TALOS PROJECT to JATF NEXT
Where Did We Start?

Individual Equipment Evolution...What has Changed?

WWI

MACVSOG VIETNAM

OEF / OIF

FUTURE
TALOS: Protecting the Operator at his most vulnerable moment

Combat Suit Development: Research, assessment, test and development of emerging / disruptive technologies; integrator of multiple sub-systems and tactical components.

Accelerate Tech Development / Transitions: Over-the-horizon technology focus; equipping SOF to win in a complex, uncertain future.

Pioneer Innovative Processes: Rapid prototyping, prize challenges, streamlined acquisition; leveraging novel acquisition and development methods.

Persistent Collaboration: Maintaining extended network, continuous end-user engagement; forging new relationships with Academia, Industry, and Government.

Organizational Priorities

Original TALOS Functional Area
- Mobility & Agility
- Power & Energy
- Computing
- Command, Control, Communications & Intelligence
- Human Factors
- Operator Interface
- Offensive Systems
- Survivability
Pioneered SOCOM Prototyping
Persistent Collaboration and Innovative Processes

Government, Academia, Industry

SOFWERX Emerges

Fostered small business growth
Small Business Innovation Research

SOCOM blanket Cooperative Research and Development Agreement (CRADA)

Prize Challenges

Pioneered Commercial Solutions
Opening enabling more rapid and tailored acquisition
TALOS Combat Suit Tenents

**Survivability**: Comprehensive and improved ballistic protection. Develop an exoskeleton that supports near unconstrained movement and provides a load bearing structure.

**Human Performance**: Develop an independently powered actuated suit integrated with biomedical monitoring and thermoregulation to extend human performance thresholds.

**Situation Awareness**: Develop a visual augmentation, multidimensional display of fused sensors and an integrated array of intelligence and operational data.

**Surgical Lethality**: Shorten the time to target engagement and create options for novel weapons integration.
TALOS System Life-Cycle

2013
- State-of-the-art Market Research
- Non-traditional Partnering
- Ideation
- Team Building

2014

2015
- Use Case derivation (CONOP)
- Explored the Design Spaces
- Modeling and Simulation
- Architectural Designing
- Iterative Prototyping

2016

2017

2018

2019

- Design and Build Sub-System Components
- Configuration Management
- Preliminary and Critical Design Reviews
- Test and Evaluation

- System Integration
- Demonstrated prototypes

TALOS Architecture
ARMOR

Research Objectives:
• Increased Ballistic Threat Protection
• Reduced Size/Weight
• Novel Armor Design
Research Objectives:
• Improve Battery Technologies
• Lithium Polymer
• Solid Oxide Fuel Cell
• Hybrid Engines
BASELAYER

Research Objectives:
• Physiological Status Monitoring
• Active Thermal Management
• EMG Technology
• Novel Textiles
HELMET

Research Objectives:
• Target Acquisition
• Digital Vision Displays
• Augmented Reality
• 3D Audio

Visual Augmentation System Assembly

Swappable IR/Vis Imagers
Bridge
Holographic Display
Night Vision Fusion
Lookdown Displays
(ATAK + ISR)
Earform for 3D Audio

Helmet Computing

3D Audio
(Ambient and RF)
SOCOM Embedded Computing Environment (SEMONE)

C4I

Research Objectives:
- Software Integration
- Computing Hardware
- Networking hardware

Design Principles
- Survivable
- Adaptable
- Open

Middleware & Message Encoding

- External Input 1 (Different OS 1)
- External Input 2 (Different OS 2)
- External Input 3 (Different OS 3)
- Exterior Input 4 (Data Source 1)
- Exterior Input 5 (Data Source 2)

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Analyze kinematic effects

Extract joint centers and axes rotations

Overlay model onto 3D scan

Create Kinematic model

Human Motion Analysis

Walking
Running
Step up/down

Capture human motion data

Translate human motion data into model

Align human motion model with kinematic model

EXOSKELETON

Research Objectives:
• Modeling and Simulations
• Actuation
• Structures
• Sensors & Control

Modeling and Simulation

Exoskeleton Kinematics
EXOSKELETON

Research Objectives:
• Modeling and Simulations
• Actuation
• Structures
• Sensors & Control

Load Carriage Designs
Government Led System of Systems Integration

Lightweight Augmentation Design
Single Vendor (SBIR)

Early Prototypes

Load Carriage Designs Lightweight Augmentation Design
MK5 System of Systems Integration

- POWER ENCLOSURE
- HELMET
- COMPUTING
- EXOSKELETON
- ARMOR
- BASELAYER
- Thermal Management
- BioMedical Monitoring

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Integrated TALOS Prototype

OPERATIONAL STRESS INDEX

BIOMEDICAL MONITORING SHIRT
Integrated TALOS Prototype

- 3D AUDIO
- LOOKDOWN DISPLAYS
- SHOT DETECTION GARMENT
- BALLISTIC BATTERY PLATE
- LIGHTWEIGHT POLYETHYLENE ARMOR
- SMALL ARMS STABILIZATION
- BIOMEDICAL MONITORING SHIRT
- OPERATIONAL STRESS INDEX
- METABOLIC COST REDUCTION SYSTEM (PNEUMATIC KNEES AND ANKLES)

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Future Operating Environment

Multi-Domain Environment
• Physical (air, land, sea, space)
• Virtual (cyberspace)
• Cognitive (influence minds)

The democratization of emerging technologies provide our competitors with the means to predict and act faster than we do.

The Hyper-Enabled Team must quickly and effectively use information to predict and act while leveraging the decentralized flexibility of the SOF professional.
Enhancing Cognition (OODA Loop)

Cognitive Overmatch: The ability to dominate the situation by making informed decisions faster than the opponent.

We must leverage technologies to asymptotically drive the OODA Loop to zero.
Hyper-Enabling the Operator

- DATA ASSETS / SENSORS
- COMMUNICATIONS
- COMPUTING
- HUMAN MACHINE INTERFACE

HEO Technology Enablers at the Edge

Accelerate Decision Making
- Increase Situational Awareness
- Reduce Cognitive Load

Enhance Cognition

Technical Infrastructure Foundation

- Data Management Analytics
- Hybrid Cloud Strategy
- Communications Network Architecture

Culture

- Decision-Quality Data Drive Decisions
- Warfighter Teamed with Technologists and Data Scientists

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Learning Culture

Transformational innovations do not start with solutions; they begin with a clear understanding of a problem

Define Problems → Rapidly Prototype → Learn → Accelerate SOF Innovation