Human Systems Community of Interest
An Overview

Dr. Kevin Geiss

AFRL 711 Human Performance Wing

Chair, Human Systems Community of Interest

Human Systems CoI: SubAreas

Personalized Assessment, Education, and Training

Right Person, Right Job, Right Skills

- Training, Education, And Personnel Development
- Personnel Selection and Assignment

Protection, Sustainment, and Warfighter Performance

Ensuring Warfighter Safety and Survivability

- Understanding and Quantifying Warfighter Variability
- Enhancement and Mitigation Strategies

System Interfaces and Cognitive Processes

Effective, Natural Human-Machine Teaming

- Human-Machine Teaming
- Intelligent, Adaptive Aiding
- Human Information Interpretation & Influence

Human Systems CoI

- **Vision:** Develop & deliver new human-centered technologies to select, train, design, quantify, protect, and operate for measurably improved mission effectiveness.

- **Mission:** Enhance mission effectiveness through:

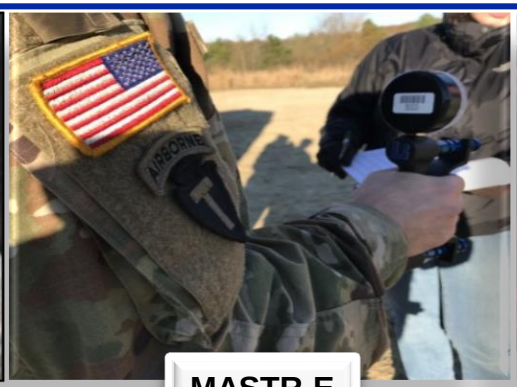
  1) Integrated simulations for mission training, experimentation 2) Human-machine designs for mission effectiveness, 3) Assessment of operator effectiveness, 4) Operating through battlespace stresses, and 5) Mastering the political, military, economic, social, infrastructure, and information systems (PMESII) battle space.

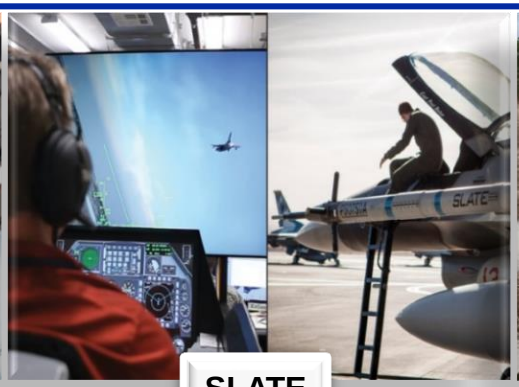
- **Key Products:** Integrated service roadmaps; CoI taxonomy, budget & programs; seedling, and tri-service Applied Research for the Advancement of S&T Priorities (ARAP) proposals, collaboration opportunities; success stories.

- **Data Link:** Other key CoI information including roadmaps can be found on **https://defenseinnovationmarketplace.dtic.mil/communities-of-interest/human-systems/**

State of Technology: Accomplishments


IMPACT & TTCP


MASTR-E


SLATE


BATDOK

- Intelligent Multi-UxV Planner with Adaptive Collaborative Control Technologies & The Technical Cooperation Program (IMPACT & TTCP) Autonomy Strategic Challenge demonstrated single operator managing 16 unmanned multi-domain assets, both live and simulated.
- Monitoring and Assessing Soldier Tactical Readiness and Effectiveness (MASTR-E) CCDC – Soldier Center in partnership with the 82nd Airborne and many HS CoI members. Leveraging cutting-edge technology and an array of technical disciplines to identify the human performance x-factors that reliably account for sustained dismounted soldier and squad lethality.
- Secure Live Virtual Constructive (LVC) Advance Training Environment (SLATE) New waveform for LVC data transmission; Enhanced range infrastructure; New standards, data specs, and interface control docs for 4th & 5th gen LVC. Success led to several senior OSD,USAF and USN outbriefs and a requested outbrief to senior Royal Australian Air Force leadership.
- Battlefield Assisted Trauma Distributed Observation Kit (BATDOK) Enhance patient care and survivability by leveraging an operator-centric, easy-to-use mobile interface that increases the medic's awareness throughout the care and transport of injured personnel, in both combat and humanitarian missions.

State of Technology: Investments

Gaps and Risk Areas

- Wearable technology and real-time operator state assessment
- Performance optimization via adaptive wearable robotics
- Trainable undifferentiated agents for rapid constructive force generation
- Context-aware communication for human-machine teaming performers

Service Partnering

- 4th Gen LVC Advanced Training Environment: Strategic partnership between AF and Navy on requirements and leveraging of funds for F15E Operational Flight Program (OFP) changes to reduce timeline/costs for similar OFP mods to F18 aircraft
- Directed Energy (DE) Bioeffects; ARL has placed a position within AFRL DE Bioeffects Team to pursue collaborations and leverage AF investment
- Navy and AF seedling: A Cognitive Computing Environment for Mixed-Initiative Alternative Course of Action Analysis

Future Direction

Technological

- Optimal warfighter performance and lethality: leveraging AI and big data
- Synchronized Air/Ground/Sea Medical Autonomous Platforms (SAGSMAPS) for Autonomous Care and Evacuation (ACE) to Increase Unit Lethality – with Autonomy and ASBREM CoIs
- Marine Corps experimentation with large data collection at School of Infantry – East
- Personalization of training; Proficiency-based training and assessment; Human-machine team training and assessment

Initiatives or Best Practices to Accelerate R&D Process

- Regular meetings between subarea leads and NDIA partners
- Continuation of IR&D TIMs
- Participation in NATO, The Technical Cooperation Program (TTCP), and international workshops
- HS CoI Awareness Campaign: Steering group familiarization lab visits, quarterly newsletter, bi-weekly calls, DoD - Human Factors Engineering Technical Advisory Group, National Defense Industrial Association (NDIA) Human Systems Division (HSD)

Cross-CoI, Industry, Academia Opportunities for Collaboration

- ASBREM: Military Operational Medicine Research Program Wearables meetings
- Autonomy: Machine perception, reasoning & intelligence

HS CoI Status
Key Events/Activities

- **U.S.-U.K. Human Systems Workshop** — **Feb 2018**
- **Air Force Familiarization Visit** — **May 2018**
- **Navy Familiarization Visit** — **Aug 2018**
- **HS CoI Steering Group/"All-Hands"** — **Oct 2018**
- **Reliance 21 Meeting** — **Jan 2019**
- **Army Familiarization Visit** — **Feb 2019**

- **NDIA Human Systems Conference collocated with Human Factors Engineering Technical Advisory Group (HFE TAG)** — **Apr 2019**
- **HS/ASBREM CoI Internal Research & Development Technology Interchange Meeting (IR&D TIM)** — **Jun 2019**
- **HS CoI Annual Meeting** — **Sep 2019**
- **HS CoI Roadmap Review** — **Oct 2019**
- **FY19 Budget Update** — **Oct 2019**

Takeaways

- The HS CoI is well-positioned to support recent Service strategic documents to leverage the human dimension in complex systems via use of synthetic environments.
  - Programs in Human-Machine Teaming, LVC, and Wearable Sensors address key capabilities
  - DE Bioeffects as an emerging area of interest
  - Developing and executing jointly planned proposals
- The HS CoI Steering Group will continue to strengthen awareness of Services' S&T capabilities through a series of laboratory site visits.
- The HS CoI has been leveraging collaborations with other CoIs (ASBREM, Autonomy, C4I, etc.), including ARAP proposals, Autonomous Medical Evac Workshop, and combined ASBREM/HS CoI IR&D TIMs event.

State of HS CoI: Changes

Personnel changes:

- Dr. Corde Lane (Army) Steering Group Member
- Dr. Michelle Zbylut (Army) Steering Group Member
- Dr. Robb Wilcox (Army) Steering Group Member
- Ms. Roxanne Constable (AFRL) - Working Group Chair

Sub Area / Roadmap changes:

- Human Aspects of Military Environments (HAOME) refocused to Human Information, Interpretation, and Influence (HI3) thrust within SICP
- Addition of Robotic Maintenance Assistants to System Interfaces and Cognitive Processes (SICP)
- Noted AI threads in S&T Focus for SICP Roadmaps

Roadmap Trends for Human-Machine Teaming

- Development of wearable electronics to sense and adapt to the cognitive/physical state of the warfighter and environment enables more mission effective human agent teaming
- Applied Neuroscience related to operator and mission performance: focus on sensor development and assessment methodologies (i.e., machine learning)
- Advance cognitive modeling for realistic avatars, adaptive training, human-agent teaming, and performance monitoring and prediction
- Neuromodulation related to protection and enhanced learning outcomes
- Growth in biosciences (bioengineering and biosensors) and robotics

Events & Meetings

NDIA Human Systems Conference

- April 2019

Aerospace Medical Association Annual Meeting

- April 2019

Human Factors and Ergonomics Society Annual Meeting

- October 2019

DoD Human Factors Engineering Technical Advisory Group Meeting

- April 2019

HS CoI Internal Research and Development Event (IR&D)

- June 2019

Human Systems CoI: SubAreas

Personalized Assessment, Education, and Training

Right Person, Right Job, Right Skills

- Training, Education, And Personnel Development
- Personnel Selection and Assignment

Protection, Sustainment, and Warfighter Performance

Ensuring Warfighter Safety and Survivability

- Understanding and Quantifying Warfighter Variability
- Enhancement and Mitigation Strategies

System Interfaces and Cognitive Processes

Effective, Natural Human-Machine Teaming

- Human-Machine Teaming
- Intelligent, Adaptive Aiding
- Human Information Interpretation & Influence

Service Demand Signals

Personalized Assessment, Education and Training

- Personalized, integrated assessments and training to improve performance, accelerate proficiency and increase affordability
- Enhanced warfighter performance through scenario based training & automated performance based readiness assessments
- Maintain air superiority over complex, evolving threats using adaptive training

Protection, Sustainment and Warfighter Performance

- Greater force protection to ensure survivability across all operations and environments
- Maintain health & injury recovery; reduce noise induced hearing loss
- Agile Combat Support through countering aerospace physiology and toxicology threats, reducing cognitive workload

System Interfaces and Cognitive Processing

- Achieve operational maneuverability through soldier-system integration
- Design systems to enable effective human machine interaction, including robotics & autonomous systems
- Enhanced interaction & trust w/ autonomous systems; increased SA for operators; reduced analyst workload
- Provide situational awareness; timely mission command and tactical intelligence human-agent teaming

- *Army Enduring Challenges*
- *Navy Vision/Objectives*
- *AF Core Mission/Challenges*

Personalized Assessment, Education, and Training

PAET Scope
Personalized Assessment, Education & Training (PAE&T)

Research and development in personnel assessment will produce integrated measures and adaptive testing for more precise assessment of individual potential, yielding improved personnel selection and assignment. Meanwhile, work in education and training will produce competency-based systems grounded in quantitative metrics to enable personalized, proficiency-based training to accelerate acquisition and enhance operational performance. The end result is more capable warfighters with decreased training costs.

<u>Thrust Area 1</u>:

Training, Education, and Personnel Development

S&T Focus Areas on Roadmap:

- Realistic, secure, and adaptive LVC environments
- Persistent **and** personalized readiness assessment and tracking
- Multi-Level modeling for readiness management
- Computational cognitive science research to support model and agent development for training and operational support

<u>Thrust Area 2</u>:

Personnel Selection and Assignment

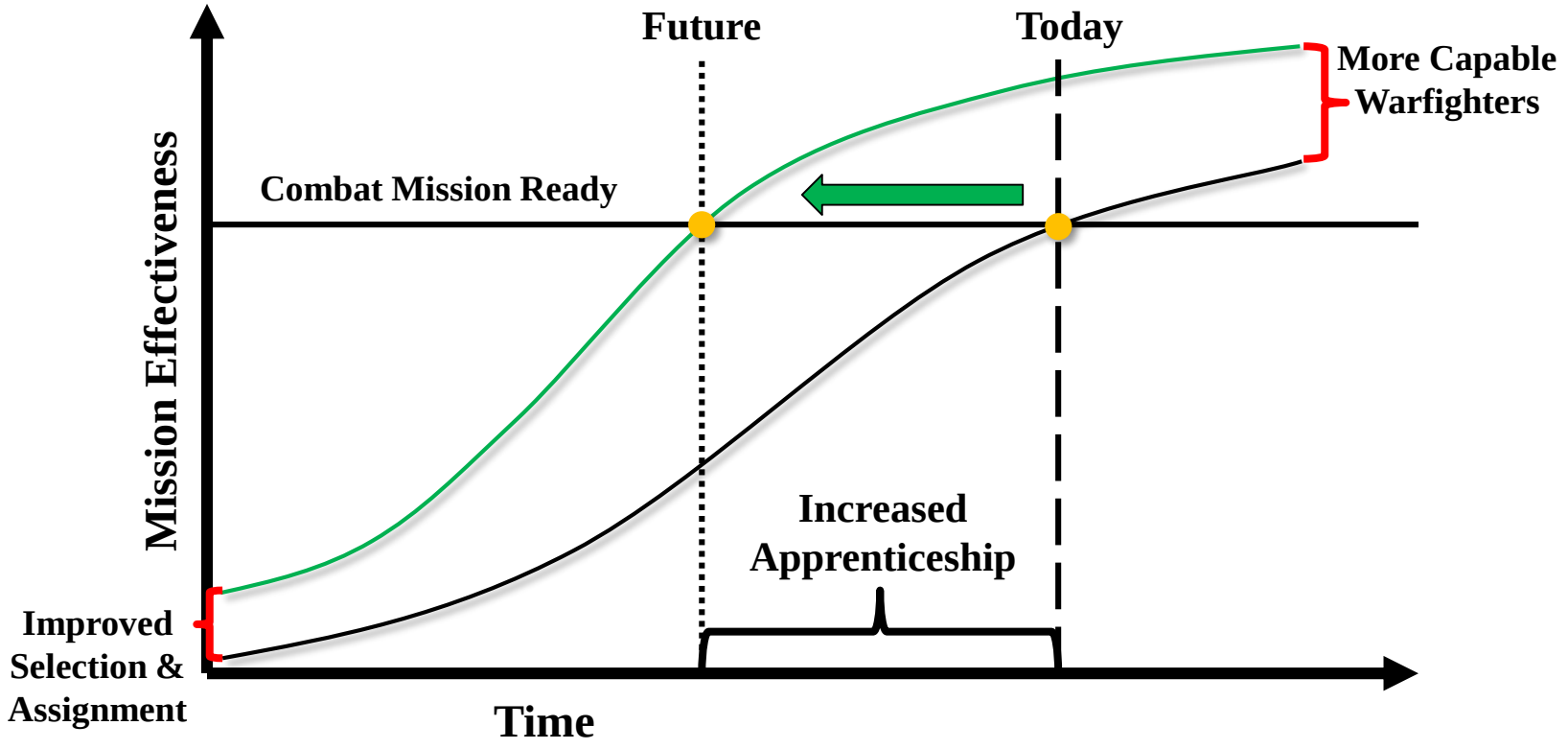
S&T Focus Areas on Roadmap:

- Predictors: Expand/refine non-cognitive measures (e.g., Tailored Adaptive Personality Assessment System)
- Outcomes: Expand/refine behavior and performance data
- Models: Expand/refine predictive analytic model for integrated cognitive plus non-cognitive measures to predict attrition, performance, and behaviors

Personalized Assessment, Education, and Training: Vision

VISION

A readiness ecosystem that ensures the right person has the knowledge, skills, and experiences needed to be mission ready for a dynamic and uncertain 21st century operating environment



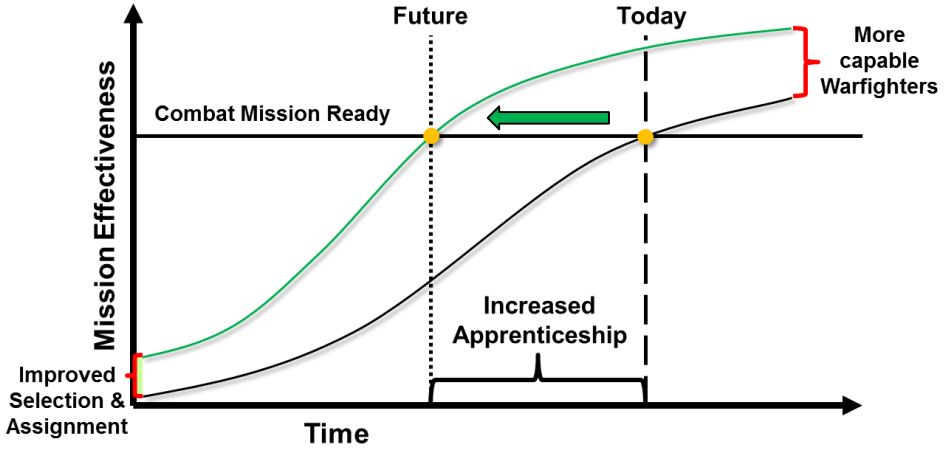
Personalized Assessment, Education, and Training: Overview

Challenges

- Unpredictable and asymmetric adversaries
- Dynamic, evolving operational environment
- Diverse personnel pool
- Budget and manpower constraints
- Need for better training at point-of-need
- Personalization to maximize mission effectiveness
  - Increased agility
  - Point of need training
  - Efficient use of training resources

Science & Technology Solutions

- Adaptive LVC synched w/operations
- Human science models (e.g. training, assess.)
- Performance measures and assessment
- Talent mgmt. functions personalized to data
- Optimization of talent mgmt. via learning science
- Proficiency-based assessment
- Cognitively-based instruction and training schedules



Thrust 1: Training, Education, and Personnel Development

Delivering the Mission

Education & Training Practices and Technologies that Support Efficient and Effective Development of Mission Readiness and Cognitive Agility

- Leverage learning sciences and technology to reduce resource costs (cost, manpower, time)
- Tailor training to individuals to enhance warfighter capabilities and agility
- Measure, track, and warehouse quantitative, proficiency-based performance measures

Delivering Capability (i.e., End States)

- Persistent, interoperable learning "ecosystem" …with personalized measurement; readiness tracking
- Secure LVC joint/coalition training environments …with realistic constructive teammates / adversaries
- Consistently high-quality training and education, tailored to individuals and available when needed
- Increased insight into personnel (data) informs individual learning decisions and mission planning

Key Technical Challenges

- Developing, deploying, and using proficiency-based performance measures / analyses
- Warehousing & using (big) learning data to inform life-long learning and operational decisions
- Securely integrating LVC environments
- Develop adaptive and valid cognitive agents
- Adapting learning sciences to military contexts and foster the right culture for their use

Example Program Successes

EXPERIENCE API

TXA AITT

Thrust 2: Personnel Selection and Assignment

Delivering the Mission

- Initial Military Training attrition is ~10% ($1.7B cost/yr)
- IMT attrition could be reduced to ~ 8% (saving ~.34B/yr) if current S&T product (TAPAS) was implemented to assess personality. IMT attrition could be reduced to 6% (saving $.68B/yr) with FY22 S&T products.
- Reduce negative behaviors for enlisted by ~5%.
- Increase satisfaction, performance, and retention in critical specialties by ~15%.

Delivering Capability

Maintain our competitive edge in Human Capital (Force of Future).

- Reduce attrition and negative behaviors with more precise assessments of candidates for initial entry and job assignment.
- Improve performance and retention with an emphasis on critical specialties (e.g., cyber) through advancements in talent assessment.

Key Technical Challenges

- Predictor measures: Existing measures lack individualized precision and are not integrated.
- Outcome measures: Performance and behaviors are difficult to measure and systematically obtain over a career.
- Predictive models: Existing models are stove-piped and based on group probabilities.

Example Program Success

- Enlisted Personnel Selection – TAPAS

Takeaways

- **Metrics**
  - Quantification of individual traits, states, and performance to assess aptitude and readiness
- **Models**
  - Formal characterizations of data, behavior, and cognitive processing to support assessments, training interventions, and predictions of future capability proficiency and performance
- **Simulations**
  - Increased reliance on simulation and LVC integration to support training requirements

System Interfaces and Cognitive Processes

SICP Scope

Research and development in this area will produce human-technology interfaces that enhance warfighters' ability to focus on their primary mission. These cognitively engineered interfaces will be intuitive to use, will learn with experience, and support mixed-initiative communication.

Thrust Area 1:

Human-Machine Teaming

S&T Focus Areas on Roadmap:

- Human-Robot Interaction
- Cognitive Architectures and Integrated Intelligent Systems
- Socio-Cognitive Architectures
- Mission-Specific Natural Language Dialogue
- Unrestricted Natural Language Dialogue
- Gesture/non-verbal interaction
- Trust Calibration
- Multisensory Perception and Interfaces
- Fusion Exploitation Tool Suite
- Interfaces to C2 Information Systems
- Distributed Intelligent Interfaces for Human-Centric Info Systems
- Mission Planning and Scheduling Tools
- Closed Loop Medical Technology Research

Thrust Area 2:

Intelligent Adaptive Aiding

S&T Focus Areas on Roadmap:

- Physiological, Behavioral, And Cognitive Sensing & Assessment
- Socially-Guided Machine Learning
- Cognition, Performance and Individual Differences
- Computational Models of Operators' Beliefs, Desires, Intentions and other Mental States
- Molecular Signatures
- Applied Neuroscience
- Human-System Co-Adaptation
- Gesture/non-verbal interaction

HUMAN SYSTEMS COI SUB-AREA:
System Interfaces & Cognitive Processes

VISION

Warfighters teamed with machines through intuitive, personalized interfaces that enhance warfighters' mission effectiveness.

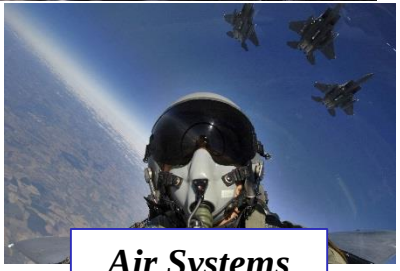


Information Systems Operators



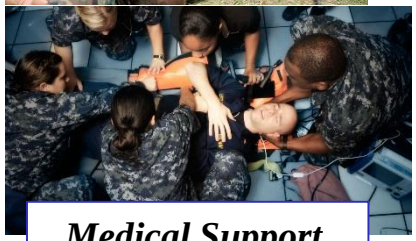
Dismounted Operators





Air Systems Operators





Medical Support Operators

Thrust 1: Human-Machine Teaming

Delivering the Mission

- Increased capability with smaller force structure across air, land, sea, space, and cyber
  - 1 MQ-9 Operator controlling 7 simulated MQ-9s
  - Reduced ISR PED Cell Operators from 5 to 3
  - Closed Loop Medical Technology Research
- USTRANSCOM Global Mission Scheduling System
  - Reduced logistics and personnel footprint ; reduced planned flying hours >2% saving $37M/year
- Trusted synthetic teammates that provide recommendations for battlespace operations
  - Reduced manpower and training requirements
- Ability to operate safely in highly contested environments
  - Reduced exposure to personnel

Delivering Capability

Seamless human-machine interfaces enabling optimized weapon system and warfighter performance in all contested domains and mission environments:

- Demonstrate highly effective, agile human-machine teaming
- Create actively coordinated teams of multiple machines
- Ensure safe and effective systems in uncertain and dynamic environments

Key Technical Challenges

- Immature intuitive, multisensory, adaptive interfaces
- Lack of robust and reliable natural language interfaces
- Absence of effective gesture control interfaces
- Fragile cognitive models and architectures for autonomous agents and synthetic teammates
- Insufficient degree of trust calibration and transparency of system autonomy
- Immature decision support tools

Program Overview

- Human-Robot Interaction
- Multisensory Perception and Data Presentation Interfaces
- Supervisory Control Technology Integration and Demonstration




Thrust 2: Intelligent, Adaptive Aiding

Delivering the Mission

- Maintain mission effectiveness despite fluctuating demands: No mission degradation in a high tempo environment
- Optimized human-machine teaming: Dynamic workload allocation to improve mission efficiency
- Provides shared situation awareness and transparency between the operator and the weapon system platform: Appropriate level of operator trust
- Optimized warfighter readiness and enhanced training: Identification of relevant biomarkers indicative of operator cognitive and physiological state

Delivering Capability

Enhance warfighter effectiveness by coupling humans and machines through the use of intelligent adaptive aids to protect from being overwhelmed by complexity and workload.

- Develop models of perception and cognition
- Assess the functional state of the operator
- Real-time measurement and assessment of warfighter performance

Key Technical Challenges

- Immature tools for individual and team functional state assessment
- Fragile cognitive models
- Operationalize minimally invasive sensor suites
- To Identify the appropriate biomarkers for determining operator performance
- Absence of effective gesture/non-verbal interfaces

Program Overview

- Applied Computational Neuroscience
- Cognitive Performance Optimization
- Monitoring, Predicting, and Optimizing Battlespace Awareness

Where We Are
Thrust 3: Human Information, Interpretation and Influence (HI3)

Delivering the Mission

- Identify adversary uses of information technology
- Characterize trends in the information channel (deception, themes, narratives, influence leaders, etc.)
- Analyze and estimate change occurring in the environment relative to USG initiatives

Delivering Capability

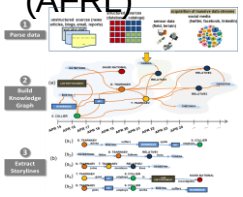
- Exploit Information Environment by extracting and enabling making meaning in multimedia
- Models and Machine Learning Algorithms to detect anomalous activity (bots)
- Extract and fuse knowledge graphs to uncover actors, roles, causal relationships.
- Socio-cultural aware decision support for COA analysis.

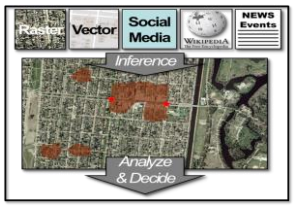
Key Technical Challenges

- Adversaries hide tactics and change identities if banned from platforms (hard to track)
- Deception is difficult to identify in early stages of an information campaign, need alert models
- Influence assessment is difficult, particularly for "competition" events/situations
- Blending social and computational sciences to characterize and anticipate socio-cyber behaviors
- Translation tools need global coverage & ACR for video.

Program Overview

- Bot Identification and Threat Evaluation (EUCOM)
- Analytics Using Geospatial Storytelling (ERDC)
- Big Open Source Social Science (ERDC)
- Collaborative agents in multi-agent systems (ARL)
- Blending "emic" data & game theory for deterrence analysis (AFRL)





Protection, Sustainment, and Warfighter Performance

Protection, Sustainment, and Warfighter Performance Scope

Research and development in this area will produce better understanding of the critical environmental stressors and the human factors yielding individual performance differences in operational environments in order to enhance performance and mitigate the effects of stressors. This includes designing systems that support and exploit individual differences, and developing operationally relevant metrics to monitor and assess performance.

Thrust Area 1:

Understanding and Quantifying Warfighter Variability

S&T Focus Areas on Roadmap:

- Ability to Conduct Warfighter Assessment in All Environments
- Mechanisms and Effects of Individual Differences and Critical Stressors on Warfighter Performance
- Real-Time Data Analysis and Performance Prediction

Thrust Area 2:

Enhancement, Mitigation, and Bioeffects

S&T Focus Areas on Roadmap:

- Tool(s) for conducting trade off studies between protection/load, performance, and individual differences.
- Development of Augmentation Technologies and Techniques
- Design and Development of Models and Methods for Understanding Mitigating Stressors
- Bioeffects

HUMAN SYSTEMS COI SUB-AREA:
Protection, Sustainment, and Warfighter Performance

VISION

Enable superiority of Warfighters by understanding and overcoming operational stressors, and providing protection from threats in their environment.

DARPA Warrior Web early prototype

Wearable sensor technology

This will be achieved through:

1. Understanding the factors that influence individual performance
2. Developing the ability to measure performance in the operational environment
3. Developing strategies to mitigate the effects of critical stressors on performance

Achieving this vision will enable:

1. Increased ability to perform at a higher stress level without a performance decrement or increase in injury
2. The ability to measure performance in training and operational environments
3. Warfighter protection aligned to mission specific threat, environment, and region allowing for optimal performance while maintaining protection
4. New technology capable of measuring current Warfighter state and predicting current and near term performance, resulting in 20% increase in task performance
5. Load mitigation strategies resulting in 25% decrease in metabolic cost

Thrust 1: Understanding and Quantifying Warfighter Variability

Delivering the Mission

- Data analysis and performance prediction will enable improved resilience by providing critical information on Warfighter readiness.
- Understanding the underlying mechanisms through which critical stressors influence performance will enable greater performance and protection methodologies.
- Understanding individual differences in the effect of critical stress on performance will enable greater Warfighter resilience.

Delivering Capability

- Developing technology capable of objectively measuring warfighter performance in operational environments to enable real-time monitoring of Warfighter performance.
- Understanding the underlying mechanisms through which performance is influenced will provide a pathway to optimizing Warfighter performance.
- Modeling individual responses to critical stressors will enable the leveraging of individual variability as a means of improving Warfighter performance and protection.

Key Technical Challenges

- Sensors needed that are non-invasive, don't adversely influence performance, and provide meaningful data.
- **Workflow and tools to support data acquisition, storage, sharing, and analysis.**
- The influence of human variability on the effects of stress on warfighter performance is difficult to predict.
- High fidelity models that predict performance and injury and/or the impact of protection strategies on performance are lacking.

Program Overview

- Determinants of hazardous biomechanics
- Ubiquitous and unobtrusive Real-World Assessment
- Impact of individual differences

Thrust 2: Enhancement, Mitigation, and Bioeffects

Delivering the Mission

- Physical augmentation to reduce metabolic cost by up to 25 %
- **Modeling and Simulation tools capable of predicting physical stress on the Warfighter Performance**
- Optimized load configurations and route planning leading to a 10% reduction in metabolic cost and 10% increase in operational performance.

Delivering Capability

- Develop methods of lessening the effects of critical stressors on Warfighter performance
- Understand the underlying mechanisms by which physical augmentation and protection technologies affect performance. Set system requirements.
- Provide the tools (M&S, route planning, etc.) necessary to understand the relationship between new technology, mission requirements and operational effectiveness.

Key Technical Challenges

- Tools to model effects of augmentation on physical performance and injury potential are still in development.
- Route planning tools require high fidelity models of human physiological response to critical stressors.
- Individual variability influences the extent to which physical augmentation can mitigate physical loads

Program Overview

- Lower Extremity motor adaptations to actuation
- Effects of physical augmentation on walking efficiency
- Enhanced Technologies for Optimization of Warfighter Load

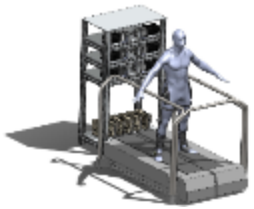


Photo property of MIT Prof. Hugh Herr 75 Amherst St., Rm. E14-374L, Cambridge, MA, 02139, (t) 617-258-6574, hherr@media.mit.edu

Thank You

BACKUP

Human Systems Community of Interest Active Membership

STEERING GROUP

Dr. John Tangney (Navy)
Dr. Ben Petro (OSD)
Dr. Corde Lane (Army)
Dr. Patrick Mason (Navy)
Dr. Kevin Geiss (AF)
Dr. Michelle Zbylut (Army)
Dr. Robb Wilcox (Army)
Ms. Lisa Sanders (SOCOM)

WORKING GROUP

Ms. Rachel Weatherless (Army)
CDR Jeffrey Alton (Navy, OSD)
Ms. Karen Gregorczyk (Army)
Ms. Roxanne Constable (AF)
Dr. Marty Bink (Army)
Dr. Paul Chatelier (Navy)
Dr. Kristy Hentchel (Navy)
Dr. Jessie Chen (Army)
LCDR Pete Walker (Navy)
Dr. Todd Nelson (AF)
Ms. Josephine Wojciechowski (Army)

SUB-AREAS

Personalized Assessment, Education, and Training

Dr. Glenn Gunzelmann (AF)
Mr. Rodney Long (Army)
Dr. Kendy Vierling (USMC)
Dr. Harold Hawkins (Navy)
Dr. Greg Ruark (ARI)
Dr. Sae Schatz (ADL)
LCDR Pete Walker (Navy)
Dr. Mark Livingston (Navy)
Dr. Shannon Salyer (OPA)
Dr. Michael Nugent (DLNSEO)
Dr. Eric Sikorski (CTTSO)
Dr. Jim Pharmer (Navy)
Dr. Pete Khooshabehadeh (Army)

Protection, Sustainment, & Warfighter Performance

Dr. Peter Squire (Navy)
Dr. Mike LaFiandra (Army)
Dr. John Ramsay (Army)
Dr. Tom Lamkin (AF)
Dr. Adam Irvin (AF)
Dr. John Schlager (AF)
Dr. Morgan Schmidt (AF)
Dr. Karl Van Orden (Navy)
Dr. Jeff Schiffman (Army)
Dr. Kurt Yankaskas (Navy)
Dr. Sandra Chapman (Navy)
Dr. Kristy Hentchel (Navy)

Systems Interfaces and Cognitive Processes

Dr. Mark Draper (AF)
Dr. Jeff Palumbo (AF
Dr. Tom Mckenna (Navy)
Dr. Jeff Morrison (Navy)
Dr. Erica Johnson (AF)
Dr. Caroline Mahoney (Army)
Dr. Ami Bolton (Navy)
Mr. Ed Davis (AF)

SICP (cont'd)

Dr. Liz Bowman (Army)
Dr. David Scribner (Army)
Dr. Rebecca Goolsby (Navy)
Mr. Eric Hansen (AF)
Dr. Edward Palazzolo (Army)
Dr. Lisa Troyer (Army)
Dr. Laurie Fenstermacher (AF)
Dr. Adam Russell (DARPA)

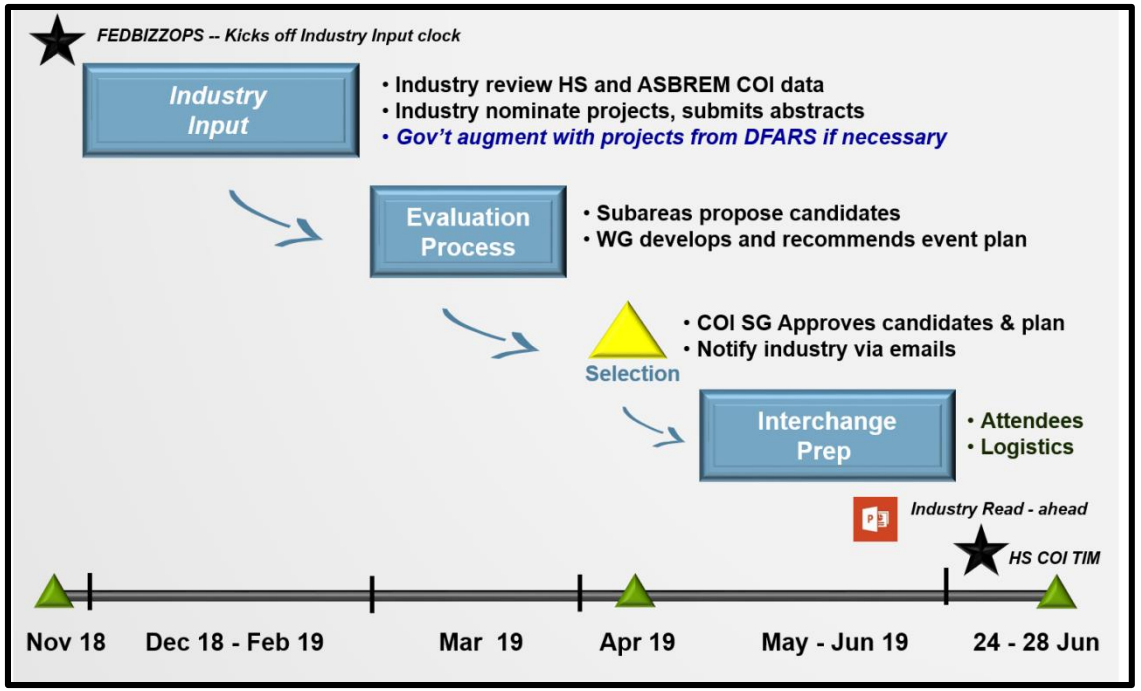
HS CoI
FY18 Completed Events/Activities

• Annual Reliance 21 Meeting	Feb 2018
• HS CoI Newsletter (Three Editions)	Feb/Jun/Oct 2018
• NDIA Human Systems Conference	Mar 2018
• NDIA S&ET Conference with CoI Poster	Apr 2018
• Human Factors Engineering (HFE) TAG	May 2018
• Air Force Familiarization Visit	May 2018
• ARAP Proposal	Jun 2018
• HSI Brown Bag	Jun 2018
• Seedling Proposal	Aug 2018
• Navy Familiarization Visit	Aug 2018
• HS CoI Steering Group/"All-Hands"	Oct 2018
• I/ITSEC Conference	Nov 2018
• FY19 Budget Update	Nov 2018

HS CoI Status
IR&D Interchange

- **New Partner: ASBREM CoI**
- **Location/time: Strategic Analysis, 24-28 Jun 2019**
- **Goals:**
  - Leverage Marketplace for insight on industry IR&D
  - Look for collaboration opportunities
- **Outcome: Continue collaboration development or not**
  - Examples: POCs given for future meetings, data exchanges, site visits, testing, CRADA/MOA discussion
- **Format: Face-to-face discussion led by Subareas**
- **Content: One hour per project; Includes Q&A and Government Caucus**

2019 HS/ASBREM CoI IR&D SCHEDULE



Acronyms

- ARAP - Applied Research for the Advancement of S&T Priorities
- BATDOK - Battlefield Assisted Trauma Distributed Observation Kit
- CCDC - U.S. Army Combat Capabilities Development Command Soldier Center
- DE – Directed Energy
- HFE TAG - Human Factors Engineering Technical Advisory Group
- HSD - Human Systems Division
- I/ITSEC – Interservice/Industry Simulation Training & Education Conference
- IMPACT - Intelligent Multi-UxV Planner with Adaptive Collaborative Control Technologies
- IR&D TIMs – Internal Research & Development Technical Interchange Meetings
- LVC – Live, Virtual, Constructive
- MASTR-E - Monitoring and Assessing Soldier Tactical Readiness and Effectiveness
- NDIA- National Defense Industrial Association
- OFP – Operational Flight Program
- PMESII - Political, military, economic, social, infrastructure, and information systems
- SLATE - Secure Live Virtual Constructive (LVC) Advance Training Environment
- TTCP – The Technical Cooperation Program