



NSRDEC Exoskeleton Background Joint Technology Exchange Group (JTEG)

February 2015



**Unmanned Equipment &
Human Augmentation Systems Team
NSRDEC**

Load Problem - General Soldier Load Tasks

Prepare Equipment



Perform Vehicle Recovery



Change a Tire



Install Wire Obstacle



Handle Ammo



Transport a Casualty

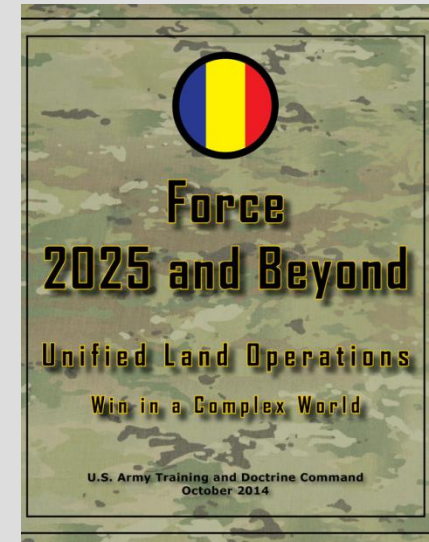




CSA Vision Force 2025



The Army's Challenge: *To meet the demands of the future strategic environment in alignment with its strategic vision and priorities, the Army must make the BCT and enablers leaner while retaining capability, prevent overmatch through 2025, and set the conditions for fundamental change by 2030-40.*

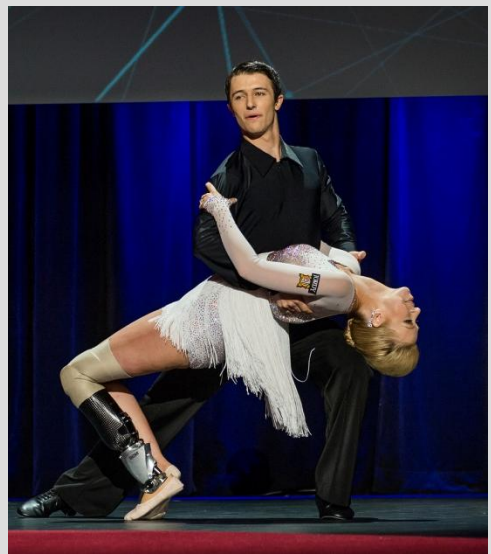




Exoskeletons for Load Assistance



Medical



Able-bodied



Industrial/Depot



Support/FOB



Combat/Infantry



Sources: www.bion.com, BAE Systems, Revision Military, Lockheed Martin, Ekso Bionics, Daewoo, Cyberdyne

NSRDEC Exoskeleton Approach

NSRDEC's Focuses:

- Address an Army Challenge to Ease the Overburdened Soldier by exploring and advancing Human Augmentation (HA) capabilities/technologies.
- Address CSA Vision Force 2025 & Army S&T Priorities (e.g. Human 3.0).
- Identify, advance, evaluate, refine, and transition effective HA technologies for the Soldier.

NSRDEC Exo Effort Goals:

- Enhanced Mobility
- **Force Multiplier** – less people, same warfighting power or better
- Capability will extend the battle space
- Reducing casualties during movement
- Extending warfighter reach and lethality of a squad
- **Optimize Soldier performance**
- Ability to provide each Soldier to carry additional ammo-food-water load allows them to go for >72 hrs
- Overall Manpower Reduction – CONUS & OCONUS



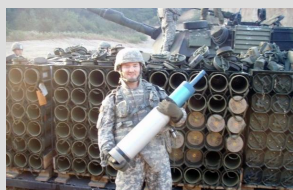


RDECOM

Human Augmentation (HA) Front End Analysis (FY14-15)

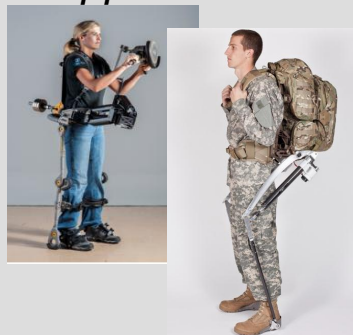


Current CONOPS



Value?

Augmented Human Approach



-Reduction in manpower?
-Increased effectiveness?

Schedule (FY14-15)

- December 10-12, 2014 HA Roundtable
- Summary Report May 2015

Purpose:

- Document the state of current technology across different HA types
- Document HA tech gaps that are major barriers to program success
- Inform and enhance broader NSRDEC, ARL, DARPA HA Strategy

Product:

- December 10-12, 2014 Roundtable Event
- Final Report in Spring 2015 documenting:
 - Load Carriage Framework Research
 - Market Survey
 - State of Human Augmentation Research
 - Human Augmentation Technology Gaps Research

Payoff:

HA technologies that achieve Vision 2025, MCoE, and/or MSCoE load assistance priorities:

- Reduces manpower required & provides force multiplication
- Heavy and/or repetitive supply lifting, loading, unloading, and transporting assistance
- Strength and load productivity enhancement
- Load-induced injury mitigation



NSRDEC Human Augmentation Roundtable



- **Purpose:** Brainstorm topics related to developing a load assistance / human physical augmentation capability to align Army efforts with future Vision.

- **Goals:**

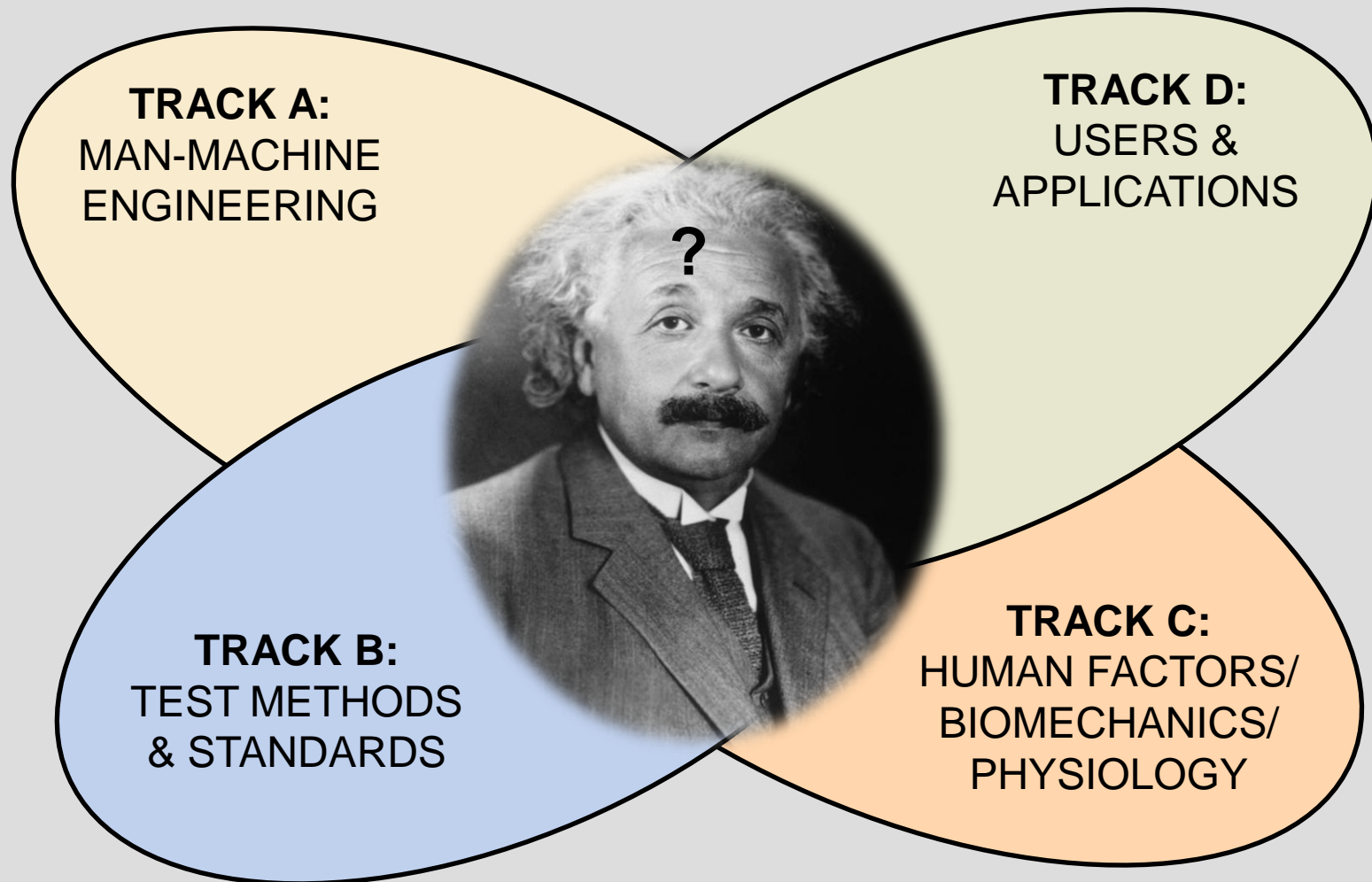
1. Identify 3-5 engineering priorities
2. Identify science & technology gaps
3. Identify consumer perception
4. Foster dialogue and joint brainstorming

- **Format:**

- Held at UMASS-Lowell NERVE Center 11-12 DEC
- Presentations from NSRDEC and Academic SMEs (Prof. Hugh Herr (MIT) & Prof. Dan Ferris U of Michigan))
- Four Roundtable Discussion Tracks
- Summary Presentation of High-level Roundtable Conclusions



It will take many different disciplines working together!



Other Major Disciplines?...



Overall Roundtable Outcomes



- Significant HA-related Government, Industry, & Academia Representation
 - ~85 Participants Total
- Very positively received by attendees
- Productive in identifying overarching trends and specific findings related to the four roundtable tracks
- Event outputs will significantly inform:
 - FY14-15 NSRDEC Human Augmentation Front-end Analysis (Project 14-095) effort
 - FY15-18 HA Strategic Plan
 - Overall collaborative engagements with DoD and non-DoD partners
- Next Steps:
 - Producing a final roundtable report and attendance list to deliver to event invitees (February 2015). For more information on roundtable technical outputs, please contact Mr. Rocco Olean, adam.r.olean.civ@mail.mil.
 - Working standards and test methods with ARL and NIST
 - Developing HA strategic plan for ASA(ALT)
 - Working with MCoE and MSCoE on requirement(s) generation



QUESTIONS?