



# *US Army Soldier Systems Center*



***“Through Science  
We Defend”***

Presented by:  
**Mr. Max Biela**  
**Operational Forces  
Interface Group, NSC**



# ***Our Mission***

- **RDT&E to Maximize the Warrior's Survivability, Sustainability, Mobility, Combat Effectiveness and Quality of Life by Treating the Warrior as a System**

– Adding Value Through:

- Technology Generation & Application
- Soldier Systems Integration
- Solving Field Problems





# ***Our Vision***

- **Recognized Center of Choice for Individual Warrior Related Technologies and Systems**
  - **NSC Leading the Army-Wide S&T Vision & Strategy for the Soldier**
  - Transformation to Objective Force with Soldier as Centerpiece of the Formation





# Major NSC Customers



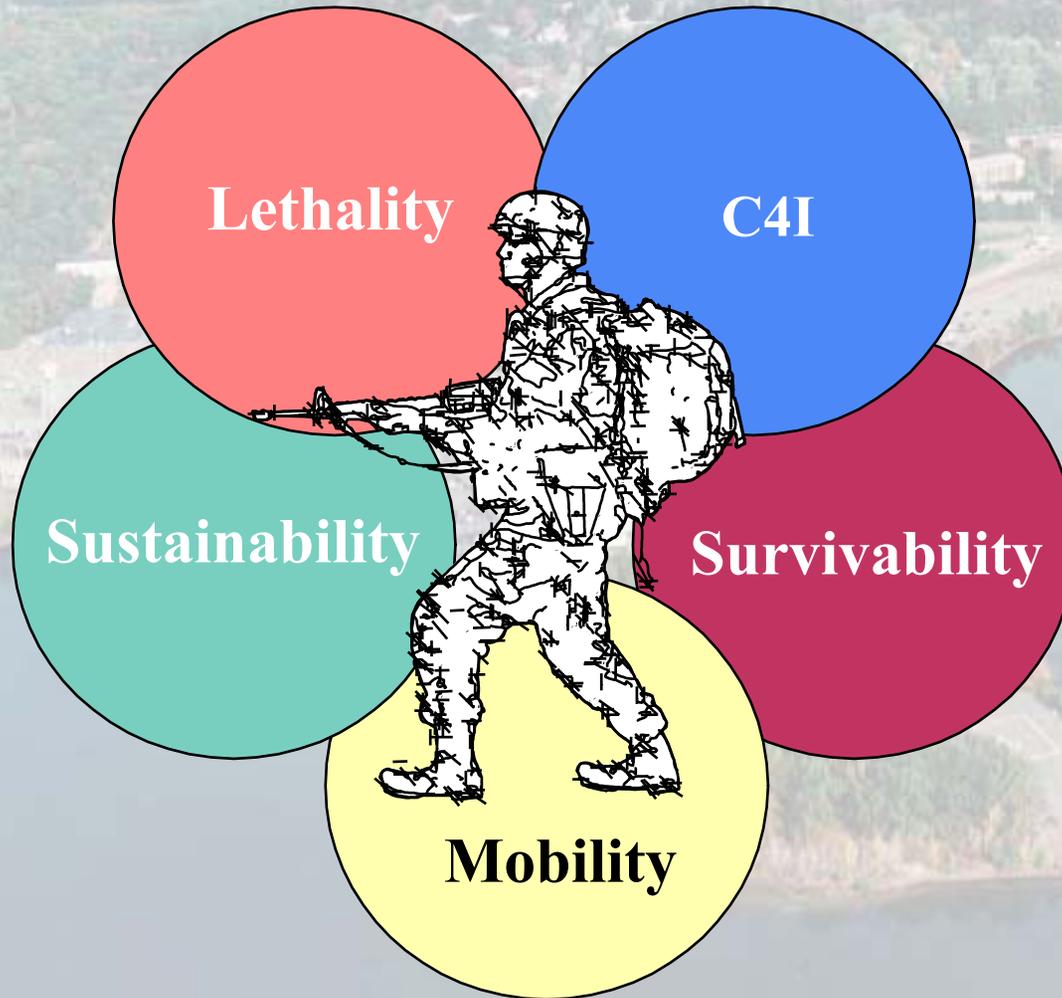
- PEO-Soldier
- PEO-Combat Support/Combat Service Support
- USSOCOM
  - PEO-Special Projects
  - Special Operations Acquisition and Logistics – Advanced Technology Office
- United States Marine Corps
- Bureau of Engraving and Printing
- Defense Advanced Research Projects Agency





# *Enhanced Capabilities Through Integration of Components*

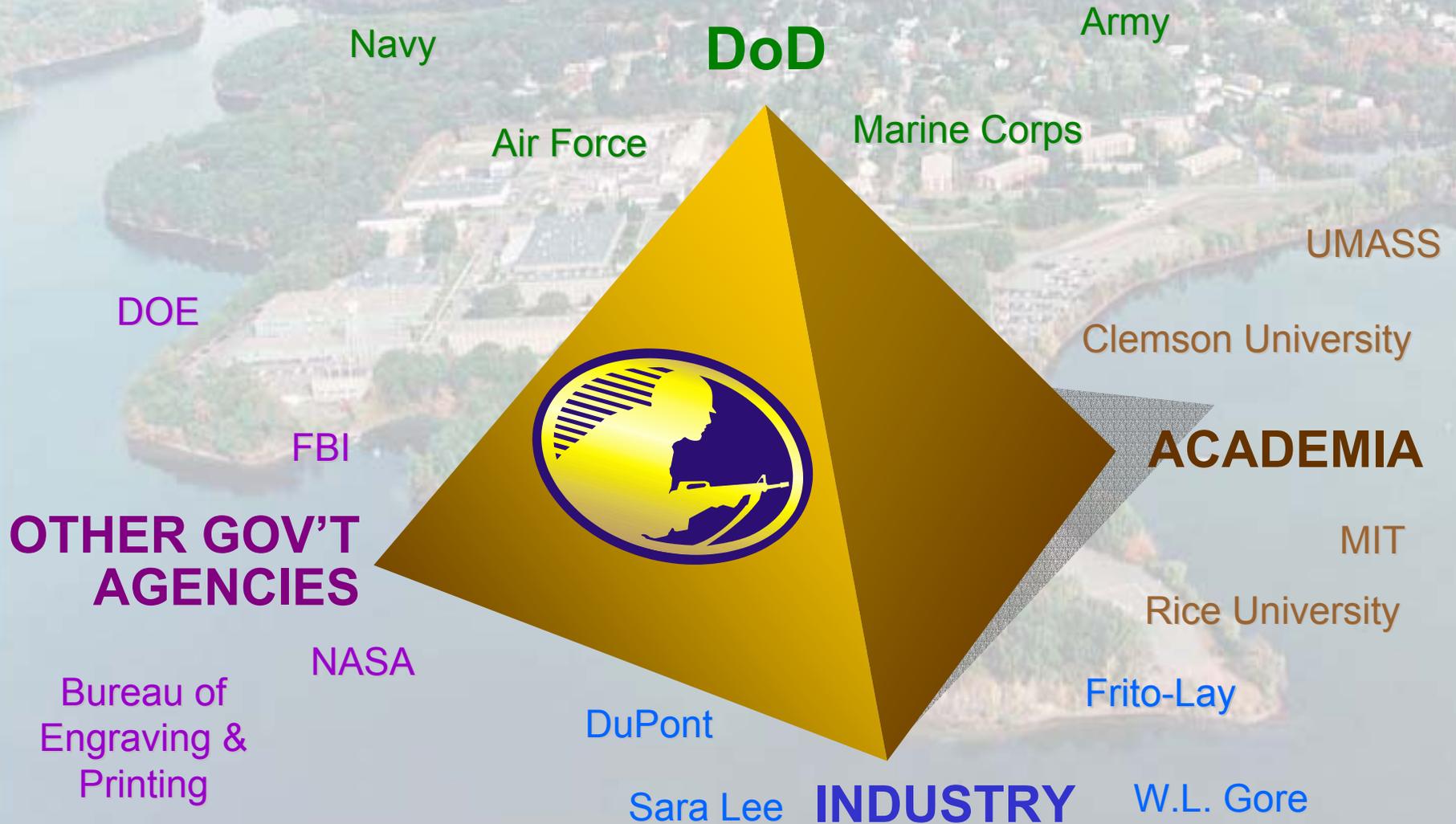
*Survivability,  
Sustainability,  
and  
Mobility...*



*...The  
Foundation for  
all Soldier  
System  
Components*



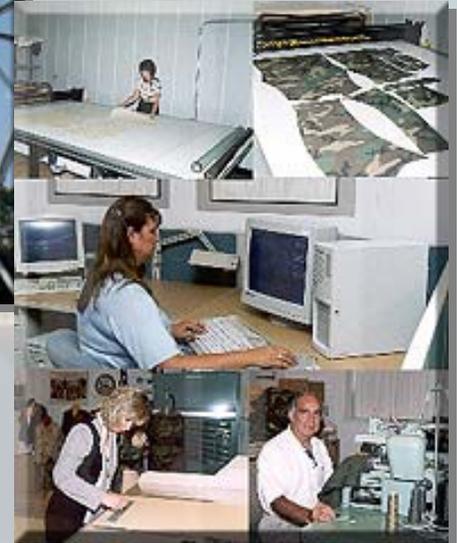
# Partnering/Leveraging





# *World-Class Facilities*

- **Continuous Capital Investment in Scientific Infrastructure**
  - Laboratory Upgrades
  - State-of-the-Art Equipment





# *World-Class Facilities*

## **Rapid Prototype System (Sinterstation)**

Atomic Force Microscope/Nanoscope IIIa  
Micro-Compounder  
Environmental Chambers Upgrade  
Footwear-Ground Reaction  
Force Shock Abs Tester  
Smart Seal Modular  
Rotary Hot Air Welder  
Airdrop High Performance  
Computing Stations  
Biomechanics Laboratory Upgrade  
Energy Dispersion  
X-Ray System  
Automated Steam Retort  
Silhouette Package & Plotter  
Environmental Test Chamber  
Airdrop Instrumentation  
Hydraulic Punch Machine  
Warrior System Components

## **Doriot Climatic Chambers**

Camouflage Analysis & Demo Facility  
Raincourt Facility  
Altitude Chamber  
Textile Facility  
Biomechanics Lab  
Defense Simulation Internet Facility  
Product Prototype Facility  
Shade Room  
Computer Aided Design & Engineering Resources  
3D Digitizer  
Combat Ration Processing & Packaging Facility  
Copper Man  
Roller Test Facility  
Helicopter Dynamic Load  
Simulation Facility  
Airdrop Impact Simulator  
Gas Chromatograph w/ Mass Selective Detector  
Whole Boot Flex Test,



# *Survivability Mission Areas*

- Chemical/Biological Protection
- Ballistic Protection
- Directed Energy (Eye) Protection
- Environmental Protection
- Camouflage
- Multi-Functional Materials





# *Supporting Technologies*

## *Mission Areas*



- **Biotechnology**
- **NanoTechnology**
- **Consumer Research**
- **Anthropometry**
- **Biomechanics**
- **Modeling and Simulation**





# *Warrior Technology Integration*



## **Objective Force Warrior**

- **Scope: All Combat Warriors within Objective Force Unit of Action**
- **Integration Program Structured to Leverage cutting edge Technologies**
  - **Currently in S&T Phase**
- **System of Systems Concept Maximizing Effectiveness of Team of Teams Operations**
- **Synchronized/Compatible with FCS**



***A Revolutionary Capability For The Objective Force***



# OFW: Extending Small Team Capabilities Without Overburdening the Warrior



**Sensory Enhancement**



**Strike (Exploit FCS Netted Fires)**



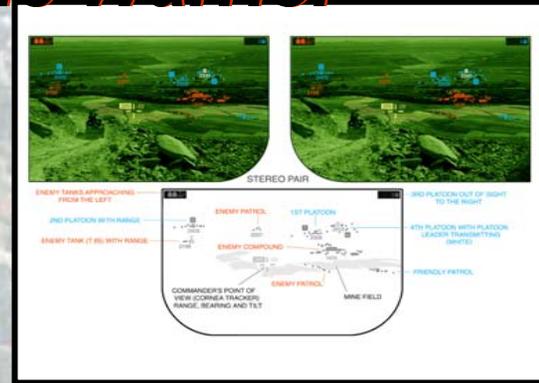
**Protect (Integrated Suit & Helmet)**



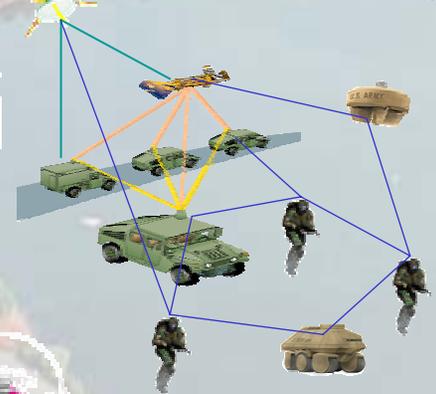
**Robotics**



**Human Performance & Embedded Training**



**Collaborative Networked Situational Understanding**



**Power Sources**

**Systems Engineering, Analysis & Assessment**

**Capstone Training & Demo**

**Program Management**



# *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
  - Electrospun matrices





U.S. Army Soldier and Biological Chemical Command  
Natick Soldier Center, Natick Massachusetts



# Major News Articles



- Time Magazine
- US News and World Report
- Popular Mechanics
- Popular Science





# **NIPC**

*NATIONAL PROTECTION CENTER*



**The “National Protection Center” is a Joint Agency/  
Alliance-driven Center that fosters research, development, test and  
evaluation and technology transfer of advanced individual and  
integrated protective technologies/systems**

**Our focus is personnel safety, reduction of occupational related  
injuries and improved operational effectiveness for personnel  
(military or civilian)**

**in high-risk occupations or conducting missions in extreme  
environments**

**In partnership with the National Institute of Justice, NASA, other  
government agencies, users, industry and academia, we promote  
and establish partnerships,  
identify, consolidate and leverage requirements/projects and  
capabilities and conduct joint RDT&E efforts.**

**Our focus is on the most valuable and fragile operating platform:**

**THE HUMAN BEING**





# NPC

## NATIONAL PROTECTION CENTER



**Public Safety**

**Emergency Response**

**Space**

- Personal Protection
- Individual Equipment
- Integrated Systems
- Multifunctional Protection



**Military**

Technology Transfer  
R&D

Leverage Resources/Expertise

Academia/Government/Industry Partners/Members

Dupont

Morning Pride

Battelle

Genex

Mass Office of  
Public Safety

Oklahoma Memorial  
Institute for the  
Prevention of Terrorism



**Stand up  
Partners**



University of  
Massachusetts

Unconventional  
Concepts Inc.

# Membership Increasing as Projects Evolve!



# ***NSC Technology Transfer***

- Example of Outputs:

- Airdrop Rigging Support to Forest Service

- Commercial License for “HooAH!® Bar”

- First Responders:

- **Interagency Emergency Communications System for NPC**

- **50% Weight Reduction in Chemical Protective Clothing via Semi-permeable Materials**

- Law Enforcement:

- **Interceptor Body Armor & Small Arms Protective Insert Achieving 40% Weight Reduction**





# ***Significant Technical Accomplishments***

- **Interceptor Body Armor w/Small Arms Protective Insert (SAPI)**
  - 13% ballistic vest weight reduction/ 40% ballistic insert weight reduction
  - 25% cost reduction (MANTECH)
- **Woven Airbeam Technology for Shelter Systems**
  - 86-foot span (vs 30-foot)
  - Improved durability/reliability with lower production costs
  - Reduced logistics burden
- **Novel Membrane for SEAL Amphibious Uniform/Dry Suit**
  - Responds to environment by adjusting molecular chain structures
  - Improves thermal protection and evaporative cooling
- **Nanocomposites & Nanofibers for Warrior Systems**
  - Solid-state solar devices constructed (7% efficiency)
  - Highest efficiency ever reported world wide
  - Solar cell will reduce reliance on heavy batteries/re supply



# *Significant Technical Accomplishments*

- **USMC Full Spectrum Battlefield Equipment for Amphibious Raids**
  - Enhanced safety
- **Fielded Individual/Group Ration Improvements**
  - 15 New MRE components
  - 7 New Group ration entrees
- **ACAT IV HMMWV-Mounted CB-Protective Shelter**
- **Biomechanics - Military Footwear**
  - 30% reduction in lower extremity injuries
- **Parachute Suspension Lines**
  - 3-Fold increase in durability





# ***MOUT ACTD Objectives***



- **Evaluate Advanced Technologies to Provide Operational Dominance in MOUT, Including TTPs, for Soldiers and Marines**
- **Improve C4I, Engagement, Mobility, and Force Protection**
- **Set the Stage for Rapid Acquisition of Selected Technologies**





# MOUT ACTD Snapshot



## 33 Operational Requirements

- All Environment Optics
- Improved Comms Effective in MOUT
- Improved MOUT Mobility Tools
- Remote Intel Collection for Bn and Below
- Improved Non Lethal Munitions
- Enhanced Situational Awareness in MOUT
- "Real time" Intel Down-link to Map Products
- Physical Protection Kit



Technology Identification

Joint Army/USMC  
User Determined

COTS/GOTS

C4I

## Technology Assessment

## SYSTEM INTEGRATION

## Transition/Interim Capability

## MOBILITY

Logical Decisions Model

Synergy of Technology, Training, TTPs

Extended User Evaluation



10 separate service experiments (squad/platoon level)

JRTC 00-10

## FORCE PROTECTION

Military Utility  
User Acceptance,  
Situation Awareness

Collective  
Military Utility  
Interoperability

## Battalion-level Culminating Demonstration



2 Joint Experiments (JE1-Co. level, JE2-Bn.level)

Advanced Concept Excursion (ACE) for Post-ACTD S&T for MOUT

EXFOR:



## ENGAGEMENT



# Key Results

- **Joint Experiment 2 Results**

- Fort Benning
- Battalion (Bn)-Experiment (Army Bn HQ, Army Co, Marine Plt)

	EXFOR Casualties	OPFOR Casualties
Base Case	28%	55%
Exp. Case w/~25 MOUT Technologies	17%	100%

**“I think we had the upper hand on the OPFOR this time. The MOUT technologies (we) employed...helped give (us) the advantage...MOUT [ACTD] gear played an essential part in the urban battle.”**

— SGT Montie Long



# *Key Results*

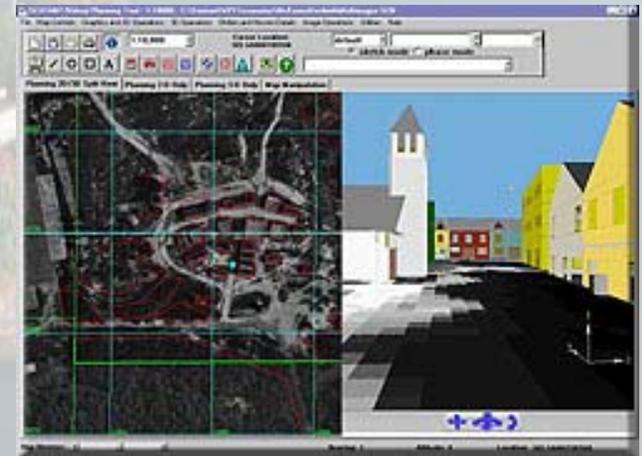
- Culminating Demonstration Observations
  - EXFOR Took Entire MOUT ACTD “Kit” Into Fight; Used Gear Successfully When the Situation Called For It
  - EXFOR Successfully Completed the MOUT Attack, as Part of a Combined Arms Team
  - Battalion and Company Commanders Want to Take Entire Kit Into Residual Phase (informal feedback)
- Formed Into Operational Capabilities that are In Use by Users (**10th Mountain Infantry Division Bosnia Rotation SEP-01, 2nd Marine Division Operational Float, Mediterranean Sea**)



# Key Results



- Transitions:
  - Warfighter Rapid Acquisition Program (First ACTD to Transition via This Mechanism): Rafael Simon Breaching Munition
  - FY01 Soldier Enhancement Program (SEP): Blunt Training Munitions
  - FY01 Marine Enhancement Program (MEP): Mechanical Breaching Kit
  - Potential FY02 WRAP Candidate (Explosive Cutting Tape)
  - Potential FY02 SEP (Battlespace Mapper, Ladders)
- Other Transitions:
  - Modification of ORDs
  - Products Put On GSA schedule
  - Methodologies considered by other programs (e.g. TAP, SA methodology)





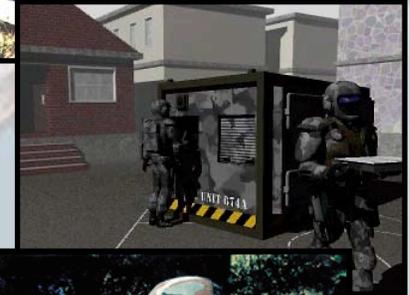
# *Breaching Munition & Cutting Tape*





# *Sustainment* *DoD Combat Feeding*

- **Combat Rations Technology**
- **Field Food Service Equipment and Energy Technologies**
- **Food Service Systems**





# Meal, Ready-To-Eat Improvements



**MRE XXII (24 Menus)  
2002 Production**



## **Hamburger patty**

**Beef Steak w/Mushroom Gravy**

**Multigrain Cereal**

**Cappuccino: Mocha and Vanilla**

**Dairy Shakes: Chocolate, Vanilla, Strawberry**

**Barbecue Sauce**

**Picante Sauce**

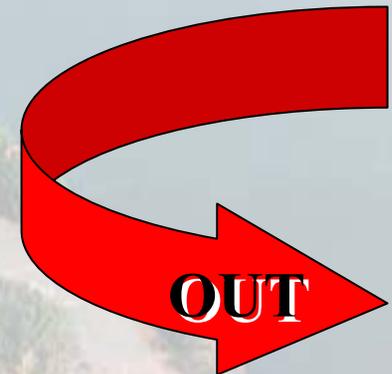
**Seasoning Blend (salt free)**

**Ground Red Pepper**

**Beef Steak**

**Chicken w/ rice**

**Hot Sauce (4 menus)**



**Commercial Items**



# *Meal, Ready-To-Eat Improvements*



**MRE XXIII (24 Menus)  
2003 Production**



**Hearty New England Clam Chowder  
Applesauce (carbohydrate fortified)**

**Pot Roast with Vegetable**

**Barbecue Pork Rib**

**Vegetable Manicotti**

**Peanut Butter M&Ms**

**Crispy M&Ms**

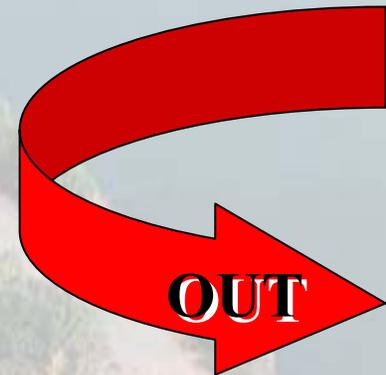
**Almond Poppy seed Pound Cake**

**Pumpkin Pound Cake**

**Chocolate Mint Cookie**

**Vanilla Waffle Sandwich Cookie**

**Jamaican Pork Chop  
Past w/ Alfredo Sauce  
Beef w/ Mushrooms**



**Commercial Items**



# ***Meal, Ready-To-Eat Improvements***

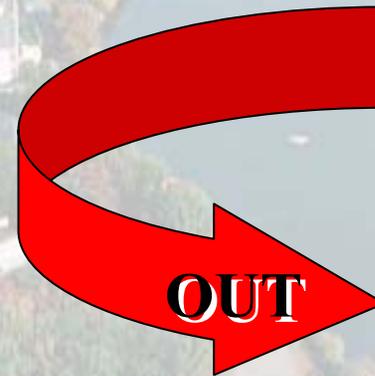
**MRE XXIV (24 Menus)**

**2004 Production**



**Veggie Griller with BBQ Sauce**  
**Mexican Macaroni and Cheese**  
**Cajun Rice with Sausage**  
**Cheese Spread with Bacon**  
**Carrot Cake**  
**Molasses Cookie**  
**Toffee Crunch Cookie**  
**Kreamsicle Cookie**  
**Dried Cranberries**  
**Dried Cherries**  
**Red hot cinnamon candies**  
**Peanut M&Ms®**

**Bean and Rice Burrito**  
**Turkey Breast with Potatoes**





# ***Pound Cakes***



**Lemon Poppy Seed**  
**Pineapple**  
**Vanilla**  
**Orange**  
**Lemon**  
**Spice**

**Almond Poppy Seed and Pumpkin debut in FY03**  
**Carrot debut FY04**



# *Performance Enhancing Ration Component (PERC)*

**Chocolate**

**Raspberry**

**Cran/Raspberry**



**Apple-Cinnamon**

**Peanut-Butter**



# *Meal Cold Weather/ Long Range Patrol*

- ✓ 12 Menus
- ✓ Snacks
- ✓ Extra drinks
- ✓ Limited protein & sodium to reduce dehydration
- ✓ Significantly lighter
- ✓ Contains dehydrated entrees
- ✓ 1540 Calories per meal
- ✓ 3 meal per day for MCW
- ✓ 1 meal per day for LRP (for up to 10 days)
- ✓ Brick Pack
  - ✓ Reduces entrée cube by 33%
  - ✓ Increases number of units per pallet by 22%





# *Unitized Group Ration*

- Simplifies & streamlines ration acquisition
- 1 or 2 NSN's vs 35
- 50 meal modules
- 7 Breakfast & 14 Lunch/Dinner Menus
- Two options currently available:
  - UGR-A (includes perishables)
  - UGR-H&S (shelf stable)
- Polymeric tray replaced metal tray can for UGR H&S
- Continuous improvement program





# *Modern Burner Unit (MBU)*

**Burns JP-8 fuel**

**Electrically controlled  
components decreasing the  
production of hazardous  
emissions**

**Clean electric ignition allows  
MBU to be lit in place**

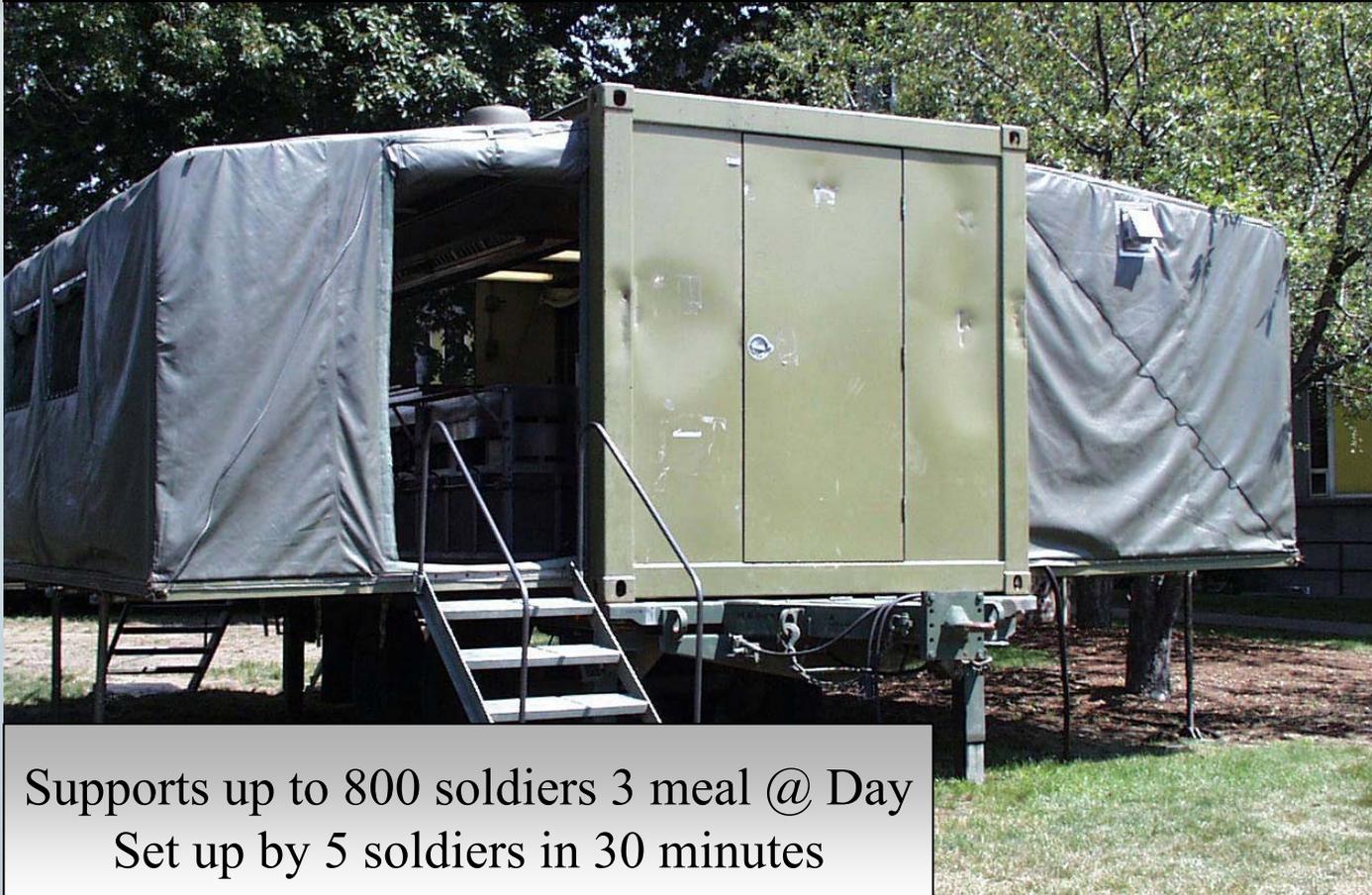




# *Containerized Kitchen (CK)*



**Description: Kitchen designed to provide a flexible, rapidly deployable, multi-fuel food preparation capability to support soldiers across the operational continuum**



**Deployed at:  
Battalion Level  
Remote Sites  
Selected units**

- Refrigeration
- MBU
- Tactical Quiet Generator

**1 CK replaces  
2 MKTs**

**Supports up to 800 soldiers 3 meal @ Day  
Set up by 5 soldiers in 30 minutes**



# *Sustainment Collective Protection*

- **Soft Shelters**
- **Tactical Rigid Wall Shelters**
- **Shelter Systems**

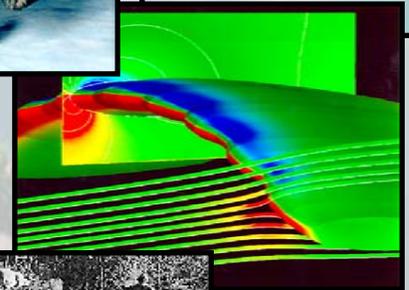




# *Mobility Mission Areas*



- **Cargo Airdrop**
- **Airdrop Modeling and Simulation**





# *Universal Static Line*



**Capabilities:** Provide capability of single static line for all current Army, Air Force, Navy and Marine aircraft.

**Description:** One end of the 15' USL static line is girth hitched to the standard d-bag and the other end to a new snap hook. When used for C-17, a 5' static line extension is added between the 15' section and the snap hook.

**Size:** 20' nominal (15' length & 5' 7" extension)

**Cost:** \$60 (\$30 for static line and extension /\$30 for snap hook)

**Status/availability:** Initial fielding Mar 01 – Mar 02

**Supportability:** Class IX repair part

**NSN:**        Static Line 1670-01-476-3068

                  Static line extension 1670-01-476-3130

                  Snap hook 1670-01-476-3142

# *Modified Improved Reserve Parachute System (MIRPS)*



**Capabilities:** Provides improved reliability over the current T-10 reserve chute

**Partial:** from ~56% to 86.5%

**Total:** from ~91% to 93.7%

**Description:** A spring deployed pilot chute is attached by a bridle line to the standard T-10R canopy to push the canopy out away from the jumper and improve reliability.

**Size:** 24 ft diameter, when packed 18" L x 7" D x 10" H

**Weight:** 12 lbs

**Cost:** Initial issue of kit free

**Status/availability:** MIRPS Conversion kits fully funded, initial fielding to be completed by May 01

**Supportability:** Class II item, available through supply system

**NSN:** 1670-01-420-4256



# *Operational Forces Interface Group* **(OFIG)**

## *Mission:*

***“Provide support to the PEO/PMs and life cycle teams by interfacing with the combat developer, user and other DoD agencies in order to determine the user satisfaction level of Natick Soldier Center items and to determine requirements for RDE planning and advanced systems concept prototypes.”***

### Equipment Specialists

**David D. Cheney Jr.**  
**Team Leader**  
**X4307**  
**Fax: 4726**

**Mr. Max Biela**  
**Mr. John Lupien**  
**Mr. Michael Duff**  
**Mr. David Emond**  
**Mr. David Higgins**  
**Mrs Carol Doering**

### Engineering Psychologists

**Mr. Chuck Greene**  
**Mr. Robert Stark**  
**Mr. Anthony Szajna**

### Liaison Sergeants

**SFC Samuel Newland**  
**SGT Joseph Patterson**

### Administrative Assistant

**Ms Carol Bates**



# *Installation Visits*



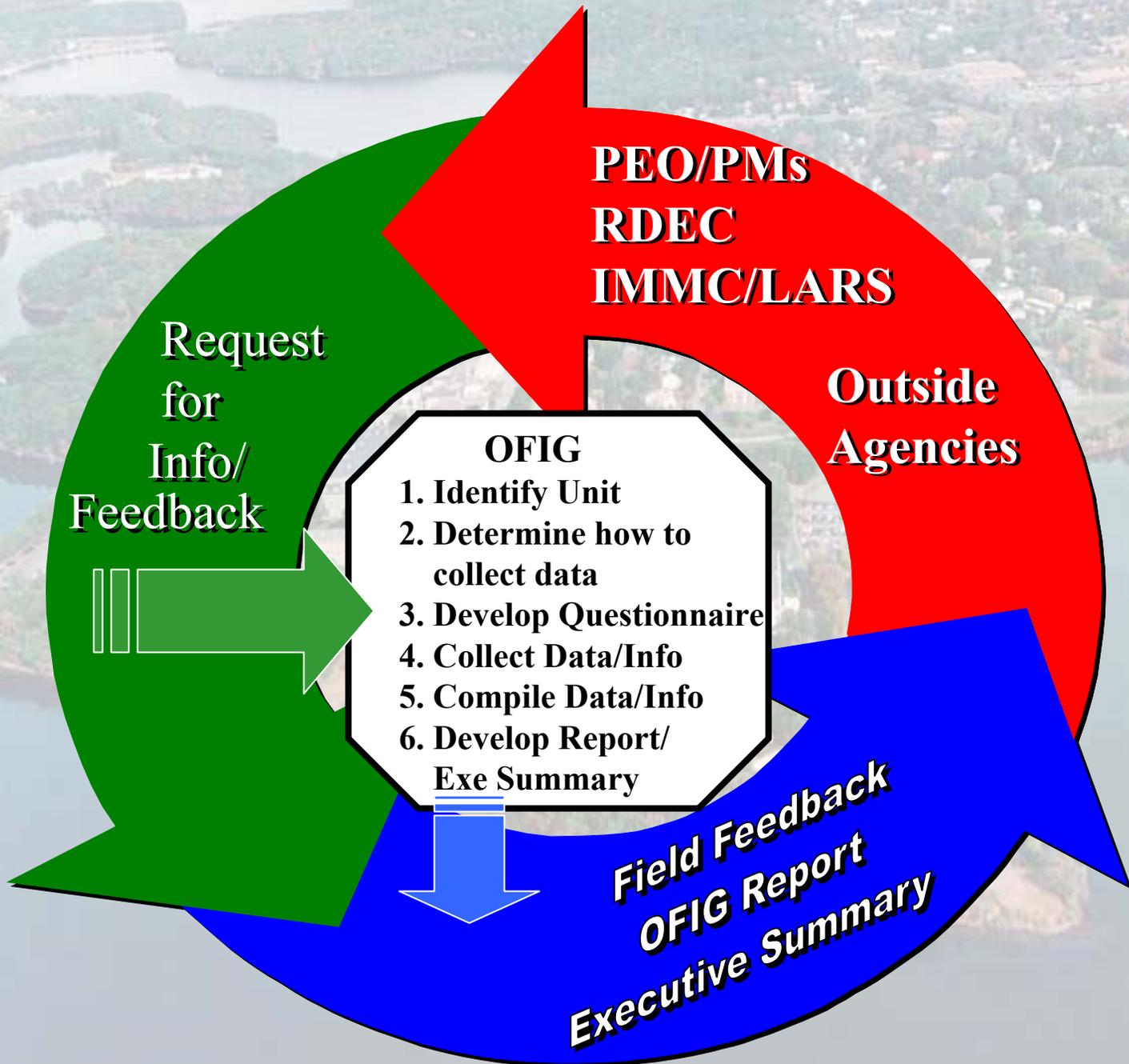
- **OFIG Team – Members of the Operational Forces Interface Group and Engineering Psychologists**
- **Goal: 6-8 visits per year to major installations**

## Objectives:

- **Survey/interview 300-400 service members after a major exercise/deployment to determine the adequacy of fielded equipment**
- **Update Commanders and their staff**



<u>Unit</u>	<u>Location</u>	<u>FY02</u>
83 <sup>rd</sup> Chemical Bn		Jan 02
101 <sup>st</sup> Airborne Inf	Afghanistan	Feb 02
Naval NCO Academy	Newport , RI	Apr 02
3 <sup>rd</sup> Armored Cav	Ft. Carson, CO	May02
5 <sup>th</sup> Engineer Bn	Ft. Leonard Wood, MO	Jul 02
3 <sup>rd</sup> Infantry Div (Mech)	Ft. Stewart, GA	Jul 02
	Ft. Sill, OK	Sep 02





# *Product Evaluations & Surveys*

- **Initial production evaluations: Provide soldier feedback on newly type classified items**
- **Developmental items/prototype items: Provide soldier feedback directly to project officers during the developmental cycle.**



**Concealable Body Armor**

**Ft. Benning, APG**

**Ft. Leavenworth,**

**Ft. Leonard Wood**

**Search Mirror (2 types)**

**Multiple Locations**

**Family of Restraints System**

**Ft. Leavenworth**

**Neck Shield for Riot Control**

**Ft. Benning**

**Sock System**

**Multiple Locations**

**Wrinkle Free BDUs**

**Ft. Drum, Ft. Belvoir**

**Ft. Hood**

**New MRE/H&S Eval**

**Ft. Polk**



# *Technical Exhibits and Displays*



- **TRADOC Commander Conferences**
- **AUSA Conferences**
- **Advanced Planning Briefings for Industry**
- **Army Science Conferences**
- **American Defense Preparedness Association Symposiums**
- **SMA Conference**
- **BG's Conference**
- **Long Term Exhibits**

**FY 02**  
**65 to date**





## Scientists and Engineers Field Experience with Soldiers

...To facilitate fielding of equipment which is more acceptable reliable, and maintainable to the soldier, and which better meets the Army's combat performance requirements by permitting design engineers to gain first hand field experience as a member of a crew/team/squad during a field training exercise.

**11 Personnel since FY98**

## Quick Reaction

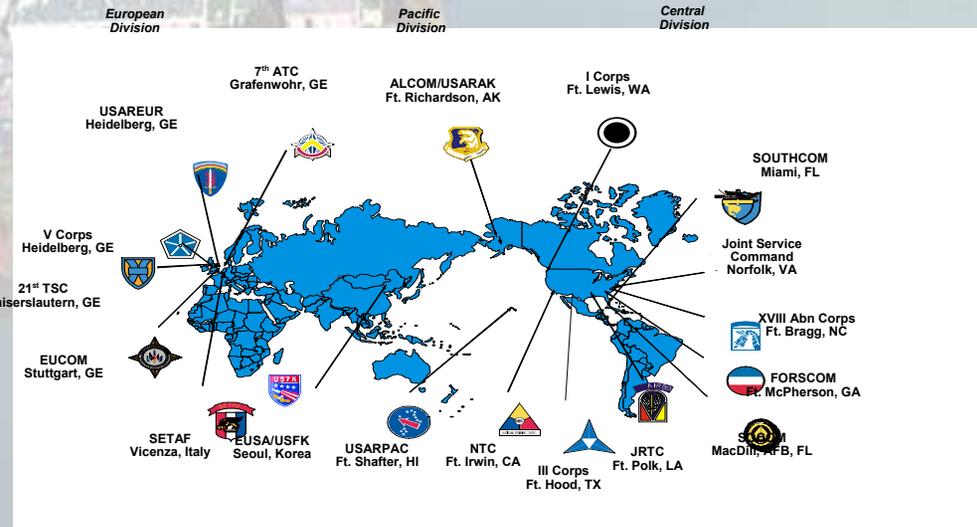
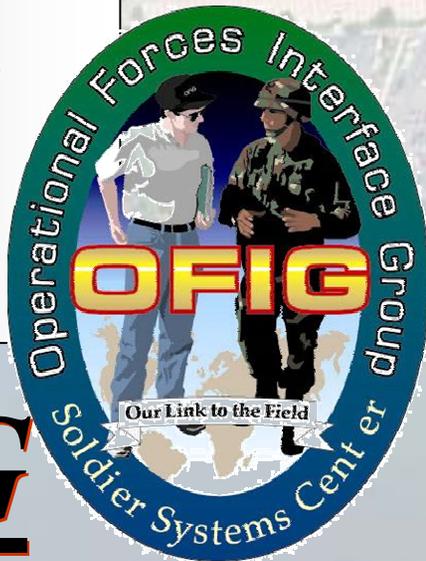
- SOMALIA  
Extremity Body Armor
- MACEDONIA  
ICWB
- GERMANY  
Ballistic Blankets
- SAUDI ARABIA  
Ballistic Protection
- BOSNIA  
Soldier Feedback Force Provider
- HUNGARY (ISB)  
OCIE Equipment
- AFGHANISTAN  
OCIE Equipment

## Greening Program Experience

This "Greening" JRTC training exercise provided the project officers with a fuller understanding and better appreciation of what the soldier has to deal with in a real combat scenario.

**52 Personnel since FY98**

## AMC FAST Quick Reaction Coordinator



# OFIG



# U.S. Army Soldier Systems Center



**INFORMATION HOTLINE FOR  
FOOD, CLOTHING, SHELTERS, AND AIRDROP SYSTEMS  
TELEPHONE: (508) 233-5341  
DSN: 256-5341**



**or on the World Wide Web**  
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**<http://www.sbccom.army.mil>**