

Some Thoughts

On

Decontamination

(... That Also May Apply To Protection and Detection ...)

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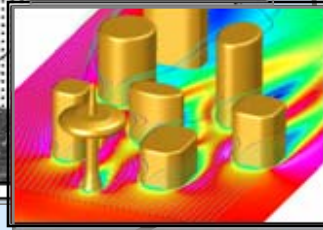
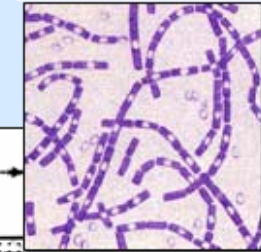
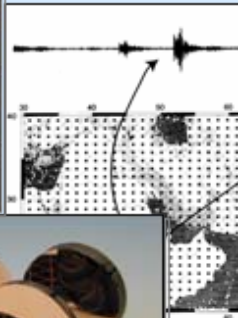
# The Challenge For Me . . .

“With the advent of globalization some would speculate that national and international conflict along with terrorism will diminish. On the contrary, the inherent tension between national interests, global economic stability or instability and ethnic distrust will lead to an increase in potential conflict scenarios. Global security, national security, homeland security, and, interestingly enough energy security, will be the moderating factors that will reduce the potential flash points. The underpinning of each is science - today’s and tomorrows.”

Congressional Hearings – October 2005

# Decon Was Hard To Do In Yesterday's World . . . . . . It Took, and Still Takes, an Integrated Systems Solution . . .

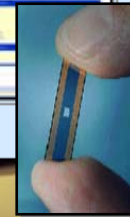
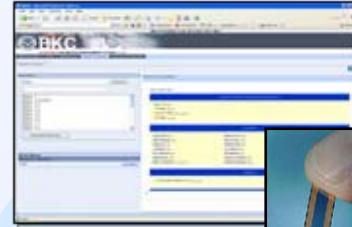
Multiple scientific and technical disciplines



Threats, R&D, prototypes, and products



Analysis, S&T, and operations



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# Muti-Service Perspectives on Decon

Future Force
<b>Biomimetics</b>
Robust biomimetic catalytic system developed for chemical agent decontamination *** Manipulation of macromolecular properties to achieve optimal performance Biologically based fabrication of advanced electronic, magnetic, and optical materials
<b>Nanoscience</b>
Rapid CB decontamination *** Atom interferometer gyroscope Quantum computing
<b>Smart Materials</b>
Demonstration of smart, conformal, load-bearing multifunctional antenna structures for rotorcraft and land vehicles Realization of active material-based rotor blade control for stealthy, long-range, and highly maneuverable rotorcraft Achievement of high-precision controlled pointing and tracking techniques for accurate weapon systems for rotorcraft and land vehicles
<b>Communications</b>
Adaptive, self-organizing networks Full internet compatibility Smart antennas for portable transceivers Extremely low probability-of-intercept signals Personal communication devices Highly secure and trusted mobile computing and communication



**Army**

**My Evaluation**

**Air Force**

FLTC 3.2: Locate, ID, Engage and Neutralize CBRNE Threats

Neutralization

Stable biomolecule encapsulation (multi-months, non-refrigerated)  
Multifunctional encapsulation

**Near Term (08-12)**

Neutralization

Stable counter-bio agent with 5-logs of deactivation of BWA

**Mid Term (13-16)**

Neutralization

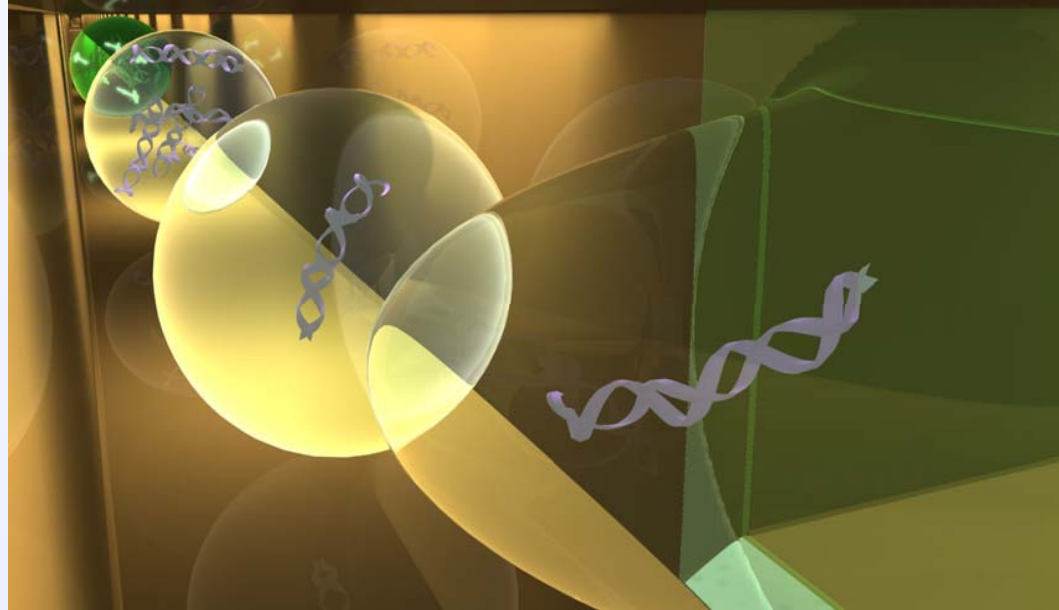
Self replicating, counter-BWA organisms

**Far Term (17-25)**



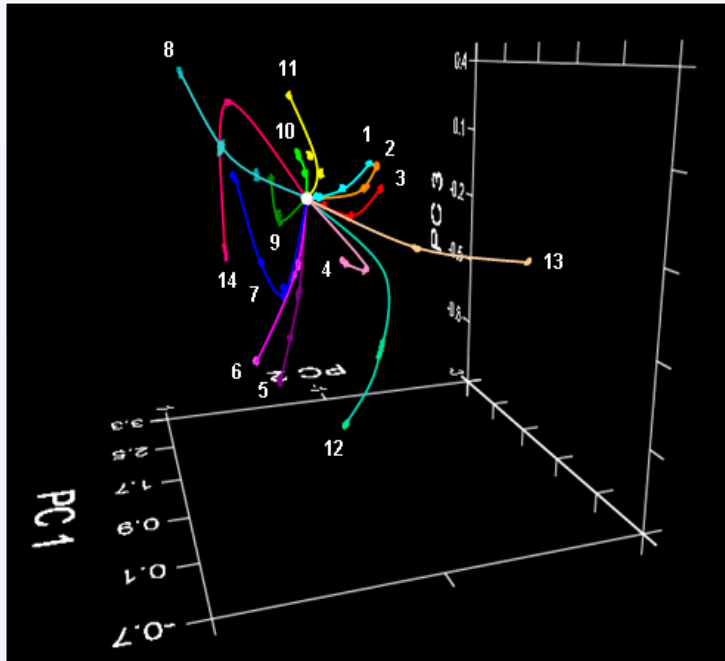
# Detection, Protection and Decon Are Inter-Related (Big Surprise?) . . .

But Fundamentally Are Solved Independently . . .



Our approach is to characterize millions of individual virions in picoliter volume microreactors

And Are Incongruent With Respect to Time Scales . . .



Principal component analysis reveals that each agent produces a unique response signature (colored tracing)

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# We Are Pretty Good as a Nation at Intel Analysis, Threats and Predictions . . .

## National Atmospheric Release Advisory Center (NARAC) / Interagency Modeling and Atmospheric Assessment Center (IMAAC)



Global- to urban-scale dispersion modeling and hazard analysis for emergency response and preparedness



## Biodefense Knowledge Center (BKC)



National clearinghouse for rapid-response and in-depth assessments of actionable biodefense information



## Forensic Science Center (FSC)



Analysis and characterization of samples of proliferation, terrorism, or law-enforcement interest  
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## Counterproliferation Analysis and Planning System (CAPS)



Assessments of nation-state WMD programs, critical nodes, and interdiction options

But We Don't Integrate Well Across Departmental Boundaries and Equities . . .



# Can "Big Science" Be Use To Solve Our Technology Challenges? . . .



**Nano-Scale Science**

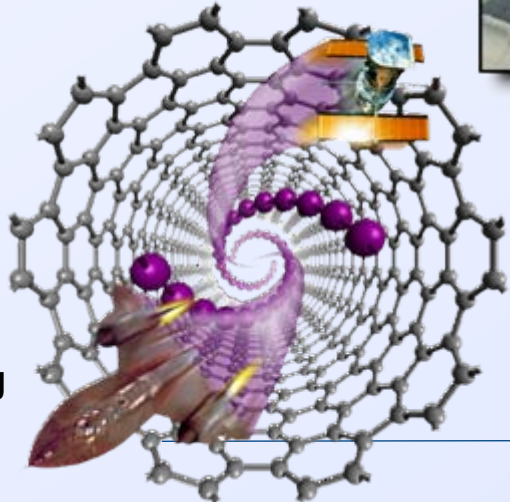


**Non-Nuclear Fusion**

Yes . . . But . . .

**Tera, Peta, Exta Scale  
High Performance Computing**

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**We Must Breakdown  
The Barriers . . .**





# ...But We Don't Do Well At R&D and Using a Multi-Disciplinary Approach to Solutions ...

## ▪ Yesterday

- Slide Rule and Manuals
- Threat Assessment
- Service Specific Solutions and R&D
- A Military Problem
- Risk Avoidance
- Liquid Based Decon

## ▪ Today

- Cluster and High Performance Computing
- Threat Analysis
- Inter-Service, Inter-Agency R&D??
- A Global Problem??
- Risk Management??
- Novel Decons??

# Some Closing Thoughts . . .



**“If we knew what it was we were doing, it wouldn’t be called research, would it?”**

*Albert Einstein*

**Global Security**

**“Those who say it cannot be done should not interrupt the person doing it.”**

**– Chinese Proverb**

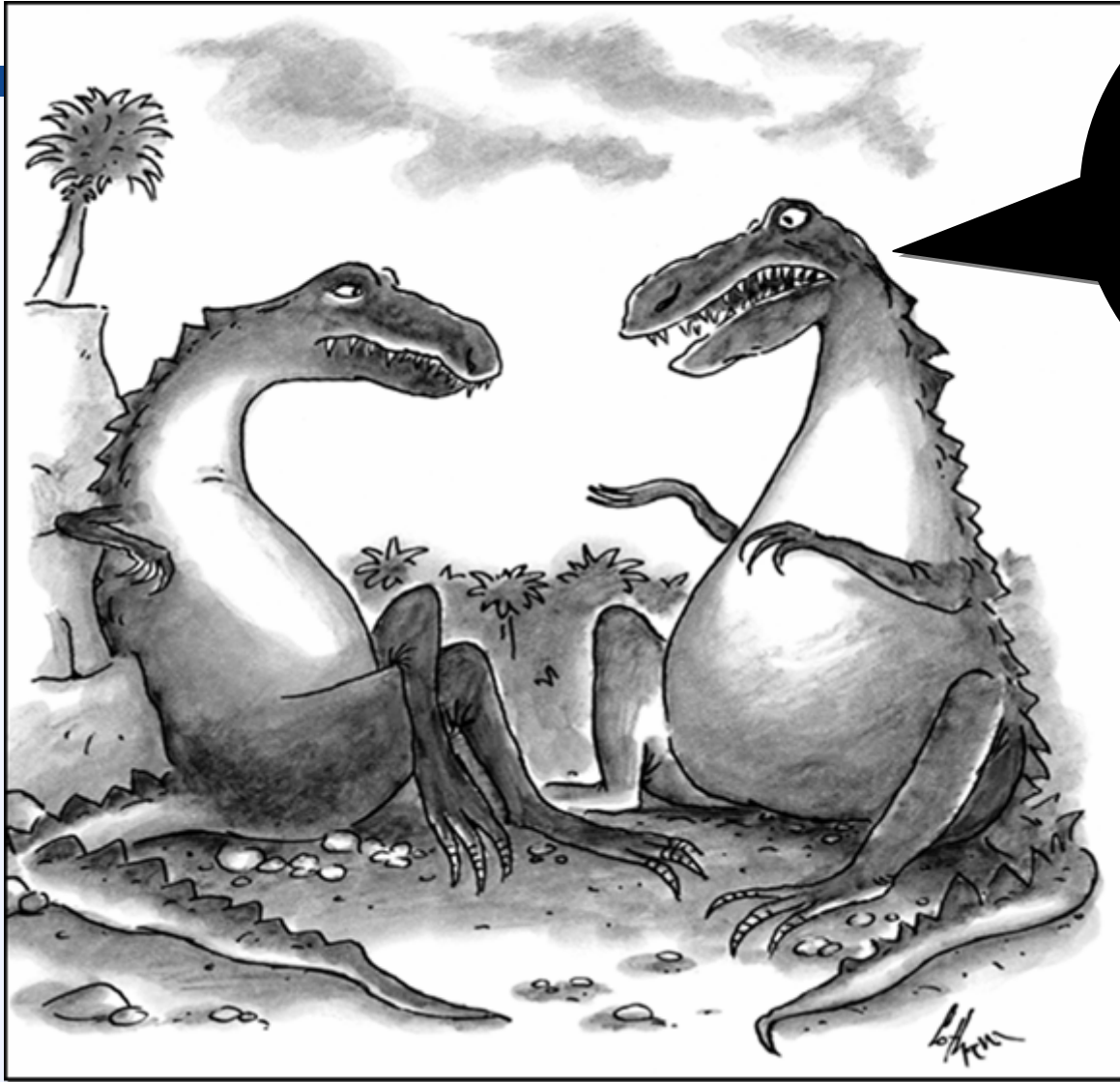
**“It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.”**

**– Charles Darwin**



**“All I’m saying is, now is the time to develop the technology to deflect an asteroid”**





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