TRAINING &
SIMULATION
INDUSTRY SYMPOSIUM
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INDUSTRY SYMPOSIUM

ALL BUT WAR IS SIMULATION

PSG
PROJECT SUPPORT GROUP

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Technology Challenges and Integration and Interoperability Overview

Technology Challenges
(1 of 10)

PROJECT SUPPORT GROUP

- **Terrain Changes and Correlation On-The-Fly:**
  - Ability to rapidly distribute terrain and feature data among networked simulators and simulations
  - Includes the distribution of dynamic changes to SAF databases
- **Voice Recognition Over Cluttered Radio Frequencies:**
  - Voice recognition technology that can isolate a speaker in a cluttered RF environment
  - Application:
    - Train Terminal Attack Controllers to control virtual pilots
    - Requires multiple aircraft all on the same radio channel
    - The virtual pilot must recognize the controllers voice without any call sign identification

Technology Challenges
(2 of 10)

PROJECT SUPPORT GROUP

- **Processing Unstructured Human Language in a Tactical Environment:**
  - Technology that allows an unstructured description of terrain or targets to be understood be a virtual human. The ability to command a virtual person to take an action and/or make a decision based on information passed verbally
  - Application:
    - Trains the Terminal Attack Controller in a close Air Support environment
    - Allows Terminal Attack Controller to pass on friendly, tactical and target information in a semi-structured (semi-unstructured format)

Technology Challenges
(3 of 10)

- **Immersive Technologies:**
  - Autonomous virtual characters that can have meaningful interactions with human users
  - Universal language model
  - Seamless ability to grab control CGF
  - Improved HMD:
    - 110’ horizontal field of view, low cost, 1280 x 1024, rugged
  - Improved locomotion devices
  - Low cost, wireless hand and arm sensors
  - Low cost haptic vest/suit

Technology Challenges
(4 of 10)

PROJECT SUPPORT GROUP

- **Highly scalable and mobile wireless MESH/MANET networks and waveforms:**
  - MAN/WAN/WLAN/PAN applications:
    - CIS to peer, peer-to-peer, DMT/TES PAN, OC comms, medic PDA, etc
  - High throughput and QoS
  - Bandwidth and spectrum efficient
  - Power efficient
  - Waveforms: JTRS SRW, JTRS WNW, OT TES OFDM, CEOFDM, 802.16 etc
  - Identify best technologies, protocols and standards
    - Ex: Best PAN standard: Zigbee or Bluetooth? Others?

Technology Challenges
(5 of 10)

PROJECT SUPPORT GROUP

- **Accurate and Affordable Geo-location/Situational Awareness capabilities for indoor and GPS-denied environments:**
  - A high fidelity position/location system for tracking soldiers in an indoor/urban or GPS-denied environment
    - “Best” technologies? - UWB, RF, GPS, Acoustic, IR, Video, magnetic, etc.
    - Accuracy: 6-8 inches/15-17 CM (T); 3-4 inches/10 cm (O)
    - Low impacts to both soldier and infrastructure
  - High fidelity weapon orientation
    - High fidelity pointing vectors for weapons within these environments
    - Accuracy: <.1 degrees
    - Small form/fit, SWaP

Technology Challenges
(6 of 10)

PROJECT SUPPORT GROUP

- **Software Defined Radios (SDR)/Cognitive Radios/Dynamic Spectrum Assess (DSA) technologies:**
  - An affordable approach to support test and training applications
  - Configurable multi-spectrum SDR/Cognitive radios
  - Mobile and interoperable with other legacy and tactical RF systems
  - Frequency agility
  - Supports multiple waveforms
  - Small form/fit footprint which makes extensive use of COTS or Military radios

Technology Challenges
(7 of 10)

PROJECT SUPPORT GROUP

- **Testing, Training and Tactical Communications on one network infrastructure:**
  - Technologies and algorithms to increase throughput and more efficiently use the limited available bandwidth and spectrum
  - A highly scalable and robust mobile “wireless” network to support live testing and training applications
  - Training, Test and Joint Range end to end application interoperability
    - Data translator (GW) intelligent data mapping/throughput
    - Common Data Model Schema
    - Fair fight correlation of models
  - Miniaturization of PU H/W, battery life and weight reduction

Technology Challenges
(8 of 10)

PROJECT SUPPORT GROUP

- **Virtualization Strategies:**
  - Constructive simulations, tools and interface applications are often poorly matched to their host hardware platforms. Some applications use very little of the platform's available computing power and memory while others demand more resources than a typical platform can provide. Yet each may still run on its own single platform
  - Platform virtualization is a potential strategy that can be used to pool computing resources of several applications within a federation for higher efficiency

Technology Challenges
(9 of 10)

PROJECT SUPPORT GROUP

- **Reduce Role-Player/Operator Overhead and Footprint:**
  - A significantly large role-player/simulation operator footprint/overhead is observed with constructive simulations as they scale up to represent larger forces and numbers to support large exercises.
  - Investigate the feasibility of developing and integrating intelligent role player assistance technologies that can provide the role player a wider span of control and more timely situational awareness of widely dispersed (geographically) forces under his control.
  - Investigate technologies and techniques that have been proven efficient for streamlining workstation operator workload allowing a broader span of control without sacrificing ability to control a larger number of subordinate units/entities.

Technology Challenges

PROJECT SUPPORT GROUP

- **Fuel Cells/Batteries – lighter, smaller, low cost**
- **Wireless Communications:**
  - Real time ray tracing communications model of 30k+ entities OFDM for 4G wireless internet
  - More mature narrow band OFDM on small form factors
  - Transmission of classified data from remote instrumentation
- **Low cost sophisticated remote target control – Technology has yet to drive costs of complex target control systems. (UAVs)**
- **Cognitive Evaluation – Advanced sensors and algorithms for EEG, ECG, EMG, EG, CBT, etc**

Integration & Interoperability (I2) Update

PROJECT SUPPORT GROUP

- **<u>End State</u>: Improved Program Execution Across Entire PEO STRI Program Portfolio:**
  - Program Synchronization: “Better Decision Making”
    - Identified and Baselined Current Program Interdependencies
  - Interoperability: “Enhanced Training and Testing Capabilities”
    - Established a Live, Virtual, Constructive – Integration Cell (LVC-IC) for Selected Programs of Record (CCTT, OneSAF, HITS) to Identify and Resolve Barriers to Persistent Interoperability
    - Demonstrated Interoperability Progress to Industry Partners That Responded to the LVC-IA Sources Sought
  - Common Components: “Reduction in Total Ownership Costs”
    - Requiring Formal PM Certification That New Solicitiation Comply with PEO STRI’s Common Standards, Products, Architectures and Repositories (CSPAR) Document and Also Promote Reuse
    - Updating CSPAR to Latest Products and Standards

Technology Challenges		
Title	**Domain**	**Category**
Adaptive behaviors	Virtual; Constructive	Behaviors
Terrain Changes and Correlation On-The-Fly	PEO	Modeling and Simulation
Dismounted Infantry	Virtual	Modeling and Simulation
Testing, Training and Tactical Comms on 1 network infrastructure.	PEO	Networks
Use of Artificial Intelligence in Virtual environments	Virtual	Modeling and Simulation
Data encryption	Live	Software
Accurate Geo-location/SA capabilities	Live	Instrumentation
Weapon/muzzle orientation and tracking	Live	Instrumentation
Advanced Power Management and Power Sources	Live	TBD
Multi-level security	PEO	TBD
Communications modeling	PEO	Modeling and Simulation
Humint within entity level simulations	Virtual; Constructive	Modeling and Simulation
Gaming technology	PEO	Modeling and Simulation
Embedded Tactical Engagement Simulation System Visual and Aural Signature Effects	Live	Instrumentation
Software Defined Radios (SDRs)	Live	Software
Mobile and wireless ad hoc network technologies and protocols	Live	Networks
Fully automated brigades/brigade combat teams	Constructive	Behaviors
Civilian infrastructure representation/urban effects within the synthetic natural environment	Constructive	Modeling and Simulation
Image Sensor Math Models (Algorithms)	Virtual	Modeling and Simulation
Pursuit of alternate technologies/solutions for non-contact engagement scoring	Live	Instrumentation
Voice Recognition Over Cluttered Radio Frequencies	Virtual	Modeling and Simulation
Processing Unstructured Human Language in a Tactical Environment	Virtual	Behaviors
Rendering Multiple Specialized Objects Using Advanced Instancing Features	Virtual; Constructive	Modeling and Simulation
Impacts of Astronomical Environment on Virtual and Constructive Simulation	Virtual; Constructive	TBD
Distribution of simulations.	PEO	Software
Psychological Operations (PSYOPs).	Constructive	Software
Atmospheric Effects	Virtual	Modeling and Simulation
Standardized Terrain Data Attribution Methodology	Virtual	Modeling and Simulation
Automated feature extraction for DB	Virtual	Modeling and Simulation
Bi-directional Oral comm	Constructive	Software
Low cost MEMS sensor	Live	Instrumentation
Unobtrusive sensor for physical cog perf & SA	Live	Instrumentation
Video collection/distribution/storage	Live	Instrumentation