Objective Force Warrior

NDIA Small Arms Symposium
August 2001

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Warrior Systems Modernization
Supporting Army Transformation

OFW Vision, Scope & Technology Plan (FY01)

Soldier-Centric, Rapid, Responsive, Deployable, Agile, Versatile, Lethal, Survivable, Sustainable & Dominant

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Objective Force Warrior

- Major System of Systems S&T Project focused on the “Centerpiece of the Objective Force Formation” - the Soldier

- Dominant, Revolutionary Capability for the Individual & Small Unit – across Full Spectrum Operations (Missions, Environments & Threats)

- Complement & Collaborate with Future Combat Systems to Realize Objective Force Vision

“The core of any land-based operation will rest on the HUMAN DIMENSION. That is the heart and soul of tactical and operational dominance.” – Army Transformation White Paper

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Inputs that Shape the Concept

- The Army Vision
- The TRADOC Objective Force “Specification”
- Original Future Warrior Concept
- IRT Recommendations
- Program Definition Workshop
- Special Study Group
- ASB Summer Study
Objective Force Warrior
A Formidable Warrior......

**C4**
- Secure C4 integrated into multi-function suit

**ISR**
- Multi-spectral optics & acoustic in one piece helmet
- Virtual 360 vision

**Survivability**
- One piece multi-function suit
- Full body ballistic protection
- NBC protection
- Laser protection
- Stealth

**Decision-making**
- Integrated Cognitive Aides

**Human Factors**
- Self- medicating systems including trauma care
- Status Monitoring & Feedback

**Lethality**
- Multipurpose precision handheld weapons
- LOS and BLOS capable
- Lightweight systems

**Training**
- Embedded Training and Rehearsal

**Sustainment**
- Integrated rations, water, and waste management

**Mobility**
- Mechanical enhancement for Strength, load-bearing and endurance
- Fuel Cells based Power

Many Revolutionary Capabilities Are Within Our Reach

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**Complex “System of Systems” Integration**

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**Power & Energy**
- Extend System Operation Times
- Reduce Logistics Support Burden
- Reduce Energy Demand
- New Power Source Technologies

**Weight Reduction**
- Dramatic System Weight Savings
- Stretch Goal is not to exceed 35% of Body Weight (compared to 92 pounds today)

**Affordability**
- Reduce Total Ownership Costs by 50% (Stretch Goal)

**Fightability**
- Maximize Combat Performance within the Physical & Cognitive Limits of the Human

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**Revolutionary Technology & Innovation**

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In an Invincible Team

- A combined arms force at the fire team level
- C4ISR Provides leap-ahead overmatch effectiveness
  - Collaborative real time planning and execution
  - Coordinated LOS and BLOS fires and movement
- Robotic “Mules” and “Dogs” provide
  - Remote sensing
  - Mobility
  - Sustainment
  - Lethality

Many Revolutionary Capabilities Are Within Our Reach
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Preliminary Technology Opportunities

- Lethality
- C4
- Intelligence, Surveillance, Reconnaissance
- Decision Making
- Protection/Survivability
- Mobility
- Sustainment
- Training
- Human Factors
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Lethality Systems and Technologies

- **Beyond Line of Sight Engagement for the Infantryman**
  - Miniaturized GNC
  - Multi-purpose warheads
  - Novel Propulsion
  - Anti-Tank Capability (Top Attack)
- **Enhanced Line of Sight Accuracy (2X Current)**
  - Stabilized or Motion Compensated Helmet Based Aiming and Firing
- **Weapons fully integrated into C4ISR and Decision-making System – Networked & Synchronized Fires**
- Lightweight Weapon systems
- Robotic Mule for Weapon transport and Resupply

**Dominant Close Combat Power**

**Emphasis on Ultra-Light Lethal Capability**

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“Network-Centric” C4

Robust, Secure, Adaptable Communications

- Lowest Level of Future Tactical Internet
- Adapted for Objective Force Operations in Complex Terrain (MOUT)
- Selectable, Robust Bandwidth & Range, Frequency Agility
- Dynamic Relays through Mobile Devices (Warriors, Space, Micro-UAV, UGV and/or Unattended Sensor)
- Common Operational Picture
- Self-Organizing, Ad-Hoc Networks
- Minimize Power & Energy on the Warrior
- Distributed Processing
- System on Chip

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Decision-making Systems and Technologies

- Processing and Decision Aides to Support:
  - Automation Aided Collaborative Planning
  - Automation Aided Engagement Algorithms
  - Embedded rehearsal
  - Order Generation and Distribution
  - Status Alerts

- Mental Performance Enhancements (to achieve “at rest” Performance)

- Individual Cognitive Performance Modeling

- Logistics Modeling
  - Individual Monitoring for fatigue, health, nutrition, re-supply, etc.

“Revolutionary Individual and Team Information Processing Support”

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Mobility Systems and Technologies

- Enhanced Load-bearing integrated with Combat Suit
- Individual soldier bio-mechanical modeling and monitoring
- Precision air drop for fire-team or individual
- Robotic “mule” for sustainment and mobility
- Continuous Human Factors monitoring and treatment to insure peak performance
- Fuel-cell based power systems

“Revolutionary Mobility Systems for the Soldier and Team”
Sustainment Systems and Technologies

- Delivery/Transport
  - Robotic Mules
  - Precision Airdrop

- Quality of Life Enhancements
  - Portable Shelters
  - Hygiene Systems Embedded in Suit
  - Food, Medical, Water, Medications, Treatments Integrated into System of Systems

- Ammo weight and bulk reduction through precision and miniaturization

- Casualty Management Integrated into Soldier Systems

“Revolutionary Advance in Sustainment Achieved Through Integrated Soldier Systems Technologies”
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Sustainment Systems and Technologies

Revolutionary Power Sources
- Advanced, Hybrid Fuel Cells
- Nano-Particle Polymer Photo-Voltaic
- Leverage DARPA Palm Power

Conducting Nanofibers

Solar Cell Patches and Cloths for Direct Power

Heel Strike Power Generation

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Training Systems and Technologies

- Objective Force Warrior will demand higher soldier performance at all levels, placing new demands on training systems
- Individual differences will have to be identified and training optimized to specific needs
- Collaborative and Individual automated training systems embedded in C4 System and Combat Suit and Helmet
- Ability to attain high cognitive performance under stress will be critical training goal

“Revolutionary Advances in Training Systems are Necessary to Enable Objective Force Warrior Vision”
Human Factors Technologies

- Maintaining and enhancing human performance offers significant potential
- Nutrition and supplements (and delivery mechanisms) are a key area— it appears many now using supplements
- Proper sleep and exercise regimes appear to be very important (little is known about mission impact)
- Biologically based protection measures rapidly evolving
- But many system integration issues must be addressed
Human Factors/Human System Integration Issues

- Total Soldier Team Performance Assessment:
  - this soldier; in this team; performing these tasks; using this equipment
- Operations on the move - vulnerable first minutes after exit
- Weapon/System maintenance by the soldier
- Auditory/visual enhancement
- Skill mix in team
- Skill decay
- Form, fit, function assessment
- Operations in extreme conditions
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Human Factors/Human System Integration Issues (Con’t)

• “Trust” in automation
• Adaptive behavior:
  • thinking by individuals - initial understanding, then tools to train
  • team action response
  • evaluation tools for validation of adaptive behavior in dynamic field environments
• Cognition - overarching consideration in soldier technology performance and use assessment

“Adequate Models of Human Behavior in the Objective Force Warrior Environment are needed to Support all Other Development Efforts”
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Survivability Systems and Technologies

- Integrated Suit and Helmet
  - Full Body Armor based on nano-technology
  - Environmental Control
  - Stealth
  - Electromagnetic Protection
  - Laser Protection
  - Integrated C4ISR and Lethality Interfaces
  - Integrated CB Protection
- Electro-mechanical Mobility Enhancement
  - Increased Load Bearing and strength
  - Increased endurance
- Multi-spectral Sensing of Threats
- Embedded Health Maintenance and Treatment Capabilities

“Revolutionary Survivability Systems for the Individual Soldier and the Team”
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**OFW: Integrated Designs, Virtual & Physical Prototypes, Field Demonstrations**

**From...**

- Hand Cutting and Placement of Component Mock-ups to...

**Through...**

- Virtual Prototype Form, Fit, Function Prior to Breadboard Prototyping

**To...**

- Reduced Risk Breadboards, Brassboards, Field Tests of Integrated “System of Systems”

**Human Performance Data**
- Injury Mechanisms
- Component Mass Properties
- Mobility as a Function of Load and Load Carriage Equipment
- Biomechanics of Fatigue and Individual Movement

**Infantry Warrior Virtual Prototype Simulation**
- Bio-mechanic Simulation Tool
- Analysis of Human and Equipment Performance Under Realistic Use Conditions.

**Interaction of Human Body, System Equipment & Combat Performance**
Objective Force Warrior

What’s in it for Small Arms???

Lightweight, Lightweight, Lightweight, Lightweight

- Potential opportunity to develop and demonstrate lightweight systems

- Compliment OICWs in rifle squad with reduced weight systems with equivalent performance of current

- Goals:
  - M4 Carbine from 7.4 lbs to 5 lbs
  - M249 automatic rifle from 23.3 lbs to 14 lbs
  - M16/M203 Grenade Launcher from 12.6 lbs to 7 lbs

- Integrated Troop Demonstration FY07

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Lightweight Weapon Family

- Program approval Sep 01
- Expect FY02 Start
- Clean Sheet of Paper Design
  - Maximum use Lightweight Composite Structures
  - Simple mechanisms
  - Inexpensive, Lightweight, Polymer or caseless Munitions
- Efficient/Quick Squad Networked Fire Control
- Low Risk Tech Insertions

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Objective Force Warrior Roadmap

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Summary:

• Technology effort directed at the Dismounted Soldier
• Capstone Demonstrations FY06-07
• Fielding in the Objective Force time frame
• Strong interest in a lightweight weapon family to compliment OICW in the squad.
• Demonstrate a lightweight weapon family offering same capability as current systems in FY07
### Objective Force Warrior
#### Operational Needs

**Brainstormed from Draft O&O for Objective Force**

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**Enabling/overarching needs**

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