FCS Embedded Training: An Overview
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FCS LSI Training Systems IPT
12/13/2005

Training is THE factor in determining the victor.
- DSB Task Force on Training Superiority and Training Surprise

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**Title:** FCS Embedded Training: An Overview

**Performing Organization Name:** Future Combat Systems, Washington, DC, 20301

**Abstract:**

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

Modeling and Simulation Conference, 2005 Dec 12-15, Las Cruces, NM

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:

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17. LIMITATION OF ABSTRACT

Same as Report (SAR)

18. NUMBER OF PAGES

20

19a. NAME OF RESPONSIBLE PERSON

Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
Leading Transformation

• The US Army “At War and Transforming”
  ➢ 781,000 to 480,000 active duty since 1990
  ➢ Army’s Transformation effort announced in Oct 1999
  ➢ Leading implementation of network-centric operations
  ➢ Driving Joint interdependency & standards

FCS is a Significant Opportunity to Support the Soldier

General Peter J. Schoomaker
Chief of Staff, U.S. Army
### Training Enhancements

#### Current Force vs Future Force

<table>
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<tr>
<th>Current Force</th>
<th>FCS Equipped BCT</th>
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<tr>
<td>Infrequent doctrine/TTP updates</td>
<td>Ability to rapidly update doctrine/TTP for deployed forces</td>
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<tr>
<td>Slow to adapt to needed changes</td>
<td>Respond quickly to the dynamic challenge</td>
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<tr>
<td>Constrained training capability when deployed</td>
<td>Ability to train 24/7 with no appended equipment while deployed or at Home Station</td>
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<tr>
<td>Appended TESS</td>
<td>Embedded TESS capability</td>
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<tr>
<td>Limited training support packages</td>
<td>Fully embedded Live, Virtual, Constructive, Multi-mode training capability</td>
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<tr>
<td>Limited Battle Command Training Capability</td>
<td>Embedded Battle Command Training capability</td>
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</table>
| Custom SW for each application | - Product line approach to system development  
- Collective training capability  
- Basic load of Training Support Packages |

**FCS is providing a new capability that takes Training to the Soldier anywhere, anytime**
Centerpiece: FCS Equipped BCT Capabilities

- Transportable by C130/C17/C5 profile
- FCS-equipped BCT Can Fight on Arrival

- Battle Command on the Move
- Ubiquitous, Distributed C4ISR Network
- Networked Army and Joint Fires
- Overmatch Enemy in All Conditions and Environments
- Mutual Support
- Integrated Survivability: Soldiers and Platforms Leverage Integration of Active and Passive systems and Force Protection
- Reduced Sustainment Requirements
- Network Enabled, Embedded, Virtual, Constructive, or Live Training

Close With And Destroy Enemy Forces To Seize Terrain And Dominate The Battlefield

Soldiers as the Centerpiece of the Formation
FCS Family of Systems

Manned Ground Vehicle Systems

Robotic Systems

Fires & Effects

Logistics

Battle Command

Complementary Systems

See First

NLOS Cannon

Long Range Indirect Supporting Fires

Command and Control Vehicle

Understand First

Reconnaissance and Surveillance

Intelligence gathering

Command and Control Vehicle

Act First

Military

Maintenance & Recovery

Medical

Medical Treatment Evacuation

Finish Decisively

Transport Infantry to Battle

Support

Reconnaissance, Surveillance & Target Acquisition

Infantry Carrier Vehicle

Transport Infantry to Battle Supporting fire

Mounted Combat System

Direct Fire Close Support to Infantry

NLOS MORTAR

Indirect Fire Close Support to Dismounted Soldiers

CL III UAV

Intelligent Munitions

Unattended Ground Sensors

UAVs

Class I and II UAV

Class IV UAV

RECON MORTAR INFANTRY ARMOR

CAB Level

BCT (BDE) Level

NLOS AVN BICC FSB

BCT (BDE) Level

Soldier Systems

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FCS Training Summary…up front

- Embedded Training is the user’s default option
- Enabling technologies are sufficiently mature
- Procurement strategy is well defined and understood by LSI
- Integration is the challenge
Embedded Training….. a DoD plan ; an Army Commitment

“Build an Integrated Live, Virtual, and Constructive Training Environment. The ultimate goal is to develop a transformed training capability that provides accurate, timely, relevant, and affordable training and mission rehearsal in support of specific operational needs. Training must be a living process with the ability to adapt and respond quickly to the dynamic challenges of the national security environment. This will require the ability to identify potential crisis situations in real time; conduct course-of-action analyses; utilize continuously available networks for mission rehearsal, simulation and just-in-time training; and measure performance systematically to improve operational effectiveness.”

Para 3.2, Strategic Plan for Transforming DoD Training, 1 Mar 02

Expanded training capabilities to enable training anywhere, anytime
FCS BCT Training Concept

- **Expanded training availability** using organic, integrated, embedded systems - Training, Operations, and Mission Planning/Rehearsal - for full spectrum training including JIM
- **Full range of training task representation** - individual, crew, collective, and leaders - embedded or ‘reach’ via C4ISR system
- **Reduced training burden and cost** resulting from product line design approach - maximum commonality between operational and training systems

FCS will provide the first Army embedded training capability that supports individual, crew, collective, unit, and leader training
OV-1: Operational Concept Graphic

KPP#6: The FCS FoS must have an embedded individual and collective training capability that supports live, virtual and constructive training environments.
KPP Critical Enabling Requirements

EXERCISE FUNCTIONS

- Plan Exercise
- Initialize Simulation
- Execute Exercise
- Assess Exercise

ENABLERS

- Scenario Generation
- Exercise Management
- OTW View
- Embedded TESS
- Datalogger
- After Action Review (AAR)
- Computer Generated Forces (CGF)
- Synthetic Operational Environments (3-D terrain)
- Intra Vehicle Connectivity
- Interoperability & ‘Reach’

Interoperability & Reach

Embedded Training - Live

CTC

Embedded Training Virtual / Constructive

HS

Dismounted Training
Embedded Training Is Achieved Thru….

**Army**
- Leverage Developing Programs
- Army Training Information Architecture (ATIA)
- OneSAF Objective System (OOS)
- Common Training Instrumentation Architecture (CTIA)
- OneTESS

**TNG IPT/PEOSTRI**
- TCC Software Items
  - Based on the SoS Architecture
  - Training common components
    - Exercise Management Sys
    - Training Management Sys
    - Environmental Representation
    - Scenario Generation Sys
    - Computer Generated Forces (CGF)
    - After Action Review (AAR)
    - Datalogger

**TCC Bundle**

**LSI One Team Partners**

**TCCs are:**
- A Software item
- Used on multiple Prime Items (variants)
- Developed as part of a product line by the TCC OneTeam Partner (PEO STRI) to leverage reuse from an existing (TRL 6) program.
- Integrated/extended by OneTeam Partners to meet the product team’s training requirements in support of a system IAW the SOW.

**SOSCOE**

....a sequence of repetitive integration activities with all One Team Partners
IP 10: Conduct Multi-Mode Training OV-1

**Plan:** Conduct long-range planning, short-range planning, and near-term planning

**Assess:** Conduct organizational assessments, prepare training assessments, and evaluate training

**Execute:** Prepare training, conduct training, and recover from training

**Unit Training (FM 7-0)**

Commander, leader, supervisor and soldier conduct individual training management and soldier participates in self-development, OJT, and cross training to gain new skills

CONUS Knowledge Repositories

Unit Training (FM 7-0)

FBCT

NCIE in FCS BCT
Embedded Training Anywhere, Anytime

Embedded Task Training
(Crews and Soldier)

Platform Crew-station

Live Training
[Embedded Tactical Engagement Simulation System (TESS) and CTC Instrumentation Interface]

Combat Training Centers

Home Station

M1A2

Distributed, Collective Training
(Leaders and Units)

Distributed Learning
(Operators, Maintainers, Medics,……)

‘Reach’

FCS BCT will be capable of “reach” for Training Products (e.g., TSPs)

Training Common Components

<table>
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<tr>
<th>CGF</th>
<th>Environment Representation</th>
<th>Scenario Development</th>
<th>Exercise Management</th>
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SOSCOE

Common, consistent, integrated capabilities
Embedded Task Training

Crews and Soldier

CAPABILITIES
• Individual Computer-Based Training (IETMs/CBTs)
• Mission Systems Trainers (Driver, Weapon, RSTA, C2)
  – Switchable vision blocks provide virtual (out-the-window) view
  – Driver or Crew Chief acts as Instructor
• “Battle Stations” override

ENABLERS
• Environmental Representations (terrain, littoral, atmosphere, weather) are essential to operations and training. They will be stored on-board FCS platforms.

• Computer Generated Forces embedded on-board will provide external entities necessary to training tasks (e.g., targets, Unmanned Vehicles, dismounted Soldiers).

Individual / crew training utilizes internal system network
Distributed, Collective Training

 Leaders and Units

CAPABILITIES
• The FCS-equipped unit will be capable of conducting distributed, collective training in either a virtual or constructive training mode anywhere and anytime.

ENABLERS
• Computer Generated Forces- will provide wrap-around friendly combat, combat support and combat service support elements (including joint and coalition) and opposing force elements – to create training in a combined arms environment. CGF can be provided from;
  (1) on-board,
  (2) adjacent FCS platform(s) not part of the training audience or
  (3) by interoperating with external simulation connected by the Network Battle Command system
• Network services (transport layer)
• Battle Command Services must work in training mode

Collective distributed training depends on network services
Live Training

E-TESS

CAPABILITIES

• The FCS-equipped unit will be capable of conducting instrumented live training at home station, at CTCs, and while deployed.

• Legacy Multiple Integrated Laser System (MILES/TESS) capabilities (i.e., sensors, eye-safe engagement laser, signature simulator and kill indicator) will be embedded in FCS platforms through dual use of operational Laser capabilities.

• The FCS network will be capable of acting as a ‘range instrumentation system’ connecting all FCS platforms for distributed home station and deployed training or interfacing to the existing instrumentation system at the CTCs.

• Absent real supporting or OPFOR entities/units, a separate FCS system, operating in a training mode will provide virtual wrap-around entities/units within the COP (2D view).

Live training can be accomplished at home, CTCs or deployed locations.

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The FCS-equipped unit will be capable of reaching back to distributed knowledge repositories via the FCS Network system for training support products such as:

- TSPs for collective training exercises,
- TSPs for individual training
  - leader or Soldier tasks, or
  - distance learning modules

TSP – Training Support Package
ATSC – Army Training Support Command
HSOC – Home Station Operations Capability
Training IPT Provides Products

- Mission and Task Analyses (TRADOC, FD, SEI, Suppliers)
- Embedded Training (ET) system (L, V, C)
  - Driver Trainer
  - Weapons Trainer
  - RSTA Trainer
  - Battle Command Trainer
  - Each contains a progressive performance matrix (a la Conduct of Fire Trainer)
- Stand-Alone Training Systems (reconfigurable) for those tasks which are unsafe, unaffordable or impractical for embedded training; expected primary support for institutions (L, V)
  - High fidelity
  - Desk-top
  - Each Stand-alone trainer reuses Embedded Training (ET) software
- Maintenance Trainers
- Training Support Packages (TSPs) - Individual and Collective
  - Level V Interactive Electronic Technical Manuals (Logistics IPT)
  - Simulation-based Training Support Packages (TSPs)
  - Interactive Multimedia Instruction (IMI)

L = Live
V = Virtual
C = Constructive

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Summary

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