



Panel Discussion: Rising Issues in Human Systems

NDIA Human Systems Conference
February 11, 2015

John Tangney, ONR/341
John.F.Tangney@Navy.Mil

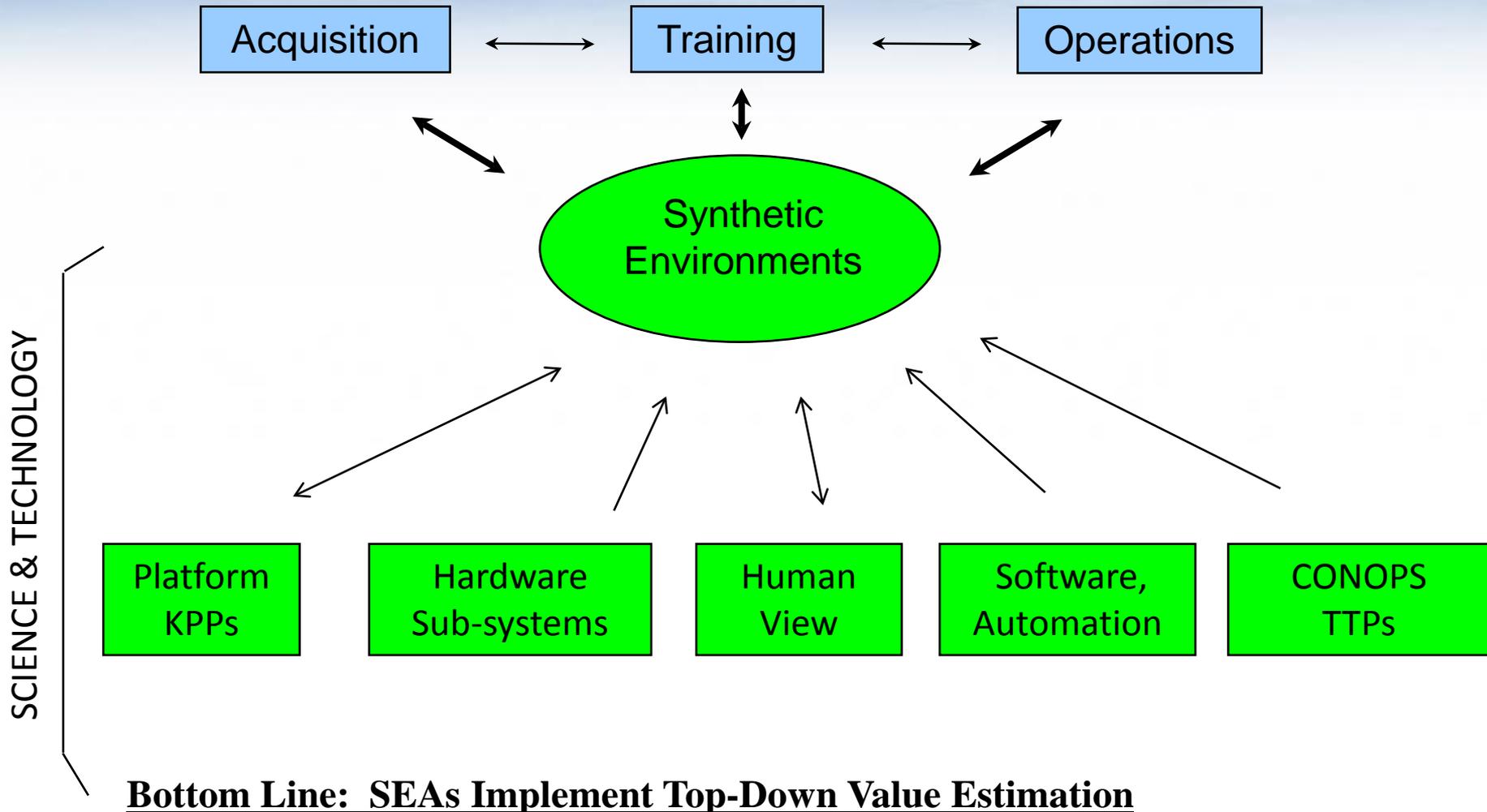


NEW IDEA: Design to Mission

- Need Mission Effectiveness Estimates
 - Realistic Mission Training Simulations – Lightweight, so Flexible
 - Mission Success Metrics – performance metrics support
 - Calibrated Using Experts in the Loop
 - Integrated, Joint, Coalition
- Enable Exploration of Large Design Space
 - Hardware, Software, Human Elements – baseline and notional
 - Broadly Available to Industry – e.g. Networked PCs
 - Flexible – i.e. Modest Fidelity
- Gain Confidence in Capability Based Assessments
 - Operator CONOPS and TTPs
 - Trade Space Analyses within Mission



Synthetic Environments for Assessment





The Design Space

- For many domains of interest, requirements shift too fast for the conventional “research, design, build, test” cycle of acquisition
- What is the impact of new capability “x” on mission, training, team performance, etc?
 - Given new mission profile “y,” what new capabilities are required for team to meet effectiveness standards?
 - What are improved CONOPS and TTPs?

- This is what Simulation Based Acquisition hasn't solved...
but Synthetic Environments for Assessment offer hope
- SEA allows interoperable models to be reconfigured in infinitely many ways to test hypotheses about effectiveness
 - SEA is not a “system” that you plug models into (like SAF)
 - SEA facilitates validated collections of models that provide calibrated simulations for testing new ideas and concepts.



Proposed Criteria for SEA

- Simulation in Form, but Fidelity Traded for Flexible Experimental Use
- Support Multiple Task Scenarios within the Environment, functionally equivalent to Operational Tasks
- Scenarios linked to Naval Mission Effectiveness Metrics
- Calibrated Metrics Using Naval Operators
- Distributed to Broad Science and Technology Community

Enable an Engineering Approach to Unified System Design, Training, and Operation.



Fleet Integrated Testing, Experimentation, and Planning

Description:

- **Technologies for High Fidelity, Multi-mission, Integrated Distributed Training and Experimentation.**
 - Realistic Synthetic Entities, Environment, and Mission Scenarios
 - High Fidelity Integrated Mission Training Facility, Ford Island HI
 - Models and Analysis of A2AD Tactical Behaviors

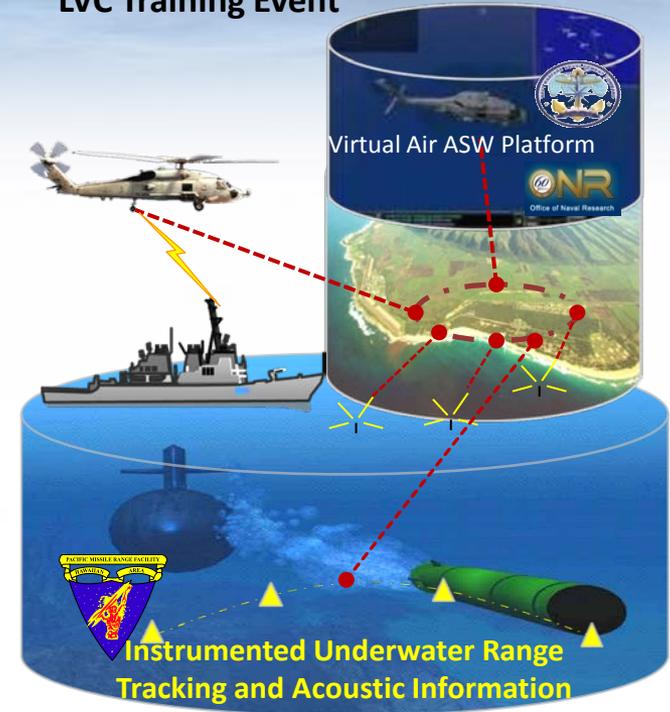
Naval Need:

- **Ability to Train to System-of-Systems Missions**
 - Fully Automated, Realistic Synthetic Forces (LVC)
 - Carrier Air Wing Mission Rehearsal (LVC)
 - Automated Scenario Generation (UAS Training)
 - Realistic Synthetic Environments – EW (EDUCAT2E)
 - Missions: FAC/FIAC, ASW, ASuW, MIW, NIFC-CA, EW, A2AD, OTH-Strike

FY14 Accomplishments:

- NIFC-CA entity behaviors to a Navy Common Training System (NGTS)
- FIST2FAC bi-coastal FST demo (PACFLT and LANTFLT) of synthetic A2AD event

LVC Training Event



Impact:

- Enhanced Fleet Readiness and Resilience
- Synthetic Environment for Assessment of CONOPs, TTPs, and potential ROI on weapon system acquisitions



Networked Fleet Integrated Synthetic Training/Testing Facility

FIST2FAC

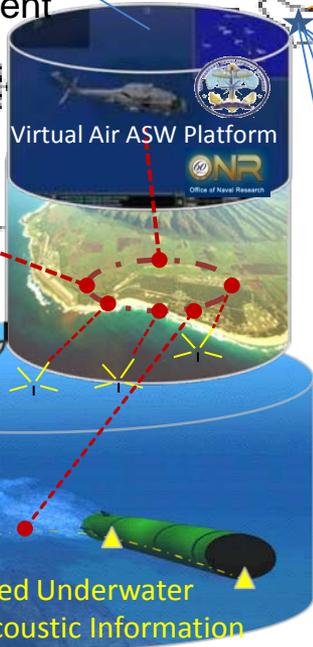
- Systems
- NCTE Operational Node
 - NCTE RDT&E Node
 - Communications Suite
 - JSAF
 - GCCS
 - DREN/SDREN



Academia and S&T Community



Live Training Event



Defense Research & Engineering Network

JTEN

Joint train & experiment NW

Partner Nations



Research & Development Data Repository

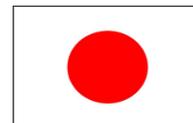


Japan



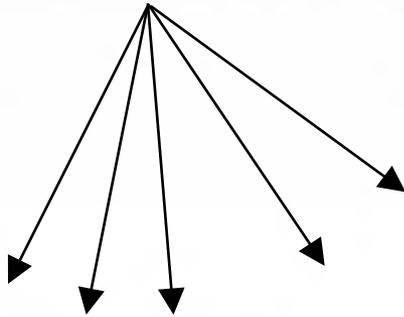
S. Korea

Singapore



SEA for Acquisition

Acquisition



The smart buyer problem:

How to select design elements for leap-ahead capability improvements without buying everything of value?

Platform

Personnel

Training

Interface

Automation

Sensors

Communication

Computation

- Is there some metric applicable to all technology disciplines?



Unmanned Aircraft Systems Interface, Selection, and Training Technologies (U-ASISTT)

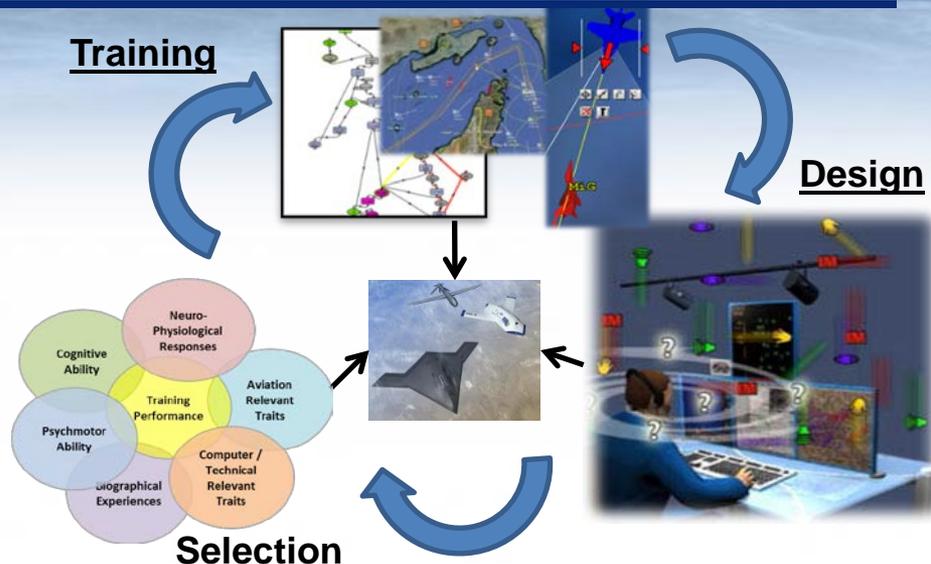
FY14 EC – Three Products

Interface Designs

Create a Synthetic Environment with realistic mission scenarios for:

- Building calibrated Mission System Trainer
- Evaluating various interface designs
- Testing Operator Candidates
- ✓ TTA with Common Control System (PMA-281)

Training



Design

Selection

Personnel Selection & Assignment

Deliver selection test components for Navy unmanned aviation operators

- Identify skills unique to UAS operators
- Understand training trade-offs
 - Implication of different missions & operators (officer vs enlisted)
- ✓ TTA with NAMI for Integration into ASTB

Training: Automated entities & Scenarios

Realistic: Deliver computer generated forces & scenarios built from raw data

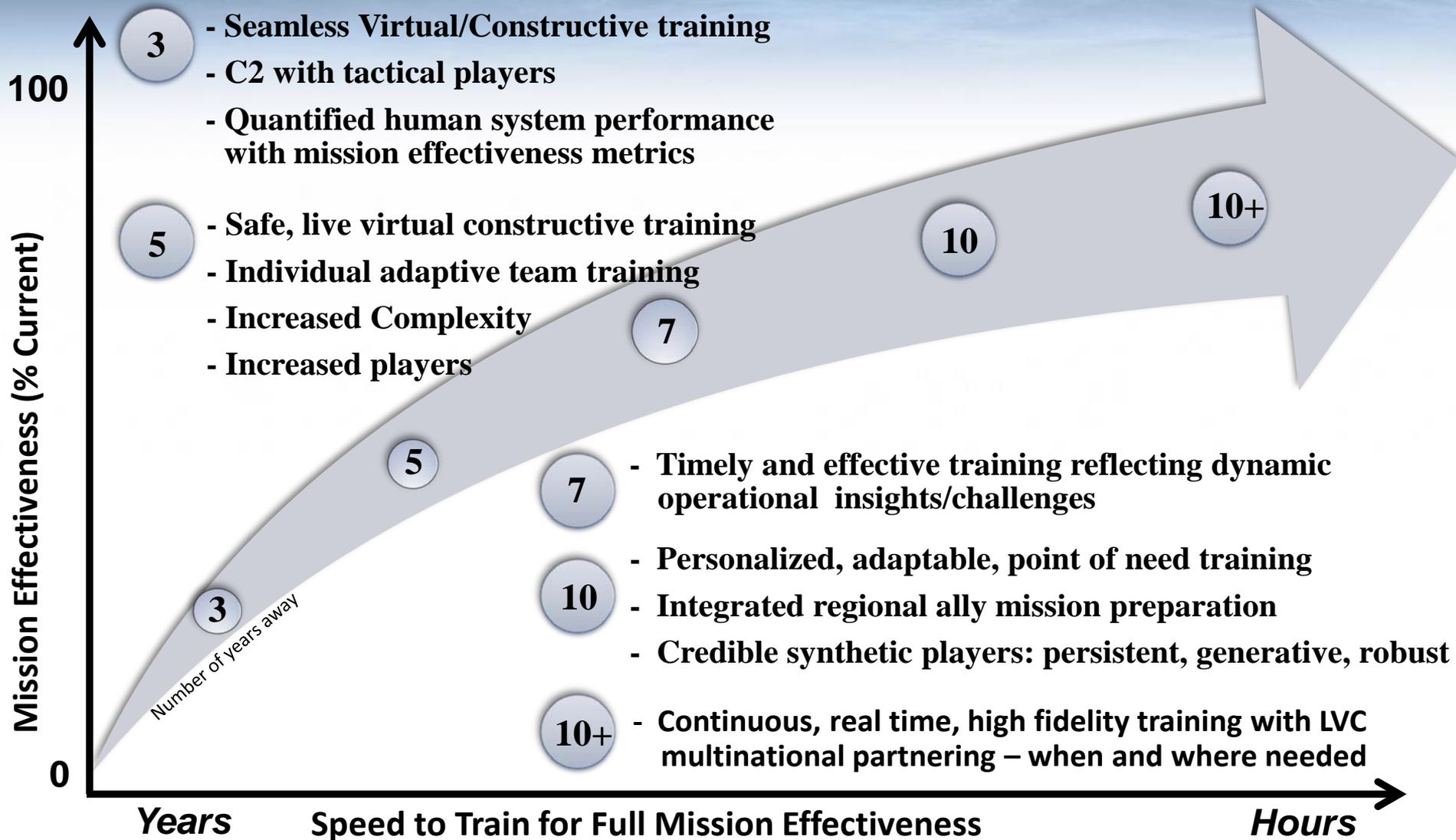
Mission Scale: Rapid generation of large numbers of synthetic entities and realistic mission relevant scenarios

- ✓ TTA with Next Generation Threat System (PMA-205) & UCLASS

Integrated Design, Select, and Train for Mission Effectiveness with UASs



DoD Priority Steering Council – Training Technology End States

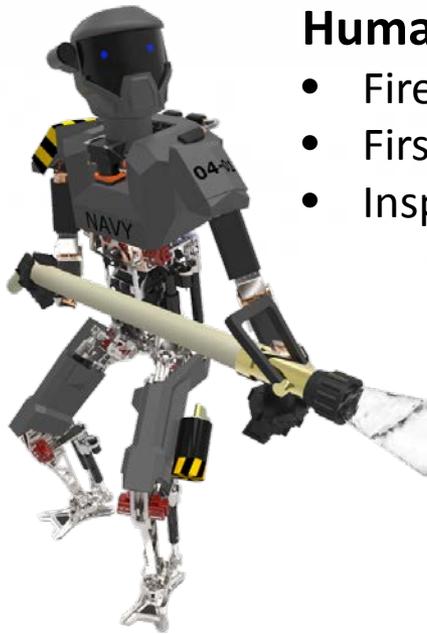




Hybrid Force – Warfighters and Autonomous Systems Working as Teams

Objective: machine intelligence for autonomous systems

- peer-to-peer human-machine interaction,
- and high levels of autonomous behavior
- in highly dynamic and complex battlespaces.



SAFFIR Ship-board Autonomous Fire-Fighting Robot

Humanoid Shipboard Robotics

- Firefighting
- First responder
- Inspection & maintenance



Computational Cognitive Science

- Cognitive architectures
- Natural language dialogue
- Social Cognition

Future Impact

- Minimally supervised, easily taskable autonomous vehicles, robots & systems
- Cognitively-compatible control interfaces



Synthetic Environments for Assessment

