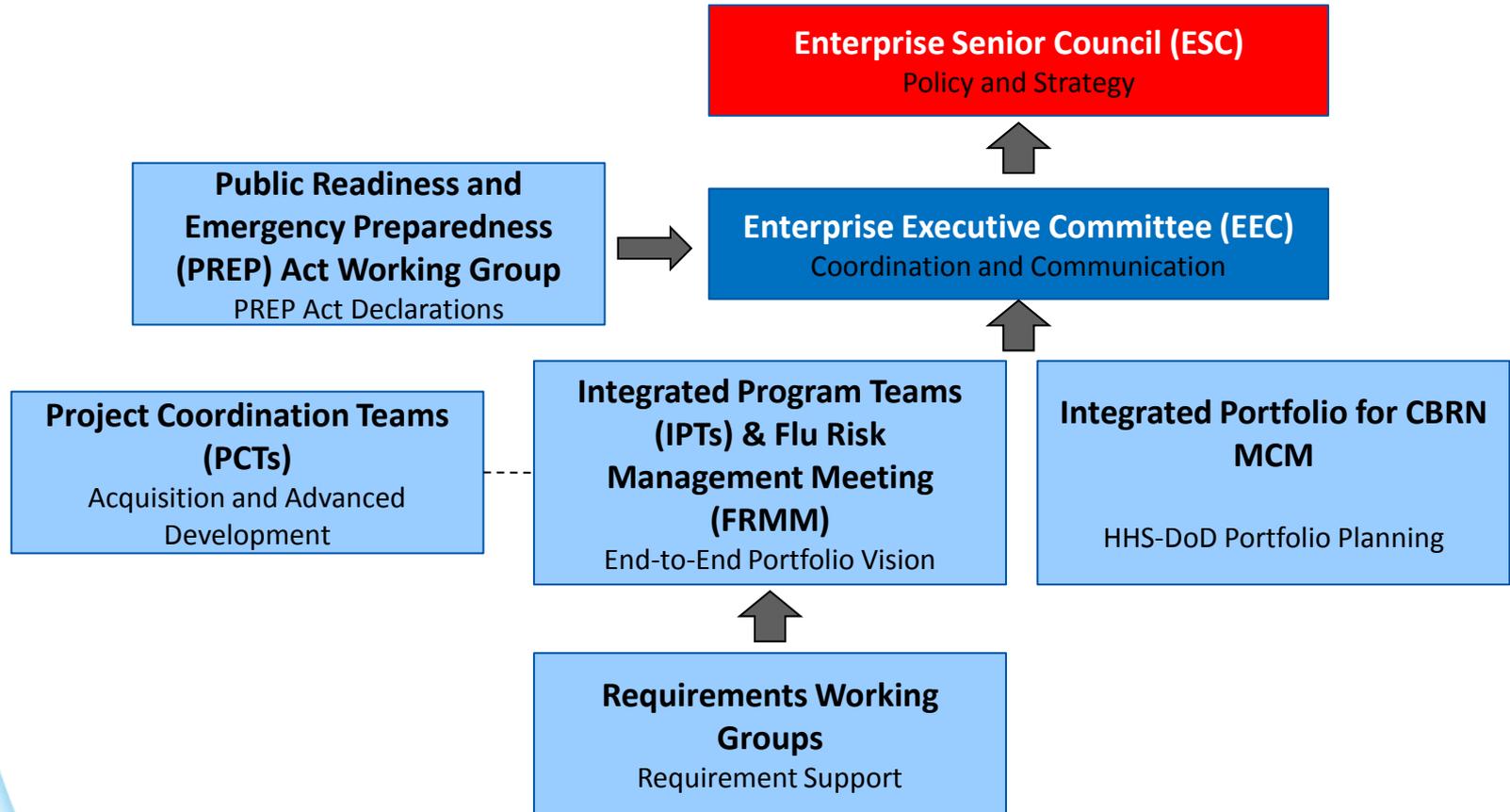
-  PHEMCE Mission Components
-  HHS PHEMCE Agencies
-  Non-HHS PHEMCE Agencies
-  Non-Federal Stakeholders

## Acronyms

- PHEMCE:** Public Health Emergency Medical Countermeasures Enterprise
- DHS:** Department of Homeland Security
- DoD:** Department of Defense
- USDA:** U.S. Department of Agriculture
- VA:** Department of Veterans Affairs
- HHS:** Department of Health and Human Services
- ASPR:** Assistant Secretary for Preparedness and Response
- BARDA:** Biomedical Advanced Research & Development Authority
- CDC:** Centers for Disease Control and Prevention
- FDA:** Food and Drug Administration
- NIH:** National Institutes of Health

*Resilient People. Healthy Communities. A Nation Prepared.*

# PHEMCE Governance Structure



*Resilient People. Healthy Communities. A Nation Prepared.*

# Recognized Threats

Agents	MTD Issued	MTA Published
<b>Chemical</b>		
Volatile Nerve Agents	September 2011 (Nerve Agents)	November 2005
Low Volatility Nerve Agents	September 2011 (Nerve Agents)	January 2007
Cyanide Initial Evaluation	N/A	January 2007
Pulmonary Agents	N/A	March 2007
Vesicants	N/A	May 2007
Blood Agents	September 2011 (Cyanide)	July 2007
<b>Radiological / Nuclear</b>		
Radiological Materials	September 2004	July 2005
Nuclear Detonation	September 2004	December 2005
<b>Biological</b>		
Botulinum Toxin	June 2004	August 2004
Plague	September 2006	August 2004
Anthrax	January 2004	April 2005
MDR Anthrax	September 2006	April 2005*
Smallpox	September 2004	February 2012
Tularemia	September 2006	December 2006
Typhus	September 2006	December 2006
Q-fever	N/A	December 2006
Rocky Mountain Spotted Fever	N/A	December 2006
Glanders	September 2006	February 2007
Melioidosis	September 2006	February 2007
Viral Hemorrhagic Fevers - Filovirus Ebola Marburg	September 2006	December 2006
Viral Hemorrhagic Fevers - Junin, Arenavirus, Flavivirus, Bunyavirus	September 2006 (Junin) -- Rescinded September 2011	February 2007

\*Extrapolated from Anthrax MTA

# Preparedness Assessment Determinants

## Need

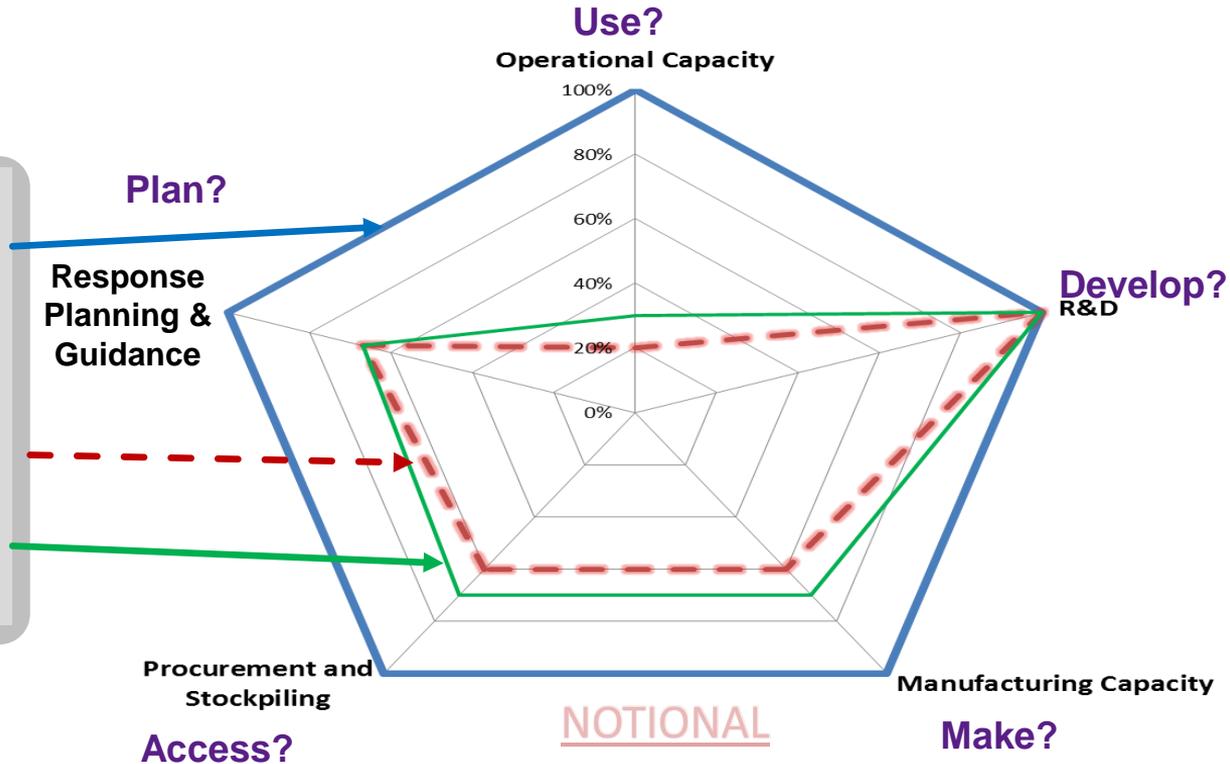
Preparedness Goals express our strategic end state

## Current

Current levels show our present state of preparedness

## Projected

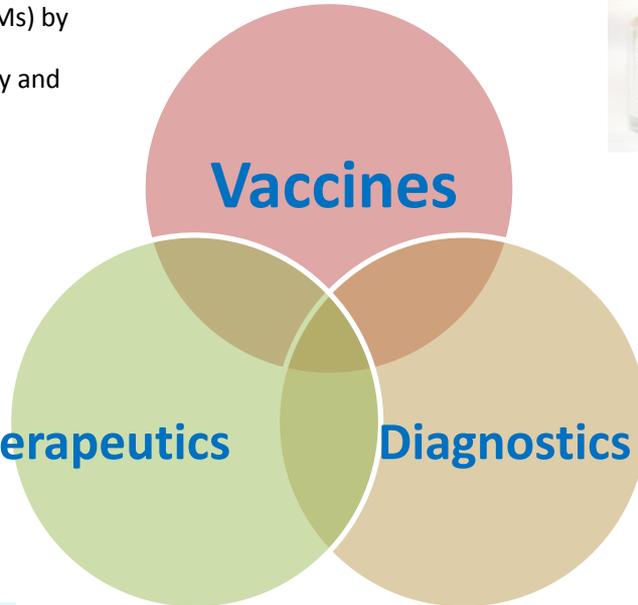
Projected level is an estimate given a 5-year resource constraint



*Resilient People. Healthy Communities. A Nation Prepared.*

# What BARDA Does

BARDA develops and makes available medical countermeasures (MCMs) by forming unique public-private-partnerships with biotechnology and industry partners



10 - 1.6 mL Single Use Vials NDC 55513-546-10

AMGEN

Neupogen®  
Filgrastim

A Recombinant Granulocyte Colony Stimulating Factor (rG-CSF) derived from E. coli

480 mcg/1.6 mL 300 mcg/1 mL (3 x 10<sup>7</sup> Units/1 mL)

For Subcutaneous or Intravenous Use Only  
Sterile Solution - No Preservative

Refrigerate at 2° to 8° C (36° to 46° F). Avoid Shaking.

Amgen Inc. Thousand Oaks, CA 91320 U.S.A. U.S. License No. 1080



GlaxoSmithKline



GlaxoSmithKline



FLUCELVAX  
Influenza Virus Vaccine

emergent  
biosolutions™

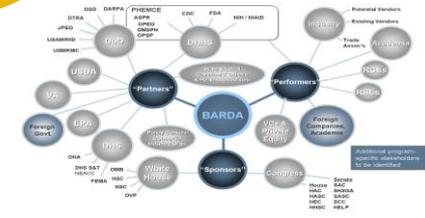
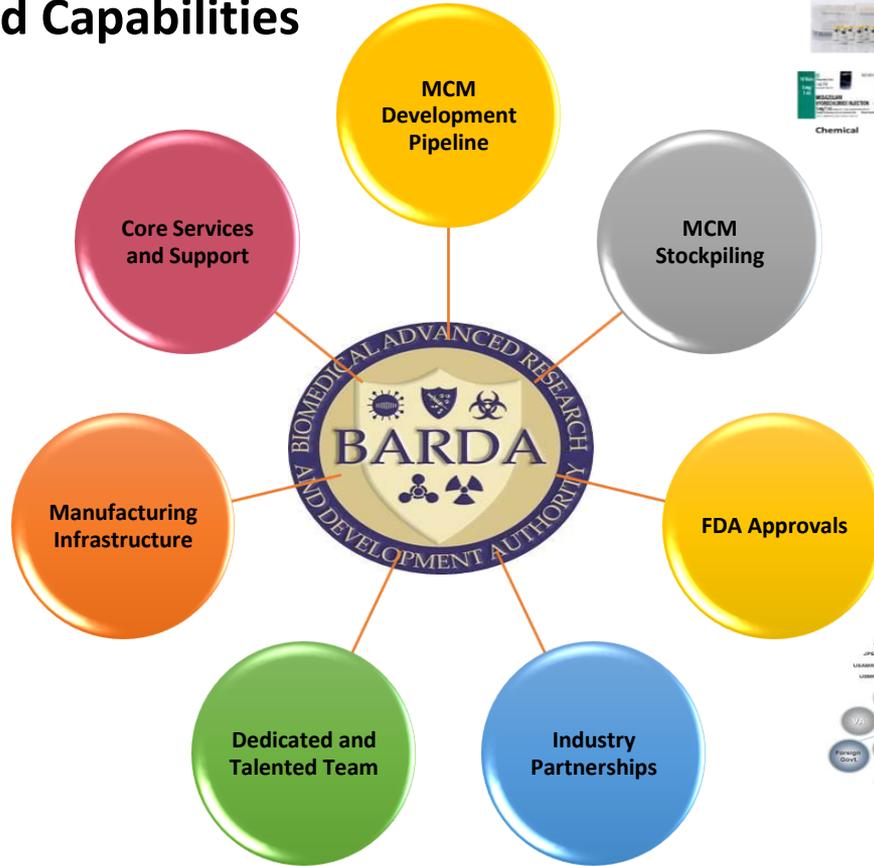


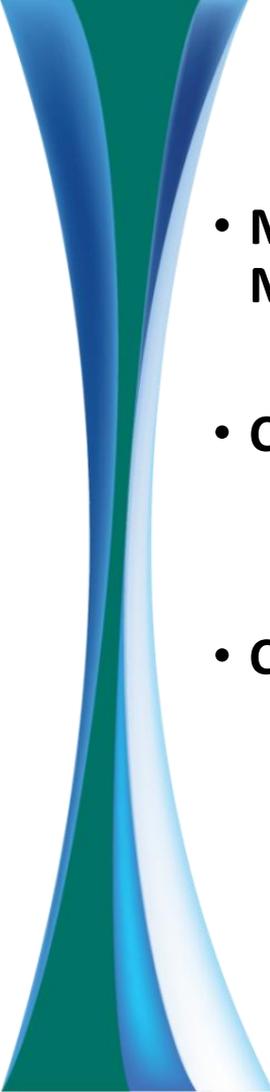
FOCUS  
Diagnostics



Resilient People. Healthy Communities. Always Prepared.

# BARDA's Integrated Capabilities



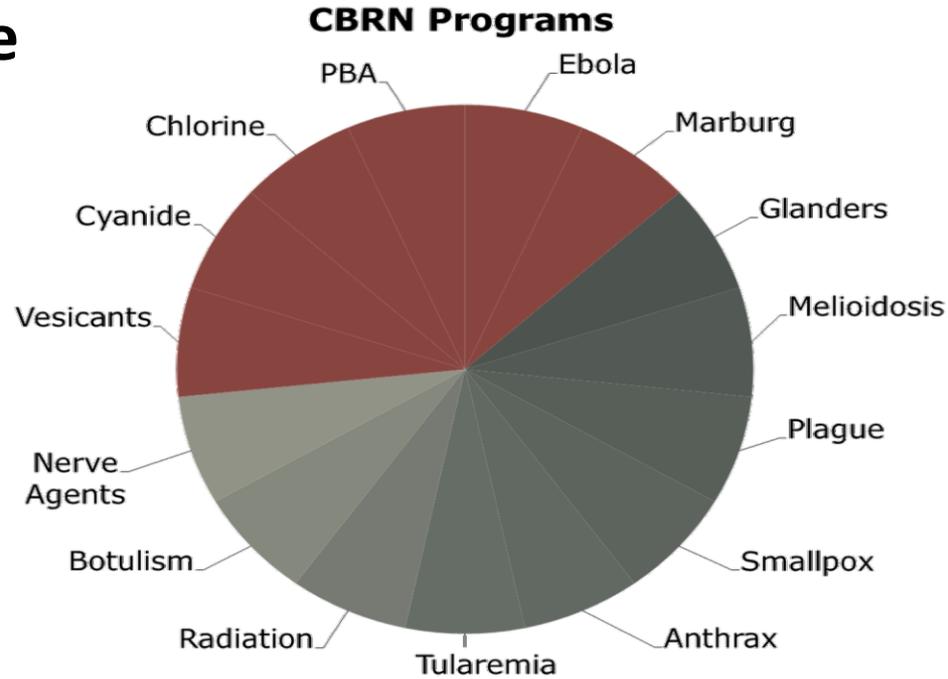


# CBRN Goals

- **Mitigate the effects of an attack by 80% of threats that have Material Threat Determinations issued by 2023**
- **Complete nearly all major programmatic objectives by 2023**
  - *Reach a point where the law of diminishing returns applies*
- **Continue to fill operational gaps in our MCM response**
  - *Lower costs, treat special populations, etc.*

# Coverage for Current Known Threat Landscape

- **60% of threats have a least one MCM stockpiled**
- **40% remain unmitigated**



# Progress Report 2017

**Anthrax:** Vaccine, Antibiotics, Antitoxins

**Smallpox:** Vaccines, Antiviral drug

**Botulism:** Heptavalent Antitoxin

**Radiation:** Biodosimetry Devices, Cytokines

Burn: Silver Dressing, Debridement, Artificial Skin,  
Autograft Sparing Technologies

**Plague:** Antibiotics

**Melioidosis:** Antibiotics

**Glanders:** Antibiotics

**Nerve Agents:** Decon Guidance, Midazolam

**Ebola Zaire:** No MCM

**Ebola Sudan:** No MCM

**Marburg:** No MCM

**Chlorine:** No MCM

**Mustard:** No MCM

**PBAs:** No MCM



# Project BioShield Successes

Smallpox

**Anthrax Antitoxins**



Vaccine

ST-246 Antiviral



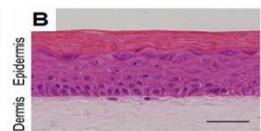
**Anthrax Vaccines**



**Chemical**



**Botulism**



**Burn Products – Nuclear, Radiation, Chem**  
*Resilient People. Healthy Communities. A Nation Prepared.*

# PBS Successes

## Nuclear/Radiation



VMI



**DxTerity**  
Diagnostics

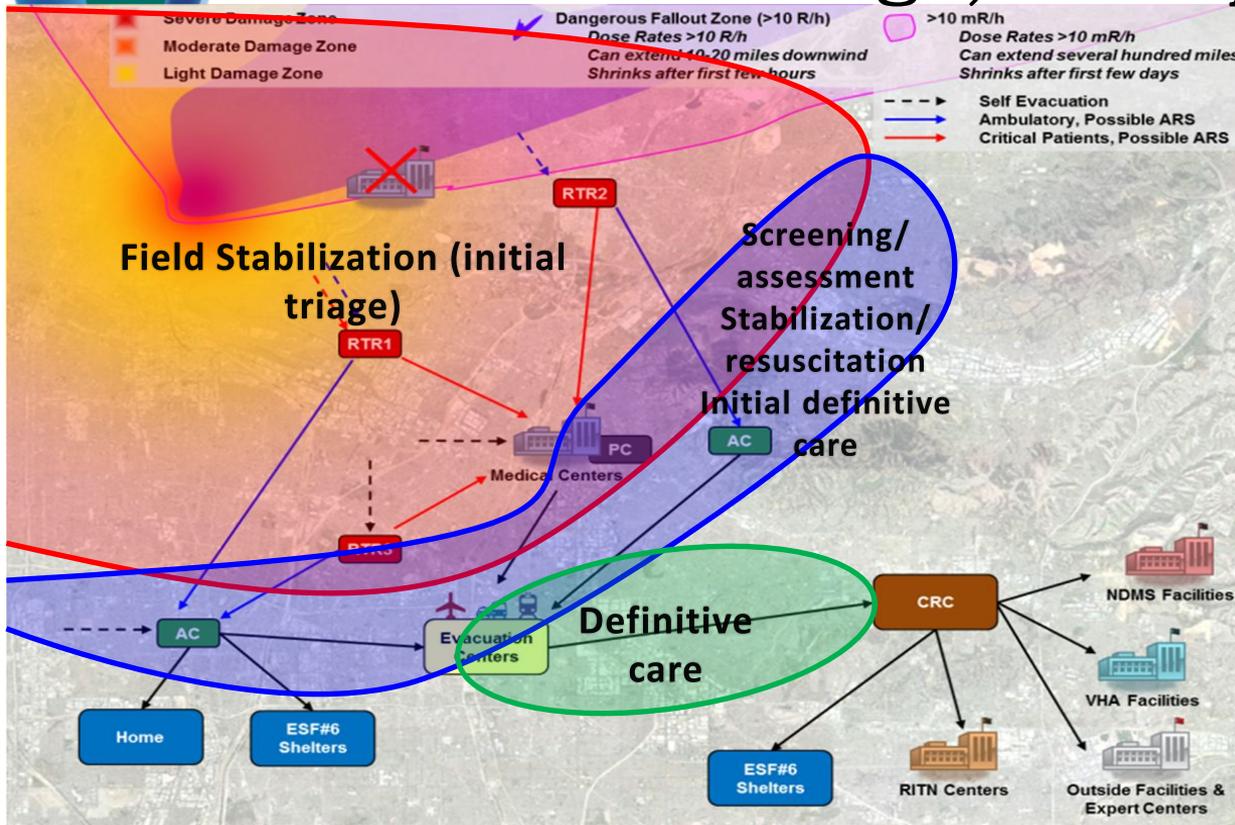
**Biodosimetry Devices**

*Resilient People. Healthy Communities. A Nation Prepared.*

# Additional PBS Activities

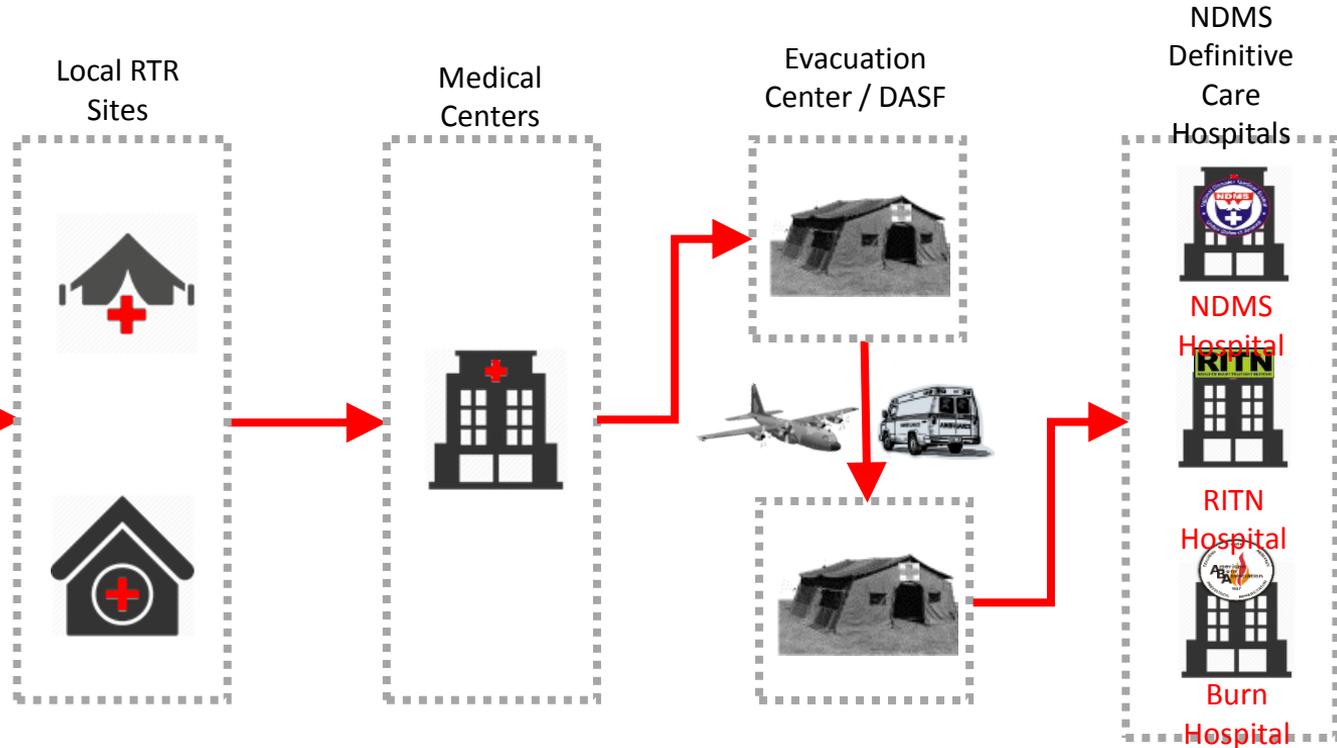
- BARDA is not done when the product is licensed/approved
  - Relabeling of product once licensed/approved
  - Stability studies to support extended expiry
  - PMC/R
    - GSK - Raxibacumab
    - Cangene/Emergent – HBAT
    - Amgen – Neupogen and Neulasta
    - Additional commitments/requirements as products become approved
  - PHEMCE has established a Monitoring and Assessment IPT to address the issues of use of products during a declared emergency
  - **Sustainment**
    - Long-term affordability for the PHEMCE
    - Sustainment of the manufacturing capacity – need to manufacture lots to maintain GMP compliance
- For FY18 anticipate additional 5 products licensed/approved and 4-5 candidates EUA

# Radiation Triage, Transport, Treatment



Type	Location	Operator	Time	Function
RTR1	Damage zones and around blast area	Local	< 48 hrs	Trauma assessment, triage, stabilization
RTR2	Edge of the fallout zones	Local	< 48 hrs	Trauma assessment, triage, stabilization (decon if possible)
RTR3	Outside damage and fallout zones	Local	< 48 hrs	Trauma assessment, triage, stabilization (decon if possible)
Assembly/Screening Centers	In local area and region outside danger zones	Local, NGOs, MRC	1 day – 1 wk	Radiation screening, gross decon, initial assessment
Medical Centers	In local area and region	Local, NGOs, (VHA, NDMS, FMS)	1 day – 1 mo	Radiation screening, decon, triage, trauma and emergency care
Local / Distant ESF#6 Shelters	In local area and region / outside region	ESF #6	1 day – mos	Mass care, routine medical, hematology, outpatient (distant)
Evac Centers	In local area and region	LSTTF, DOD, NDMS	< 1 wk	Staging for casualty or patient transport

# RITN Concept of Operations... Patient Movement



*Resilient People. Healthy Communities. A Nation Prepared.*

# High Throughput Laboratory-based Biodosimetry Projects

- Active Projects:

Developer	HT Technology	Type
Arizona State University	Gene expression	Semi-automated QuantStudio Dx
Northrop Grumman/ Columbia U	Cytology - <i>micronuclei</i>	Semi-automated including Cytology Microscopes
Duke University/ DxTerity	Gene expression	Semi-automated including ABI 3500 Dx



- All in Verification Phase
- Analytical and clinical validation will follow

*Resilient People. Healthy Communities. A Nation Prepared.*

# Point of Care Biodosimetry AR&D Projects

- Active Projects

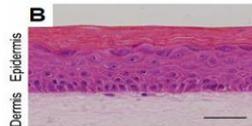
Developer	Point Of Care Technology	Type
SRI International	Protein Expression immunoassay	Dual Lateral Flow w/ Reader & Cell Extractor
MesoScale Diagnostics	Protein Expression immunoassay	Microfluidic Cartridge & Instrument

- Project Bio-Shield Solicitation envisioned later in FY2017



# Radiation/Nuclear MCMs

- Biodosimetry to triage patients
- Stockpile cytokines to treat neutropenia
- Future: Thrombocytopenia, Coagulopathy, POC Biodosimetry
- Advanced products for burns



Cornified  
Granular  
Spinous  
Basal



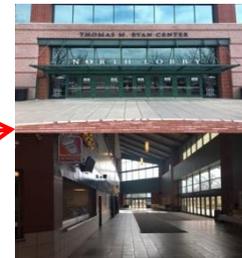
# Chemical Agents

- Major focus for BARDA going forward
- Focus on partnering with companies on products with dual utility
- Treating the injury NOT the agent



# Operation DOWNPOUR

- Event: Full-scale decontamination exercise and research study conducted on August 3<sup>rd</sup>, 2017.
- Purpose: To evaluate different decontamination methods for efficacy and efficiency following a chemical event
  - Evaluate the practical utility of PRISM Guidance (**P**rimary **R**esponse **I**ncident **S**cene **M**anagement – developed under previous BARDA contract)
    - Dry vs Wet vs Technical Decontamination (or combination)
    - Techniques for decontamination of skin and hair
- Scenario
  - Volunteers sprayed with harmless fluorescent chemical (methyl salicylate + curcumin)
  - Decontamination by local emergency personnel **minimally** trained in updated methods
  - Photographic and laboratory measurement of chemicals remaining in skin.
- Location: Ryan Center – University of Rhode Island



# Operation DOWNPOUR

- **Funded By:** ASPR/BARDA/CBRN Countermeasures
- **Conducted By:** University of Hertfordshire, UK (BARDA Contractor)
- **Participants:** North Providence, North Kingston, URI, and Hopkins Fire Departments, Medical Reserve Corps, EMS, DMAT from RI, MA, and CT
- **Attendees and Observers (partial list):** ASPR/OEM, FEMA, HPP, RI Department of Health, British Consulate Boston, Staffer from Rep Jim Langevin (RI-2)
- **DOWNPOUR Exercise (preliminary observations)**
  - 94 volunteers underwent decontamination**
  - Total decon time: 28 minutes**
  - Very positive feedback from response organizations**
  - Final Report expected by end of September**



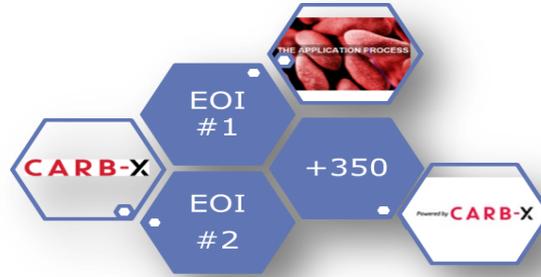


# Other CBRN Initiatives

- **Develop animal models to support licensure of Ebola/VHF MCMs**
- **Develop animal models to support the approval of narrow spectrum antimicrobial therapies**
- **Invest in technologies to enhance sustainment, lower life cycle costs**

# CARB-X Initiative

- Addressing potential secondary effects of exposure to CBRN threats, infection with PI, and potential EID while addressing the broader public health concern of AMR



**CARB X**



A portfolio of ~20 antibacterial candidates

Private sector approach to funding/portfolio management

A minimum of 2 candidates progress to clinical development

# Novel Antibiotics

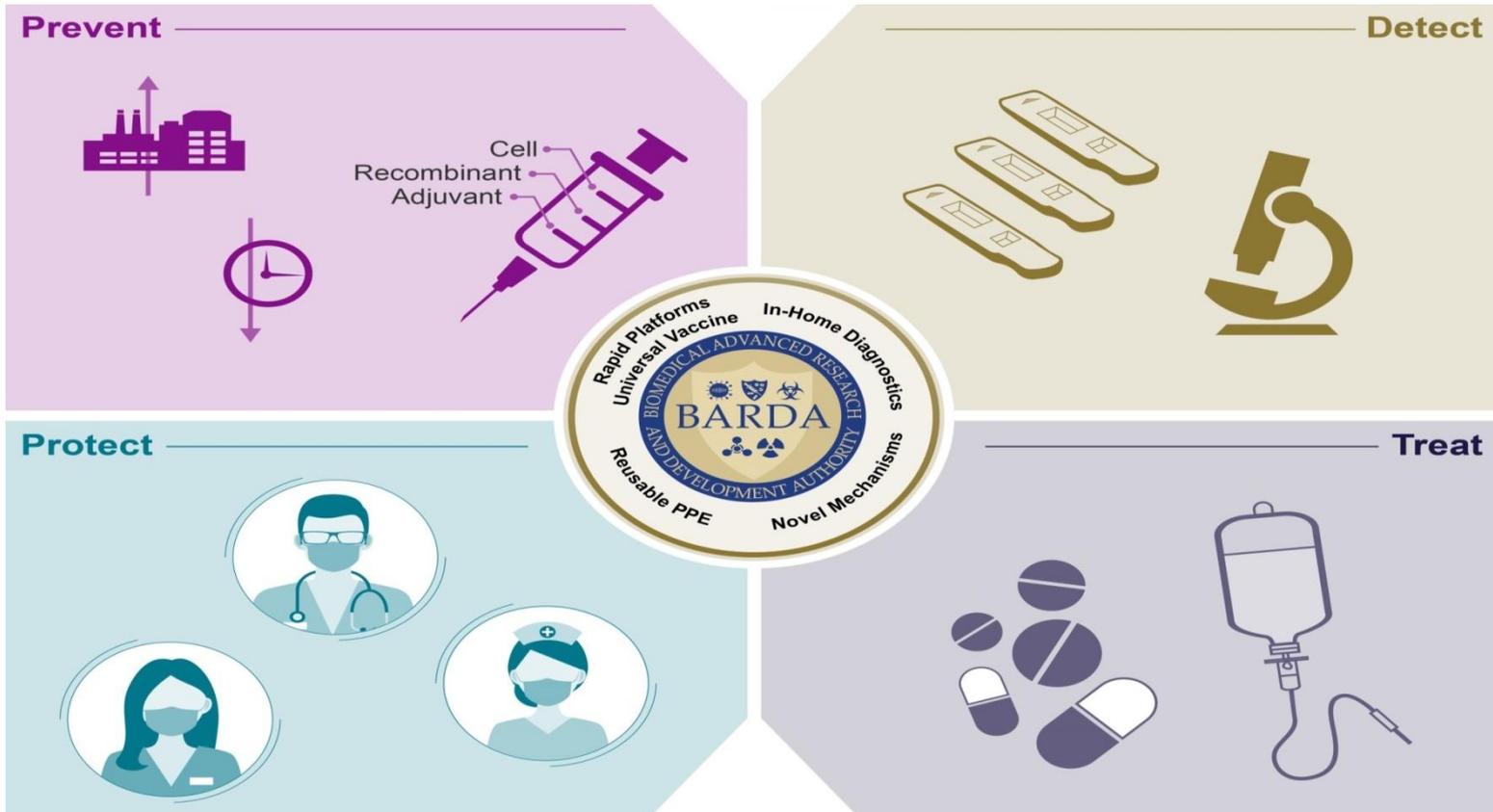
BARDA's Antibacterial Pipeline				
Sponsor	Compound	Development Stage		
		Preclinical	Phase I	Phase II
Achaogen	Plazomicin	Next-Generation Aminoglycoside cUTI/AP, CRE, Plague, Tularemia		
Rempex	Carbavance	BL/BLI Combination CRE, cUTI		
Cempra	Solithromycin	Next-Generation Fluoroketolide CABP, GC, Anthrax, Tularemia		
CUBRC/Tetraphase	Eravacycline	Fully Synthetic Tetracycline cIAI, cUTI, MDR		
Basilea	Ceftobiprole	Cephalosporin ABSSSI, SAB, CABP, Plague, Tularemia		
Astra Zeneca	Aztreonam-Avibactam	BL/BLI Combination cIAI, HAP/VAP, cUTI, BSI, MDR gram-, Melioidosis, Glanders, Plague		
GlaxoSmithKline	Gepotidacin	Topo II Inhibitor CABP, GC, uUTI, Plague, Tularemia, Anthrax		
GlaxoSmithKline	GSK-830	Cephem BL cUTI, cIAI, HABP/VABP, MDR		
GlaxoSmithKline	GSK-680	Topo II Inhibitor TBD		
The Medicines Company	Carbavance	BL/BLI Combination HABP/VABP, MDR		
Hoffman-La Roche	RG6080	Broad Spectrum BL cUTI, cIAI, HABP/VABP, MDR		
CARB-X	Pre-Clinical Accelerator	Hit-to-Lead to Phase 1		

# CARB-X Pipeline

CARB-X Antibacterial Treatment and Prevention Product Portfolio - Novelty Screen											
Sponsor	Product	Novelty			Description	Priority		Development Stage			
		New Abx Class?	New Non-traditional Product?	New Target?		CDC	WHO	Hit to Lead	Lead Optimization	Pre-Clinical	Phase I
Tetraphase Pharmaceuticals	TP-6076				Next-generation tetracycline	✓	✓	<i>Acinetobacter + Enterobacteriaceae</i>			
Cidara Therapeutics	CD201		✓	✓	Bifunctional immunotherapy	✓	✓	<i>Acinetobacter + P. aeruginosa. + Enterobacteriaceae</i>			
Microbiotix	T3SS Inhibitor		✓	✓	Virulence modifier	✓	✓	<i>P. aeruginosa</i>			
Spero Therapeutics	SPR741			✓	Potentiator	✓	✓	Gram-negative activity			
Entasis Therapeutics	ETX000				Oral Gram-negative combination	✓	✓	Gram-negative activity			
Forge Therapeutics	FG-LpxC	✓		✓	Inhibitor of LpxC	✓	✓	Gram-negative activity			
Oppilotech	LPS	✓		✓	Targets synthesis of LPS	✓	✓	Gram-negative activity			
ContraFect	Gram-negative lysins		✓	✓	Recombinant lysin protein	✓	✓	<i>P. aeruginosa</i>			
Redx Pharma	NBTI	✓			Dual-acting topoisomerase inhibitor	✓	✓	<i>Acinetobacter + P. aeruginosa. + Enterobacteriaceae</i>			
Visterra	VIS705		✓	✓	Antibody-drug conjugate	✓	✓	<i>P. aeruginosa</i>			

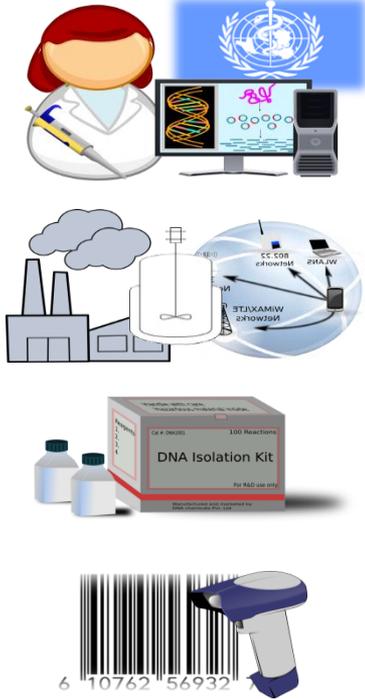
The above projects are Powered by CARB-X utilizing non-dilutive funding from BARDA, Wellcome Trust, & NIAID. The stage of development is approximate as of March 2017 (please refer to each company's website for updated information). Characterizations of new Abx Class and New Target by CARB-X, following [Pew pipeline analysis](#). Other characterizations by CARB-X experts and external expert opinion. Abx = traditional small molecule antibiotic. Non-traditional Product = not a traditional small molecule antibiotic.

# Influenza Strategy



*Resilient People. Healthy Communities. A Nation Prepared.*

# Seasonal Influenza Vaccine Improvements



## Early detection antigenic drift & rapid virus seed production

- Expand WHO Global Network
- Modeling & Risk Assessment
- Candidate Vaccine Virus Development

## Manufacturing improvement

- Develop high-yield CVV
- Optimize communications

## Potency reagent availability

- Produce reagents at risk year round
- Improved assay performance

## Vaccine distribution and use

- Real-time monitoring distribution
- Track product and dose administration



## SIVI Steering Committee

NIH

CDC

FDA

BARDA



Flu Risk  
Management  
IPT

# BARDA is Achieving National Pandemic Vaccine Goals

More Effective Vaccines Initiative – FY15

Vaccinate US Population ≤6 mo.

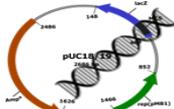
Antigen-Sparing Technology



H5N1 Q-PAN<sup>®</sup>  
Licensed 11/22/13



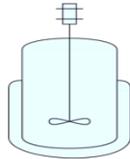
Recombinant Vaccine



Flublok<sup>®</sup>  
Licensed 01/16/13



Cell-based Vaccine



FLUCELVAX<sup>®</sup>  
Licensed 11/20/12



Egg-based Vaccine



H5N1 Vaccine  
Licensed 04/17/07



Manufacturing Improvements

More, Faster, & Better Vaccines!

# Building From Previous Successes

- Supported licensure/approval of 27 candidate products, across all threat areas
- Robust pipeline of candidate products under advanced research and development
- Yielded 21 candidates with licenses or EUA under Project Bioshield (PBS)
  - 14 have been delivered to the Strategic National Stockpile
  - 6 have been licensed approved by the FDA
- Launched CARB-X, ahead of schedule
- Responded to Ebola, MERS, and Zika and remains committed and ready to respond to additional EIDs
- Formed public-private-partnerships and utilizing authorities provided under Pandemic All Hazards Preparedness Act

# Challenges / Future Efforts



- Sustainment – all programs
  - Maintaining the capacity and capabilities that have been established
- Addressing additional gaps in preparedness
- Demonstrate capability to respond rapidly to new threat
- Improving influenza vaccine efficacy
- Developing new therapeutics for influenza
- Finishing the effort even when supplemental funding expires due to other priorities
- Harnessing information from Operational Capacity to improve MCM's

# Find ASPR Online



**PHE.gov:**  
[www.phe.gov/oem](http://www.phe.gov/oem)



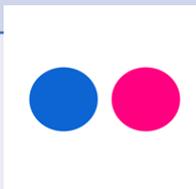
**Facebook:**  
[www.facebook.com/phegov](http://www.facebook.com/phegov)



**PHE.gov Newsroom:**  
[www.phe.gov/newsroom](http://www.phe.gov/newsroom)



**YouTube:**  
[www.youtube.com/phegov](http://www.youtube.com/phegov)



**Flickr:**  
[www.flickr.com/phegov](http://www.flickr.com/phegov)



**Twitter:**  
[www.twitter.com/phegov](http://www.twitter.com/phegov)