

Protection and Hazard Mitigation – Vision of the Future

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CB Defense Program Organization

JOINT REQUIREMENTS OFFICE

OFFICE OF THE SECRETARY OF DEFENSE

***JOINT PROGRAM
EXECUTIVE OFFICE***

***JOINT SCIENCE AND
TECHNOLOGY OFFICE***

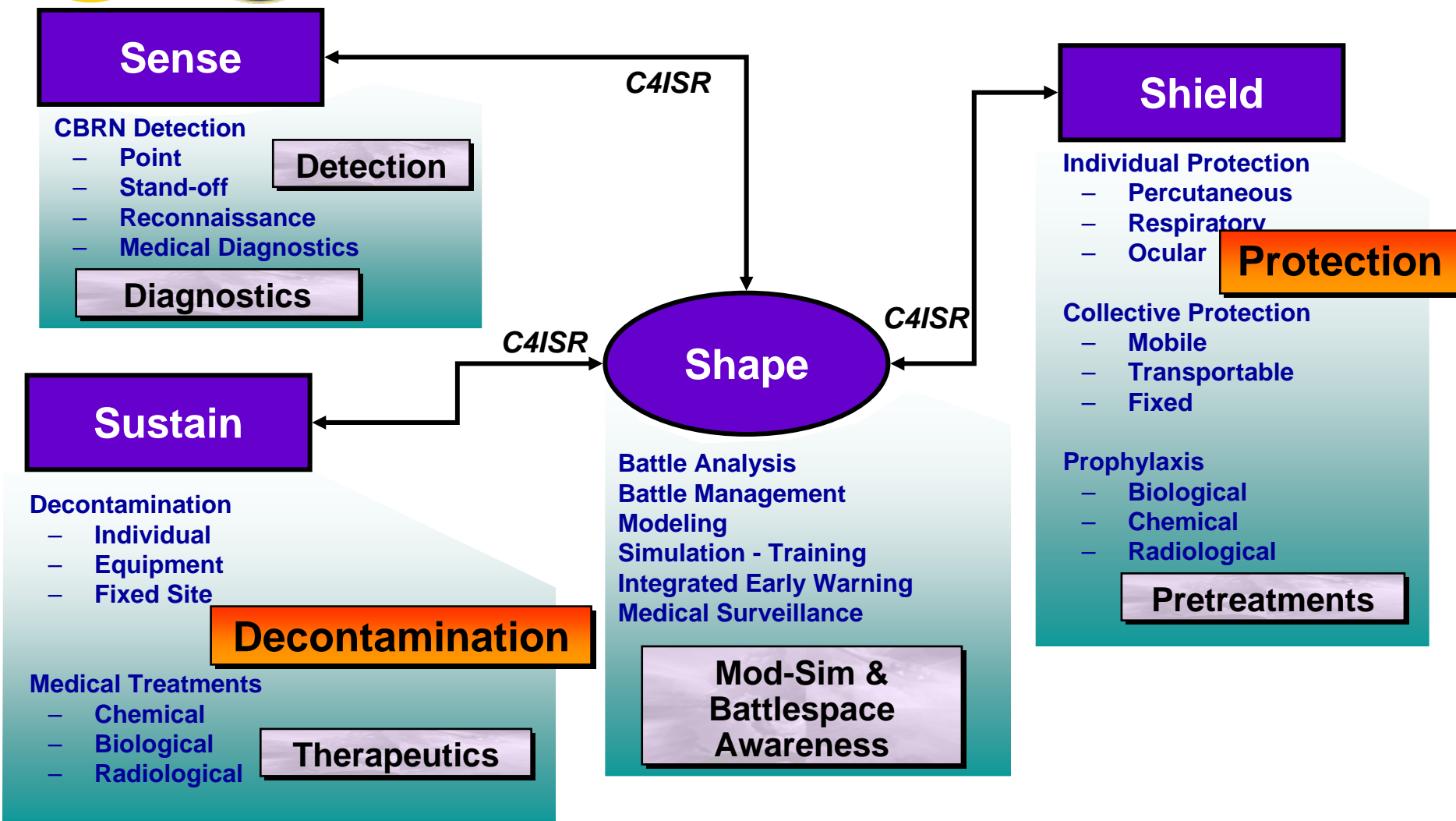
***JOINT TEST AND
EVALUATION EXECUTIVE***

***JOINT COMBAT
DEVELOPER***

Delivering Joint Warfighting Capabilities



CBRN Doctrinal Elements





OSD Guidance

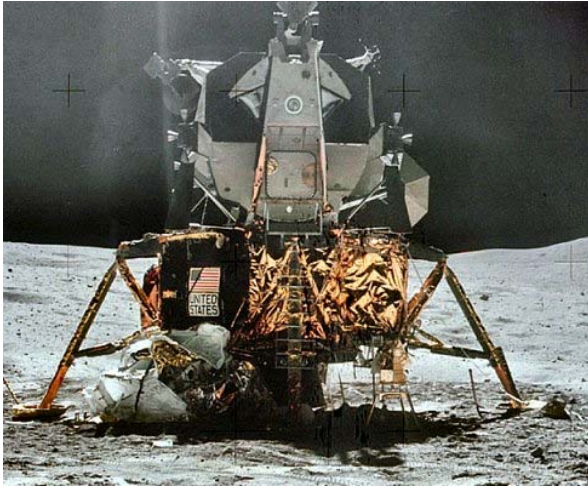
- Identify and exploit **revolutionary**, rather than evolutionary, technologies
- Invest in approaches to counter emerging threats that hold the potential for **revolutionary capabilities**
- Seek out and take advantage of advancements in **information management, nanotechnology, bioengineering, multifunctional materials, and human performance studies**
- Exploit **nanotechnology** and microsystems to achieve the capability to embed detectors **into major defense acquisition program systems**

Excerpt from Program Strategy Guidance, March 2006

... seek out revolutionary technologies!



What *is* Revolutionary?



\$135 Billion¹ Apollo program makes 6 landings on the moon over a 3-year period and stimulates development of many spin-off technologies including integrated circuits and fuel cells. Journey has not been repeated in over 34 years.

1. Adjusted to 2006 dollars

Automatic rifle designed by Mikhail Kalashnikov and introduced in 1947 is revered for its simplicity and reliability. Produced worldwide and used by 55 national armies, it has become a cultural icon.



Fantastic, yet radically simple



The Low-Burden Imperative

Like Improvised Explosive Devices (IEDs), future threat use of CB weapons will likely be immediate, intense, and local. Thus, to have its greatest impact, protective and hazard mitigation measures must be constantly available. This necessitates low-burden equipment.

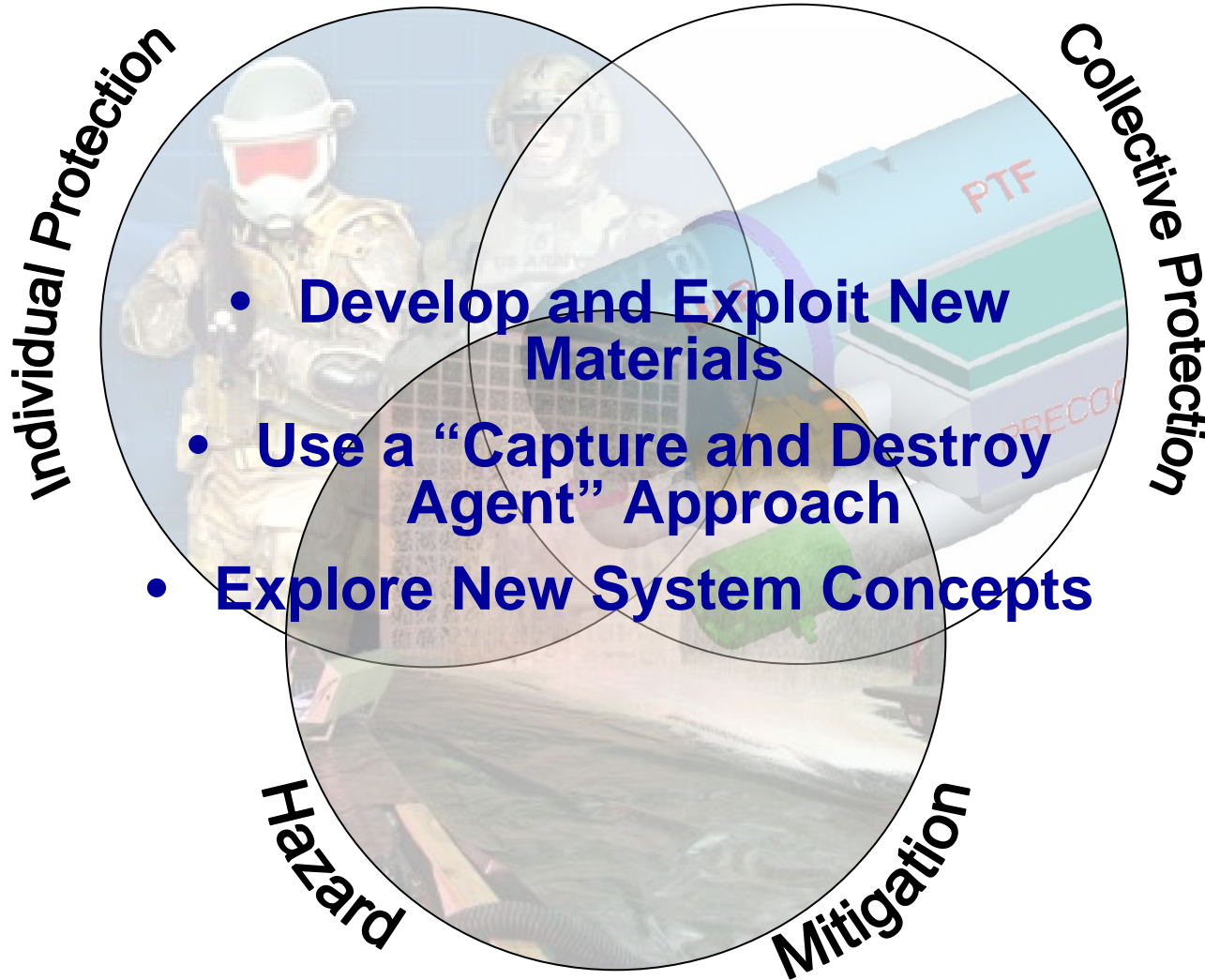


Sources of Burden:

- Physiological
- Cognitive
- Logistical
- Operational



Unifying Threads

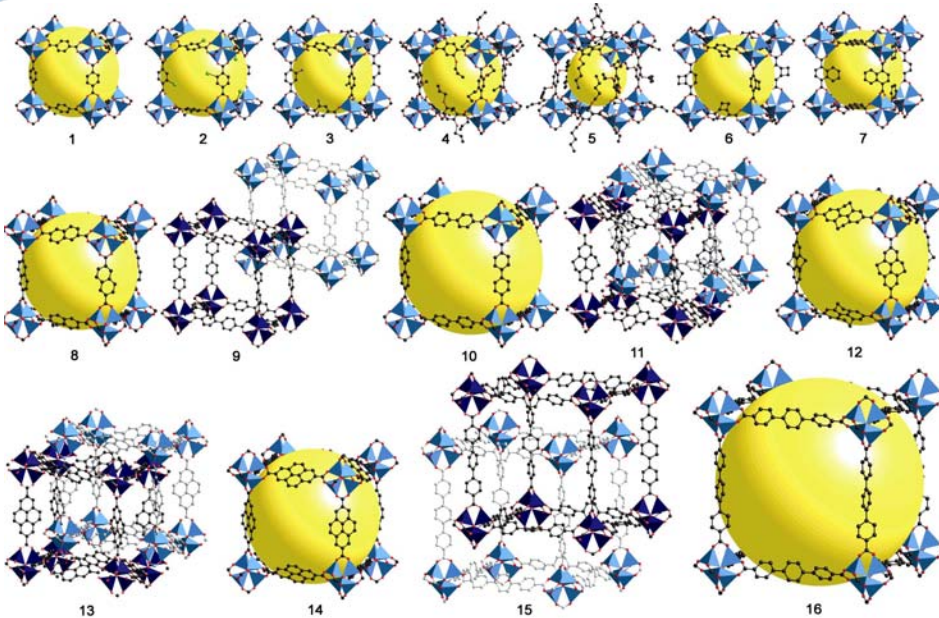




New Materials



UCLA



Reticular Chemistry

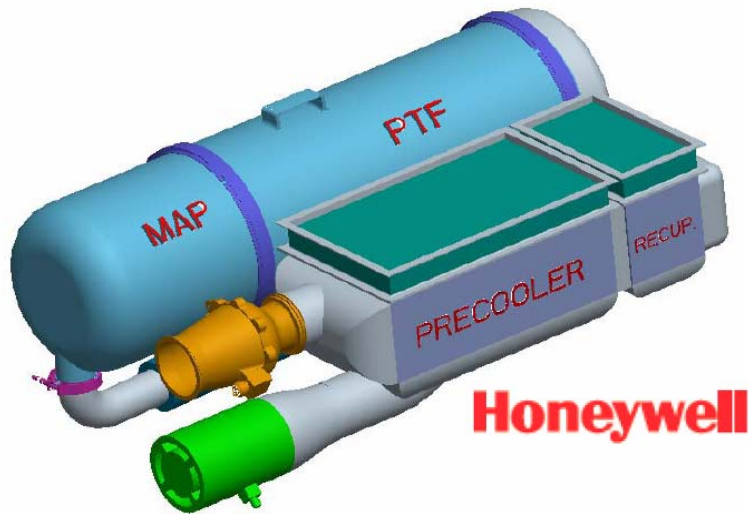
- Synthetic open cell 3D structure
- Tailor-ability by size and functionality

Nano-Fibers

- High efficiency, low drag
- Overcoming robustness and scalability issues
- Tailor-ability

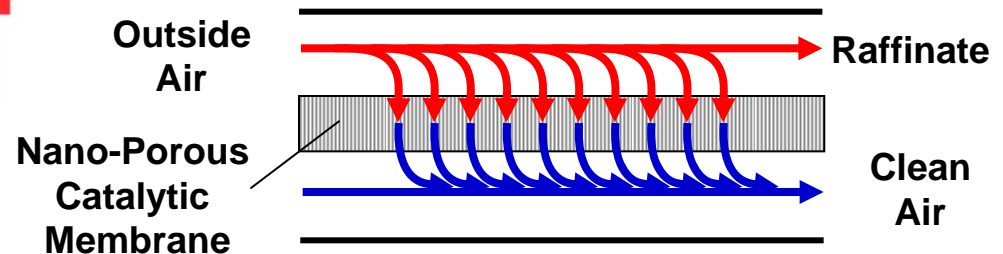


Capture and Destroy Agent 1 (Reactive Filtration)



Catalytic Membrane

- Selective and reactive
- Lower temperature
- Single-step

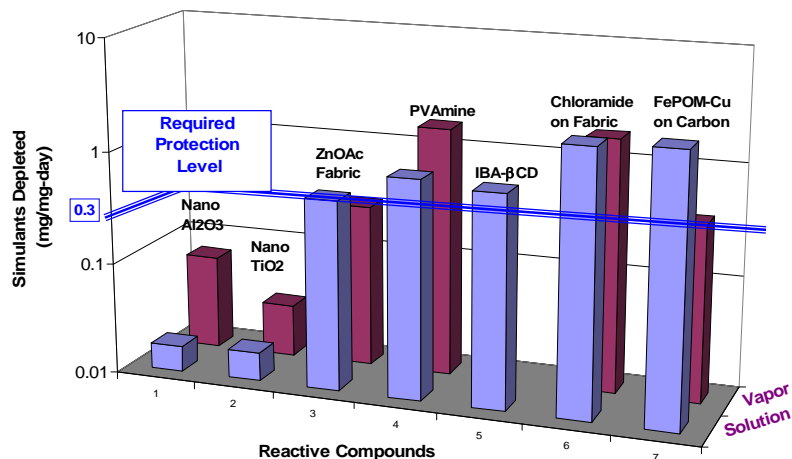
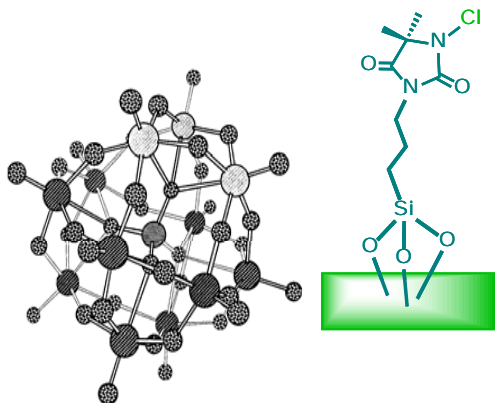


CATOX Air Purification

- Developed technology
- Non-traditional for CB
- Broad spectrum
- Post treatment of products

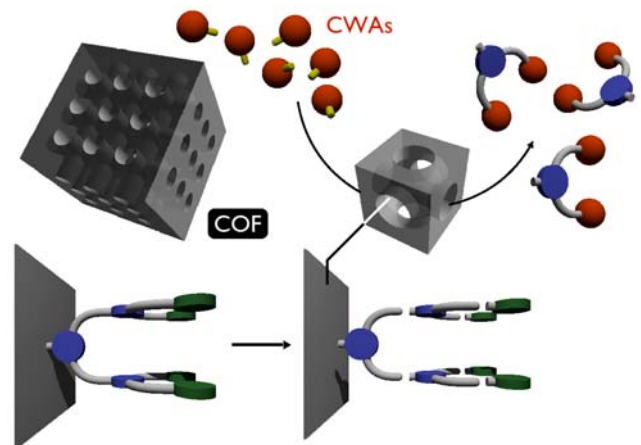


Capture and Destroy Agent 2 (Self-Detoxifying Materials & Surfaces)

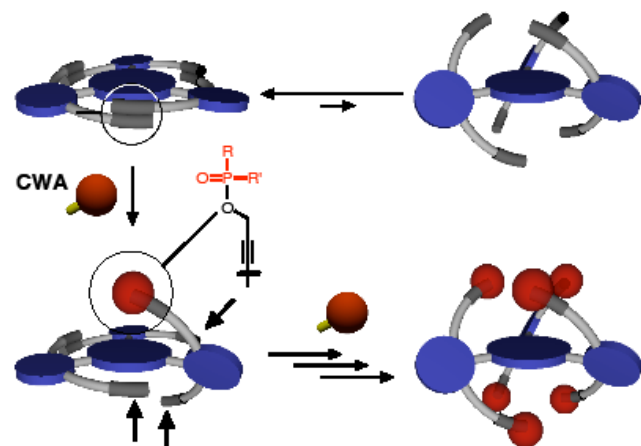


- Various approaches with some success, but
 - Slow kinetics
 - Transport limitations
 - Environmental stability issues
- Other approaches
 - Fast adsorption with slow self-detoxification
 - Combination with other treatments

Capture and Destroy Agent 3 (Smart Materials)



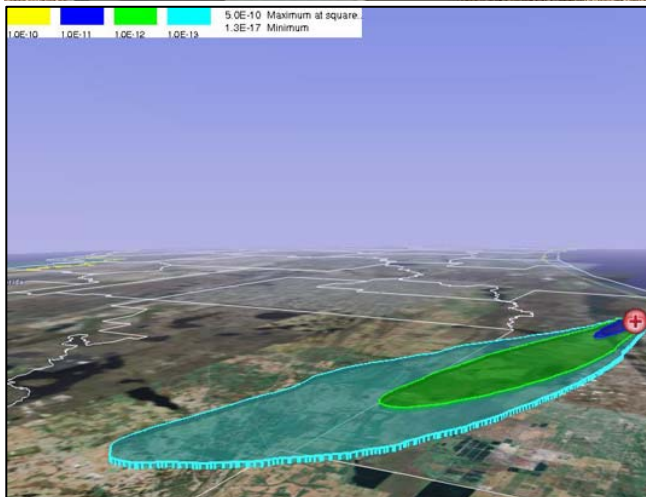
- Sense
- Respond
- Signal



Beyond
Open
Reticular
Geometries



System Concepts (e.g. ColPro)

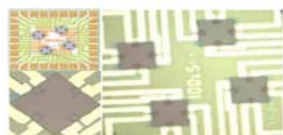
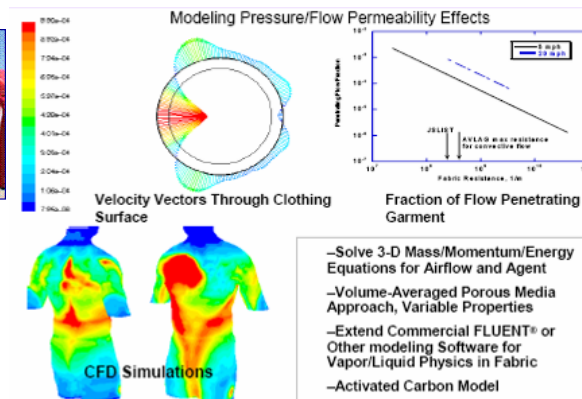


- Increase affordability and reduce logistical burn
- Assess notional technologies critical to alternative approach
- Conceptual assessments:
 - Hazard reduction vs. complete protection
 - Scalable protection
 - Nascent vapor/aerosol release mitigation
 - Internal release mitigation
 - Non-overpressure solutions
 - Rapid ingress/egress
 - Network enabled solutions

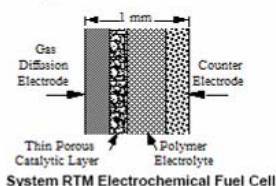


Enablers: Improved Test Methods

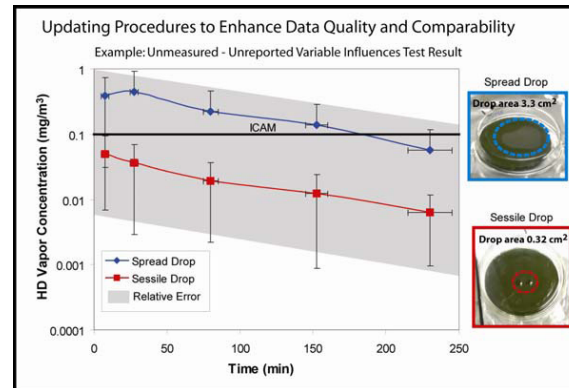
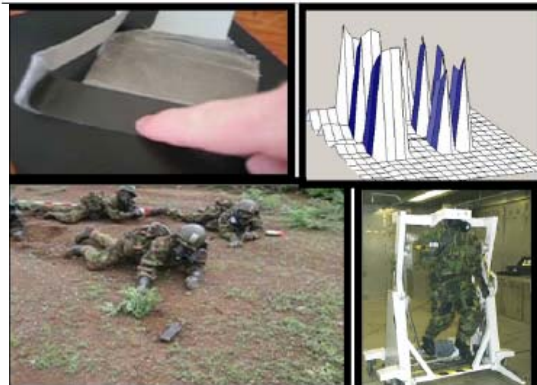
- Relevant
- Repeatable
- Real-Time



System RTM MEMs Sensor



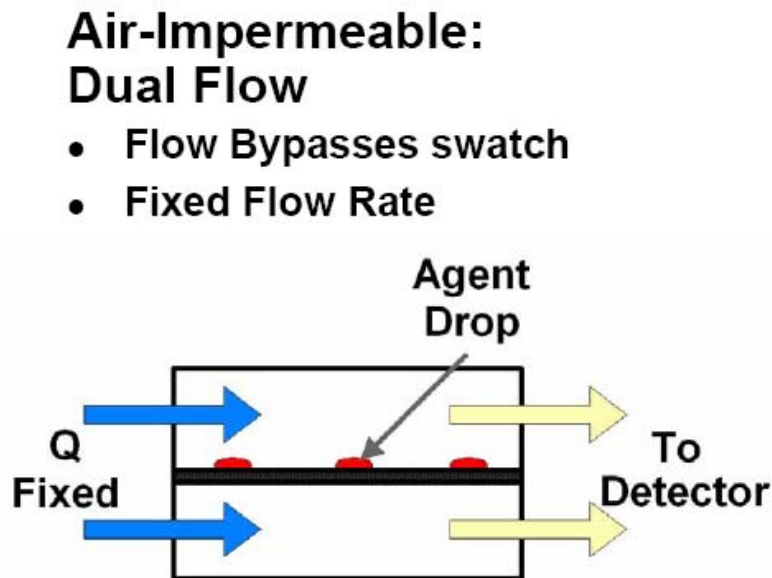
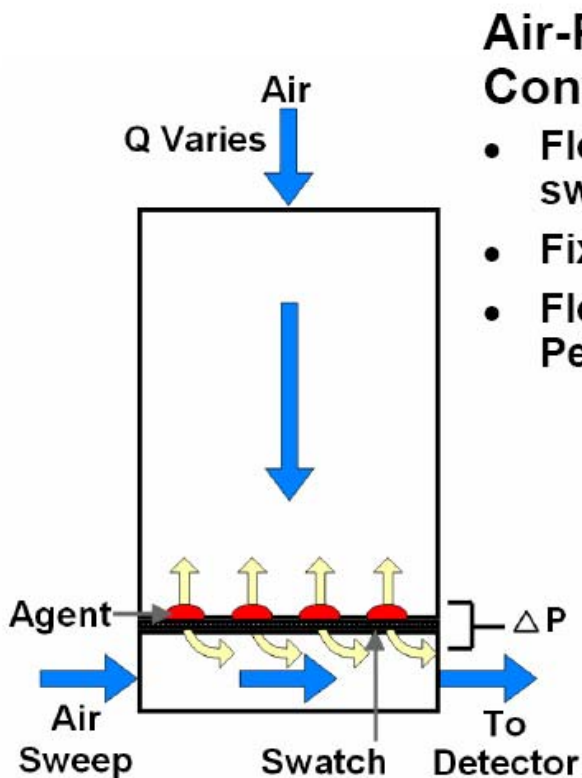
Whole Body Aerosol Scanner





Example – Swatch Testing

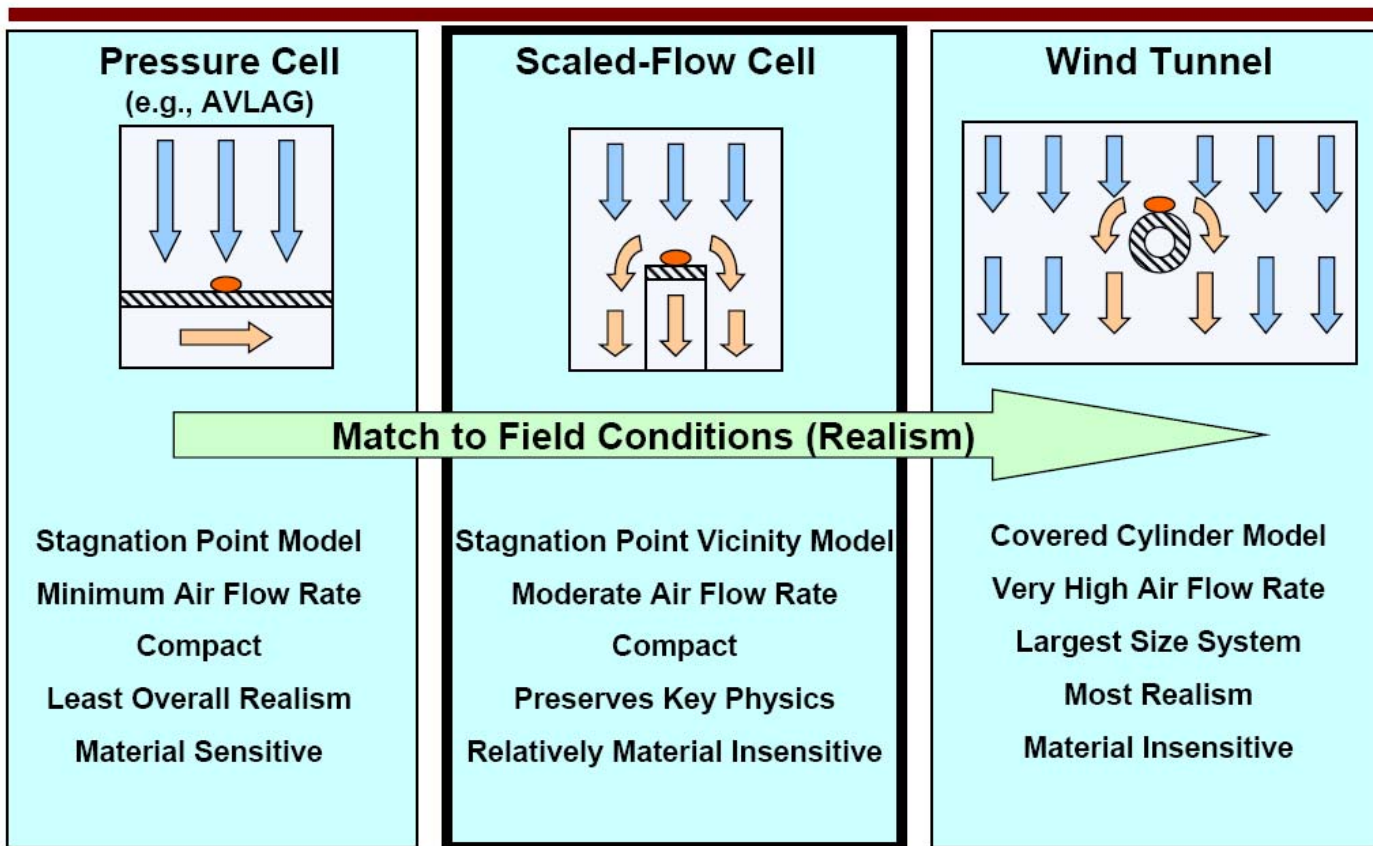
Current AVLAG Cell Operation





Example – Swatch Testing

Cell Design Spectrum





Low-Burden Protection Integration

- Lemma 1: Integration of the CB ensemble with the warfighter's ensemble will substantially increase mission performance
- Lemma 2: An ensemble optimized for low physiological burden can meet CB performance needs

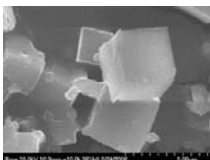
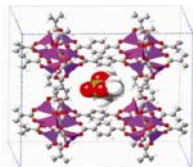




Low-Burden Protection Integration

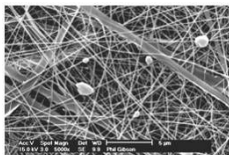


Helmet/
Respirator
Integration

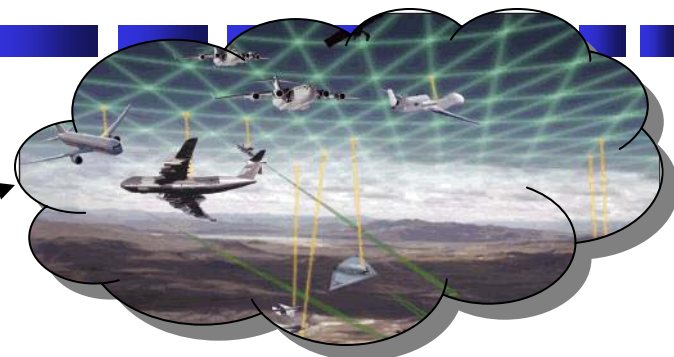


Reticular
Chemistry

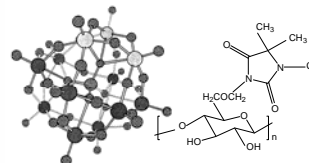
Nano-
Fibers



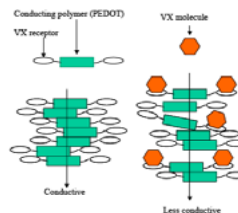
SaaS-G Leader Concept



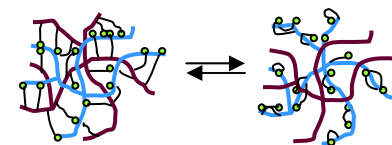
The Network



Self-Detoxification



Agent Detecting Fibers



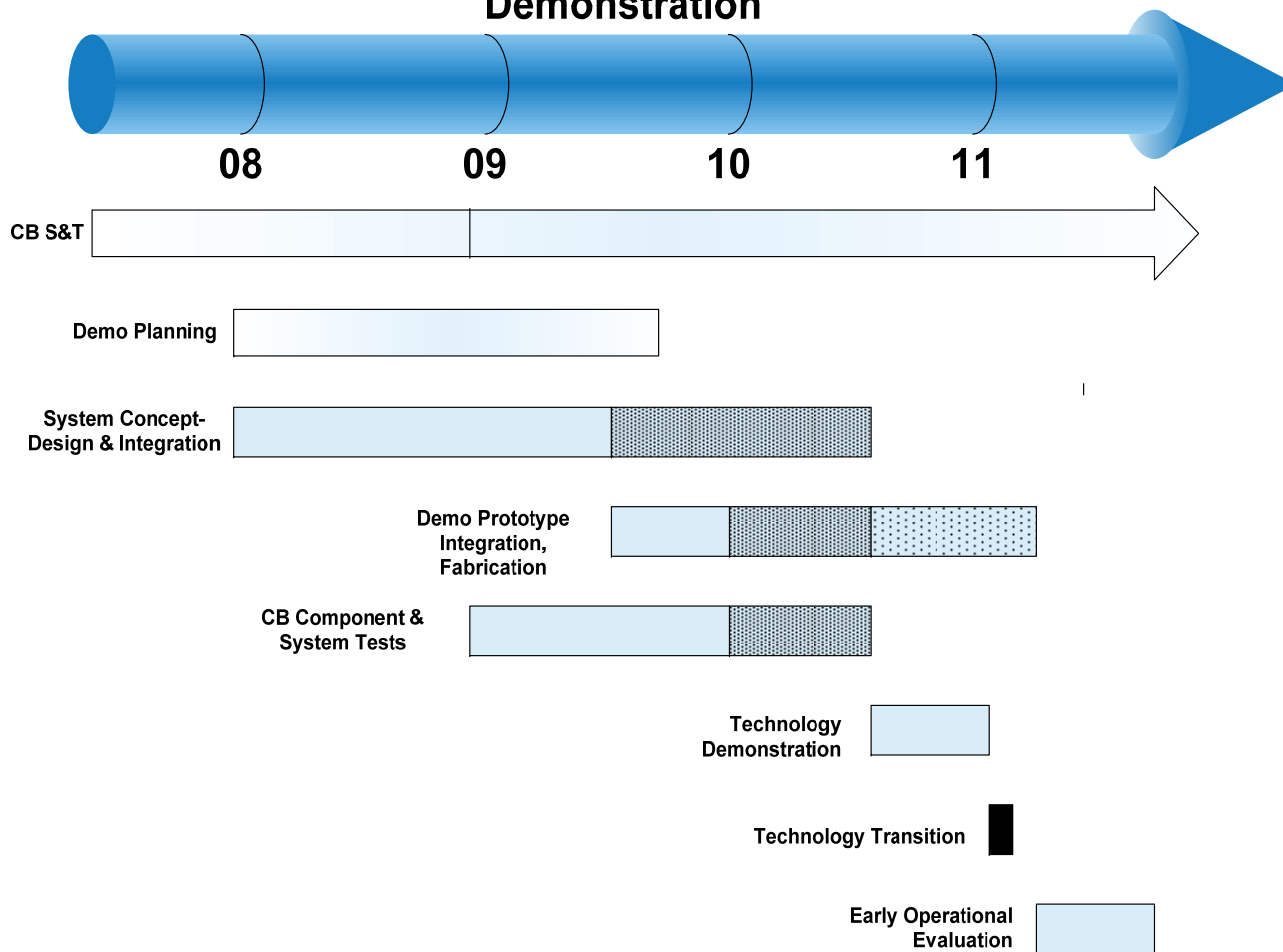
Switchable Fabrics

Demonstrate an integrated concept in FY2010; use thermal burden as an independent variable



Demonstration Timeline

JCE / SaaS-G Combined Technology Demonstration





Support the Warfighter



- Responding to validated Joint Service needs
- Accessing best-in-class performers within and outside DoD
- Closely linked with Joint Program Managers to transition technologies to the warfighter

Delivering Best Technology to the Warfighter!



Questions?