Weapons of Mass Destruction (WMD) Terrorism Preparedness & Response Conference

Technologies and Equipment For Military and Public Safety Emergency Response

Technology Needs Performance Deficiencies

A Safer Rescuer Means a Safer America !

Presented By:
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National Protection Center
DOD/DOJ InterAgency Board
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Report Documentation Page

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	Grant Number
	Program Element Number
Author(s) Haskell, Bill	**Project Number**
	Task Number
	Work Unit Number
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Abstract

Subject Terms

Report Classification unclassified	**Classification of this page** unclassified
Classification of Abstract unclassified	**Limitation of Abstract** UU

Number of Pages
66

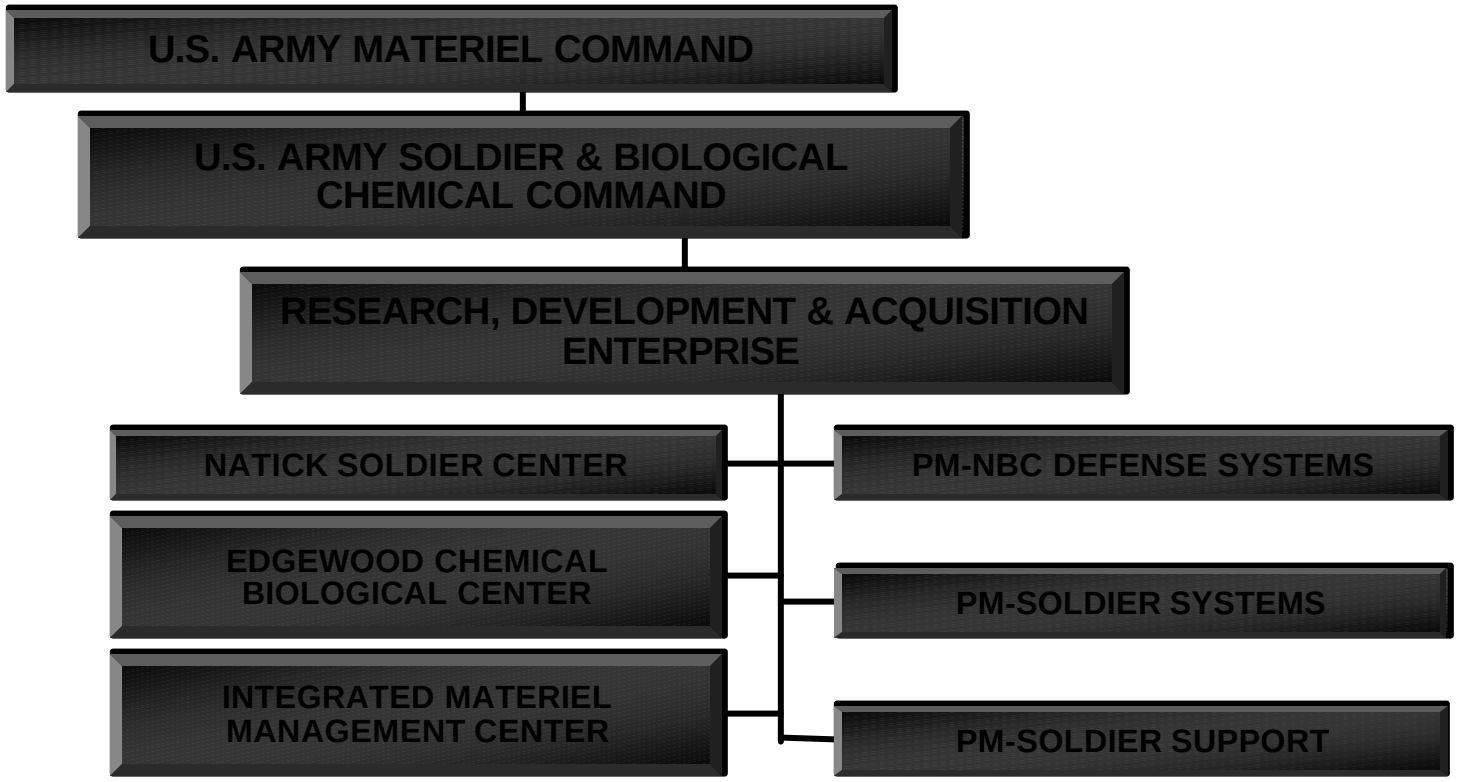
SBCCOM Improved Response Program Workshop

Biological Weapons – Improved Response Program
Guidelines, Products & Procedures
Dr. Mohamed Mughal
Homeland Defense Business Unit

Chemical Weapons – Improved Response Program
Guidelines, Products & Procedures
Dr. Paul Fedele
Homeland Defense Business Unit

Breakout Session IIIB
Wednesday, May 2, 2001
11:00 – 11:45 AM
Seasons South

Where SBCCOM Fits In



The Army is - - People

If the Soldier

wears it …

carries it …

eats it …

lives in it …

SBCCOM provides it!

"The magnificence of our moments as an Army will continue to be delivered by our people. They are the engine behind our capabilities, and the Soldier remains the centerpiece of our formation."

— GEN Eric K. Shinseki
Chief of Staff, U. S. Army
12 October 1999

Soldier System Technologies

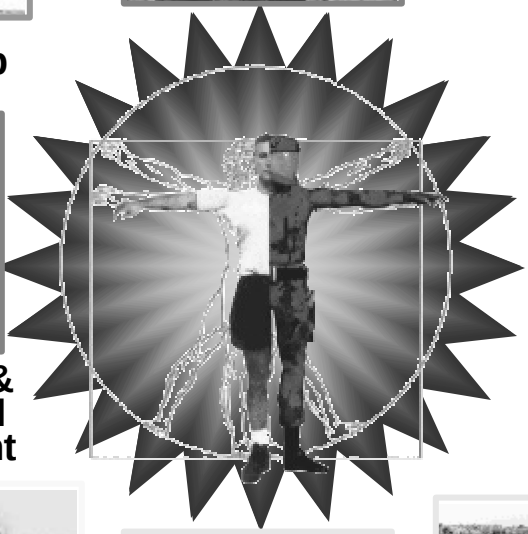
Airdrop

Chemical Protective Clothing

Obscurants

NBC Reconnaissance Systems

Clothing & Individual Equipment



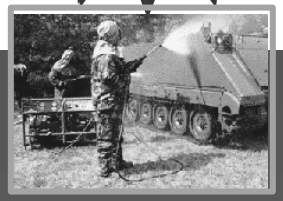
Masks

Warning & Reporting Systems

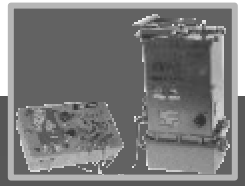
Combat Rations & Field Feeding

Field Services

Shelters / Collective Protection

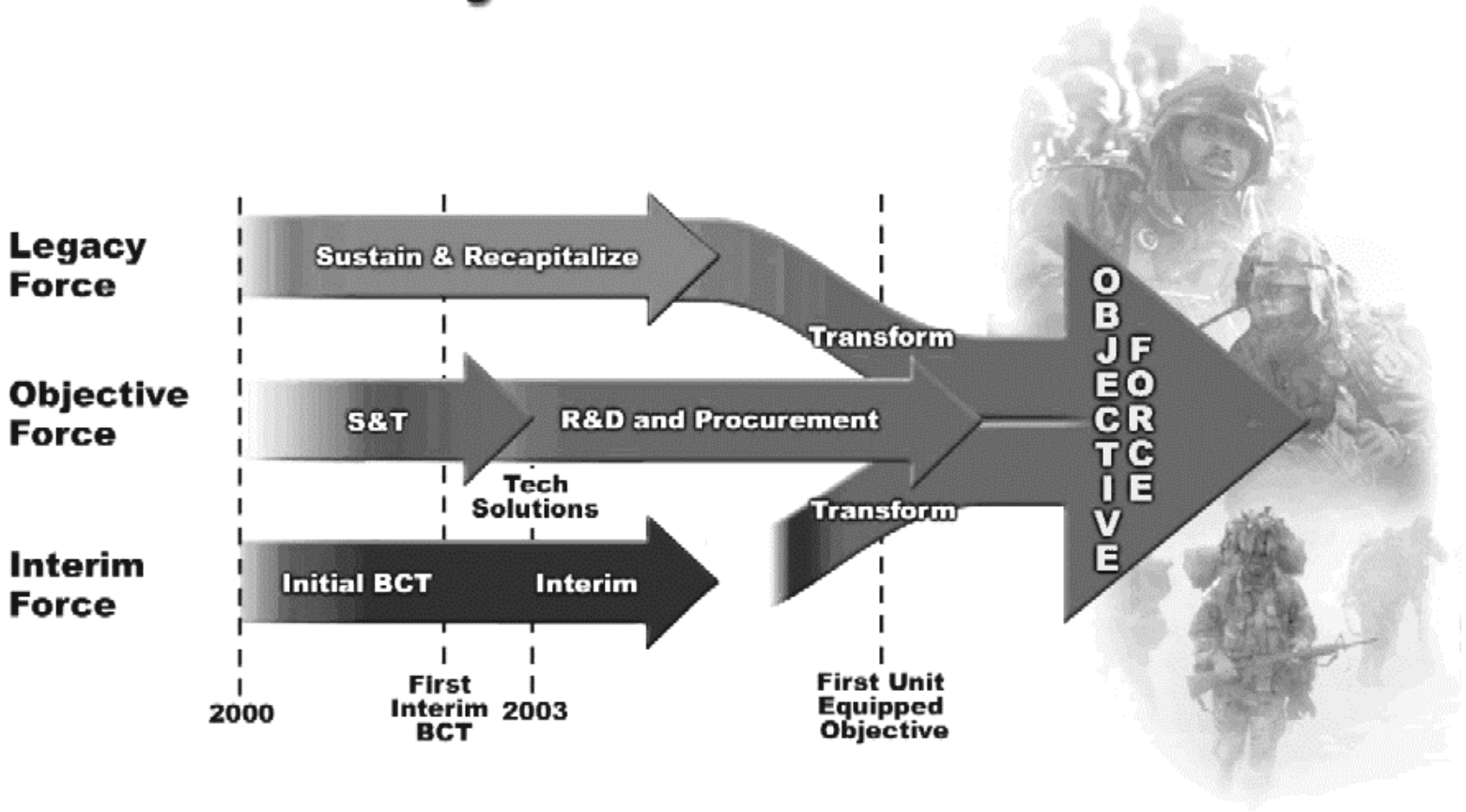


Decontamination Systems



NBC Detection Systems

The Army Transformation



. . . Responsive, Deployable, Agile, Versatile, Lethal, Survivable, Sustainable.

The Land Warrior System

INTEGRATED HELMET ASSEMBLY

- LIGHTWEIGHT HELMET WITH MOUNTED DISPLAY
- LASER DETECTOR
- BALLISTIC/LASER EYE PROT.

COMPUTER/RADIO SUBSYSTEM

- PENTIUM COMPUTER
- SOLDIER AND SQUAD RADIOS
- NAVIGATION
- HANDHELD FLAT PANEL DISPLAY & KEYBOARD

WEAPON SYSTEM

- VIDEO CAMERA
- THERMAL WEAPONS SIGHT
- CLOSE COMBAT OPTICS
- LASER RANGEFINDER

SOFTWARE SUBSYSTEM

- MODULAR, TACTICAL & MISSION SOFTWARE
- TACTICAL INTERNET

PROTECTIVE CLOTHING AND INDIVIDUAL EQUIPMENT SUBSYSTEM

- MODULAR LIGHTWEIGHT LOAD-CARRYING EQUIP (MOLLE)
- INTERCEPTOR BODY ARMOR
- CHEM/BIO
- COMBAT I.D.

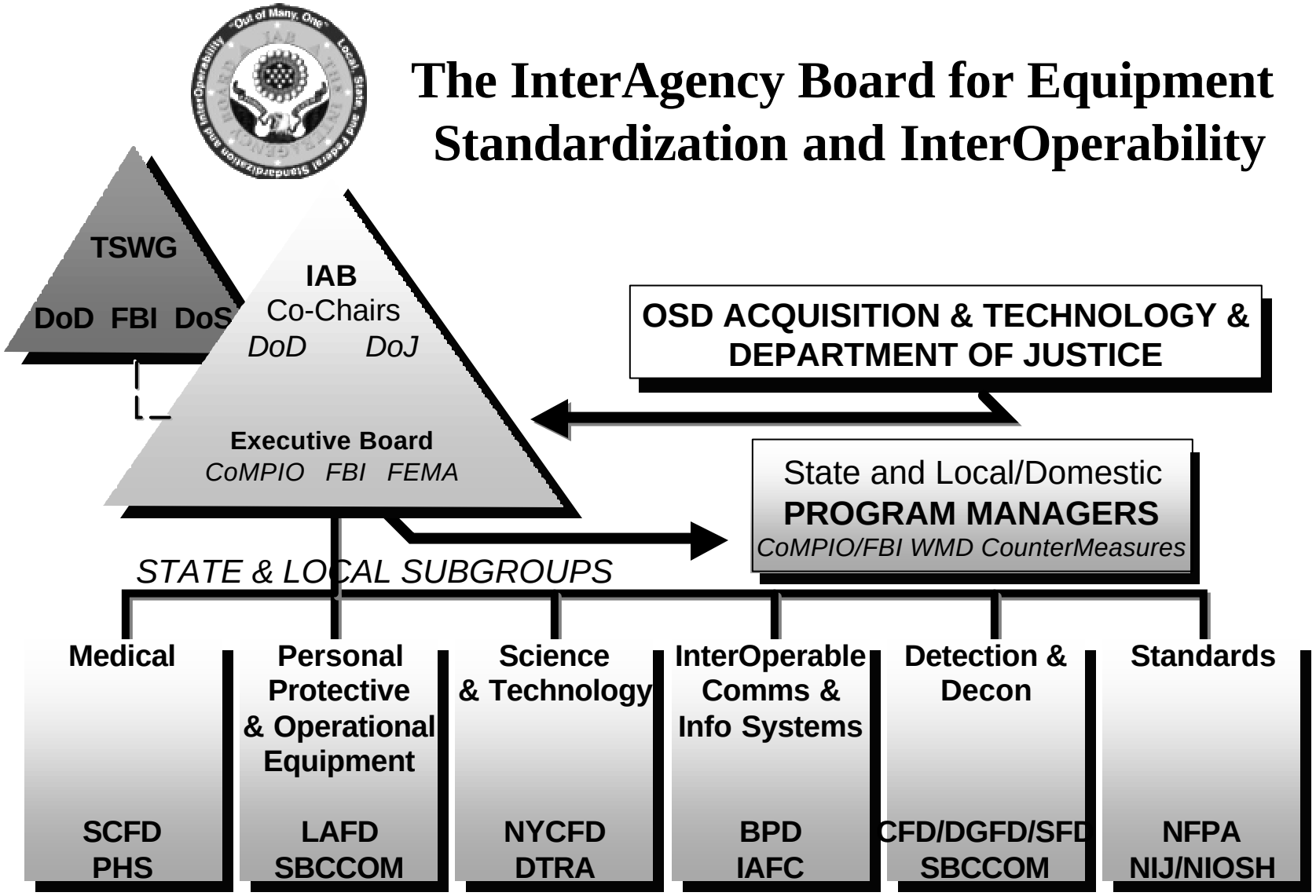
Army's First Fully Integrated Infantry Fighting System
Combines Sensors, Computers, Lasers, Geo Location and Radio With Soldier Mission Equipment
Achieves Chief of Staff Army Vision by:

- **Enhancing Lethality, Survivability, Mobility and Situational Awareness of the Soldier**
- **Does Not add Weight to Soldiers Combat Load nor Increase Unit Logistical Footprint**

Future Warrior

- **Platform for exhibiting high-tech capabilities**
- **Technologies are in early research, but a visualized concept provides direction**
  - Microelectromechanical Systems
  - Nanotech based materials
  - Fused sensor displays
  - MCC microtubes
  - Electrospinlaced matrices

The InterAgency Board for Equipment Standardization and InterOperability



Homeland Defense

Breakout Session IIIB
Wed May 2nd
11:00 – 11:40 AM
A Must See!!

Automated Decision-Aid System For Hazardous Incidents (ADASHI) Booths 47&48

Domestic Preparedness
- City Training & Exercises
- Improved Response Program
- Federal, State, & Local Exercises

Technical Assistance
- Fixed Site/Building Protection
- NBC Equipment Evaluations
- Special Projects

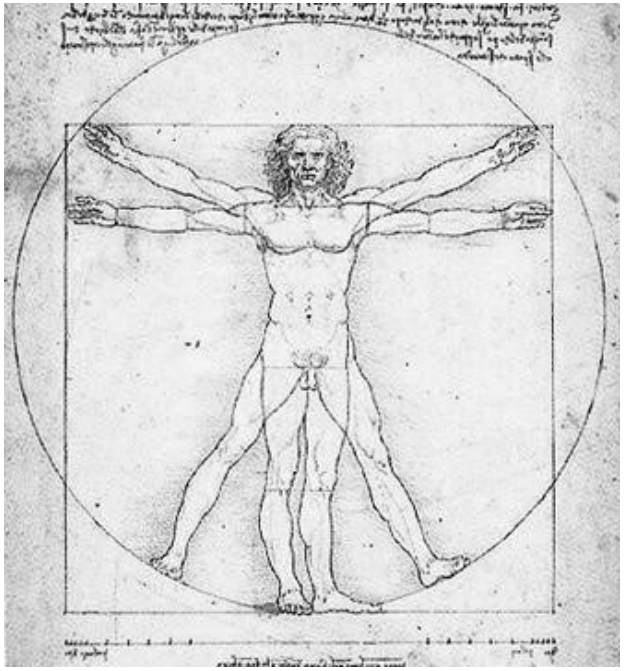
Installation Protection
- Military Installations
- Special Facilities

NPC
NATIONAL PROTECTION CENTER

Our Focus:

Technology & Integration for the Most Important and Fragile Tactical Platform:

http://npc.sbccom.army.mil



The Human Being

National Protection Center

No single agency can effectively meet the technological demands of the user

Personal Protection
Individual Equipment
Integrated Systems
Multifunctional Protection

Public Safety
Emergency Response
Space

Military

Technology Transfer
R&D
Leverage Resources/Expertise
Academia/Government/Industry Partners/Members

National Fire Protection Association

Mass Office of Public Safety

Los Angeles Sheriff Dept

Stand up Partners

AmTech

Battelle

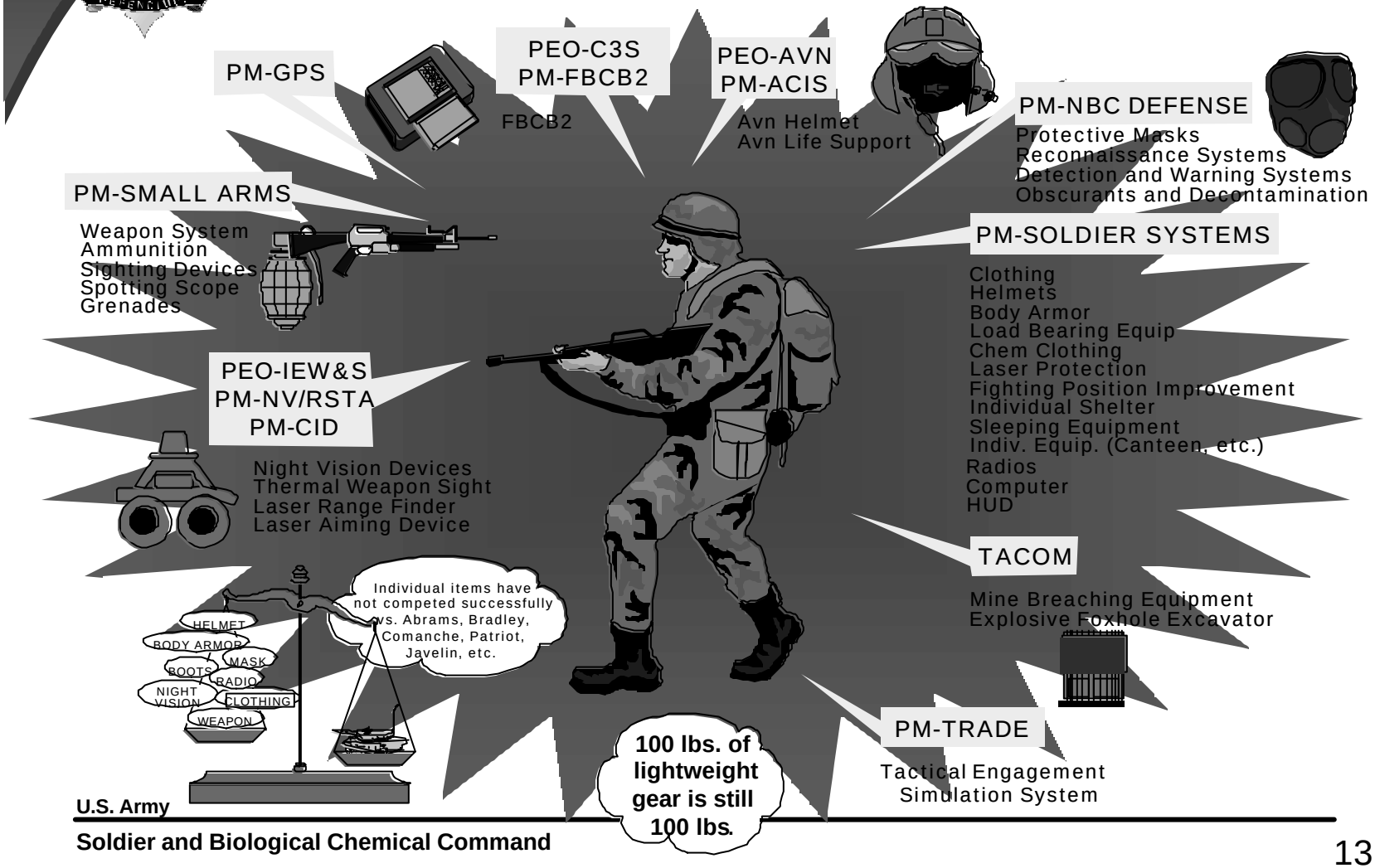
Gentex

University of Massachusetts

Unconventional Concepts Inc.

Membership increasing as projects evolve!

INTEGRATION & MODULARITY



Personal Protection
for Improved Individual Survivability

– **Joint effort with 3 Army Agencies**

Natick Soldier Center (Natick) - Lead Agency
(Army & Marine Corps)
U.S. Army Research Laboratory (ARL)

U. S. Army Materiel Systems Analysis Activity (AMSAA)

Defense Science Office → **High Risk, High Payoff**
Joint DARPA/Army Team

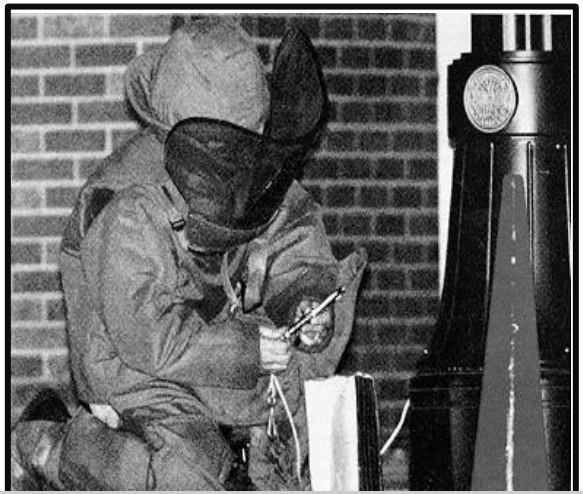
- **Ultra-light weight armor materials for personal protection**

Personal Protective Armor

- **Increased Penetration Resistance/Multiple Threats**
- **Significantly Lighter Weight**
- **Significantly Less Bulk**
- **Protection from Blast, Blast Overpressure**
- **Human Factors - Flexible**
  - Comfortable
- **Affordable**

Modular Body Armor ("Interceptor")

Explosive Ordnance Disposal (EOD) Suit



Interim Small Arms Protective Over vest (ISAPO)

Laser Eye Protection

The EOD suit is used by DOD & Civilian Law enforcement agencies. It consists of a coat, trousers, a face shield with chest plate, a helmet and a ballistic helmet cover.

Ranger Body Armor (RBA)

Anti-Personnel Mine Protective Over boots

High Performance Fibers Properties

Fiber Type	Fiber Density (g/cc)	Tensile Strength (g/d)	Tensile Modulus (g/d)	Elongation at Break %
Kevlar® 29	1.44	22	525	3.5
Kevlar® KM2	1.44	27	500	4.3
Spectra® 1000	0.97	35	2010	2.7
Zylon®	1.56	42	1300	2.5
M5®	Under development			

M5 Fiber

M5 fiber is a new <u>ultra high performance fiber</u>. It has extraordinary potential for use in armor systems for personnel and vehicles. M5 will also high flame and thermal protection.

hree
ensional
drogen
bonding

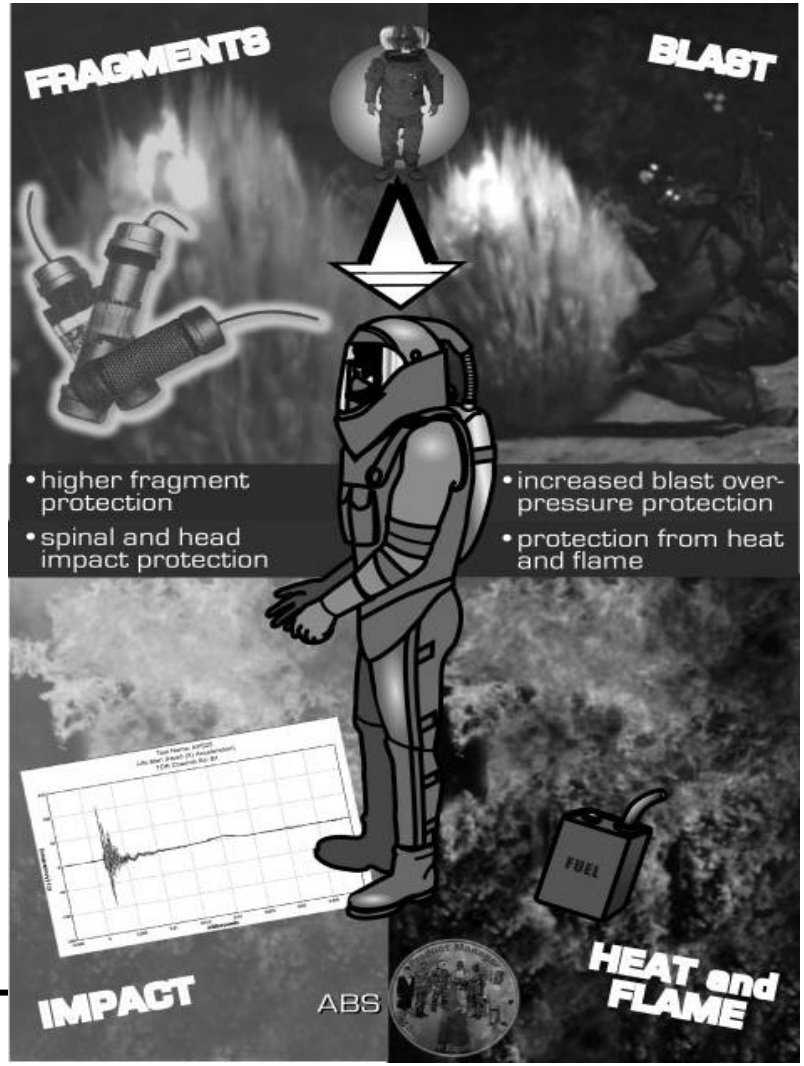
Expected Material Characteristics:

- **Yarn tensile modulus 400-450 GPa (current 300 GPa),**
- **Average yarn axial tensile strength 9.5 GPa (current best fiber 6.5 GPa),**
- **Average elongation at break 2.5% (current best fiber 2.5%)**
- **Unlike Kevlar and especially PBO, the fiber is UV stable**
- **Unlike most high performance organic fibers, the fiber has a high axial compressive strength (currently 1.7 GPa)**
- **The fiber has the <u>highest flame and thermal properties of any organic fiber</u> (better than PBO and PBI, 20-times Nomex)**

Advanced Bomb Suit (ABS)

Barry Hauck
Project Director
PM-Soldier Equipment

(508) 233-4348 DSN 256
FAX: 508-233-9527/5454
Barry.hauck@natick.army.mil



Explosive Ordnance Disposal (EOD) Suit PS-820

Type Classified & Fielded in 1988

Design and Material Technology:

- Kevlar, Fiberglass, Nomex, Polycarbonate, Acrylic
- System Components: Unitized face shield and chest plate, Jacket, Trousers, PASGT helmet, Helmet bonnet

Deficiencies

- Poor weight distribution, face shield cumbersome and subject to fogging
- Lacks protection against higher velocity fragmentation and overpressure protection technology
- No significant impact protection to head and spine
- Difficult to don and doff, ineffective coverage of legs due to design, inflexible sleeves
- **Weight :** 62 lbs

Commerical Systems Evaluation

Med Eng Systems
EOD-8

Safeco Inc.
EOD-2000

Med Eng Systems
EOD-7B

American Body Armor
BBS-4

ABS Program Background

- **The PS-820 EOD Bomb Suit is Obsolete and lacks customer confidence.**
- **Number of potential commercial solutions that collectively meet about 80% of the joint service operational requirements**
- **Acquisition Strategy is to encourage all competitors to offer innovative solutions to satisfy ORD in the interest of maximum competition.**
- **Solicitation for Request for Proposals has been released on the SBCCOM web site.**

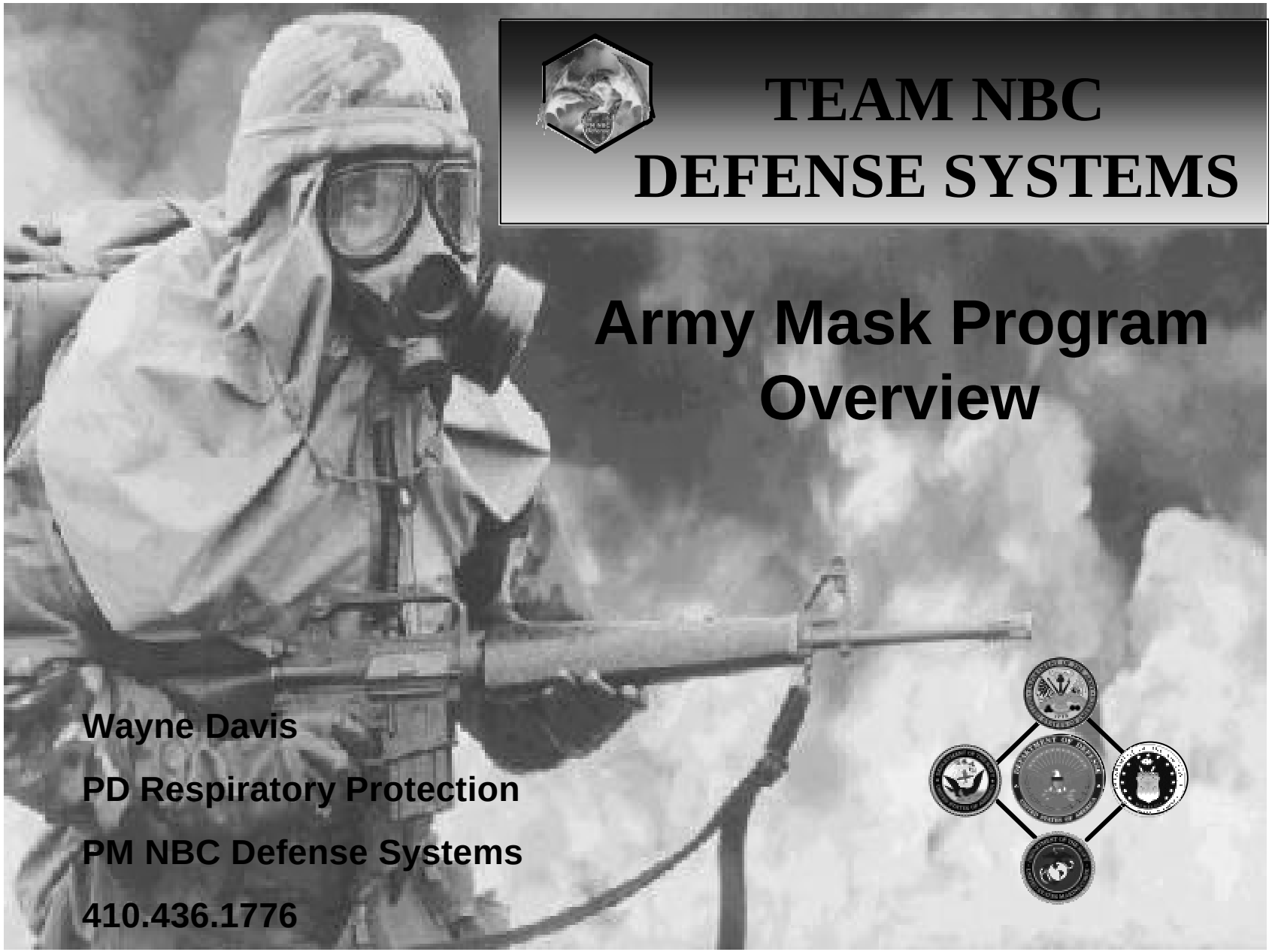
http://www.sbccom.army.mil

Advanced Bomb Suit Requirements

- **Improved frontal fragmentation protection**
- **Improved protection from Blast Overpressure**
- **Improved Human Factors**
  - **-Weight Distribution, Flexibility, Field of Vision**
- **Head and Spine impact protection**
- **Anti-Fog Face shield**
- **Flame/Heat resistance**
- **Compatible with Body Cooling System**
- **Technology Transition to Public Sector**

Proposed Effort by NIST-OLES, NIJ & SBCCOM
Is Development of EOD suit performance Standard

WWW.SBCCOM.ARMY.MIL



TEAM NBC DEFENSE SYSTEMS

Army Mask Program Overview

Wayne Davis

PD Respiratory Protection

PM NBC Defense Systems

410.436.1776

Protective Mask Program

Army Masks

- M40/M42 Series Masks
- M45 Aircrew Protective Mask
- Joint Service General Purpose Mask (JSGPM)
- Joint Service Chemical Environment Survivability Mask (JSCESM)

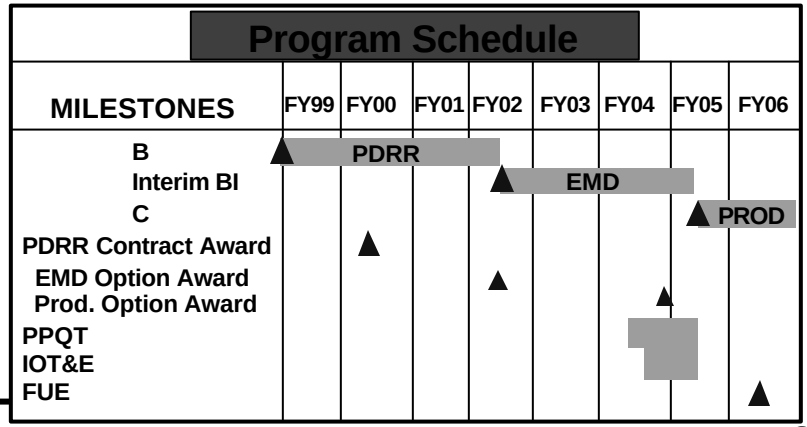
Joint Service General Purpose Mask

Objective: Provide face, eye, and respiratory protection from battlefield concentrations of CB agents, toxins, toxic industrial materials and radioactive particulate matter

- **BOI:** 1 for each ground/shipboard/combat vehicle personnel

Description:

- Lightweight
- Low profile/bulk
- Easier breathing
- TIM protection
- Improved compatibility with existing systems
- 24-hour protection



JSGPM Critical Threshold Requirements

- Protect Against Toxic Industrial Materials (TIMS)
- Protection Factor Greater Than 10,000
- Significant Weight and Bulk Reduction Compared to M40/M42/MCU-2/P Masks (Mask <= 1.5 lbs., System <= 3.0 lbs.)
- Exhalation Breathing Resistance ,<= 20 mm of Water and Inhalation Resistance <= 30 mm of Water at 85 LPM
- Improved Field of View
- Compatibility With All Service Individual Clothing and Equipment, and With Individual and Crew Served Weapon Systems and Optics
- Improved Comfort and Reduced Physiological Burden

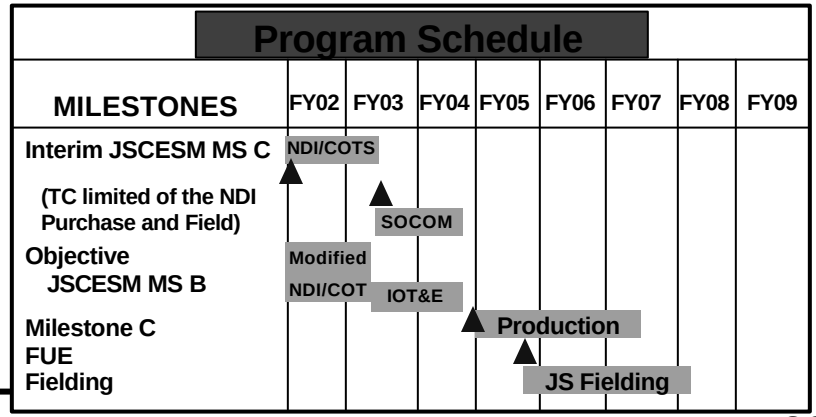
Joint Service Chemical Environment Survivability Mask (JSCESM)

Requirement: Provide a lightweight mask that provides face, eye and respiratory protection from vapor and aerosol CB agents. The mask is for use in low NBC threat situations

Description:

- One-Size-Fits-All
- Sealed Until Use
- Lightweight, < 1.0 lb
- Fits in BDU Cargo Pocket
- Drinking Capability
- Disposable After Use

Direct Emergency Response/ Public Safety Applications



CBRN Future Activities

- NIOSH-SBCCOM Joint NBC Respirator Standards Development Team progressing well
  (Public Stakeholders Respiratory Protection Workshop18-19 April, 2001)

- CBRN Standards for SCBA in FY 2000

- CBRN Standards for other respirator classes FY02-03

- NIOSH-NIST laboratory qualifications program will follow

(MIPT & NIST Funding Support has been received)

Heat Stress - A Silent Killer

DEPARTMENT OF FIRE SERVICES

HAZARDOUS MATERIALS EMERGENCY RESPONSE DIVISION

HEAT STRESS INDEX

TEMPERATURE ^{0}F	REALTIVE HUMIDITY								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
104	98	104	110	120	132				
102	97	101	108	117	125				
100	95	99	105	110	120	132			
98	93	97	101	106	110	125			
96	91	95	98	104	108	120	128		
94	89	93	95	100	105	111	122		
92	87	90	92	96	100	106	115	122	
90	85	88	90	92	96	100	106	114	122
88	82	86	87	89	93	95	100	106	115
86	80	84	85	87	90	92	96	100	109
84	78	81	83	85	86	89	91	95	99
82	77	79	80	81	84	86	89	91	95
80	75	77	78	79	81	83	85	86	89
78	72	75	77	78	79	80	81	83	85
76	70	72	75	76	77	77	77	78	79
74	68	70	73	74	75	75	75	76	77

NOTE: Add 10 ^{0}F when protective clothing is worn

Add 10 ^{0}F when in direct sunlight

HUMITURE ^{0}F	DANGER CATEGORY	INJURY THREAT
BELOW 60 ^{0}	NONE	LITTLE OR NO DANGER UNDER NORMAL CIRCUMSTANCES
80 ^{0} - 90 ^{0}	CAUTION	FATIGUE POSSIBLE IF EXPOSURE IS PROLONGED AND THERE IS PHYSICAL ACTIVITY
90 ^{0} - 105 ^{0}	EXTREME CAUTION	HEAT CRAMPS AND HEAT EXHAUSTION POSSIBLE IF EXPOSURE IS PROLONGED AND THERE IS PHYSICAL ACTIVITY
105 ^{0} - 130 ^{0}	DANGER	HEAT CRAMPS OR HEAT EXHAUSTION LIKELY, HEAT STROKE POSSIBLE IF EXPOSURE IS PROLONGED AND THERE IS PHYSICAL ACTIVITY
ABOVE 130 ^{0}	EXTREME DANGER	HEAT STROKE IMMINENT!

Warrior Microclimate Conditioning Requirements

Cooling/heating physiological requirements depend on:

- Ambient Environment Temperature, humidity, solar load, wind speed, etc.
- Work Rate
- Clothing Ensemble Characteristics
  Insulation, vapor permeability, etc.

Microclimate Conditioning
Soldier Work Rate Estimates

Metabolic Heat Production of Various Activities (70 kg man)

WORK RATE	ACTIVITY	WATTS
Very Light (105 to 175 Watts)	Lying on ground	105
	Standing in foxhole	116
	Sitting in truck	116
	Guard duty	137
	Driving truck	163
Light (175 to 325 Watts)	Cleaning rifle	198
	Walking on hard surface @ 1 m/s with no load	210
	Walking on hard surface @ 1 m/s with 20 kg load	255
	Manual of arms	280
	Walking on hard surface @ 1 m/s with 30 kg load	292
Moderate (325 to 500 Watts)	Walking in loose sand @ 1 m/s with no load	326
	Walking on hard surface @ 1.56 m/s with no load	361
	Calisthenics	378
	Walking on hard surface @ 1.56 m/s with 20 kg load	448
	Scouting patrol	454
	Pick and shovel	465
	Crawling with full pack	465
	Foxhole digging	475
	Field assaults	477
Heavy (500 + Watts)	Walking on hard surface @ 1.56 m/s with 30 kg load	507
	Walking on hard surface @ 2.0 m/s with no load	525
	Emplacement digging	540
	Bayonet drill	616
	Walking on hard surface @ 2.25 m/s with no load	637
	Walking on loose sand @ 1.56 m/s with no load	642

Enhanced Vapor Compression Cooling System

GOAL - Develop lightweight-low power vapor compression cooling System by 2002 (TRL 06).

APPROACH - Reduce cooling system weight and power thru miniaturization of its compressor, heat exchangers, and other components; and thru highly integrated design. Prototypes available in January 2002.

SPECIFICATIONS:

- **Cooling Rate: 120 Watts**
- **Power: 50 Watts @ 12-24 Volts DC**
- **Weight: 6.0 Lbs**
- **Garment Weight: 1.5 Lbs.**
- **Volume: 180 In^2**

Cooling Unit with advanced rolling piston comp

Stitchless Tubing Liquid Cooling Garment

Protective Clothing for Terrorism Incidents

MIPT **Oklahoma City National Memorial**
Institute for Prevention of Terrorism
Preventing, deterring, and mitigating the effects of terrorism

OSU

SRI International

CLEMSON UNIVERSITY

MIPT **Oklahoma City National Memorial Institute for Prevention of Terrorism**

Preventing, deterring, and mitigating the effects of terrorism

Year 1 Challenge

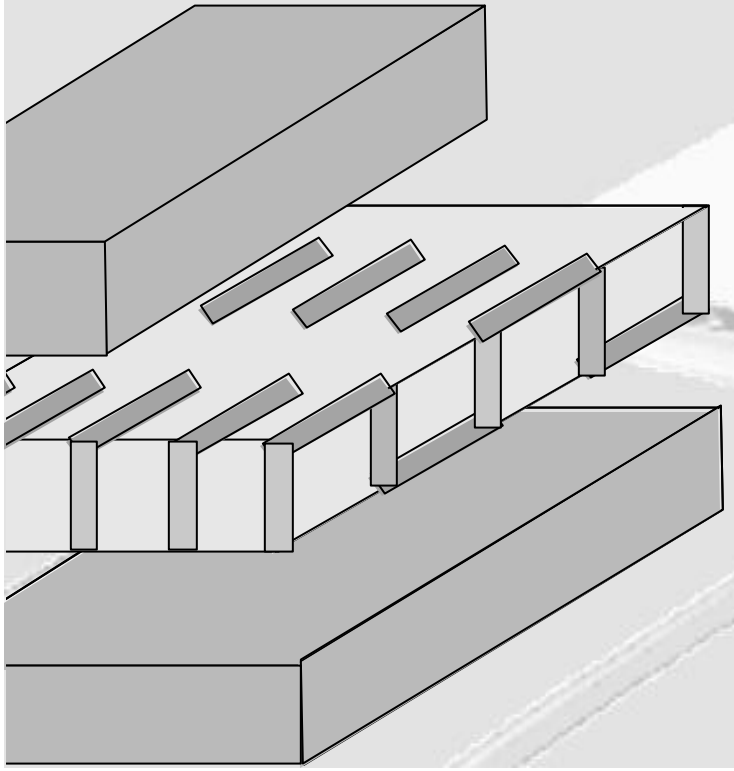
To develop and demonstrate *thermoelectric* cooling technology and a suitable battery into a protective multi-layer textile <u>sample</u> without compromising the PPE's protective qualities.

MIPT **Oklahoma City National Memorial**
Institute for Prevention of Terrorism

Preventing, deterring, and mitigating the effects of terrorism

Thermoelectric Concept 1
Textile Concept

Cutaway of Thermoelectric Clothing Concept
Integrated - Fiber Approach



Copper fiber

P-Type material

N-Type material

Thermally and electrically insulative material

Thermally conductive and electrically insulative material

OSU SRI International CLEMSON UNIVERSITY

Interagency Communications
Incident Commanders Radio Interface Unit

✓ Military Requirements

❖ **Rugged enough to move without special transport or power requirements.**

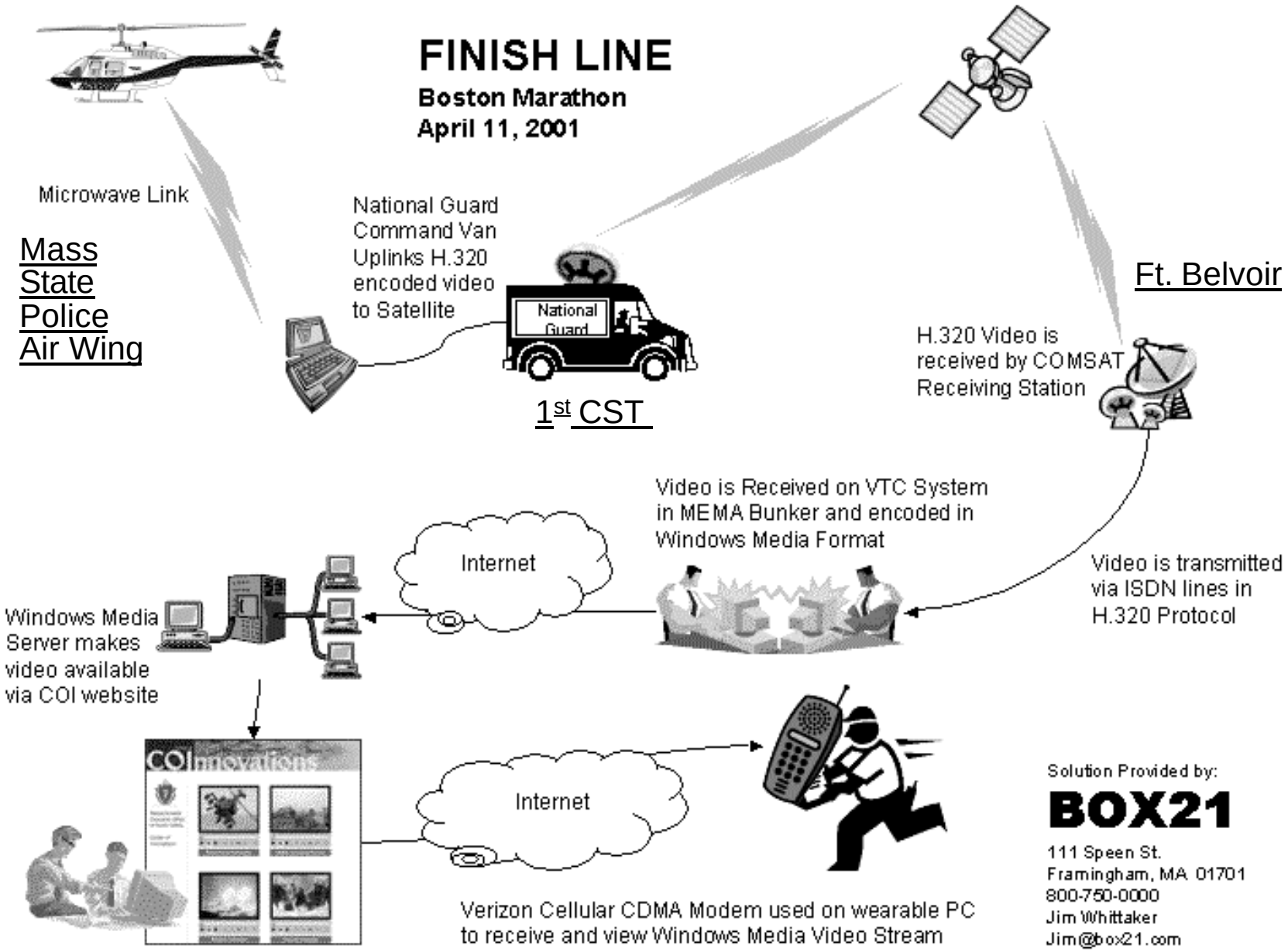
❖ **Interconnects multiple military and/or civilian radios in moments through the unmanned ICRI.**

✓ Dual Use

❖ **1st responders to incidents where there is no state/ community radio repeater network in-place**

❖ **Small, lightweight interconnect assembly that provides**
- **Use by multiple organizations/teams at WMD or disaster response operations**
- **Audio matrix interface between multiple commercial military land mobile radios, operating frequencies, and a land-line/cellular telephone**

❖ **Low procurement (< $5 K) and maintenance costs**


FINISH LINE
Boston Marathon
April 11, 2001
Microwave Link
Mass State Police Air Wing
National Guard Command Van Uplinks H.320 encoded video to Satellite
National Guard
1st CST
Ft. Belvoir
H.320 Video is received by COMSAT Receiving Station
Video is Received on VTC System in MEMA Bunker and encoded in Windows Media Format
Internet
Video is transmitted via ISDN lines in H.320 Protocol
Windows Media Server makes video available via COI website
COInnovations
Internet
Verizon Cellular CDMA Modem used on wearable PC to receive and view Windows Media Video Stream
Solution Provided by:
BOX21
111 Speen St.
Framingham, MA 01701
800-750-0000
Jim Whittaker
Jim@box21.com

Modularly Reconfigurable Warfighter Systems

Digital MP Technology Program

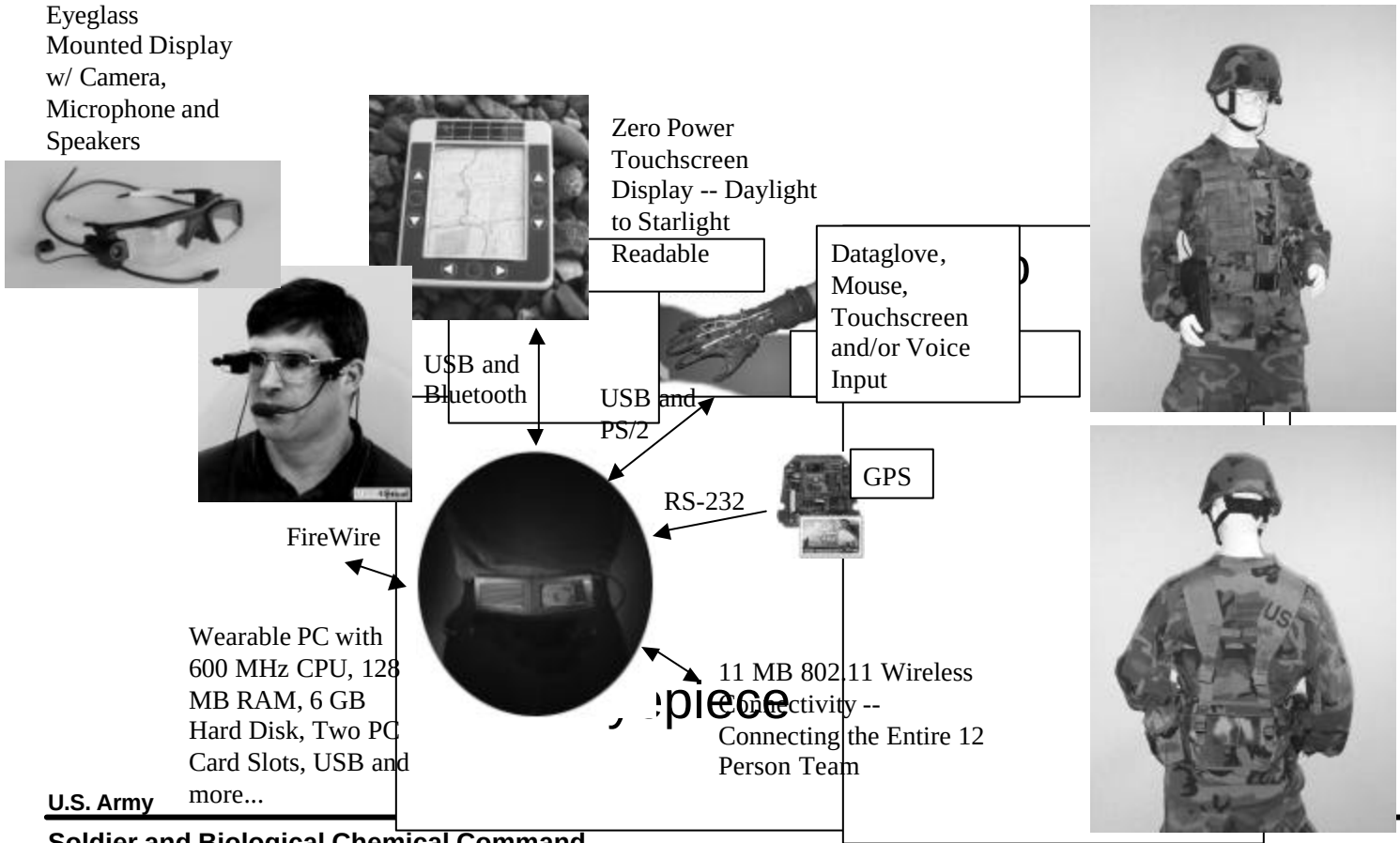
Ft. Polk Advanced Warfighting Experiment – October 2000

Wearable Computer System

Collaboration in MP Team Land Navigation/Reconnaissance

Modularly Reconfigurable Warfighter Systems

Digital MP System Design



So What Is a Military Chemical Agent Protective Ensemble?

- Ensembles worn by military personnel to protect against respiratory and percutaneous threats
- A jacket/trouser combination or coverall worn in conjunction with a respirator, boots and gloves
- Can be fabricated from either a permeable, selectively permeable or impermeable material

Joint Service Lightweight Integrated Suit Technology

JSLIST

So what is a Chemical Agent Protective Ensemble? (cont.)

- Suit integrity requires excellent sealing at the interfaces (e.g. respirator/hood)
- Must withstand chemical challenges (typically liquid, vapor or aerosol)
- They are <u>not</u> totally encapsulated garments

ADVANCED LIGHTWEIGHT CB PROTECTION

Selectively Permeable Protective Garment Technology

Quoc Truong,
Eugene Wilusz

Phone: (508) 233-5484/5485/5486 Fax: (508) 233-4331
Quoc.truong@natick.army.mil, Eugene.wilusz@natick.army.mil

IMPROVED INTERFACES FOR CHEMICAL AGENT PROTECTIVE ENSEMBLES

Cleveland A. Heath
508-233-4189, x212
FAX 508-233-4683
cheath@nctrf.natick.army.mil

Advanced Lightweight CB Protection

✓ Military Requirements

❖ **Develop moisture vapor permeable CB agent resistant selectively permeable membranes (SPMs)**

❖ **Develop a CB protective duty uniform with integrated closure system**

❖ **Membrane based fabric systems for CB/environmental protection**

✓ Dual Use

❖ **Emergency responders -- Tactical Law Enforcement Emergency Medical Service**

❖ **Pesticide applicators**

❖ **Industrial chemical handlers**

❖ **Medical personnel**

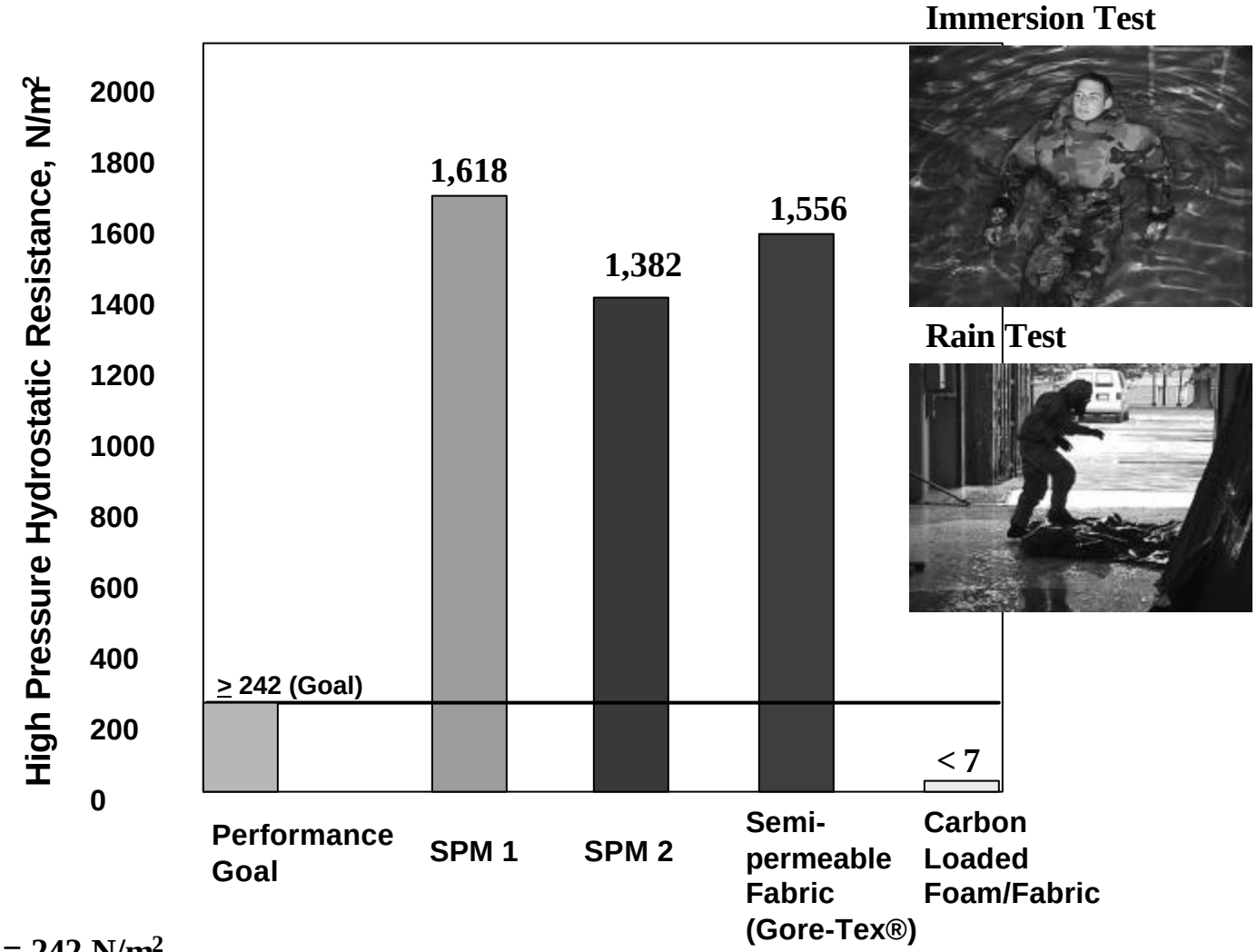
❖ **Environmental clean-up workers**

Partnering under the Dual Use Science and Technology (DUST) Program and Cooperative Research and Development Agreement (CRDA)

Challenges:

- **Combine moisture vapor permeability and CB agent barrier properties in a single material.**
- **Develop effective membrane/fabric lamination techniques.**
- **Develop a thin and durable material/fabric system.**
- **Integrate novel closures into a CB duty uniform (CBDU).**
- **Produce affordable lightweight CBDU.**

Liquid Protection



*Waterproof = 242 N/m²

So What's Next?

Field Evaluate Selectively Permeable Prototype Emergency Response Ensembles.

Photos Courtesy of T. Cloonan Scott Aviation

Selectively Permeable Protective Garment Technology

Field Evaluation &
Design Feedback

Field Evaluations have or will Include:

- FEMA US&R Team (Region 1 – Feb 2001)
- Boston Emergency Medical Service
- Oklahoma City Emergency Management Agency (Bomb Techs, Hazmat, EMS)
- Colorado Springs PD SWAT Team
- MASSPORT Logan Airport Fire & Rescue
- National Guard Civilian Support Teams (CST)
- LA County Sheriffs Department

NIST, NIJ & MIPT Funding
Support in FY01 & 02 to
Tackle Performance Determination &
Certification of this Technology
Against Toxic Industrial Chemical
Threats

NFPA 1994 Standard on Protective Ensembles for Chemical or Biological Terrorism Incidents Proposed 2001 Edition

Proposed Release August 2001

Scope:

…specify the minimum requirements for design, performance, testing, documentation, and certification of protective ensembles designed to protect fire and emergency service personnel …

Purpose:

… including dual-use industrial chemicals, chemical terrorism agents, or biological terrorism agents…

… for fire and emergency response personnel exposed to victims or materials during assessment, extrication, rescue triage, and treatment operations at or involving chemical or biological terrorism incidents.

On-Going Efforts

- Committee has completed draft of NFPA 1994 Standard on Protective Ensembles for Chemical or Biological Terrorism Incidents, Proposed 2001 Edition

- Committee working on standards for Selection, Care, and Maintenance (SCAM) document for chemical protective ensembles

Domestic Preparedness (DP) Program:

Testing of Commercial Equipment

Frank DiPietro
410-436-2223

What's Our Approach?

- **Select equipment off-the-shelf, as a consumer would**
- **Test equipment for chemical warfare agents**
- **Provide information that consumer can use when acquiring equipment**
- **Do not CERTIFY OR ENDORSE products**
- **Make results available to consumers, users and manufacturers primarily through the SBCCOM Homeland Defense web site:**

http://www2.sbccom.army.mil/hld/index.html

Detector Testing

- Testing Includes:
  - –GA, GB, and HD detection sensitivity at different conditions
  - –Sensitivity at operable temperature and RH extremes
  - –Ability to resist “False Alarms”
  - –Ability to detect the chemical agents in presence of an “interference”
  - –Field tests with potential interfering smokes and vapors
- The goal:

  To seek candidates that are easy to operate, portable, and can detect low level concentrations of chemical agent while not false alarming to common fumes and non-toxic vapor

PPM vs mg/m3

(DOD/DOJ IAB Detection & Decontamination Subgroup)

Commercial Detection Systems

(FY98)

- HNU Systems, Inc. Model 101
- Foxboro Company TVA 1000B
- MSA Passport PID II
- MiniRAE Plus Professional PID
- Draeger Detector Tubes

(FY99)

- Perkin Elmer Micro FID
- ETG APD2000 CW Detector
- Foxboro MIRAN SAPPHIRE 100E
- MSA Detector Tubes for CW Agents
- M90D1-C Detector (Finnish)

Commercial Detection Systems (Cont'd)

(FY00)

- **French AP-2C**
- **SAW MiniCad MK II**
- **RAE Systems PPB VOC Monitor (PGM-7240)**
- **Chemical Agent Monitor (CAM) Type L**
- **Barringer SABRE Ion Mobility Spectrometer (IMS)**

(FY01)

- **HAZMATCAD (Microsensor Systems)**
- **Vapor Tracer: Portable Contraband Detection and Identification System (Ion Track Instruments)**
- **Agilent Dynatherm-GC-MS (Agilent Technologies)**
- **Scentograph Plus II (Sentex Systems Inc.)**
- **M100 CW Detector (Environics Oy) (TBD)**
- **LCD-2 Detector (Graseby) (TBD)**
- **HAPSITE (INFICON) (TBD)**

Self-Contained Breathing Apparatus

(FY00 & 01)

- **Draeger 4500**
- **Interspiro (Spiromatic 9030)**
- **Interspiro (Chemical Warfare Kit)**
- **MSA Custom 4500**
- **Scott Airpack 50**
- **Survivair Panther**

Air Purifying Respirators (APR) - Negative Pressure

(FY00)

- **MSA Advantage 1000 Full Facepiece**
- **MSA Advantage 1000 CBA/RCA Full Facepiece**
- **MSA Millenium Gas Mask**
- **MSA Phalanx CBA/RCA Gas Mask**
- **Scott AV-2000 FFR**

(FY01)

- **AVON AVFM12 Mask w/NBC Protection Canister**
- **AVON AVSF10/2 Mask w/NBC Protection Canister**
- **DRAEGER KARETA M65 Mask w/NBC Canister**
- **DRAEGER DefenseAir NBC Gas Mask w/filter/Hood**
- **MICRONEL M-95 Respirator w/NBC Filter Cartridges**
- **3M FR/M40-20 Full Facepiece Respirator w/FRC2A1 Gas Filter**

IAB Input

Respirators - Negative Pressure

(FY01)

- **3M 6000 Series Full Face w/ P-100 Filter Cartridge**
- **3M 6000 Series Half Face w/ P-100 Filter Cartridge**
- **NORTH Series 7600 Full Face w/ P-100 Filter Cartridge**
- **NORTH Series 7700 Half Face w/ P-100 Filter Cartridge**
- **MSA Ultra-Twin Full Face w/ P-100 Filter Cartridge**
- **MSA Confo Classic Half Face w/ P-100 Filter Cartridge**
- **WILLSON Series 6000 Full Face w/ P-100 Filter Cartridge**
- **WILLSON Series 6000 Half Face w/ P-100 Filter Cartridge**
- **SCOTT AV-2000 Full Face w/ P-100 Filter Cartridge**
- **SCOTT Pro-Tech Full Face w/ P-100 Filter Cartridge**
- **SURVIVAR Full Face Respirator w/ P-100 Filter Cartridge**
- **SURVIVAR Half Face Respirator w/ P-100 Filter Cartridge**

Popularity is Increasing

Thermal Imaging Technology

Do we need a standard?

- No cameras are intrinsically safe.
    - Should they be?
- All Thermal Imaging Systems have temperature limits.
    - What if it “goes to sleep” when the firefighter is in deep?
- Few, if any, would meet the PASS std.
    - Drop testing, vibration testing, hot/cold, etc.
- “Caveat Emptor”
    - Let the buyer beware
- Integration into the Protective Ensemble is next.

U.S. ARMY WARFIGHTER/DoD FIREFIGHTER HEMET PROGRAM

Objective:

- **Develop and Integrate Thermal Imaging Capability on the Helmet for Use in Limited Visibility (Smoke, Low Light Conditions, and Fog).**

Payoffs:

- **Improved Survivability - Improved Ability to Maneuver in Poor Conditions, Improved Fire Detection and Ability to Locate Personnel.**

U.S. ARMY WARFIGHTER/DoD
FIREFIGHTER HEMET PROGRAM

First Look …
Firefighter Helmet Mounted System (HMS) Version 1.1 Prototype Assessment, 14 – 15 March 2001

- **Proof-of-Concept Assessment of:**
  - **Ergonomics and Design**
  - **Functionality**
  - **Operational Usability**
- **Soldier HMS Used as a Comparative Baseline**
- **Multiply Cycles Through a darkened, Smoke Filled Firefighter Training Facility**
- **Results Will Influence Final Design of Production Prototypes**

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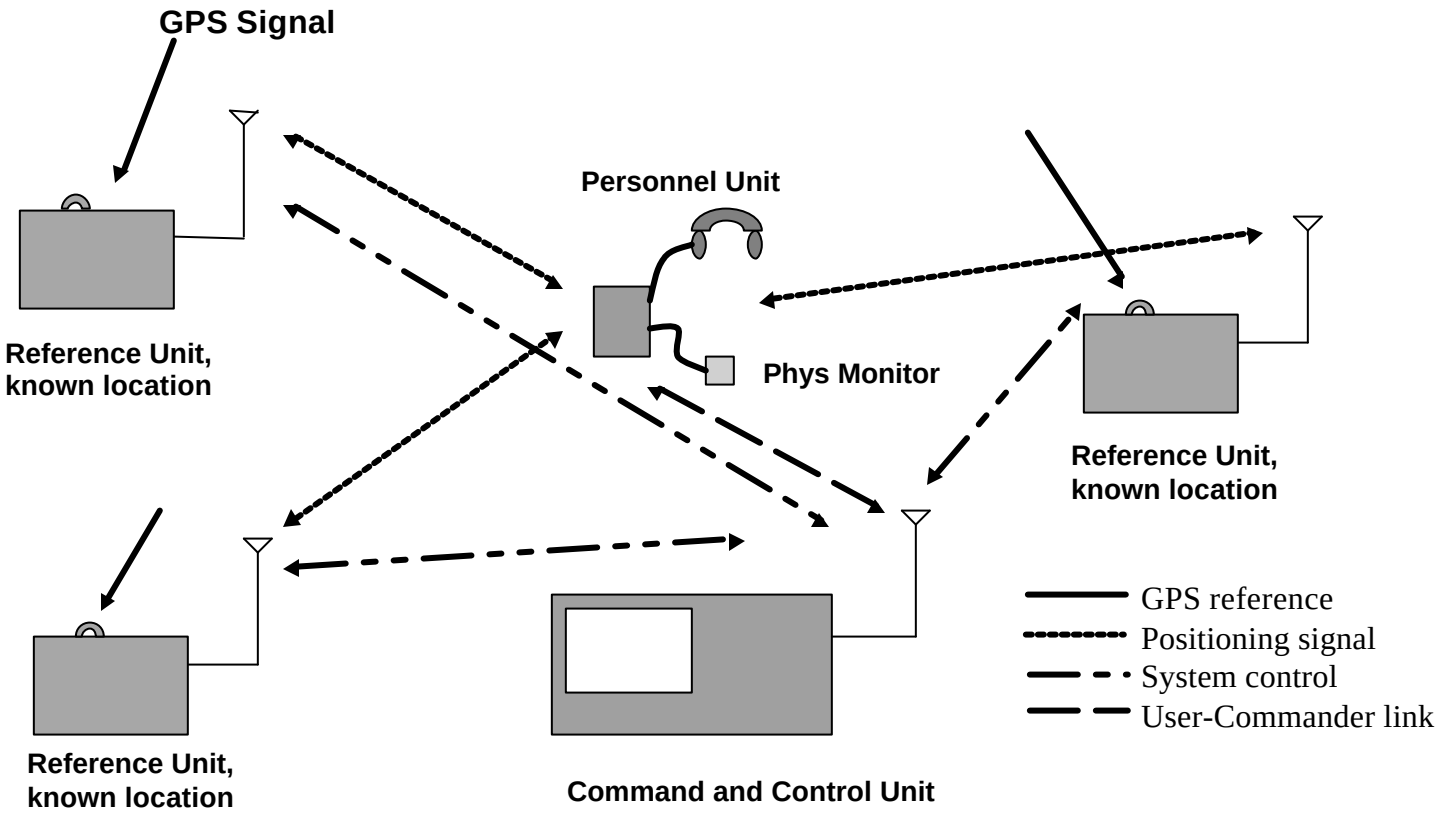
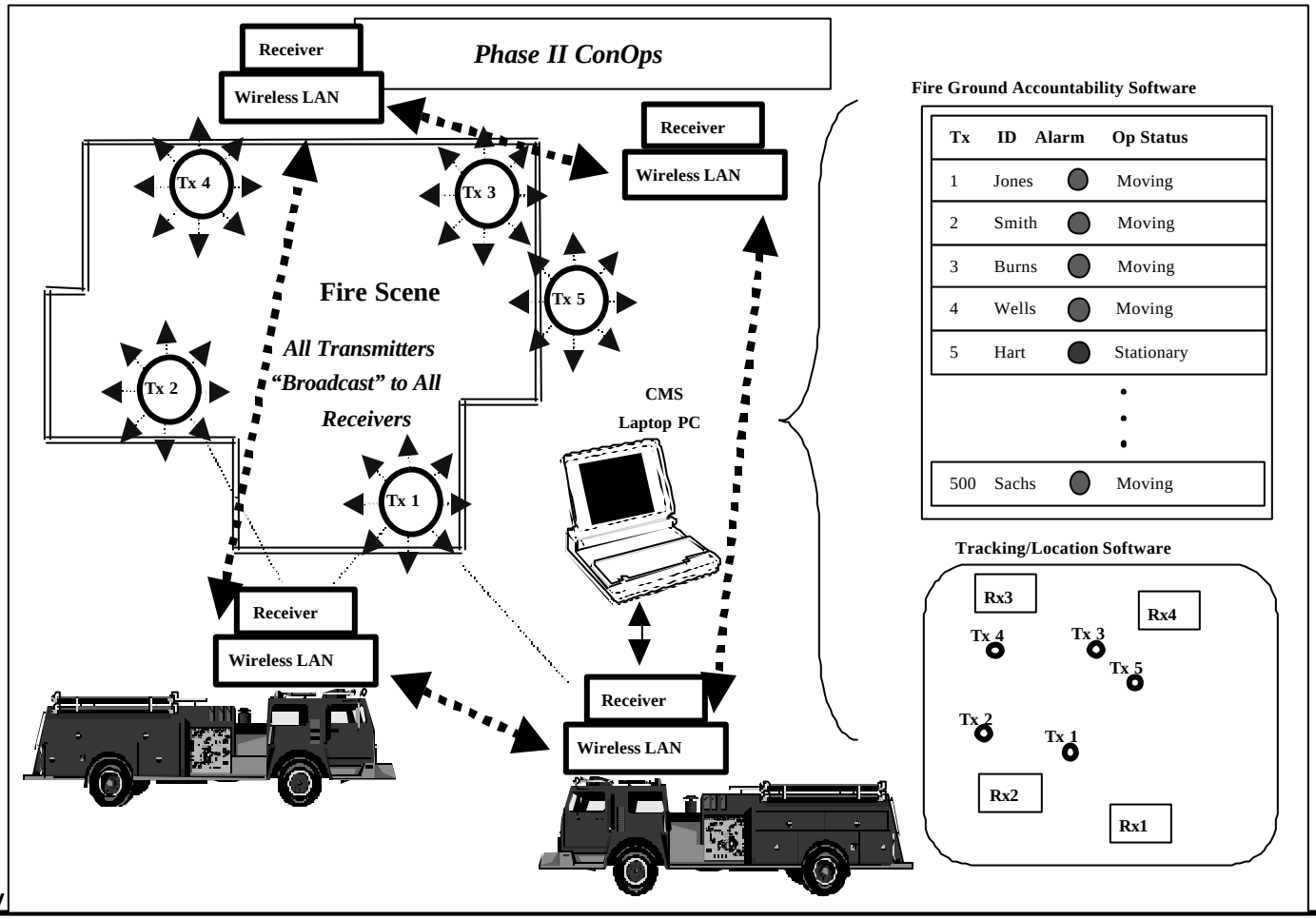
Firefighter Locator System




Phase II ConOps
Receiver
Wireless LAN
Receiver
Wireless LAN
Tx 4
Tx 3
Tx 5
Tx 2
Tx 1
Fire Scene
All Transmitters "Broadcast" to All Receivers
CMS
Laptop PC
Receiver
Wireless LAN
Receiver
Wireless LAN
Fire Ground Accountability Software
Tx ID Alarm Op Status
1 Jones Moving
2 Smith Moving
3 Burns Moving
4 Wells Moving
5 Hart Stationary
500 Sachs Moving
Tracking/Location Software
Rx3
Rx4
Tx 4
Tx 3
Tx 5
Tx 2
Tx 1
Rx2
Rx1

The Army is - - People

If the Soldier

wears it …

carries it …

eats it …

lives in it …

SBCCOM provides it!

"The magnificence of our moments as an Army will continue to be delivered by our people. They are the engine behind our capabilities, and the Soldier remains the centerpiece of our formation."

— GEN Eric K. Shinseki
Chief of Staff, U. S. Army
12 October 1999