



Sae Schatz  
February 2016 HS Conference



OUSD(P&R)

Deputy Asst. Secretary of Defense (Force Education & Training)



Sae Schatz, Director  
sae.schatz@adlnet.gov



Established via Executive Order in 1999



To conduct R&D on learning science and technology



To improve learning effectiveness and efficiency across government



Help craft the future vision of learning science and tech



Provide customer support to facilitate implementation



Show the "art of the possible" via applied R&D

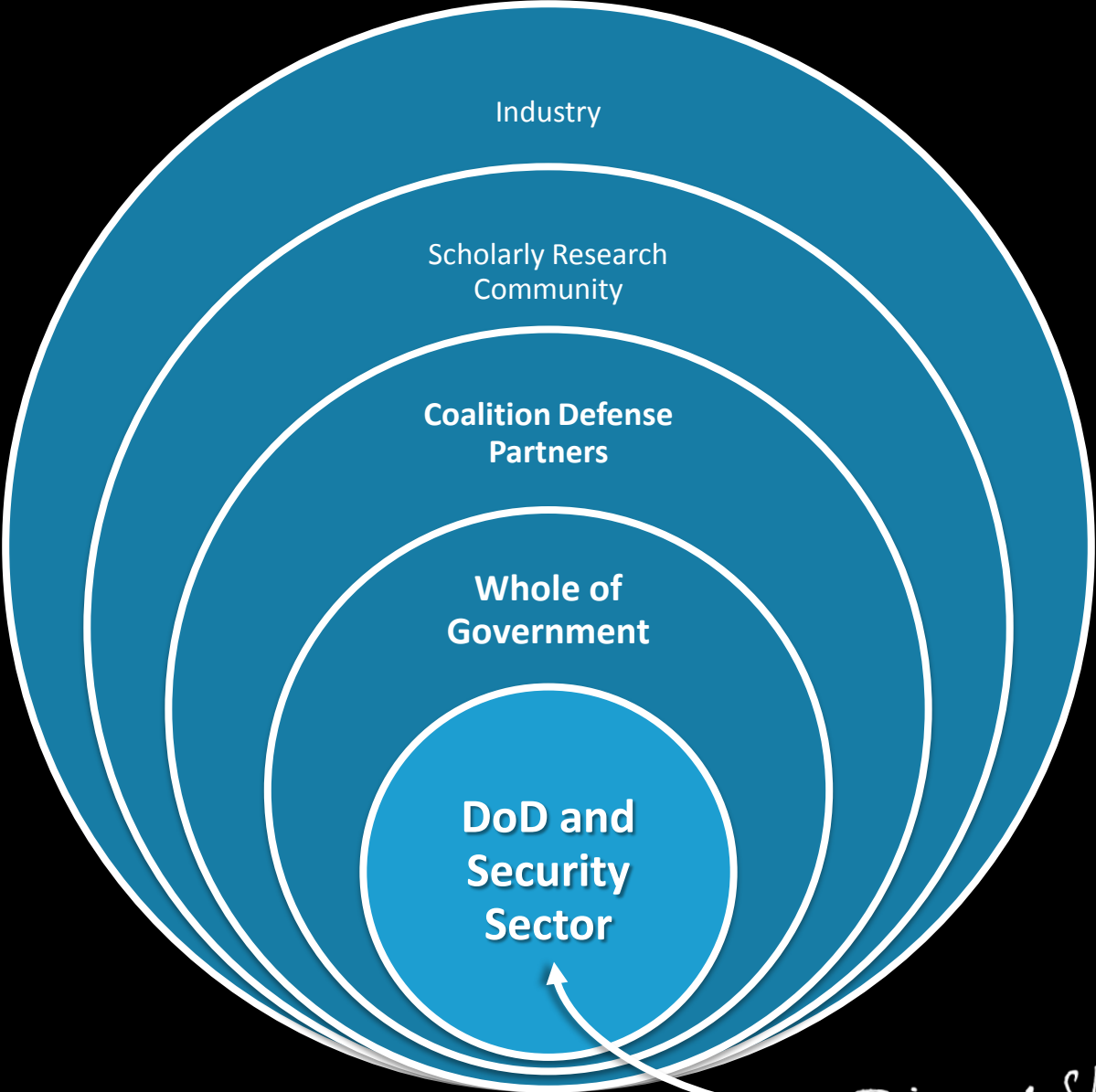


Alexandria

Orlando

# GLOBAL PARTNERSHIP NETWORK





*Primary Stakeholders*



# Activities

**Thought Leadership:**  
Help craft the vision for future learning science and technology

**Transition:** Help bridge the research-practice gap

**Innovation:** Mature learning ideas and technologies

Emerging Concepts Exploration

Requirements Engineering

Visioning and Dissemination

Engage the Community

Design-Based Research

Internal R&D

BAA Research Portfolio

Including

SCORM

e-Learning

Learning Theory

m-Learning

VWs / Simulations

TLA infrastructure

Performance Data

Learner Modeling  
Competencies and Credentialing  
Persistent and Open Models  
Visualizations

Active Outreach to DoD/Gov

Collaborative Research

Emphasis on Open-Source

Policy and Specifications

DODI 1322.26  
STANAG 2591

Via

ADL Partnership Network

Coalition: NATO, TTCP, PfPC

ADL Communities of Practice

Defense ADL Advisory Committee

e.g.

xAPI

e.g.

# Budget Activity 6.3: Advanced Technology Development



## TRL 4

### Component and/or breadboard validation in a laboratory

Basic technological components are integrated to establish that they will work together; “low fidelity”



## TRL 5

### Component and/or breadboard validation in a relevant setting

Basic technological components and their supporting elements are tested in a realistic simulated environment; “high fidelity”



## TRL 6

### Prototype demonstration in a relevant environment

Prototype *system*, beyond that of TRL 5, is tested in a relevant environment to show the technology’s readiness



EXAMPLES

ADL  
BAA

The screenshot displays the FedBizOpps.gov website interface. At the top, the site logo and navigation menu are visible. The main content area features a solicitation notice for the ADL Initiative, including a synopsis, a list of changes, and general information. The synopsis describes the mission to develop a Personal Assistant for Learning (PAL) for effective, personalized learning content and/or job performance aids. The list of changes shows updates to the synopsis on September 3, 2014, and November 6, 2014. The general information section provides details such as the notice type (Special Notice), posted date (September 3, 2014), response date, and classification code (A - Research & Development).

Federal Business Opportunities  
E-GOV USA.GOV

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**A--The ADL Initiative is to develop a Personal Assistant for Learning (PAL) for effective, personalized learning content and/or job performance aids that can be accessed from multiple devices/platforms.**  
Solicitation Number: ADLBAA12003  
Agency: Department of the Army  
Office: Army Contracting Command  
Location: ACC - APG - Natick (SPS)

Notice Details Packages Interested Vendors List [Print](#) [Link](#)

**Note:** There have been modifications to this notice. You are currently viewing the original synopsis. To view the most recent modification/amendment, [click here](#)

[Complete View](#) [Return To Opportunities List](#)

**Original Synopsis**  
Sep 03, 2014 11:23 am

**Changed**  
Oct 09, 2014 10:03 am

**Changed**  
Nov 06, 2014 9:00 am

**Changed**  
Nov 06, 2014 9:41 am

**Solicitation Number:** ADLBAA12003  
**Notice Type:** Special Notice

**Synopsis:**  
Added: Sep 03, 2014 11:23 am  
The ADL Initiative has the mission to develop and advance the state of the art in education and training through the use of technology and innovative learning methodologies which highly leverage artificial intelligence, networking, data warehousing and recall technologies for the Department of Defense and across the Federal Government. Projects funded under this BAA will include research related to the ADL mission resulting in prototypes or prototype modules with potential for transition to the Department of Defense community, including the Department of Defense Education Activity. Projects of most interest will be in those areas that explore and develop novel applications of new and emerging educational and training technologies, explore new methods of integrating sound instructional principles with the emerging learning technologies, and maintain a learner-centric orientation. Work should avoid use of proprietary software whenever possible and should

**GENERAL INFORMATION**  
**Notice Type:** Special Notice  
**Posted Date:** September 3, 2014  
**Response Date:** -  
**Archiving Policy:** Automatic, on specified date  
**Archive Date:** November 6, 2015  
**Original Set Aside:** N/A  
**Set Aside:** N/A  
**Classification Code:** A -- Research & Development  
**NAICS Code:** 541 -- Professional, Scientific and Technical

# WIIFM?



Learning Ecosystem  
of the Future  
(Vision)



Return on  
Investment (ROI)  
data for HSI

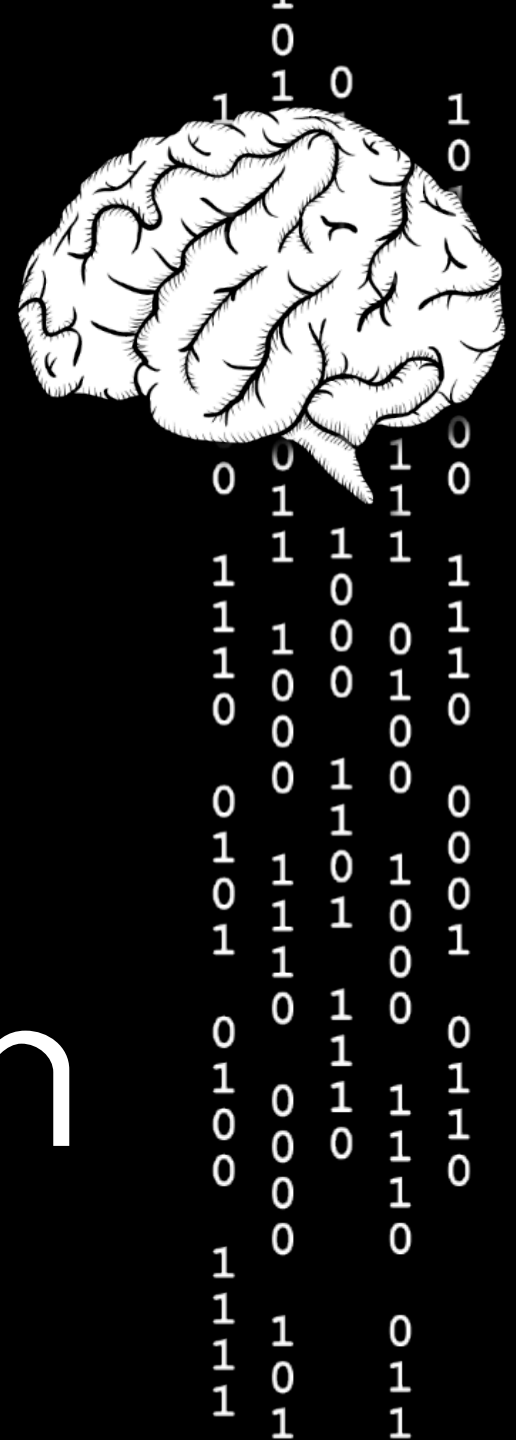


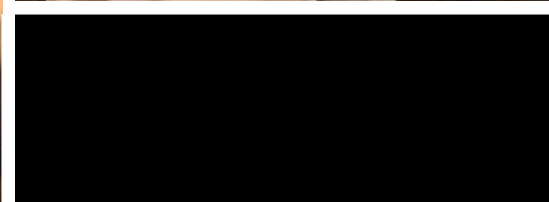
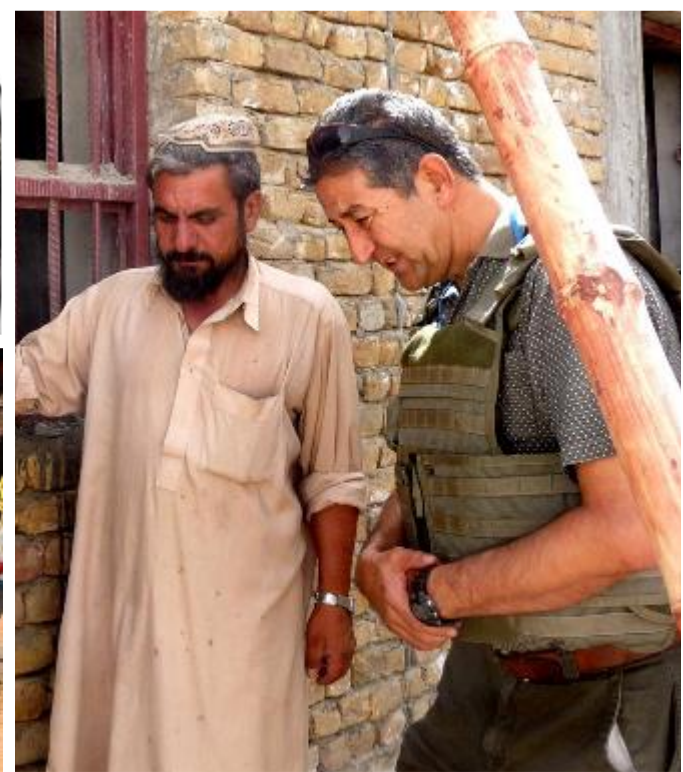
Free learning  
science and  
technology stuff



PART 2:

# Future Learning Ecosystem





Simplify

Develop technology and systems

Prepare personnel to ~~cope with~~ VUCA !!

^  
thrive in



# NBSD Hosts Resilient Workforce Summit

Story Number: NNS151005 06 Release Date: 10/5

By Mass Communication Specialist Dan P...



CHAIRMAN OF THE JOINT CHIEFS OF STAFF  
WASHINGTON, D.C. 20318-9999



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## Carter Details Force of the Future Initiatives

By Jim Garamone

DoD News, Defense Media Activity

PRINT | E-MAIL | CONTACT AUTHOR

- News ▲
- Secretary of Defense ▲
- Deputy Secretary of Defense ▲

WASHINGTON, November 11, 2015 — Secretary of Defense Ashton Carter said today that it is necessary to ensure the Defense Department is prepared for the future.

The secretary told students at the United States Naval Academy that one of his core commitments is to ensure the Department is prepared in many ways as possible.

Carter emphasized his start in the military, saying, "George Washington, launched the United States military," he said, "and fought for freedom on 9/11."

But it was more than a fighting force that he talked about, including positioning system.

### Mastering Change With Excellence

"Throughout all this, the one thing that we need to focus on is excellence -- continuing to do it better."

"But that excellence is not a one-size-fits-all solution in the 21st century."

America's advantage is tied to our ability to adapt and change.

"In the face of generational change, we need to open our five-sided box and try to do things that only Americans can do," he said.

Spreading the word that DoD is open to ideas from corporations to academia.

### Learning From Corporations

Carter announced the idea of the Force of the Future in one of his first speeches after taking office in February. The secretary visited many corporations and learned from leaders in academia and elsewhere.

"Throughout this process, we've always been mindful that the military is a profession of arms," he said. "It's not just about the hardware, it's about the people."

Veterans

11/05/2015



## DEPARTMENT OF DEFENSE TALENT MANAGEMENT

"What we've always known is that the way we win is critical to our success. To fight, we need a pool of talent that is healthy, fit, and motivated. We must evolve our personnel management, we must evolve our people. Today we shift from 'what we have' to 'what we need'." **Secret**

### UNITED STATES NAVAL ACADEMY INITIATIVES

- **Optimized Service-Assignment for USNA (2016) - USNA will continue to evolve our service assignment process by moving further away from a class-rank selection model to a more market-based system that identifies natural talents and interest of USNA graduates with focused skills needed in our warfare communities.**

### CULTURE OF FITNESS

**Navy fitness initiatives (2016-2017) - The Navy and Marine Corps' fitness culture should focus on producing warfighters capable of accomplishing any mission any time and supporting healthy lifestyles to reduce overall medical costs. To do so, we will make the following changes:**

- When measuring body fat, we will evaluate health, not shape.

### UNIFORMS

- **One Uniform - Navy and Marine Corps and Marines. The Department of the Navy will develop a uniform for both males and females.**

166-13  
e 2013

Simplify

Develop technology and systems

Prepare personnel to ~~cope with~~ VUCA !!

^  
thrive in

~~☐~~ Simplify

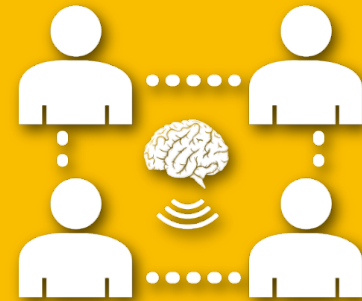
~~☐~~ Develop technology and systems



**More Skills**



**Higher Order**



**More Agile**





Learner-centric, technology-enabled: Flexibly, efficiently, and seamlessly (truly blended)





Data-driven learning tailored is to what, where, when, and how learners need it

# Learning Science



Learning system is guided by evidence-based best practices and continuously improved



Technology enables action from self, commanders/instructors, and peers (social learning)



Organizations learn lessons and disseminate them effectively



Learner-Centric  
Technology-  
Enabled



Data-Driven  
Learning



Learning  
Science



Social Learning



Learning  
Organizations

+ *Training and Learning Architecture*

PART 2:

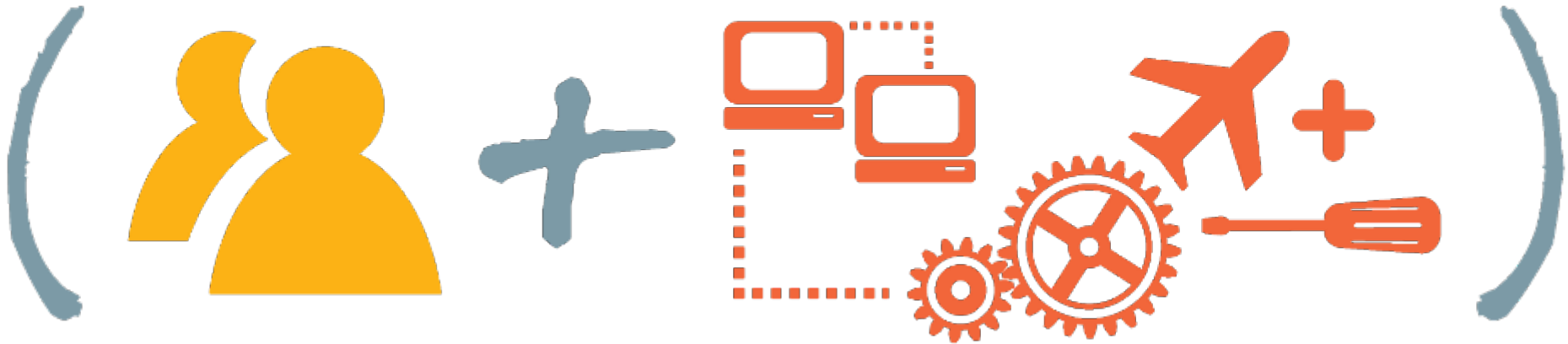
# ROI of HSI



# Human-Systems Integration

PEOPLE

TECH + INFRASTRUCTURE



HSI is a philosophy and set of processes that focus on systems-level human performance concerns throughout a system's life-cycle. Its purpose is to mitigate the risk of downstream system failure.

# Human-Systems Integration

PEOPLE



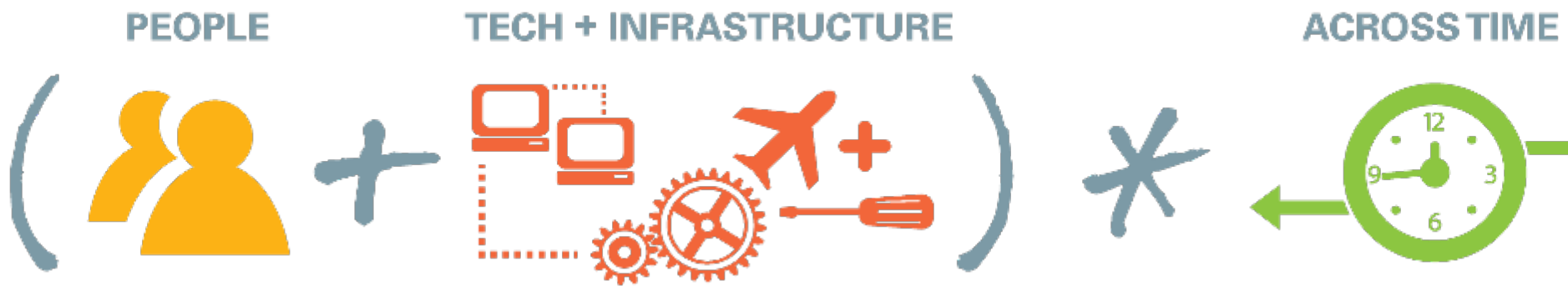
TECH + INFRASTRUCTURE



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# Human-Systems Integration



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# HSL Core Tenets



## Emphasize Humans

Emphasize human performance early and often in the system design process; give humans equal treatment to hardware and software



## Optimize Total System

Optimize overall system performance at the comprehensive (big picture) level and not simply at the individual component levels



## Consider Full Life-Cycle

Take a long view; maximize a system's benefits—while controlling its costs and mitigating risks—across the entire system life-cycle



## Facilitate Design

Facilitate multidisciplinary design; help “translate” among specialists in different disciplines as well as between designers and other stakeholders

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# HSL domains



**MANPOWER**

**PERSONNEL**

**TRAINING**



**HUMAN FACTORS**

**SAFETY/HEALTH**

**HABITABILITY**

**SURVIVABILITY**

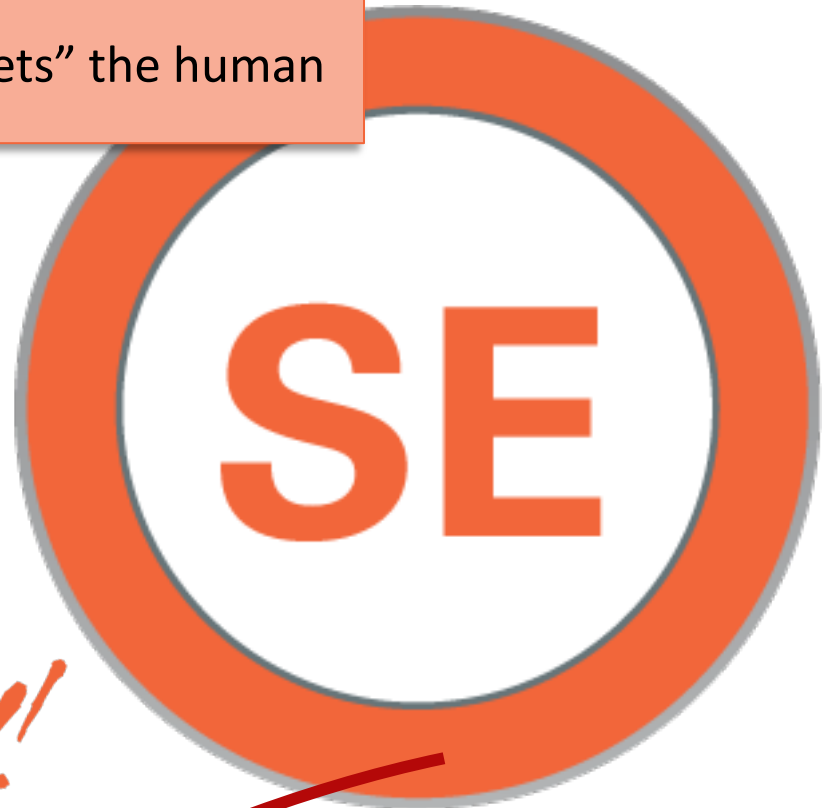


- × Optimizing across components
- × Maximizing total life-cycle ROI
- × Facilitating multidisciplinary design

Hey!

~~That's Human Factors~~

✘ In practice, SE usually “forgets” the human



*Hey!*

~~It's Systems Engineering~~



**Essentially, HSI is an alloy of HF/E (broadly defined) and SE**



## FORMALLY MANDATED

Agencies, such as the DoD, have developed guidelines mandating or instructing the use of HSI; e.g., the DoD “5000 Series” formally directs the use of HSI in all DoD system acquisitions processes



## RETURN ON INVESTMENT

HSI has high ROI; e.g., Booher reports a USAF program that had a 50:1 ROI (savings of \$50 or every \$1 spent on HSI) and two Army helicopter programs with 44:1 and 22:1 ratios, respectively



## REDUCE RISK OF FAILURE

HSI mitigates the risk of system failure, including three of the most common causes: (1) Underuse due to poor design, (2) Human error, (3) High operations and maintenance costs





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### RETURN ON INVESTMENT

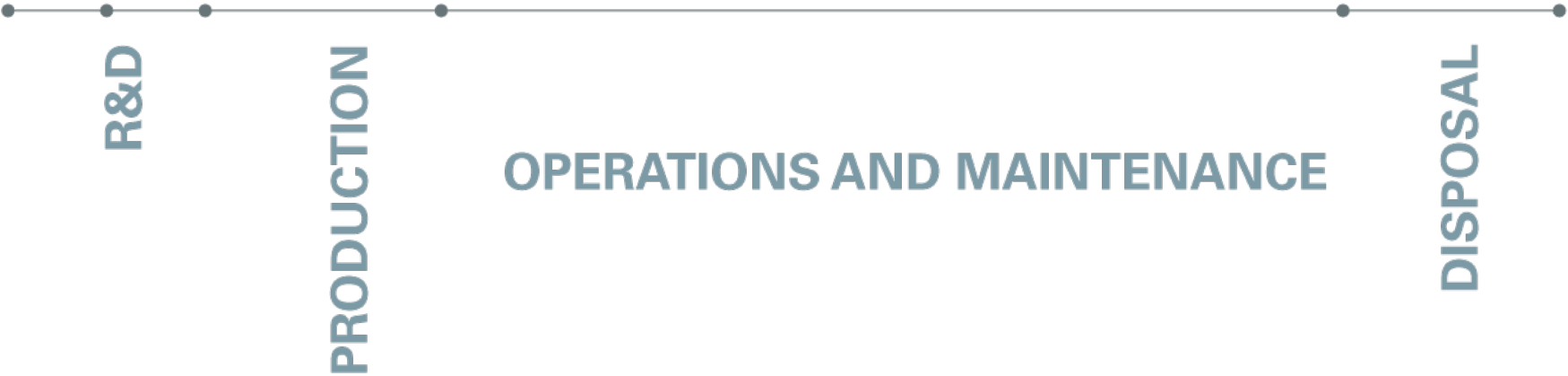
HSI has had a significant impact on the Boomer reentry program. ROI (savings) is \$1 for every \$1 spent and two other programs with 44:1 and 22:1 ratios, respectively




**Only 34% of technology development projects in the US are successful.** Projects most frequently fail because (1) inadequate understanding of the intended users/context and (2) vague usability requirements

(3) High operations and maintenance costs

# SYSTEM LIFE-CYCLE



Defence



Integration is worth the money  
 The implementation of Human  
 es in Defence capability acc


ATIONAL  
 FETY  
 ple

ence.gov.au/  
 fence.gov.au/dpe/ohsc

NAVY

WILEY

# Handbook of Human Systems Integration



HAROLD R. BOOHER

Wiley Series in Systems Engineering and Management

284 | A Publication of the Defense Acquisition University www.dau.edu

## THE F119 ENGINE: A SUCCESS STORY OF HUMAN SYSTEMS INTEGRATION IN ACQUISITION

2ndLt Kevin K. Liu, USMC, Ricardo Valerdi,  
 Donna H. Rhodes, Col Larry Kimm, USAF, and  
 Lt Col Alvis Headen, USAF

The Department of Defense recently mandated the incorporation of Human Systems Integration (HSI) early in the acquisition cycle to improve system performance and reduce ownership cost. However, little documentation of successful examples of HSI within the context of systems engineering exists, making it difficult for the acquisition community to disseminate and apply best practices. This article presents a case study of a large Air Force project that represents a successful application of HSI. The authors explore the influence of both the Air Force and the project contractor. Additionally, they identify top-level leadership support for integrating HSI into systems engineering processes as key to HSI success, reinforcing the importance of treating HSI as an integral part of pre-Milestone A activities.

**Keywords:** Human Systems Integration, Systems Engineering, Acquisition Process, Human Factors Engineering, Integrated Product Development

Image designed by Harvinder Grewal

# HSI ROI Resources



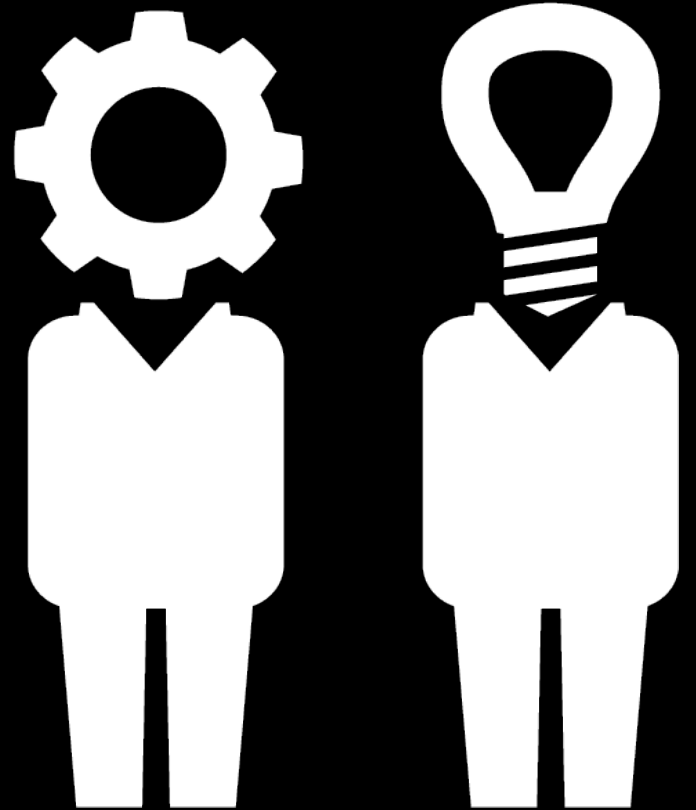
Sharable infographic



<http://goo.gl/7tUzuB>



PART 3:  
LS&T  
Goodies



The screenshot displays a web browser window with the URL `localhost:3000/adl/sandbox/3KCuD3a10-HZn2MRK/`. The interface is divided into several panels:

- Content Libraries:** A sidebar on the left containing categories like "My Environments", "My Models", "My Materials", "My Textures", "My Behaviors", and "Demo Entities". It shows a grid of asset thumbnails.
- 3D Viewport:** The central area showing a 3D scene of a boat on a body of water. The boat has a blue wireframe overlay and a yellow light source below it.
- Hierarchy:** A panel on the right showing the scene's object hierarchy, including "Scene", "asset-wf-Nf1bop40d", "DDO51", "FAC\_MASTER", "LookatCamera", and "Ocean".
- ScriptEditor:** A window at the bottom showing a JavaScript script for a "tick" function. The code is as follows:

```
1 function tick()
2
3 // The tick function is called 20 times every second.
4 // Write code here to animate over time
5
6 if (this._keysDown.indexOf("W") !== -1)
7 {
8     var force = this.transformAPI.localToGlobal(-10 * mass, 0, 0);
9     this.physicsAPI.addForceAtCenter(
10         force, this);
11 }
12 if (this._keysDown.in
```
- UI Elements:** A top menu bar with "File", "Edit", "Camera", "Hierarchy", "Create", "Assets", "Tools", "Windows", "Rendering", and "Help". A bottom status bar shows "First Playable Demo" and "Logged in as: ADTeam".

VR, AR, Simulation and Games

Virtual World Sandbox, Open-source simulations via web browser

# EXPERIENCE xAPI™

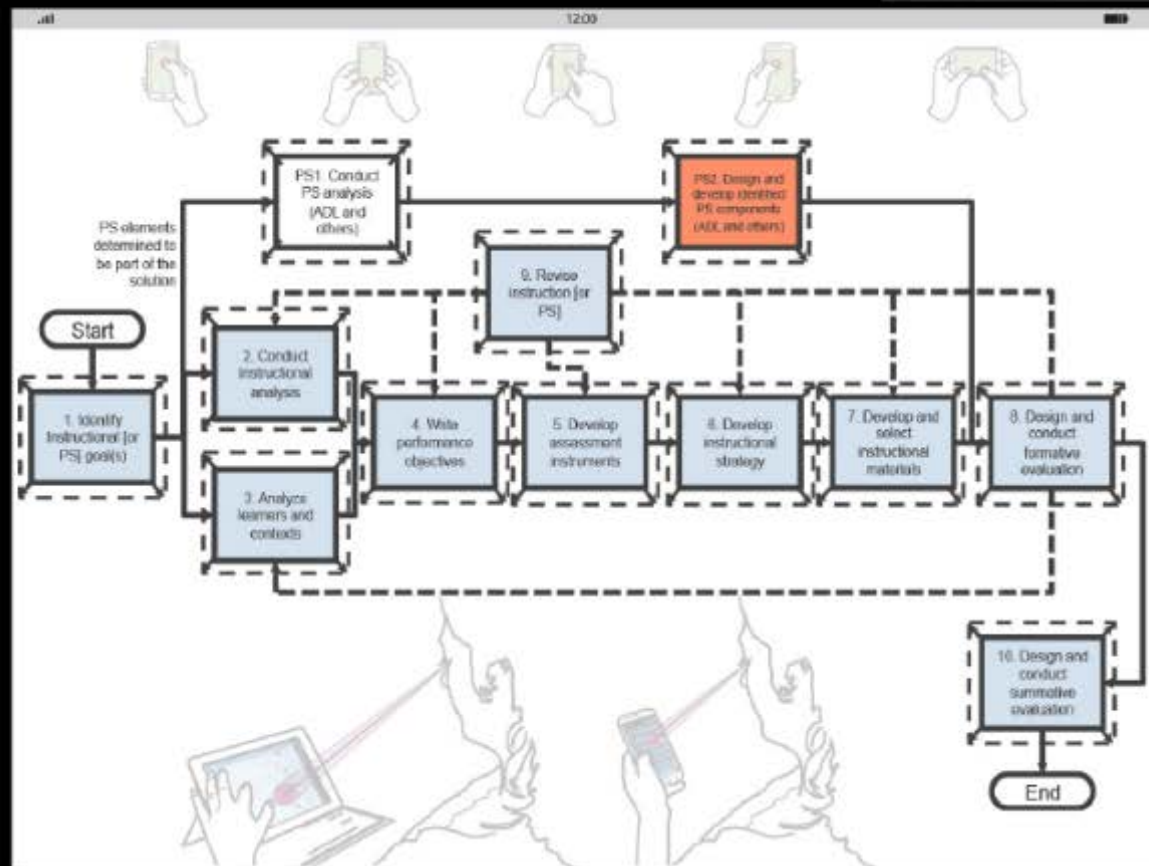
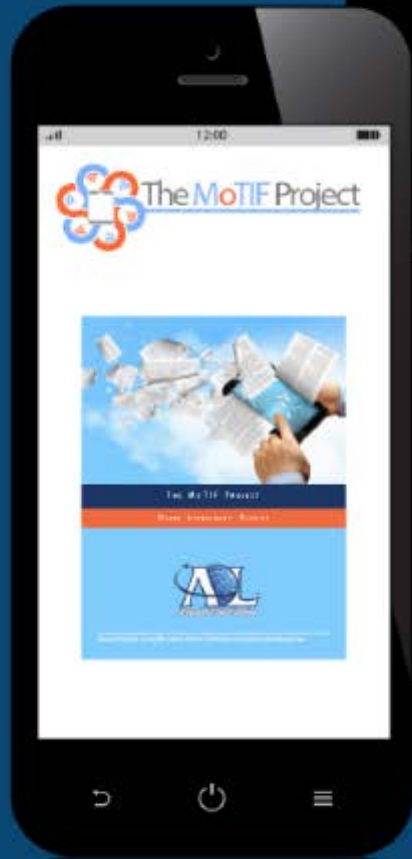


- Big Data
- Human Performance
- System Agnostic
- Open Source



Performance Tracking/Analysis

xAPI, Open-source specification for big human-performance data



**mLearning Reference Model**, interactive flowchart to guide mlearning and support design



## Choosing Authoring Tools

## Choosing a Learning Record Store (LRS)

### Choosing a Learning Management System



Advanced Distributed Learning (ADL) Co-Laboratories

2 November 2015  
Version 5.4



<http://creativecommons.org/licenses/by-nc-sa/4.0/>



Advanced Distributed Learning (ADL) Co-Lab

Peter Berking

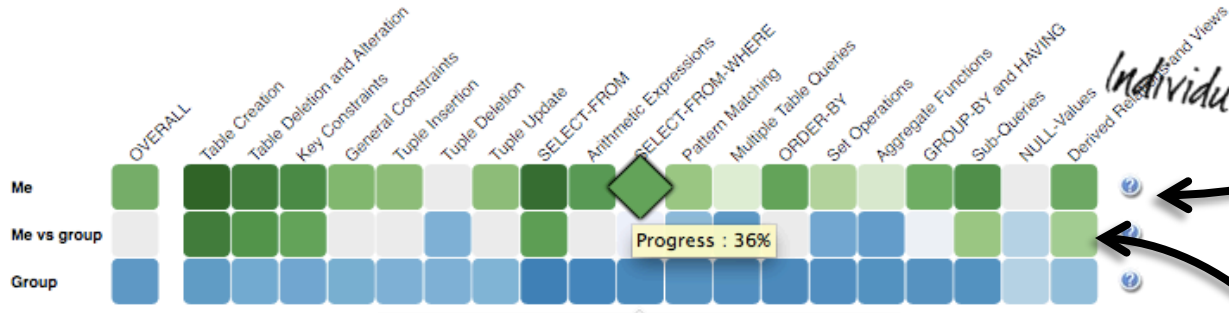
18 November 2015

Version 1.3



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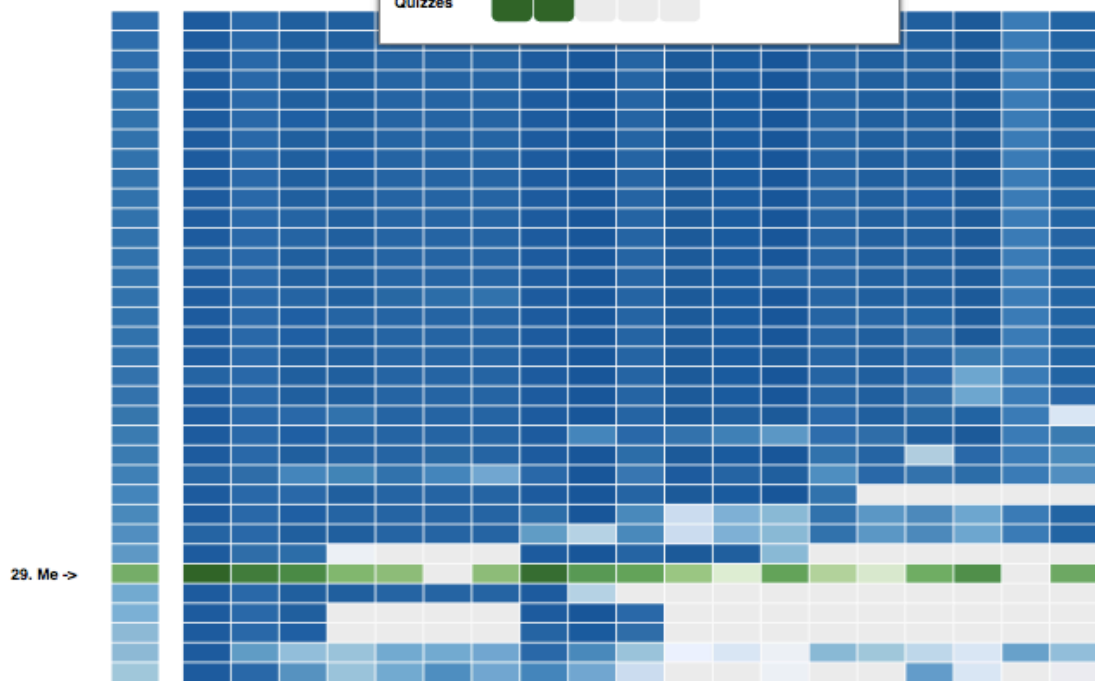
### Me and group (Students in the class)



*Individual's performance*

Progress : 36%

### Students in the class (you are 29th out of 30)



*Compared to overall class*



[www.ADLnet.gov](http://www.ADLnet.gov)

[Sae.Schatz@ADLnet.gov](mailto:Sae.Schatz@ADLnet.gov)