

ARI Research on the Use and Effectiveness of Games for Training



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30 April 2008



Our Long-Term Research Goal

Develop and evaluate technologies and methods to train dismounted Soldiers effectively at reasonable cost.



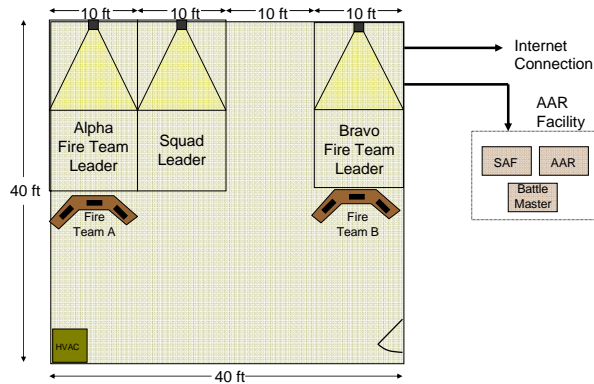
- The Current Approach
 - Labor Intensive
 - Time consuming
 - Inflexible



Background: The Virtual-Integrated MOUT Training System (V-IMTS)

Goals

- Gather lessons learned and obtain Soldier feedback for future systems
- Evaluate perceived training effectiveness

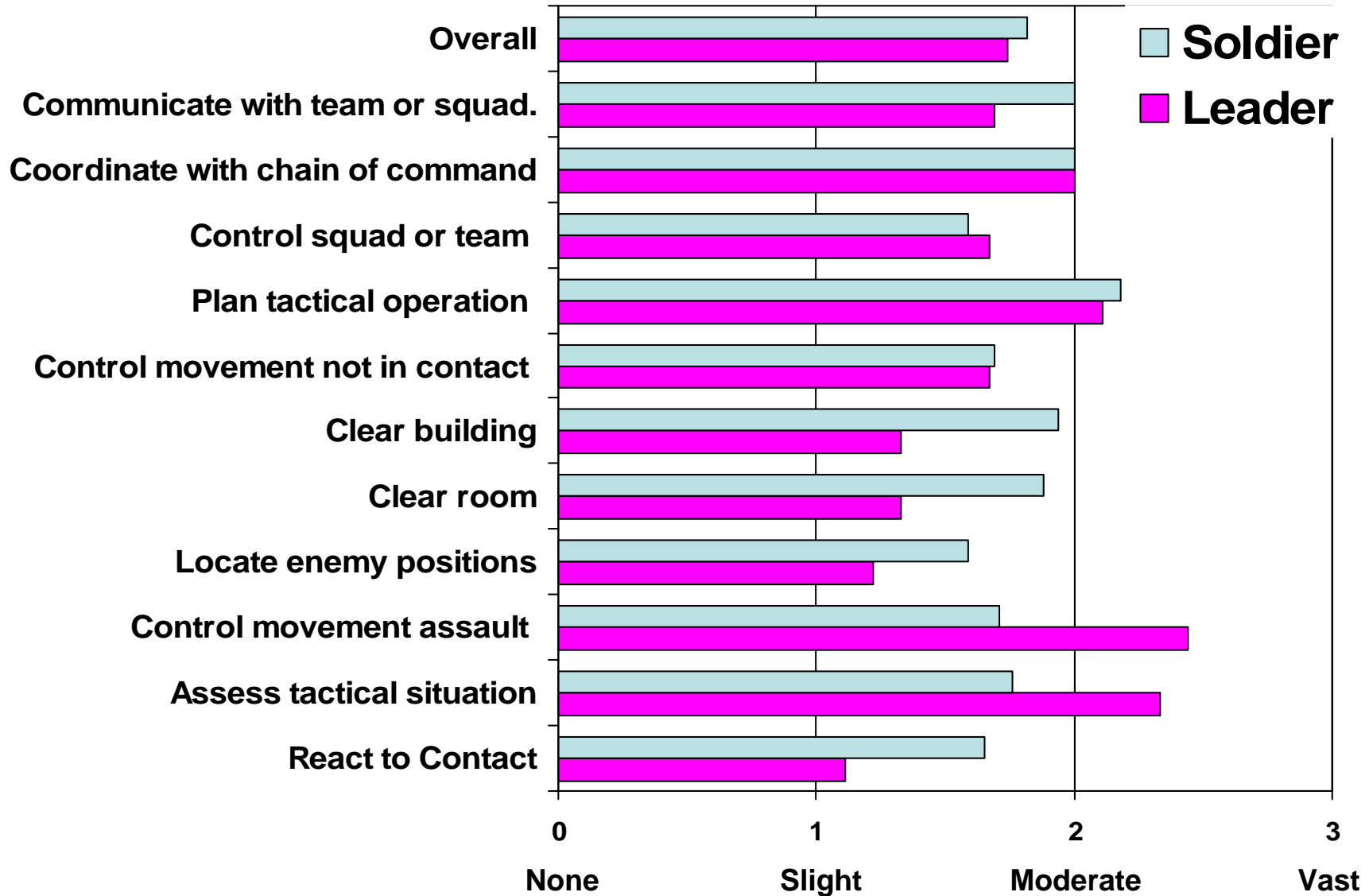


2004





Leader and Soldier Ratings of Skill Improvement as a Result of V-IMTS Training





Our Questions about Game-based Simulations

- **Do Soldiers have the gaming skills they need to benefit from game-based training?**
 - Game Experience Measure (GEM) and Game Performance Assessment Battery (GamePAB)
- **What skills are best-trained in game-based simulations?**
 - ARI participation in Asymmetric Warfare-Virtual Training Technology (AW-VTT)
 - Formative Evaluations
 - Transfer of Training Experiment
 - US-UK Exercise
- **How do we conduct AARs when trainees are not co-located?**
 - Distributed AAR Remote Toolkit (DART)
 - Distributed AAR Effectiveness Experiment
- **Are immersive interfaces worth the cost?**
 - Immersive - Desktop Analysis



Do Soldiers have the gaming skills they need to benefit from game-based training?

- US youth 8-18 years old average 70 minutes of game playing per day.
- Small samples of enlisted Soldiers in ARI evaluations appear similar, but 7-22% of enlisted and 30 – 57% of junior officers reported not playing.
- No data from those evaluations regarding the types of games (strategy, simulation, first-person shooter) that they play.
- ARI survey indicated that less than 50% of Soldiers play videogames at least weekly, with numbers varying with rank.
- Cannot assume that all trainees are proficient “gamers.”
- Implications for “train-up” requirements.



GamePAB and GEM

- Metrics for quantifying gaming experience, gaming knowledge, and gaming skill.
 - GamePAB - game proficiency measure
 - Locomotion (keyboard)
 - View/Aim control (mouse)
 - Communication/multi-tasking (auditory/verbal)
 - GEM - game experience and knowledge measure
 - Self-report and screenshot quiz
- Uses
 - Explore the usability of different game-based simulation interfaces
 - Identify trainee deficiencies in order to make a game-based training exercise more effective
- Status
 - Initial software developed and concept validated
 - Investigating relationship between GamePAB and GEM scores and effectiveness of training with games
 - Stand-alone software and documentation completed summer 08



Sample GEM Knowledge Questions



Which controller from would you most likely use with this game?



The missile on the left side of the screen is about to hit which character (circle the character)?

Would your enemy most likely be controlled by the computer or another person?



GamePAB Interactive Component





Asymmetric Warfare Virtual Training Technology (AW VTT)

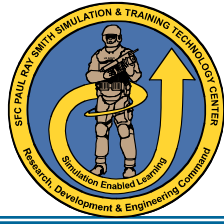


- A PC-based simulation environment (OLIVE) based on game architecture
 - Massively Multiplayer Persistent functionality
- STTC Focus
 - Develop environment to allow users to train and plan for asymmetric and conventional operations around the world
- ARI Focus
 - Obtaining user feedback to influence development
 - Assessing effectiveness and transfer of training in controlled experiments





Training Effectiveness Assessment



Illinois National Guard

“Do you think this system could be effective for any kind of Army training?”

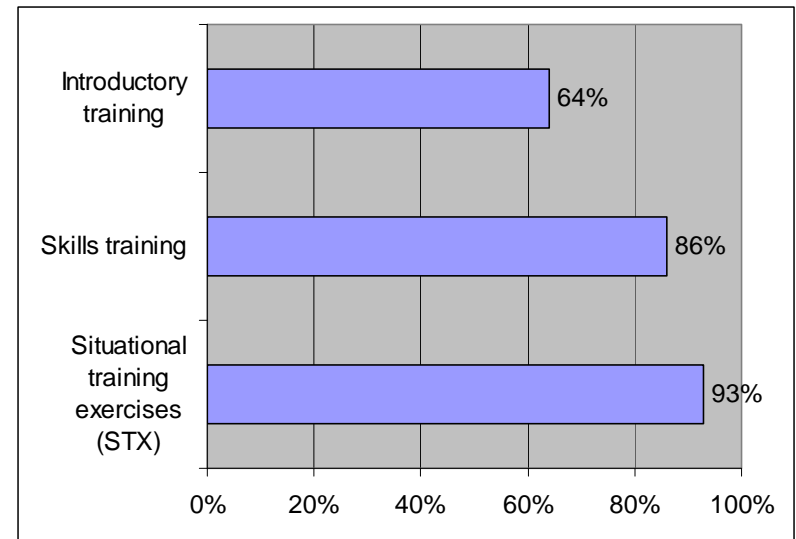
88% YES - 12% NO

Consensus from Demonstrations & Training Discussions (e.g. Battalion Staff, NTC O/C)

- System shows utility for wide range of training applications
- Mission Rehearsal eased
- Can't replace LIVE

101st Airborne Division

“ Please check all stages or types of training that you think AW-VTT could aid or supplement.”





AW VTT Formative Evaluation: Changes Rated as Most Needed



Armaments

- Explosives
 - IEDs (Some Added)
 - Grenades (Added)
- More Army weapons
- RPGs for OPFOR (Added)

Damage Visualization

- Vehicles (in progress)
- Avatar injury
 - Injury reflected in movement

Environmental Effects Desired

- Night vision
- Time-of-day lighting
- Sand, Fog, Haze

Avatar Improvements

- Correct gear for Soldier roles
 - Some items added
- Improve ability to ID Avatar
- Improve physical interaction (searching, handcuffing, moving)

Usability Improvements

- Eliminate voice training (DONE)
- Provide game-controller interface (DONE)

AAR Replay Required

- Event Marking Controls (Added)
- Freeze & POV Controls (Added)

Scenario Development Tool (In progress)



Coalition Warfare Research Program Exercise 1 (Summer- Fall 08)



- Purpose:
 - US & UK conduct “*Crawl Phase*” exercises concentrating on simulation environment, technical testing, evaluation of functions (weapons, vehicles, rotary wing, avatars), AAR concepts & procedures, and exercise control methodology.
 - First in a planned series
- Characteristics:
 - Exercise Conventional Ground Forces – Mounted & Dismounted
 - Restrict Battlefield Operating Systems: No Armor, Artillery, limited air
 - Employ Non-Traditional Scenarios
 - Non-Combatant Evacuation Order (NEO)
 - Follow-on Security Assistance
 - Alternate UK – US Leadership
 - OLIVE AW-VTT

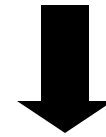




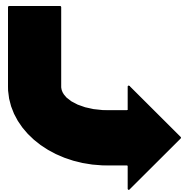
Experiment: Training Transfer



EST 2000
(Train & Test)



OLIVE (Train)



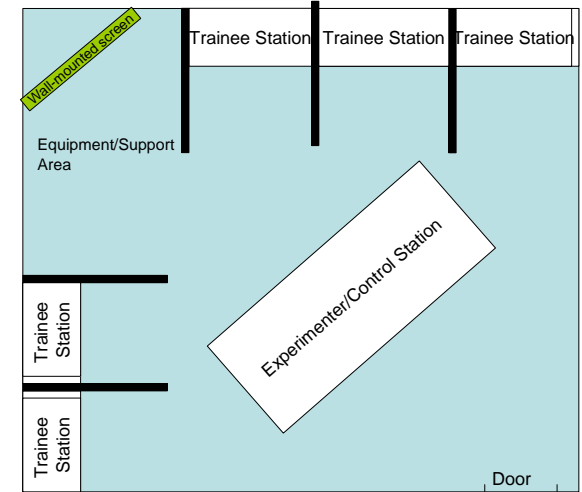
EST 2000 (Test)





Game-Based Simulation Research Testbed

- A distributed control center and player stations for the conduct of experiments on the use of game-based simulations
- Core facility at UCF/IST
- Distributed nodes at Embry Riddle Aeronautical University and Old Dominion University
- Currently using G-DIS, a lethal operations simulation based on the Half-Life game engine.
- Supports distributed AAR research & immersive-desktop comparison.





Distributed AAR Remote Toolkit

Dismounted Infantry Virtual After Action Review System

File Edit Tools Options Signal Windows

Modes: Recording Playback

Controls: Rewind Reverse Step Back Pause Step Ahead Play Fast Forward Stop Record

Speed: 1.00

Events: Jump to an Event Tag

Elapsed Time: 00:00

Visibility Controls: Time of Day: 12:00am Fog Visibility: 100000 meters

Telestrator Controls: On / Off Color: Green Shape: Free Thickness: 4 Clear This Page Clear All Pages Undo Push to Talk

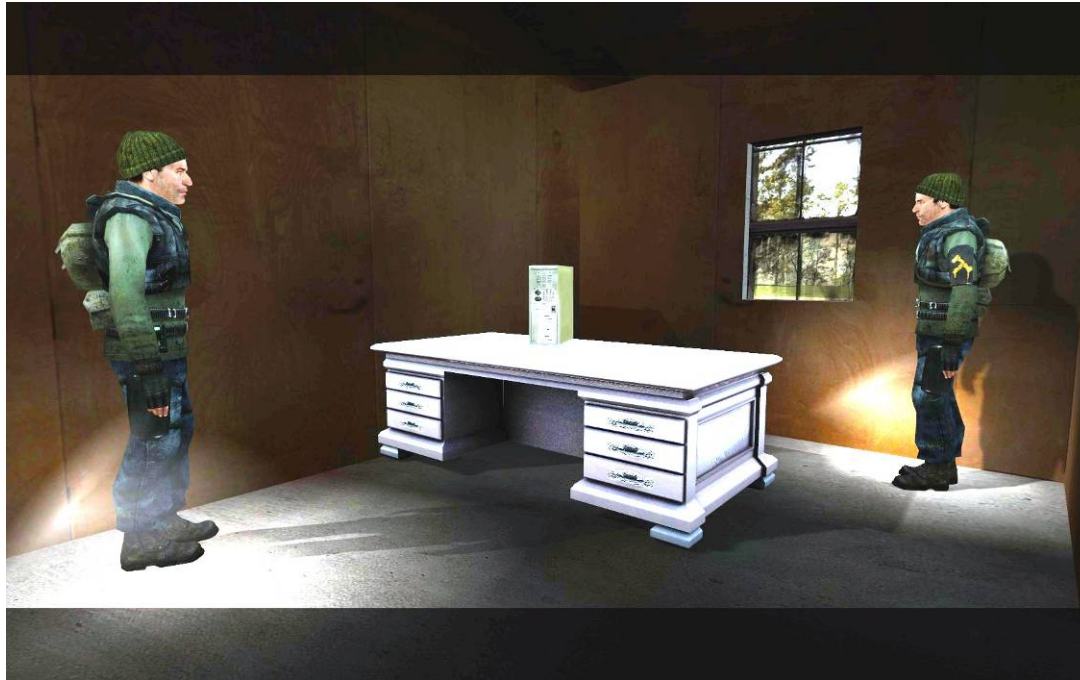
Primary View

The primary view displays a 3D virtual environment of a village. A blue rectangular box highlights a grassy area on the left. A green circle highlights a soldier standing near a light blue building. A red 'X' is drawn over a group of soldiers standing in a line in front of the building. The background shows other buildings and a clear sky.

00:00 Status: Stopped Scenario: gambit.spf Run: <none>



Experiment: Distributed AAR Effectiveness



AAR Conditions

- None
- Verbal
- Verbal & Graphic



Comparison of Immersive and Desktop Simulation

- Compare immersive and desktop dismounted Soldier virtual training systems in terms of train-up time, ease of use, tasks which can be trained, unique advantages and disadvantages of each, and cost.
- For what types of training should the Army use expensive, fully-immersive simulators, and for what types of training should the Army use less expensive desktop systems?
- Research has largely addressed the question of whether immersive or desktop VEs can be effective, and has not generally compared their effectiveness.
- Limited evidence suggests that immersive simulations do provide an advantage for training spatially oriented tasks, but this difference is not large.
- Lack of convincing evidence that immersive simulations are cost-effective for Soldier training



Comparison of Immersive and Desktop Simulation

APPROACH:

- Select simulation available in both desktop and immersive versions.
- Conduct a usability analysis of both.
 - Identify tasks that cannot be performed.
 - Provide an advance indication of interface issues and problem tasks.
- Compare students learning to perform collective tasks as buddy/fire teams in the two versions.
- Confirm these findings with Soldiers.

