S&T Stakeholders Conference

January 14-18, 2008

Advanced Technologies for First Responders and Incident Management Teams

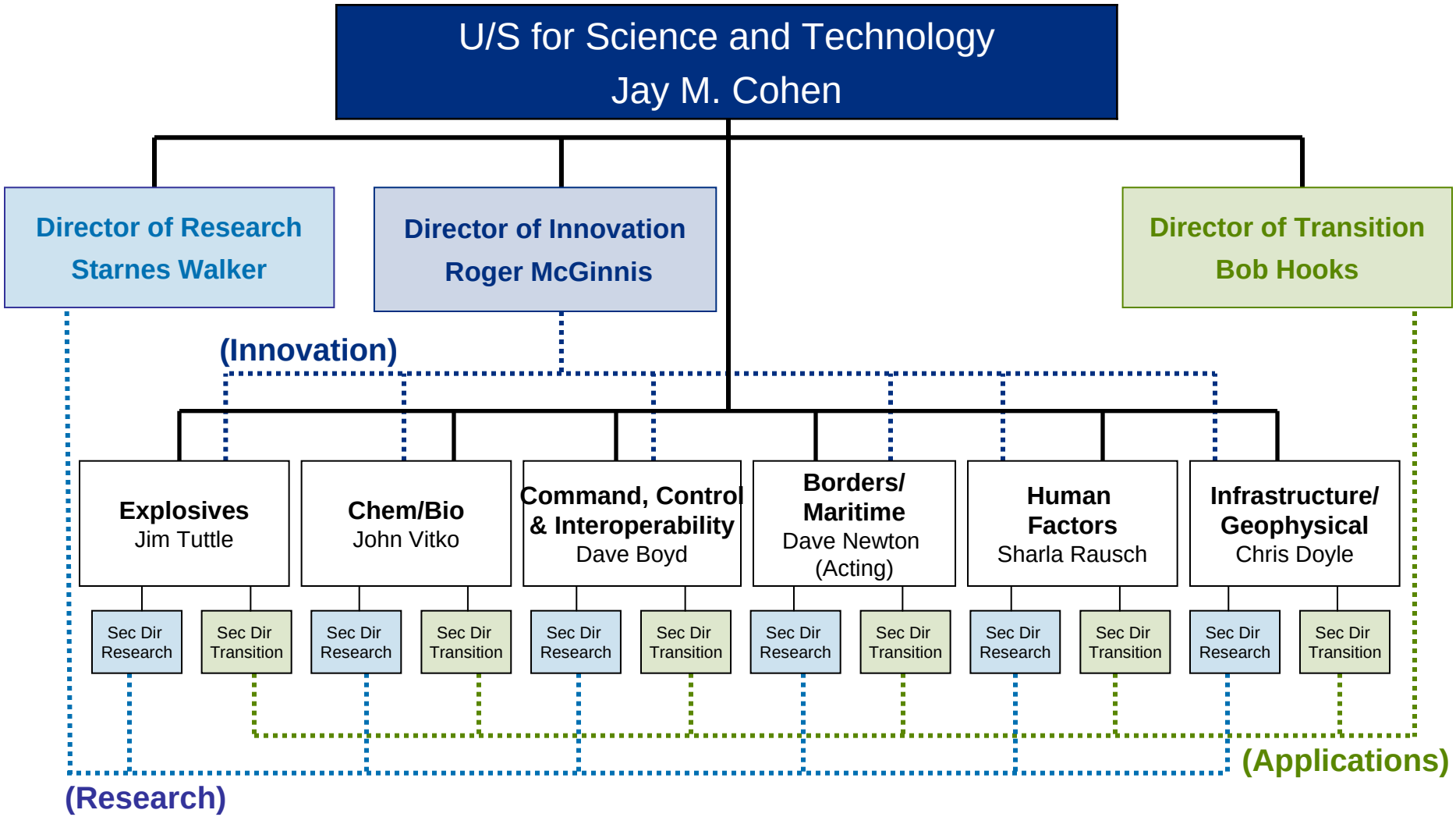
Jalal Mapar

Infrastructure & Geophysical Division

Science and Technology Directorate

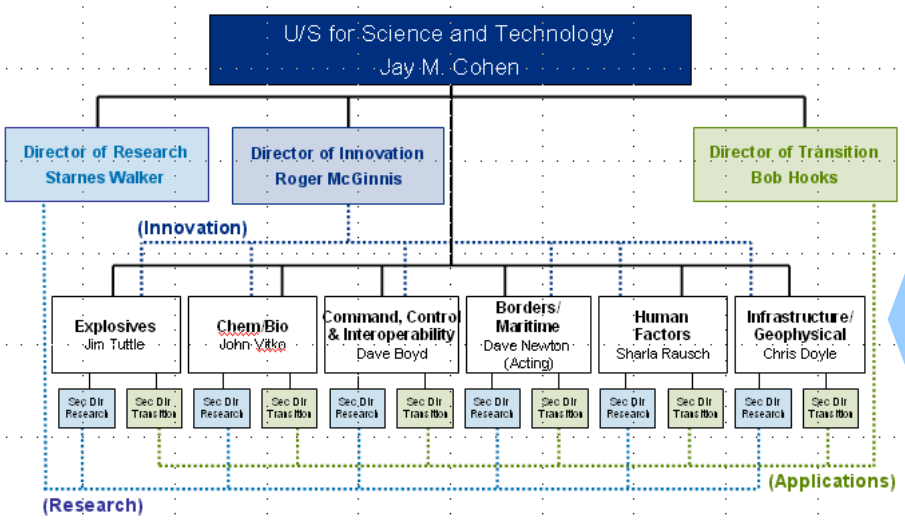
Homeland Security

DHS S&T Directorate

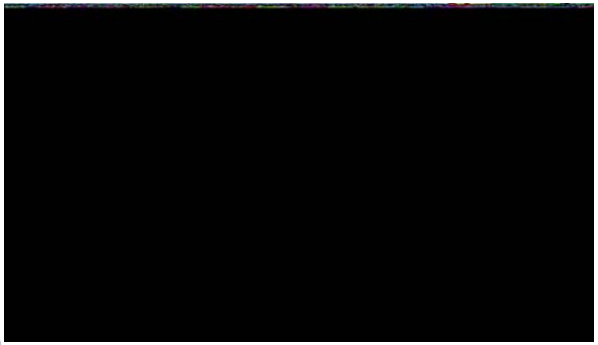


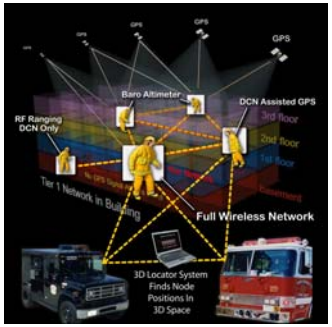
Homeland Security

Infrastructure and Geophysical Division



- **Objectives**
  - Develop capabilities to identify and mitigate the vulnerabilities of the 17 critical infrastructure and improve the ability of the Nation to prepare for, respond to, and recover from all-hazards emergencies to keep our society and economy functioning
- **Program Elements**
  - Critical Infrastructure Protection
  - Preparedness & Response
  - Geophysical





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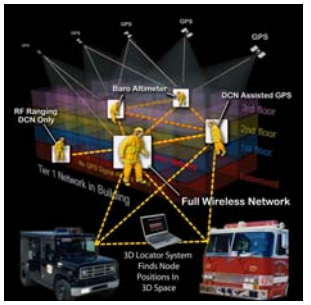
Preparedness & Response



- Objectives
  - Enhance first responders ability to prepare for, respond to and recover from all-hazards emergencies through development and deployment of enabling technologies
- Customer
  - DHS/FEMA *(primary)*, and others (CBP, CG, TSA, …)
- End-User
  - 44,000 Emergency Response Organizations
  - 18,000 Law Enforcement Agencies
  - 30,000 Fire Departments
  - 83,000 State/Local Governments

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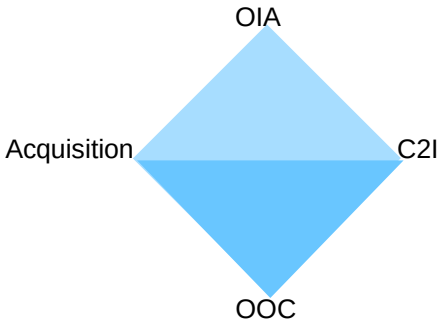
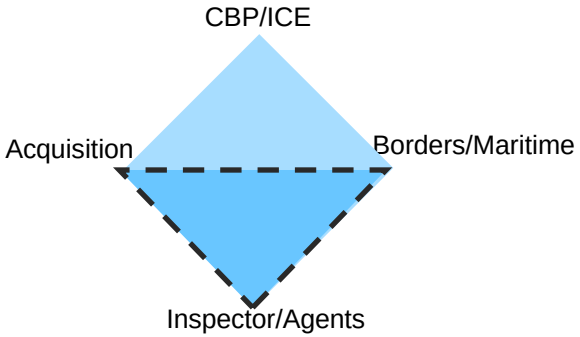
Homeland Security Capability IPTs

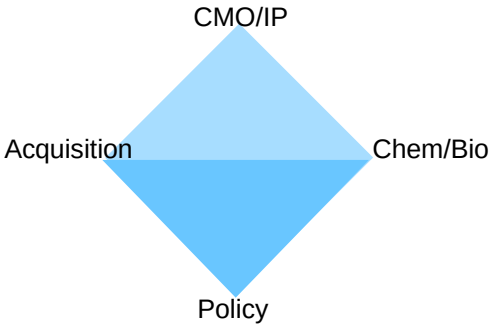
Information Sharing/Mgmt



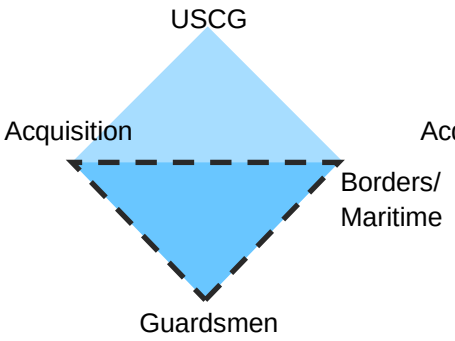
Border Security



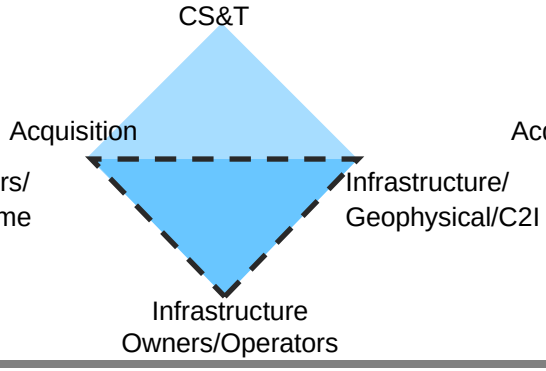
Chem/Bio Defense



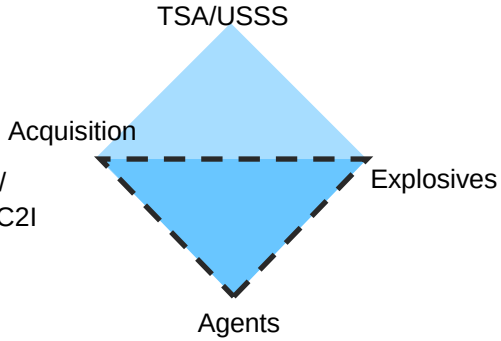
Maritime Security



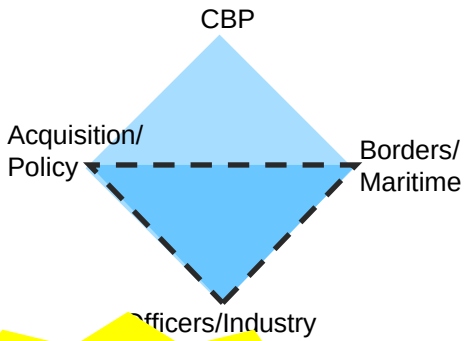
Cyber Security



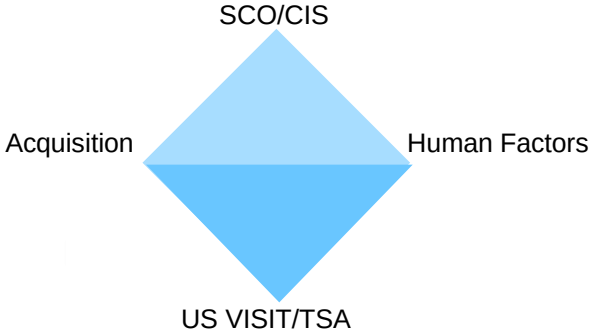
Explosive Prevention



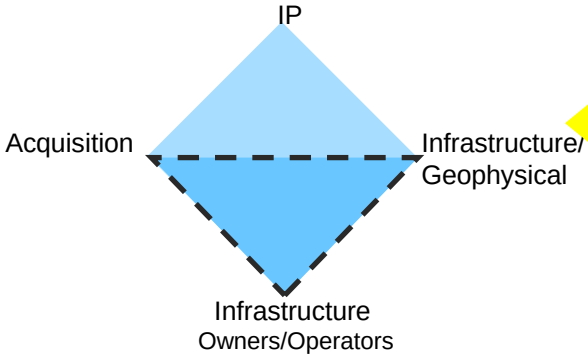
Cargo Security



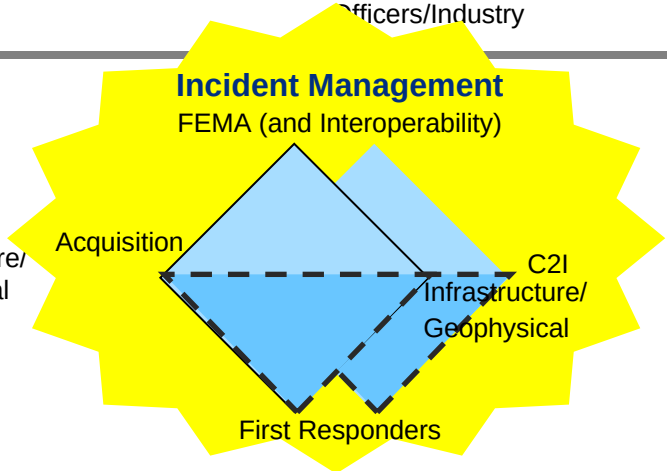
People Screening



Infrastructure Protection



Incident Management



Incident Management IPT

- **Capstone IPT Leads are from FEMA and S&T**
  - FEMA: Ret. VADM Harvey Johnson, Deputy Director/COO
  - S&T: Chris Doyle, Director, Infrastructure and Geophysical Division
- **Participants**
  - FEMA (primary), CBP, USCG, TSA, ICE, USSS
- **Process**
  - Several rounds identified prioritized capabilities
    - *S&T Projects established to develop technologies for out years*
- **Outcome**
  - Resource-constrained, prioritized list of out-year Capability gaps and Project areas

Simulation Based Incident Planning and Response

1st Responder Equipment

Common Operating Picture & Situational Awareness

Homeland Security

Preparedness & Response

Infrastructure and Geophysical

Preparedness & Response

Integrated Modeling, Mapping, & Simulation

Emergency Responder Technology

- *Responder Tracking System*
- *Physiological Monitoring System*

Incident Management Enterprise

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Emergency Responder Technology

- **Responder Tracking System**
  - Real-time positioning and status of first responders to incident commanders

- **Physiological Monitoring System**
  - Improve incident commanders situational awareness through real-time health status of first responders

Future Deployment: *Provide technology for the SEL & AEL for jurisdictions to purchase*
Cross-functional Values: Technologies for USCG, CBP, and other LE and EMS groups

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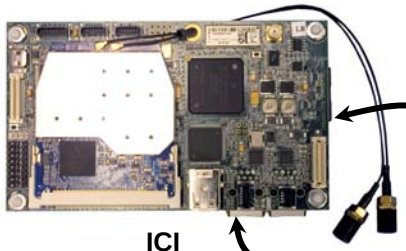
Responder Tracking System - Sensor Development



ICI
Mobiquity

Wireless Ad Hoc Network

900 MHz
Data Communications Link

Bluetooth Antenna

6 GHz Ranging Link

Navigation Fusion Engine (DCN)

RF Ranging

Altimeter

Bluetooth Antenna

GPS

GPS Antenna

BT

Inertial

Magnetometer

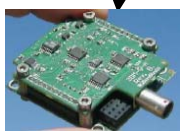
MSSI
RMR

Honeywell
PPT0015AFN2VAB

Installed on
ICI Board

Falcom
JP-15

Foot Unit



IMU/Magnetometer
(MicroStrain)
3DM-GX1

Bluetooth
To Main Unit

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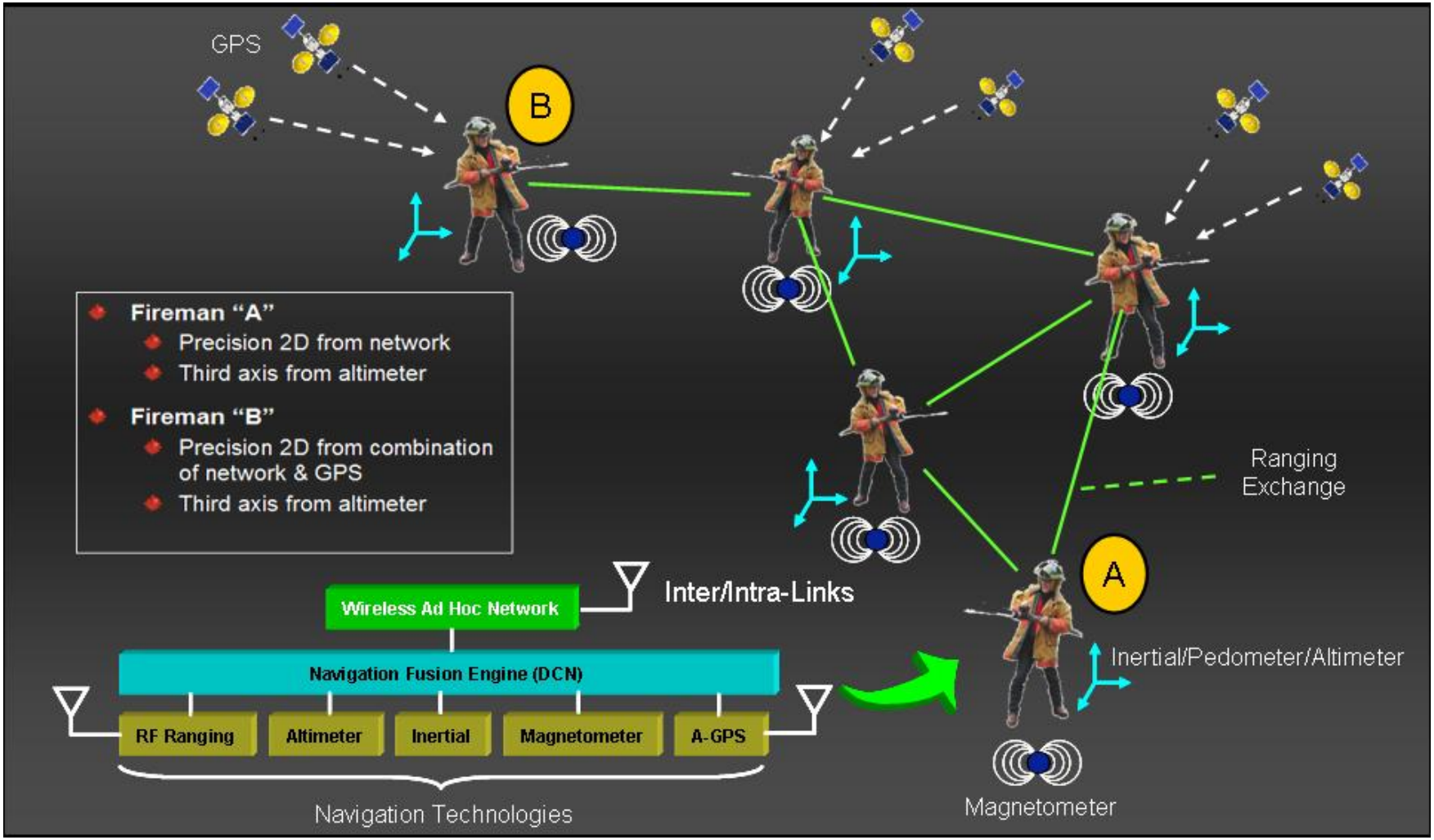
Responder Tracking System – Staying Connected

Fusing All Navigation Information Available to the Network



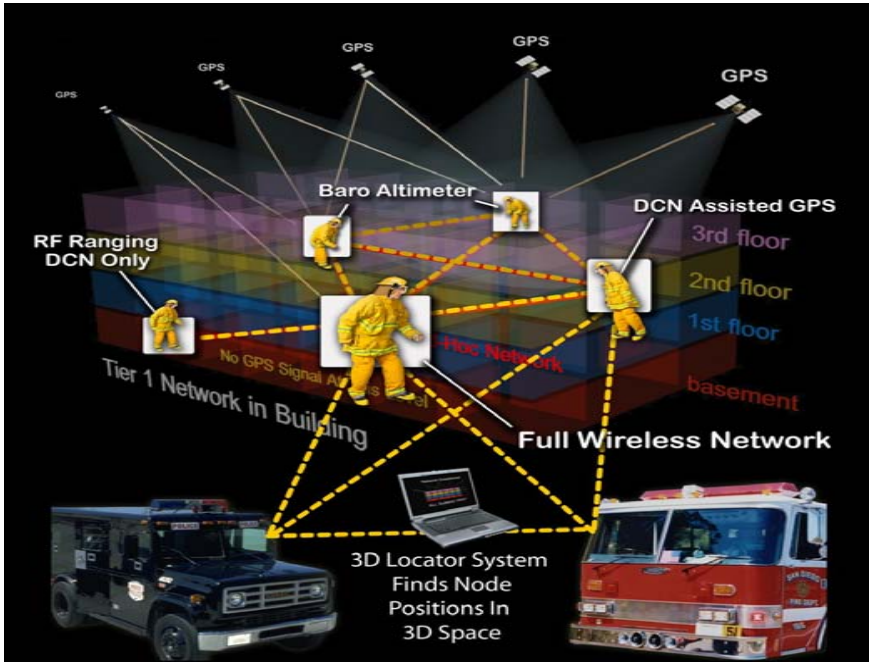
Responder Tracking System

Summary:

- No viable single solution exist
- Best approach is the ***"Cocktail Solution"***
- Current technologies
  - GPS, Radio Frequency Ranging (UWB), Inertial Navigation System (INS), Barometric Altimeter, Wireless Mesh Network and visual display for the incident commander
- Responder wears the unit that transmits location info via a wireless network to the command post

Plan and Schedule:

- Develop Prototype 3D Locator Hardware – FY07
  - Critical Design – FY07
  - Small scale testing – FY07
- Prototype visual imaging and tracking – FY08
- Pilot first responder 3D Locator System in major urban areas across the U.S. – FY08/FY09
- Improve accuracy to under 3m – FY09
- Enhance range and signal penetration in urban environment – FY09/FY10



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Physiological Monitoring System

Product Description:
- Develop an integrated sensor package that will monitor a responder's vital signs
- Develop a baseline for the overall physical health of the responder
- Identify and develop alarms notification metrics

- TRL: 4 – 7

Payoff:
- Provide incident commanders awareness of responder's health through monitoring and notification.
- Know when to pull out the right responders

Customer: FEMA
IPT Supported: IM Preparedness & Response

Planned Activities:
- Program execution plan – FY09
- System requirements and notification metrics – FY09
- Concept development and exploration – FY09
- Brassboard model –FY10; Prototype model – FY10
- Develop engineering model – FY11
- Integration, test, and system demonstration –FY11
- Field test and evaluation – FY12
- Transition system to Authorized Equipment List – FY13

There is a need for a highly reliable metric and notification system for on scene identification of firefighters who are at significant risk of an immediate cardio-vascular or cerebral-vascular incident. By identifying those firefighters in immediate peril, we could prevent fire ground deaths and the attendant risks they present to other firefighters and responders. Such work would be applicable in both CBRN and suppression operational environments.

Technology should be easy to use (lightweight and small), non-invasive, alert both the wearer and command staff monitoring emergency responders warnings of physiological irregularities, able to be integrated with existing personal protective equipment, interoperable with different types of PASS devices, able to be used in all forms of structures, and not cost prohibitive.

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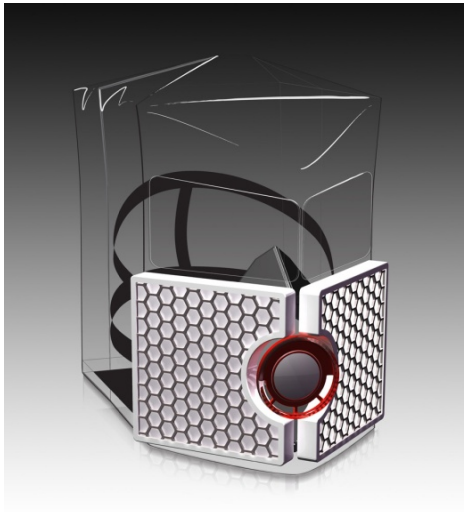
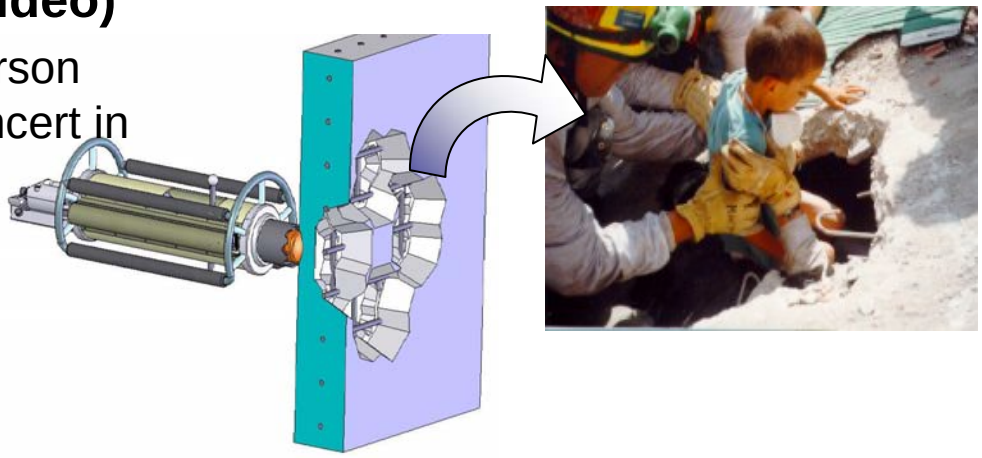
Emergency Responder Technology

- **Small Innovative Concealable 15min Escape Hood**
  - Advanced lightweight negative pressure emergency escape hood that is capable of providing 15min of protection time during a Chem/Bio/Explosive emergency to the federal/local/state emergency response community.



- **Adv. US&R Breaching Tool (Video)**
  - Using a cartridge-based two person technology to breach heavy concert in less time than current tool



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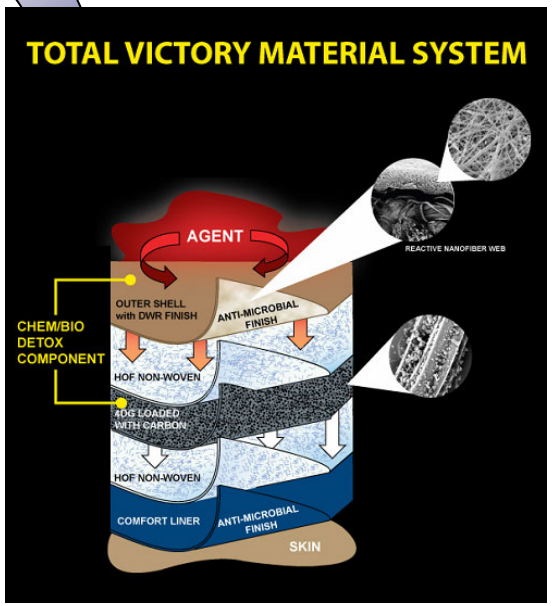
Incident Management IPT

Emergency Responder Technology

All-Hazards Personal Protective Equipment Prototype Suite

- Develop innovative and revolutionary protective materials and materials systems use by First Responders in all hazardous environments



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Incident Management Enterprise

- Integrated Enterprise for Incident Management Community
  - NIMS & NRP compliant technologies
- Incident Logistics and Resource Tracking
  - Real-time information for mission critical resources
- Simulation Training for Incident Commanders
  - Reproducible scenarios in a virtual training environment
  - Scenario playback and decision analysis for teaching next-generation of incident commanders
- Open Architecture for Incident Information Collaboration
  - Seamless link for incident information across all levels of ICS and MAC
  - Unified operational picture for incident commanders and coordination entities in MAC (EOCs, NOC, etc…)

Future Deployment: *FEMA reference specification for Incident Management Systems to adhere to*
Cross-functional Values: All government and non-government agencies in the NRP

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