

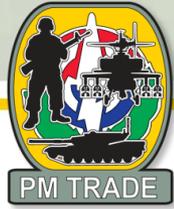
PEO STRI

Army-Tactical Engagement Simulation System (A-TESS)

Industry Day

6 & 7 March 2012

Agenda (Day – 1)



<u>Time</u>	<u>Subject</u>	<u>Presenter</u>
0830-0845	Opening Remarks and Introductions	Mr Brunat
0845-0900	PM TRADE & PM LTS Remarks	COL Flanagan/ LTC Tufts
0900-1015	A-TESS Vision/Future of MILES	Mr Brunat
1015-1045	TCM-L Remarks/A-TESS & T-IS CDD Process	TCM-L
1045-1100	Break	
1100-1200	A-TESS Future Capabilities	Mr Kosis
1200-1300	Lunch	
1300-1400	Standards/Testbeds/Embedded Training Vision	Mr Grosse
1400-1500	Logistics Issues	Mr Metzler
1500-1530	Conclusion/Discussions	Mr Brunat

Agenda (Day – 2)



<u>Time</u>	<u>Subject</u>	<u>Presenter</u>
0830-0845	Introductions	Mr Brunat
0845-0915	LT2 Framework Program Overview	Mr Kosis
0915-0945	Systems of Systems Tool Evaluation/Selection	Mr Platt
0945-1015	Functional Decomposition of CTC/HS	Mr Kosis
1015-1030	Break	
1030-1100	LT2 Framework Architecture Maturation	Mr Grosse
1100-1130	Live Training Engagement Component (LTEC)	Mr Grosse
1130-1200	Communicating with Industry	Mr Brunat
1200-1215	Conclusion	Mr Brunat



A-TESS Vision/Future of MILES

POC: Dave Brunat
APM IMILES, PM TRADE-LTS
(407) 384-5278
Cell (321) 689-7821

David.Brunat@us.army.mil

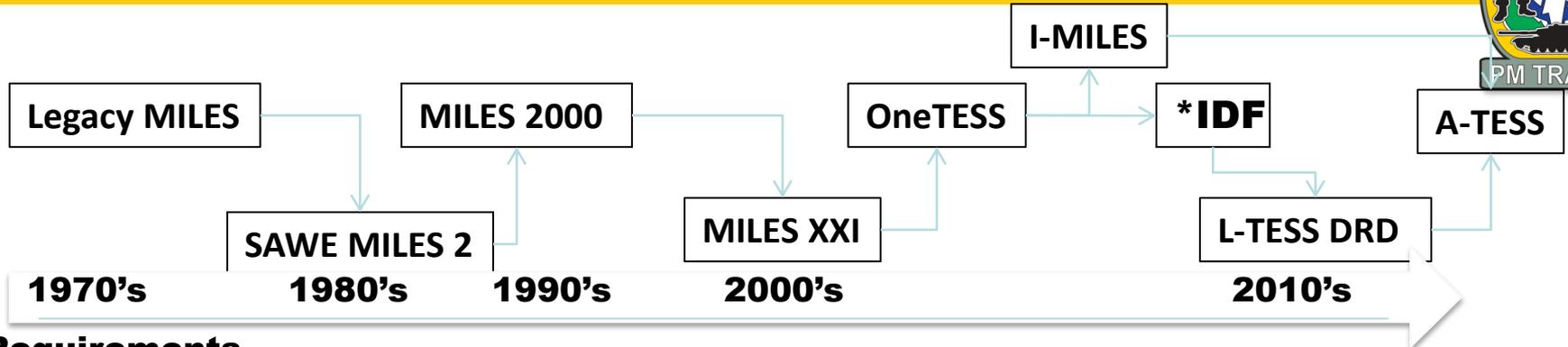
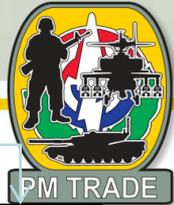
PURPOSE OF TODAY



- **Explain Path Forward for I-MILES and ATESS**
 - **Define Requirements Evolution**
 - **Explain New Procurement Methodology**
- **Improve Communications Between Industry and Government**
 - **Effectively Impact Industry RDT&E Effort**
 - **Help Industry Better Define Future Business Cases**
- **Solicit Industry Participation in Government Procurement Process**
 - **Encourage Industry to Participate in Future Workshops**



TESS EVOLUTION



Requirements

MILES Training Device Requirement (TDR) 1975

SAWE RF TDR 1988

M2K ORD 1993...amended 1996

OneTESS ORD 2004

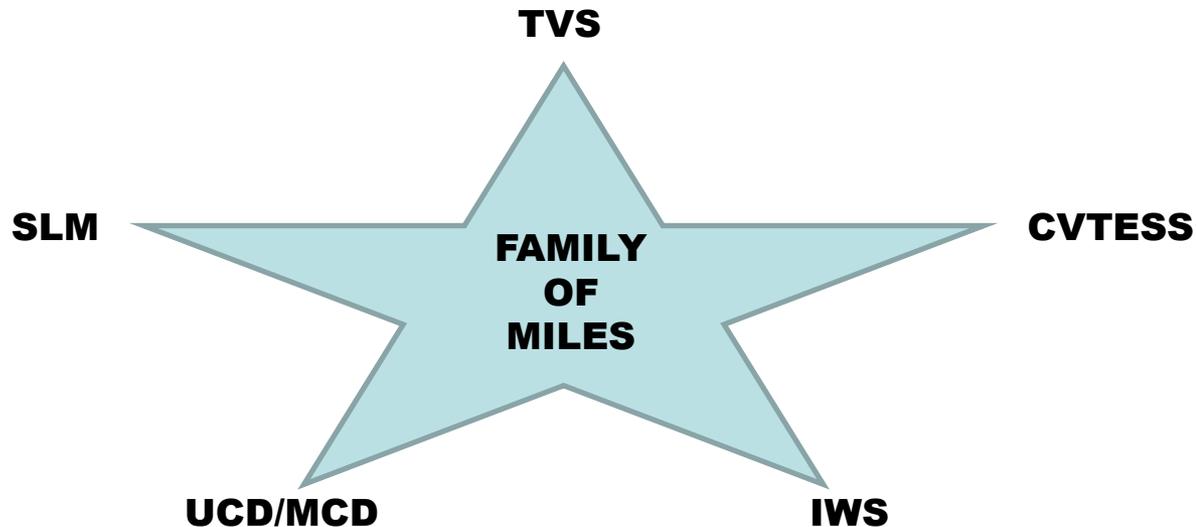
LT2-FTS ICD 2005

OneTESS CPD 2009

***Indirect Fire**

L-TESS DRD 2010

HOW WE BUY MILES TODAY



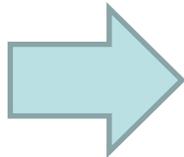
- **Five Separate Programs**
- **Independent PAN for Each Program**
- **Backwards Compatible with Legacy Systems**
- **Limited to Procuring BOI Quantities**



FUTURE MILES PROCUREMENTS

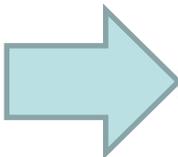


Common Architecture
PAN Standard
Jointly Defined by
Government and Industry



COMPONENT BASED PROCUREMENTS
Vests
Detectors
SATs
CVKI
Vehicle Controller Interface
Vehicle Kill Controller
Work with Industry to Define Components

Engineering Workshops
With Industry
Explain and Clarify
Performance Issues
And Requirements
Work On Solutions
To Improve Product Line



Backwards Compatibility
Not required

Contract Outside
Of STOC II

ENGINEERING WORKSHOPS



- **Common SAT**
 - **One SAT for all weapons**
- **Common Brackets**
 - **Picatinny Rail and Adapter**
- **New Laser wavelength**
 - **Improve shoot through obscuration**
- **New MILES Communication Code**
 - **More efficient code**
- **CBRN Updates**
 - **Realistic application of CBRN**
- **Casualty Assessment and Treatment**
 - **Eliminate casualty cards**
 - **Incorporate medical personnel into training environment**

ENGINEERING WORKSHOPS



- **Battle Damage Assessment**
 - **Incorporate maintenance personnel into training environment**
- **Enhanced Soldier Vest**
 - **Improve dismounted soldier vest**
 - **Incorporate vest into existing uniform/equipment**
- **Common Components**
 - **Define components for LT2 portal**
- **Explain and Clarify Specification**
 - **Improve communication between Government and Industry**
 - **Eliminate confusion in specifications**



TCM-L Remarks/A-TESS & T-IS CDD Process

POC: Tim Hale
TESS Chief, TRADOC Capabilities Manager-Live
(757) 878-0714
Cell (757) 912-6906
Timothy.hale@us.army.mil



Live Training Systems Office (LTSO)



CAC
LTG Perkins

CAC-T
COL (P)
White

ATSC
COL Baker

	<u>REQ</u>	<u>AUTH</u>	<u>ON HAND</u>
Mil	3	3	1
Civ	12	12	12
Contr			5
TOTAL	15	15	18

TCM-LIVE
COL Patrick
Connors

Standards in
Training
Commission

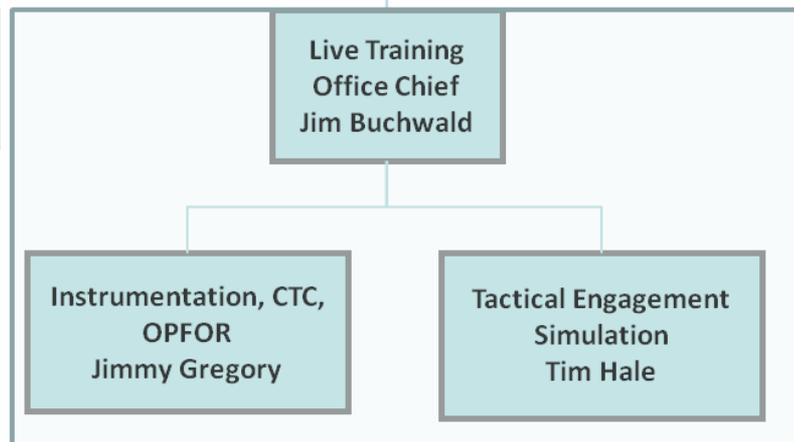
Glen Van Swol

Sustainable
Range
Program

Tom Scarbath

Requirements
& Integration
Office

Jim Brewer





TESS Team



Timothy Hale
Chief, TES

Danny Adkins
A-TESS

Walker Knight
System TES

Doug Geis
CVS/TVS

Jorge Yinat
IWS/SLM/PFA

Vacant
TES NCO

SSG Adam Armstrong
TES NCO

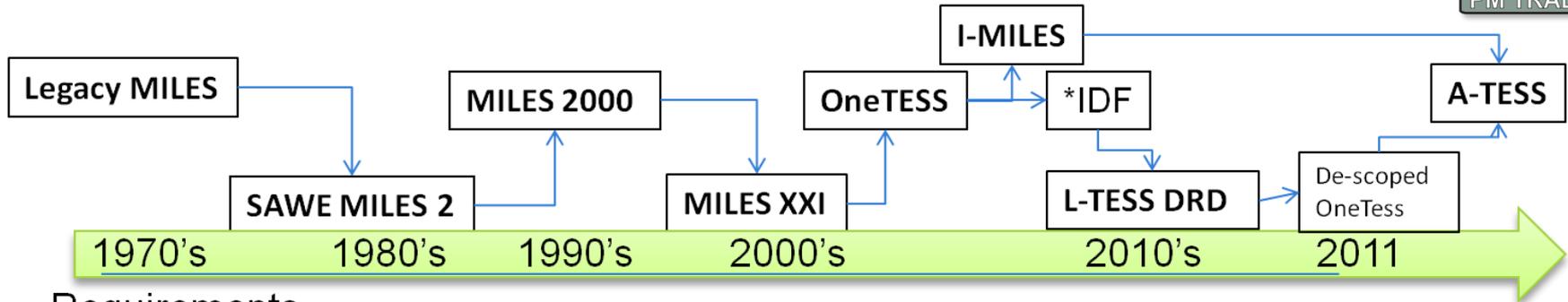
Walter Walker
Contractor
I-MILES/BOI

Sean Mahan
Contractor
A-TESS/JCIDS

- **User Representative for all Non-System TESS TADSS**
- **DA Executive Agent (TBAS MDEP)**
- **Combat Developer for TESS**
- **Army Proponent for TESS**



TESS Requirement Documents



Requirements

MILES Training Device Requirement (TDR) 1975

SAWE RF TDR 1988

M2K ORD 1993...amended 1996

All current NSTD MILES

OneTESS ORD 2004

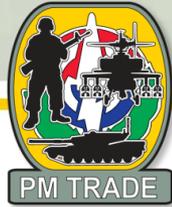
LT2-FTS ICD 2005

OneTESS CPD 2009

L-TESS DRD 2010

*Indirect Fire

OneTESS to IDF to Live-TESS back to OneTESS to A-TESS



- ❑ **DCS G-3/5/7 Memorandum dated 22 June 09 recommends that TRADOC combine existing TES PORs, IMILES and OneTESS, into one POR.... “Army-TESS”**
- ❑ **When OneTESS Contract ended, the salvageable priority of work that was the most mature was IDF and the work transitioned to an existing contracting effort under OneTESS.**
- ❑ **OneTESS on path to develop its own Instrumentation system, MDA provided guidance towards using the JTRS radio. JTRS was delayed, decision made that IDF would only run on instrumentation systems program of record radios only (HIT's, CTC-IS...).**
- ❑ **L-TESS DRD was not seen as the proper JCIDS document to take increment One (Mortars) to MS C so a board was held to de-scope the current OneTESS CPD.**



TESS Requirements Documents



	FY10	11	12	13	14	15	16	17
M2K ORD (I-MILES OPA)	→				↓	→		
L-TESS DRD (RDT&E)	→			↓	→			
A-TESS CDD (RDT&E)	→				↓	→		
A-TESS CPD (OPA)	→				↓	→		

One RDT&E line for A-TESS

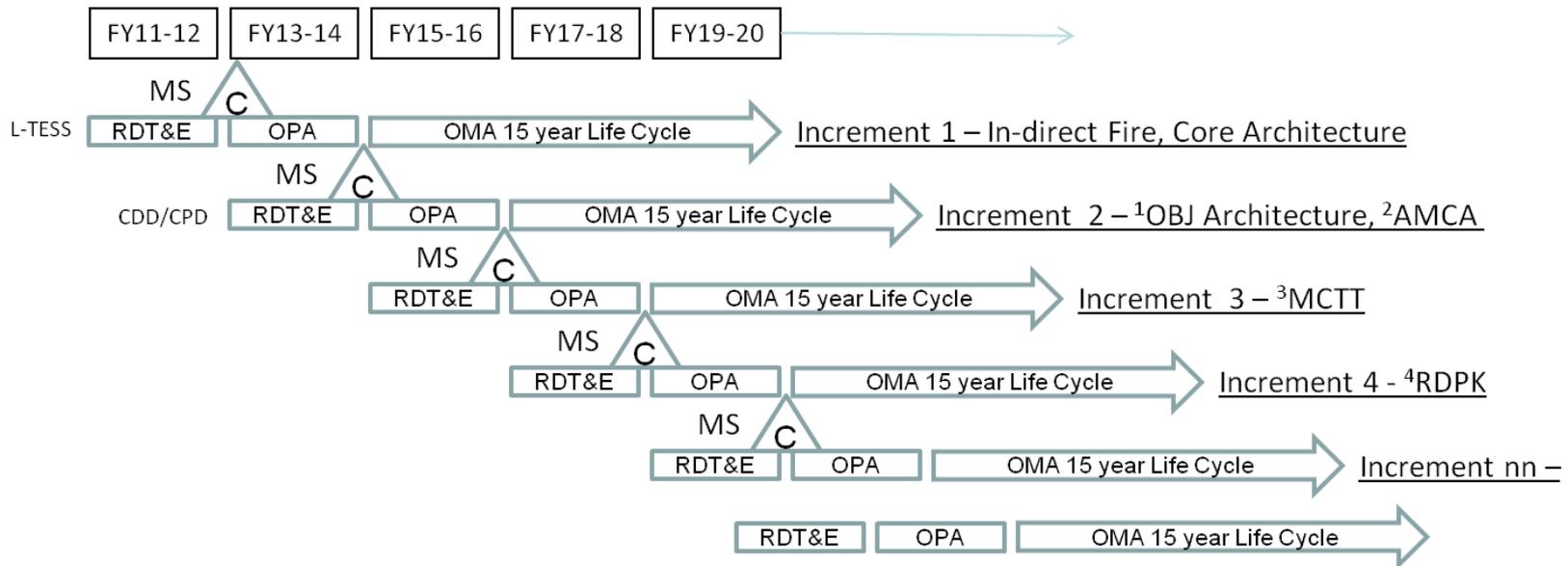
One OPA line for A-TESS

Evolutionary obsolescence of requirements documents are needed to maintain a consistent funding stream of RDT&E and OPA

A-TESS Development Strategy



- **Increment priority requirements based on availability of funds and TRL**



Notes

1. – Interchangeable LT2 components, Common SAT, Common Detector, Common Player Unit
2. - Automated Medical Casualty Assessment
3. - Medical Casualty Treatment and Tracking
- 4 – Range Dependant PK's

TESS Modernization



- ❑ **Live Virtual Constructive – Integrating Architecture (LVC-IA) and the Integrated Training Environment (ITE) compatibility with blended training**
- ❑ **Backwards compatibility across the Army hinders modernization, A-TESS requirement will not mandate backward compatibility, If you had to build TESS all over again what would it look like?**
- ❑ **Maximize re-use of hardware**
- ❑ **Limited Basis of Issue (BOI) focus on Battalion level at homestation and BDE at MCTC's**
- ❑ **Go from “Just in Case” logistics to “Just in Time” logistics supporting Hub and Spoke around Regional Collective Training Centers (RCTCs)**

A-TESS Challenges



- ❑ **How Much TESS is Enough?**
- ❑ **Resource Constrained Funding Environment**
- ❑ **Changing Force Structure (As low as 32 BCT's)**
- ❑ **Keeping Pace with Force Modernization**
- ❑ **Transition Back to a Peace Time Army**
- ❑ **Taking Advantage of Technology Leaps**

Way Ahead



- ❑ **Nothing is off the table, start from the notion of what TESS would look like if we started today, with today's technology, TRL 6+ threshold, TRL 1 Objective.**
- ❑ **Use of TESS Lab to validate Standard compliance and demonstrate new technology**
- ❑ **Turn-in all Legacy MILES**
- ❑ **M2K Obsolescence by 2018**
- ❑ **Posture A-TESS to be Easily Adaptable to Technology Advancements**
- ❑ **Slash the Cost of the Sustainment Tail**
- ❑ **Maximize End User Human Factors and Ease of Use**
- ❑ **Dynamic software updating that is expansible and adaptable to the changing Operational Environment**
- ❑ **OPFOR equals BLUFOR hardware with adaptable PK's**

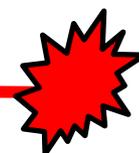


Questions?



Tactical Engagement Simulation Systems

TCM-LIVE



POC: Tim Hale
TESS Chief, TRADOC Capabilities Manager-Live
(757) 878-0714
Cell (757) 912-6906
Timothy.hale@us.army.mil

Break





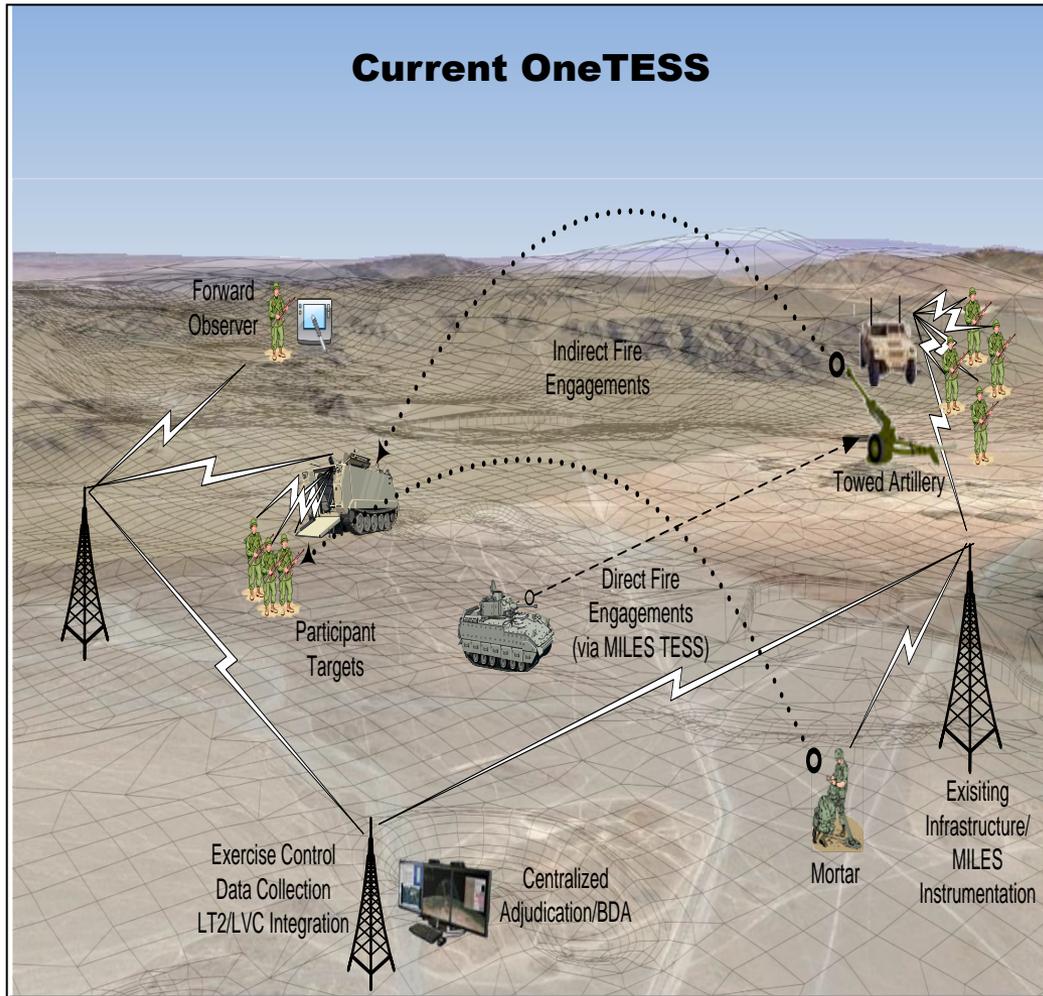
A-TESS Future Capabilities

POC: Todd Kosis
OneTESS PD, PM TRADE-LTS
(407) 384-5352
Cell (407) 456-0858
todd.kosis@us.army.mil

OneTESS Transformation



Current OneTESS



OneTESS Focus

- ✓ **Mortar capability**
(IBCT: 60/81/120mm)
- ✓ **Artillery capability**
(M777, M119, Paladin)
- ✓ **Forward Observer**
- ✓ **Automated Casualty Assessment Card** (May be superseded by A-TESS)
- ✓ **Interface with HITS/CTC-IS**
- ✓ **Interface with LT2 radio/network**
- ✓ **Indirect Fire Initial Architecture and Standards**

OneTESS Acquisition Strategy



Current Acquisition Strategy

- **Current development efforts under Consolidated Product Line Management (CPM) contract for mortars and FO effort**
- **Development efforts for artillery will be performed under CPM**
 - **M119 towed howitzer, Paladin, M777**
- **Integration with current LT2 radio**
- **Automated Casualty Assessment Card/Maintenance**
 - **Most likely will be guided by A-TESS program**





OneTESS Schedule



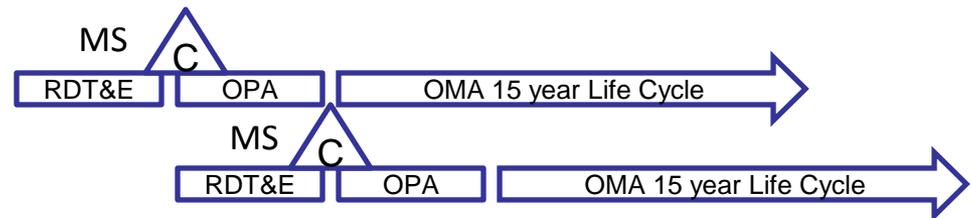
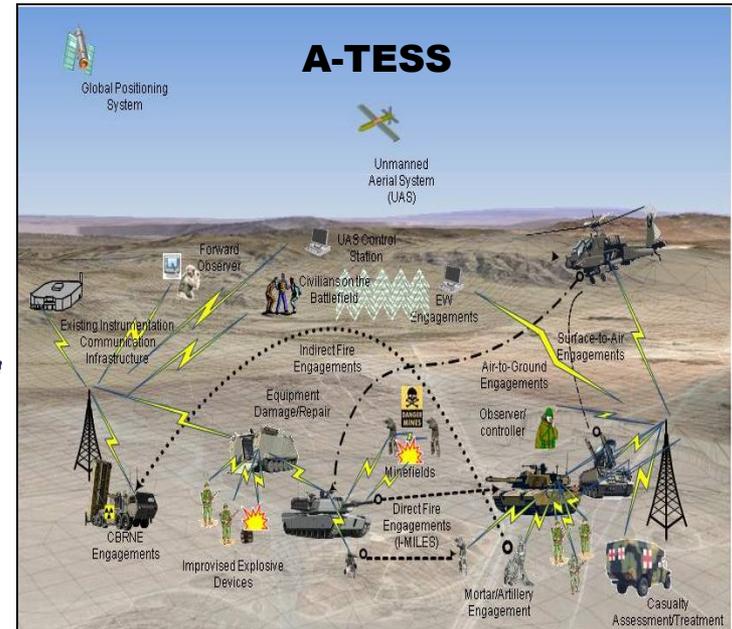
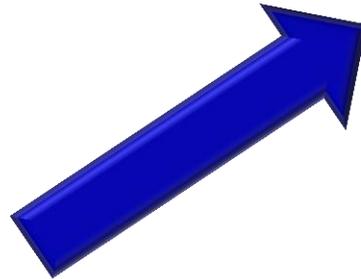
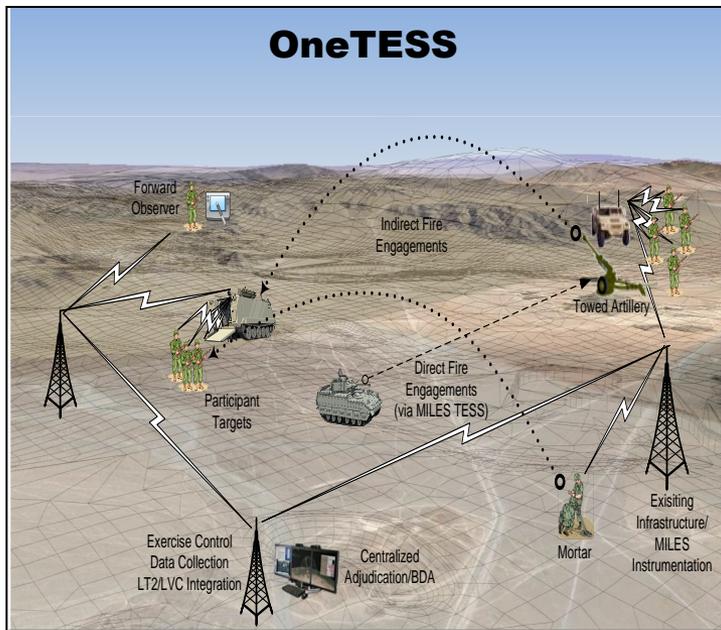
	FY12				FY13				FY14				FY15				FY16				FY17				FY18				FY19			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Oversight & Review Milestones	OneTESS MSC 1								OneTESS MS C 2				FRPDR				OneTESS MSC 3				FRPDR											
EMD Phase Contract Type	OneTESS				OneTESS Increment 2 RDT&E				OneTESS Increment 3 RDT&E																							
Engineering/ Technical Reviews	Architecture/Standards																															
Tests	DT Mar Log Demo May OT May								IOT&E								IOT&E								IOT&E							
Production Contract Type	Draft RFP RFP				CA				LRIP Del				Draft RFP RFP				CA				LRIP Del				OneTESS Increment 3 Production to 4QF/20				LRIP Del			
Fieldings									FUE OneTESS Increment 1				Draft RFP RFP				RFP CA				FUE OneTESS Increment 2											

	OneTESS Inc. #1 60/81/120mm
	OneTESS Inc. #2 Artillery
	OneTESS Inc #3 Automated Casualty/Maint

Transition from OneTESS to A-TESS



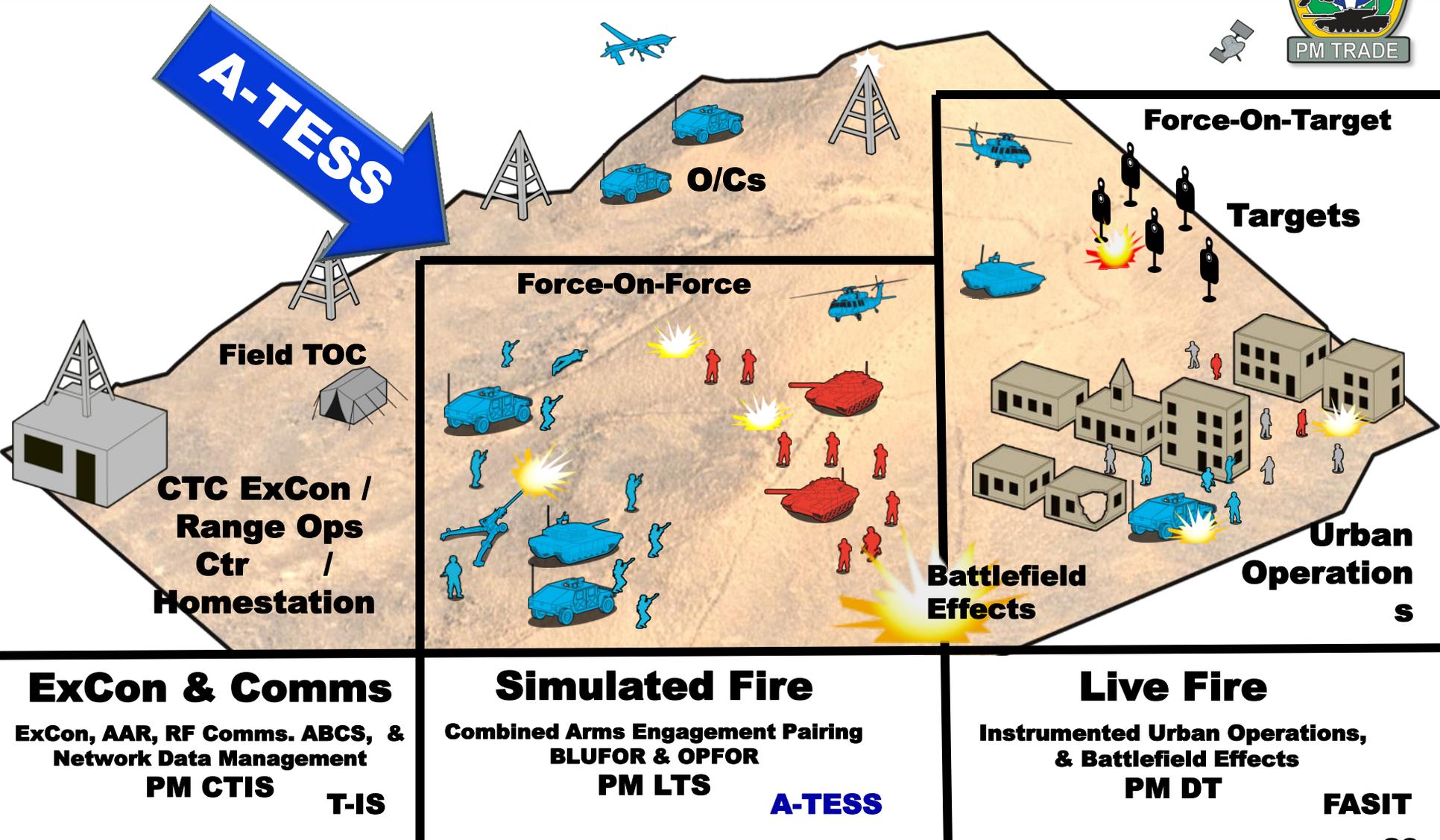
- OneTESS and I-MILES efforts to merge into A-TESS
- Modernize the five lines of I-MILES
- Interface with existing LT2-FTS and future T-IS
- Development of Architecture and Standards
- Expect RDT&E Funding in FY13 – Future
- Expect OPA Funding in FY14 – Future



Incremental Development



PM TRADE Functional Mission Area Training Environment





A-TESS Capabilities Summary



Near Term

Indirect Fire
Aviation
Medic
Improvement to MILES

·
·

FY15-17

Increment 1

Long Term

EW
M203
GCV
CBRNE

·
·

FY 18-N

Increment 2

Increment 1 (FY15-17) Capabilities



- **Architectural framework**
- **Realistic simulation of capabilities and effects for indirect fire weapon systems**
- **Integration of existing BCT-level Army aviation weapons capabilities and effects (air-to-ground)**
- **Automated, higher fidelity personnel casualty assessment**
- **Automated determination of equipment battle damage assessment**
- **Integration of existing live IED weapons capabilities, effects and C-IED**
- **Interoperability with the Army program of record instrumentation systems**
- **Improvements to I-MILES capabilities**



Increment 2 (FY18-N) Capabilities



- Objective technical standard architectural framework
- Simulation of direct and indirect fire weapons/effects/countermeasures and stimulation of counter fires radar systems
- Realistic personnel casualty assessment, treatment, and feedback
- Automated equipment maintenance assessment, repair and tracking
- Interoperability with all LT2-FTS products
- Simulation of capabilities/effects for grenade launchers and Counter Defilade Target Engagement System (CDTES) with the capability to adjust fires.
- Simulation of BCT-level air defense weapons/effects and countermeasures
- Simulation of BCT-level UAS weapons capabilities and effects
- Simulation of mines, mine sensors, and portrayal of mine clearing effects
- Simulation of BCT-level electronic warfare capabilities
- Simulation of ground combat vehicle (GCV) weapons and sensors
- Simulation of BCT-level non-lethal and directed energy weapons capabilities and effects
- Simulation of active protection systems and effects
- Realistic simulation in all training environments (including MOUT)
- Simulation of CBRNE weapons capabilities and CBRNE sensors



A-TESS Near Term Capabilities



- **Near Term capabilities to focus on:**
 - ✓ **Automated Casualty Assessment Card**
 - ✓ **Automated Maintenance Assessment**
 - ✓ **Common SAT, detector, etc**
 - ✓ **Indirect Fire (MLRS, M1064, Mk-19 etc)**

- **Don't count out looking at long term capabilities that you think can be accomplished in the near term (cost effective)**

- **A-TESS will utilize Architecture and Standards to help build common components (SATs, detectors, etc)**

Challenges



- **Weapon Orientation**
- **Visual Display for indirect fire weapons**

- Mk-19
- M203



- **Latency between shooter and target for short range weapons**
- **Forward Observer Augmented Reality**



Lunch





Standards, Testbeds, and Embedded Training Vision

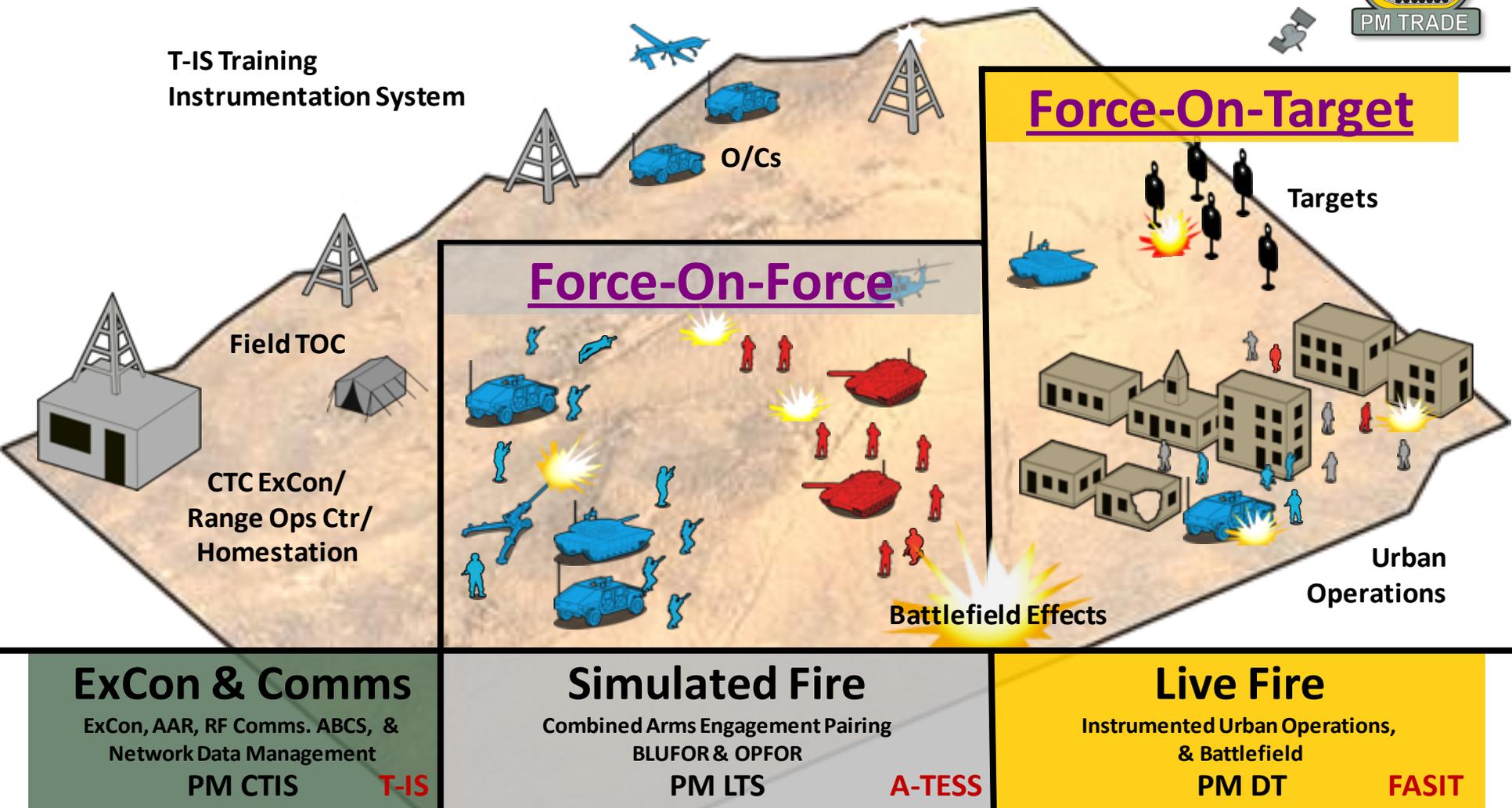
POC: Jim Grosse
PM TRADE Chief Engineer, Live Training Systems
(407) 384-3872
Cell (321) 436-7413
James.Grosse@us.army.mil



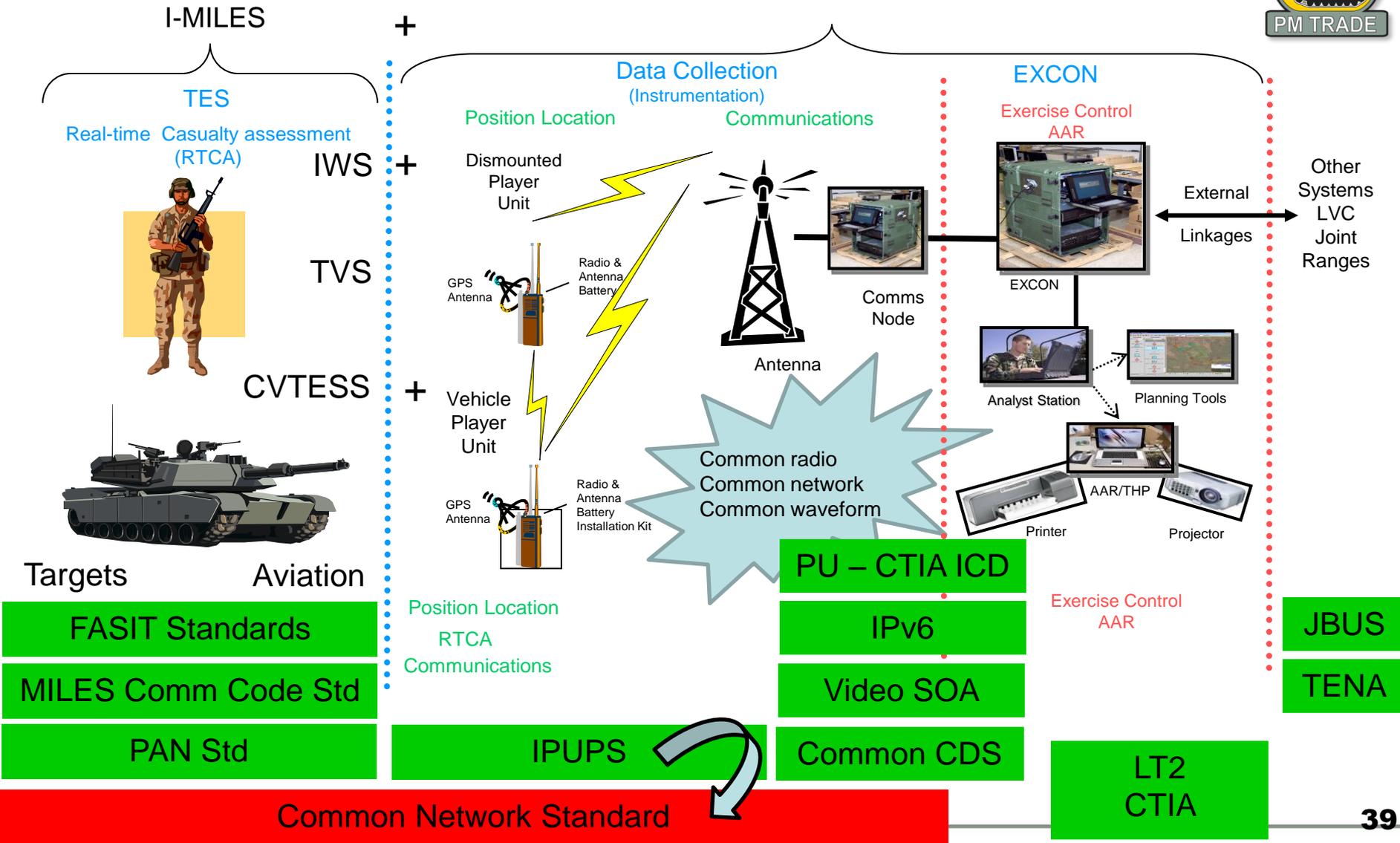
Standards



Live Training Lines of Operation



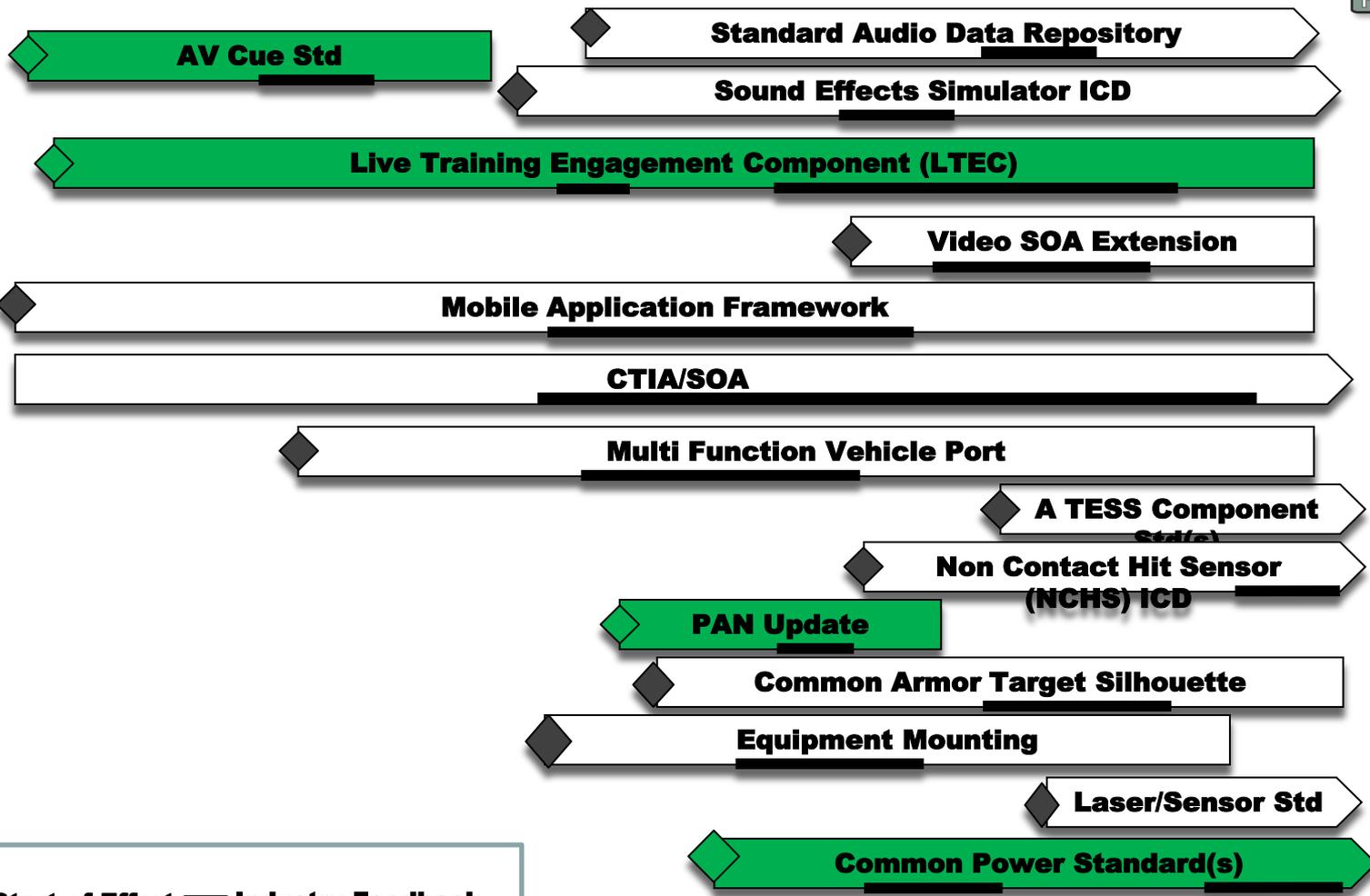
Engineering Initiatives – Architecture



Standards/ICD Calendar

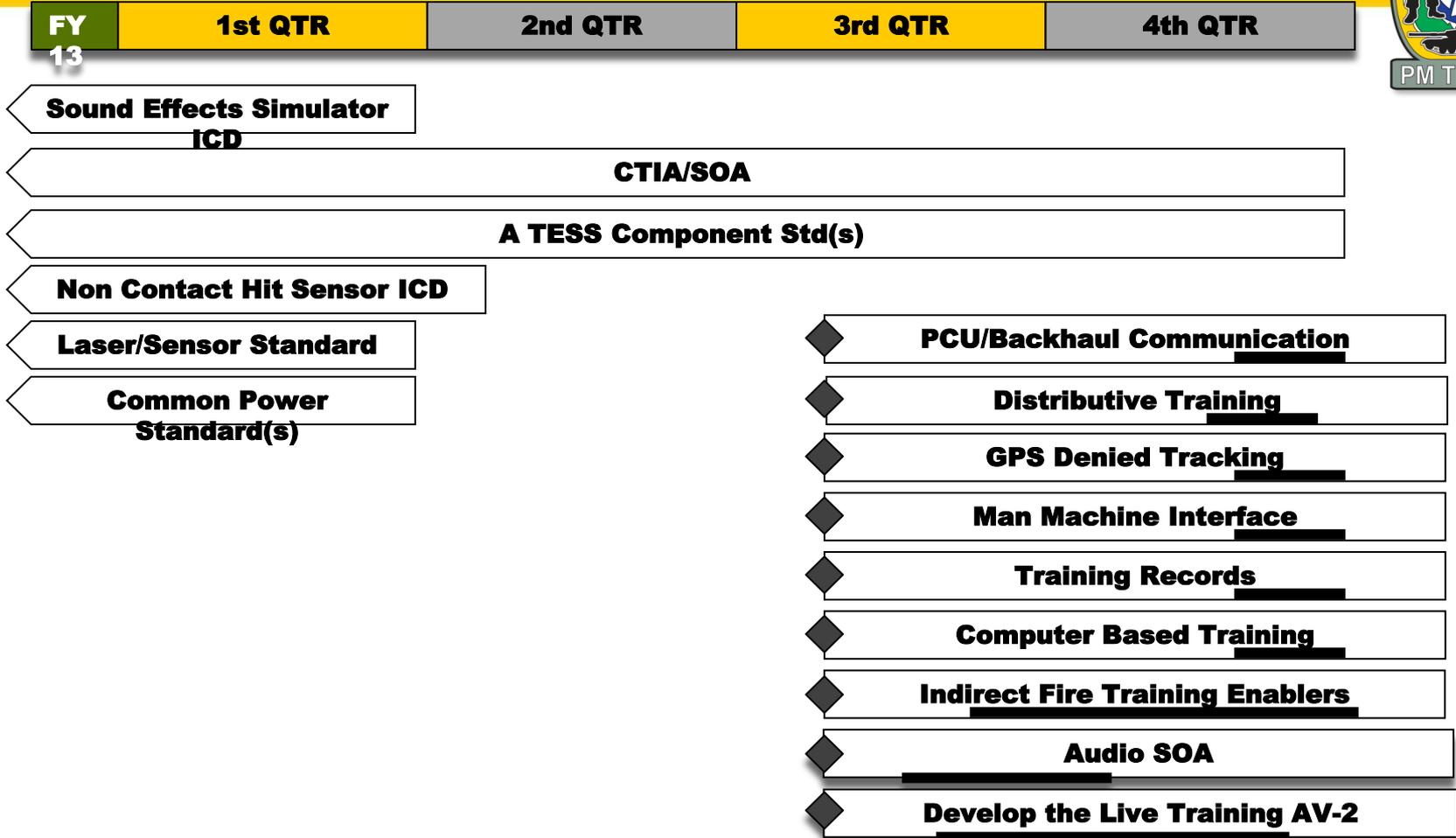


FY 12 **1st QTR** **2nd QTR** **3rd QTR** **4th QTR**



◆ Start of Effort ■ Industry Feedback

Standards/ICD Calendar



◆ Start of Effort ■ Industry Feedback

Audio Visual Cue Standard



Purpose: Define the Audio/Visual cues that training devices provide to Live Participants (BlueFor, OPFOR, Role-player, Combat/Trainers).

Scope:

- Short Term (version 1.0 of the standard)
 - ✓ TESS (Status Indicator, Weapon Signature, User Interface)
 - ✓ Individual, Manned and Unmanned Ground, Manned and Unmanned Aerial Vehicles
 - ✓ Initial Indirect Fire Chain
 - ✓ IEDs
- Long Term (FY 13+)
 - ✓ Medical
 - ✓ Complete Indirect Fire Chain
 - ✓ Chemical Biological, Radiological and Nuclear (CBRN)
 - ✓ Linkage into ATESS architecture
 - ✓ Targets



Schedule: Release draft to industry by late March 2012.
Industry day to follow.



Power Standard



Purpose: Define specifications for the sources, interfaces and distribution for battery, vehicle, shore, and portable power.

Scope: Cover all types of power.

- Short Term (version 1.0 of the standard)
 - ✓ Standards committee is currently determining initial scope
 - ✓ Potentially include batteries
 - ✓ Distribution and sharing power between different Programs of Record's equipment (TESS and Radio)
- Long Term Vision
 - ✓ Work with TCM Soldier to standardized small unit battery usage.
 - ✓ Work with the vehicle PMs to understand the power provided by the multifunction vehicle port.



Schedule:

- Current: Standards committee is reviewing the responses to an internal questionnaire.
- March : Determine initial scope of the effort.
- Next 30 days: Issue RFI and other fact finding on industry standards and impacts.
- May: Release of the draft standard.



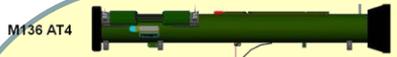


PAN Standard Update



Dismount

Vehicle



M136 AT4



RPG-7



Armbrust



Panzerfaust



SAIC

GB MK-19
SPU



Common Player Unit & Radio



DETECTOR MODULES



REMOTE DISPLAY MODULE



Vehicle Signals
Module



Hull Orientation
Module



Combat Vehicle
Kill Indicator

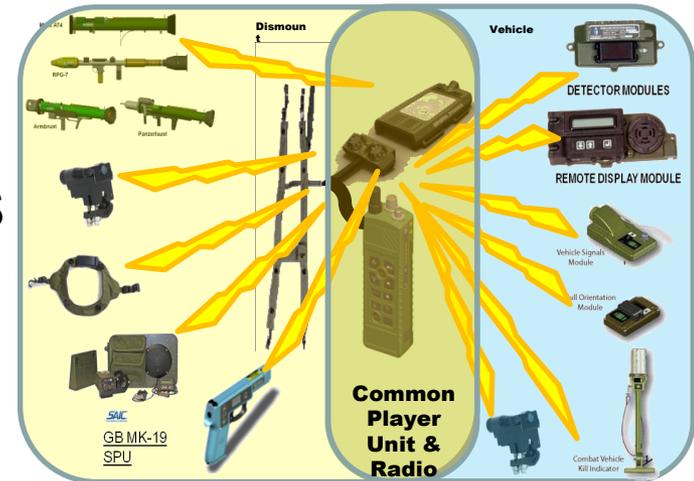
PAN Standard Update



Status: Version 1 Rev 1 Published on LT2 Portal.
Vendors and PM LTS have requested modifications:

Scope:

- Removing 900MHz capability from Std
 - ✓ Availability of chipset
 - ✓ 2.4 GHZ has been proven on the TVS program
 - ✓ Allow PM LTS to have common components across all programs and locations
- Adding other interfaces to the Std
 - ✓ Current Std only includes wireless
 - ✓ Adding wired interfaces to support LTEC
 - ✓ Adding other functionality i.e. repeater



Schedule: Release of draft to industry by late June 2012.



Testbeds

MILES Testbed

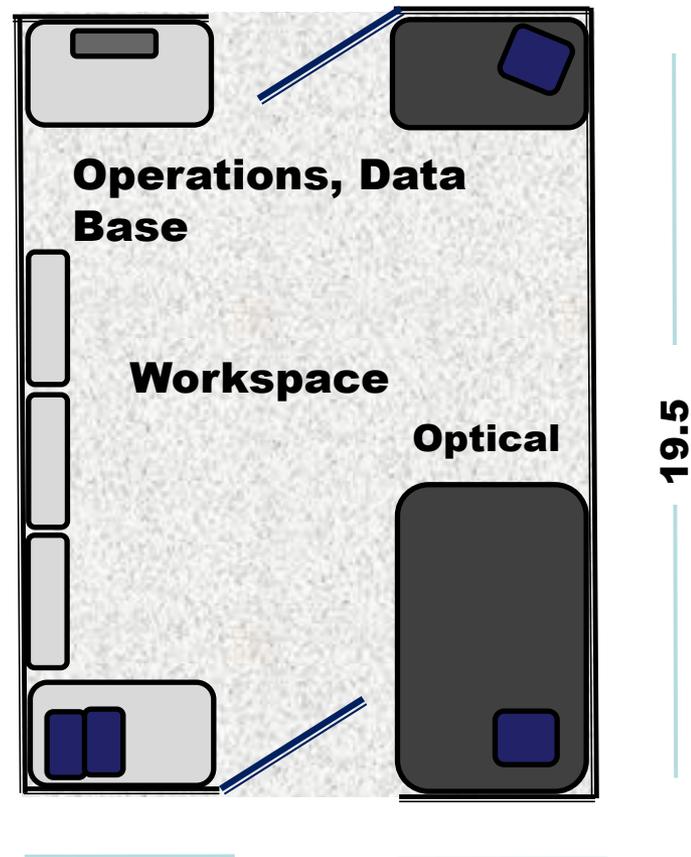


- **MCC 97 Compliance Test Set**

- ✓ Laser Module
 - ✓ Frequency, Timing , Jitter, Dither, Bin Analysis
- ✓ UCD Verifies MILES Code
- ✓ Receiver/Detector module
 - ✓ LRU Laser Code
 - ✓ Frequency, Timing, Jitter, Dither, Bin, Analysis
- ✓ GUI SW
- ✓ User &/or Operational Manuals

- **Procedures**

- ✓ 10+ Test Procedures
- ✓ Lab Policies
- ✓ Laser Safety



PAN & IS-TES Testbeds



- PAN & IS-TES Testbeds established and operational in the IDE
 - ✓ Laptops for use / checkout
 - ✓ Representative PAN devices (client and server)
 - ✓ Operating procedures
- **Capability**
 - ✓ Validate compliance with the PAN Standard and IS-TES ICD
 - ✓ Available for Industry use



Embedded Training



Embedded Training (ET)



- Ground Combat Vehicles all have embedded training requirements – currently developing stove piped solutions:
 - Training Ports
 - Embedded Virtual Gunnery Trainers
- PEO STRI established and leading Army Embedded Training Working Group (2011)
- Developed ET vision, roadmap & priorities
- Initial focus on ground combat vehicles
 - Identify common requirements
 - Identify collaboration opportunities across platforms
 - Establishing IPT's as needed
- Developing ET Standards, supporting VICTORY
- Supporting all COE Computing Environments



- **Requirements**
- **Regulations**
- **ET WG Efforts**
- **History**

- ET Working Group**
- PEO STRI
 - PM HBCT – Abrams
 - PM HBCT – Bradley
 - PM Stryker
 - PM GCV
 - PM Soldier Warrior
 - MCOE
 - TCM HBCT – Abrams
 - TCM HBCT – Bradley
 - TCM Stryker
 - TCM Live
 - TCM Virtual
 - TPIO OneSAF
 - TARDEC
 - JPO MRAP
 - PM CROWS
 - STTC
- 110+ members**



PEO STRI

Vision
For
Embedded Training

5 October 2011
Version 32

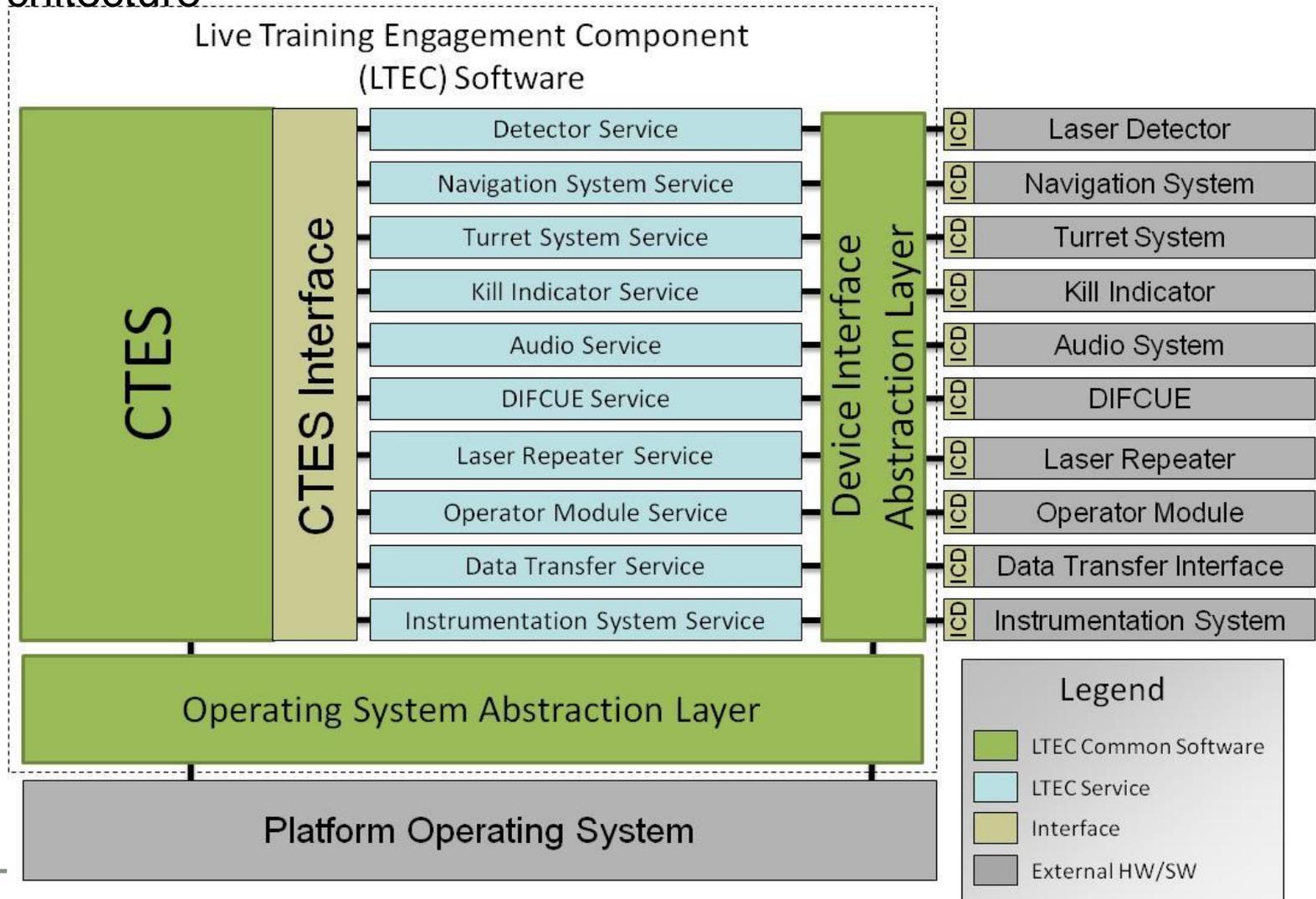
Embedded Training Capabilities support the Test and Training Communities



LTEC Architecture



- PM LTS is developing the Live Training Engagement Component Architecture





Logistics Issues

POC: Dan Metzler
Logistics Management Specialist, PM TRADE
(407) 384-3553
Cell (407) 491-8918
daniel.j.metzler@us.army.mil



Life Cycle--Training



- We have found Soldiers are not trained to use the newer TESS devices
 - I-MILES devices are not plug-and-play like basic MILES
 - A Post Fielding Survey confirmed Soldiers are not trained in the proper use of the newer devices:

“Too much time messing with gear than actually training with it”

“Not used because do not know how to zero”

“No significant training value due to improper wear”

“Make simple to use, player unit too many steps”

- Intuitiveness and complexity of the user interface is something we want to pay attention to in A-TESS.
- We also want to provide the user every opportunity to understand how to use the device properly.



QR Code Initiative



QR Code provides just-in-time training to soldiers through their Smartphone.

- Pilot effort.
- Affix QR code to devices that links to a Government-hosted repository of user-level video clips of various user tasks (association, zeroing, etc).
- Expect to add these video clips as part of the training deliverables in future contracts.
- Industry feedback on ways to improve system training solutions/requirements.



Data Acquisition



- Incomplete and/or inadequate technical data is a contributing factor in our increasing sustainment costs.
 - Sustainment contractor is forced to reverse engineer & create drawings to effectively support the system.
 - No TDPs for STTE.
 - Insufficient data/data rights limits the sources of repair parts.
- We are looking to improve our acquisition requirements of the data we purchase.
 - Are we are buying sufficient data/data rights to support the system?
 - Are we asking for too much?
 - Are we getting the level of data we have in the contract? Is our requirement clear?

Design Considerations



- We are deficient in incorporating lessons learned into our products in a timely manner.
 - Often we find out about problems in the original design well into the follow-on contract.
 - As the problem surfaces, the second procurement is underway.
 - Creates expensive retrofits or issues we have to live with.
 - Will be looking for better reporting from OEM during ICS periods and proactive approach to improving the design and lessening sustainment cost drivers.
 - We are establishing an *I-MILES/A-TESS Lessons Learned Repository Collaboration Area* where we will publish known issues with our products in an effort to improve future acquisitions.
 - Government/Industry TES sustainment IPTs where systems' performance in the field is briefed to the OEMs.

CONCLUSION



- **Industry Days will be Held Once per Quarter**
 - **Results and Due Outs from Workshops will be Discussed**
- **Workshops will be Conducted Between Industry Days**
 - **Number of Workshops Required Driven by Topics to be Covered**
- **Highly Encourage Industry Participation**
 - **Opportunity to Influence Major Changes in Future Procurements**
 - **Opportunity to Better Understand the Government's Intent**



Live Training Transformation (LT2) Framework Industry Day Briefing

7 Mar 2012



Agenda (Day – 2)



<u>Time</u>	<u>Subject</u>	<u>Presenter</u>
0830-0845	Introductions	Mr Brunat
0845-0915	LT2 Framework Program Overview	Mr Kosis
0915-0945	Systems of Systems Tool Evaluation/Selection	Mr Platt
0945-1015	Functional Decomposition of CTC/HS	Mr Kosis
1015-1030	Break	
1030-1100	LT2 Framework Architecture Maturation	Mr Grosse
1100-1130	Live Training Engagement Component (LTEC)	Mr Grosse
1130-1200	Communicating with Industry	Mr Brunat
1200-1215	Conclusion	Mr Brunat



LT2 FRAMEWORK PROGRAM OVERVIEW

Introduction

LT2 Framework Program Overview

System of Systems Tool Evaluation/Selection

Functional Decomposition

LT2 Framework Architecture Maturation

Live Training Engagement Component (LTEC)

Communicating with Industry

Summary

Consolidated Product Line Management (CPM) Program Overview



PEO-STRI Contract Vehicle to manage the LT2 Product Line

Delivery Orders (DOs) focused on development and sustainment of specific live training systems

- CTIA
- CTC-IS
- HITS
- DRTS
- ETC-IS
- OneTESS
- Target Modernization
- etc...

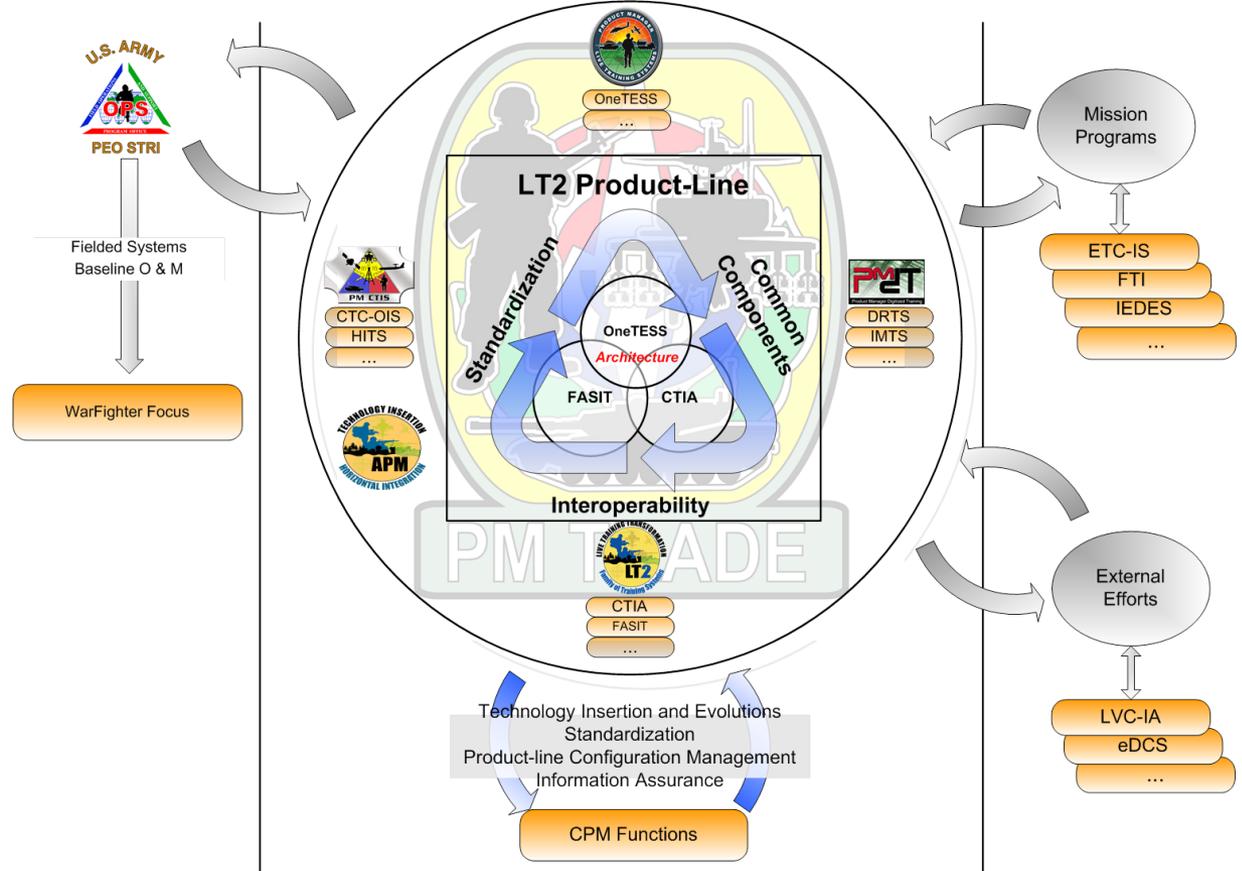
CPM Operations Guide (available on LT2 Portal) provides framework for all LT2 community members to participate in open, collaborative development/sustainment activities

DO13 is for the LT2 Framework Architecture (see next slide)

Maintenance/Sustainment

Product-Line Technology Acquisition and Sustainment

System Acquisition / Fielding



LT2 Framework (CPM DO13) Program Overview

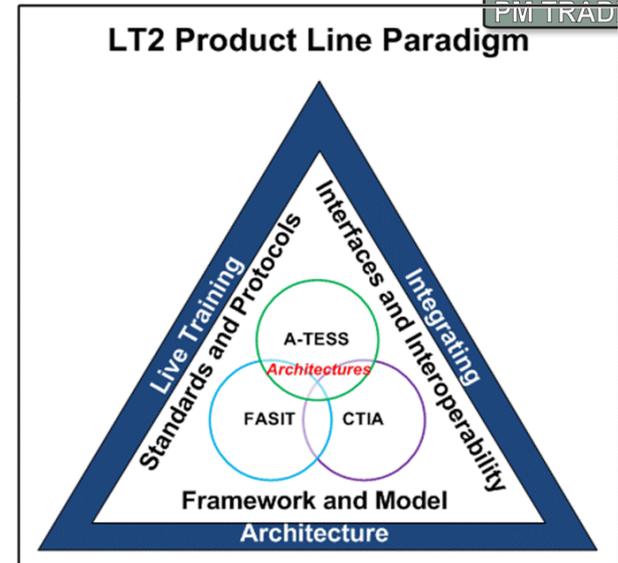


- **Tasks**

- System of Systems (SoS) Tool Evaluation
- Functional Decomposition of existing LT2 products
- Embedded Training Prototype/Demonstration
- LT2 Framework Architecture Maturation
 - Army-Tactical Engagement Simulation System (A-TESS) Architecture
 - CTIA and FASIT Architecture Evolution

- **Schedule**

- SoS Tool DAR completed in 2QFY12
- Functional Decomposition in progress to complete 3QFY12
- Embedded Training prototype in progress to support demo in 4QFY12 at Ft. Benning
- LT2 Framework Architecture Maturation starting now, to complete 4QFY13



- **Open standards and protocols**
- **Encourage Industry Participation**
- **Ensure interoperability across the product line**
- **Encourage reuse**
- **Support new technology/capabilities to improve training effectiveness**



LT2 System of Systems Managing Complexity of the Product Line

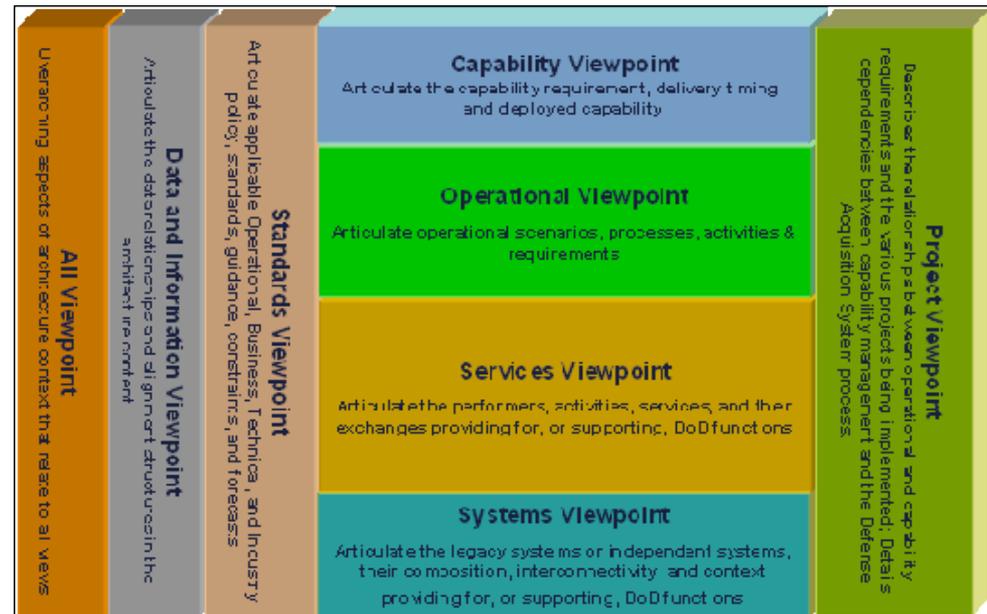


- **Problem**

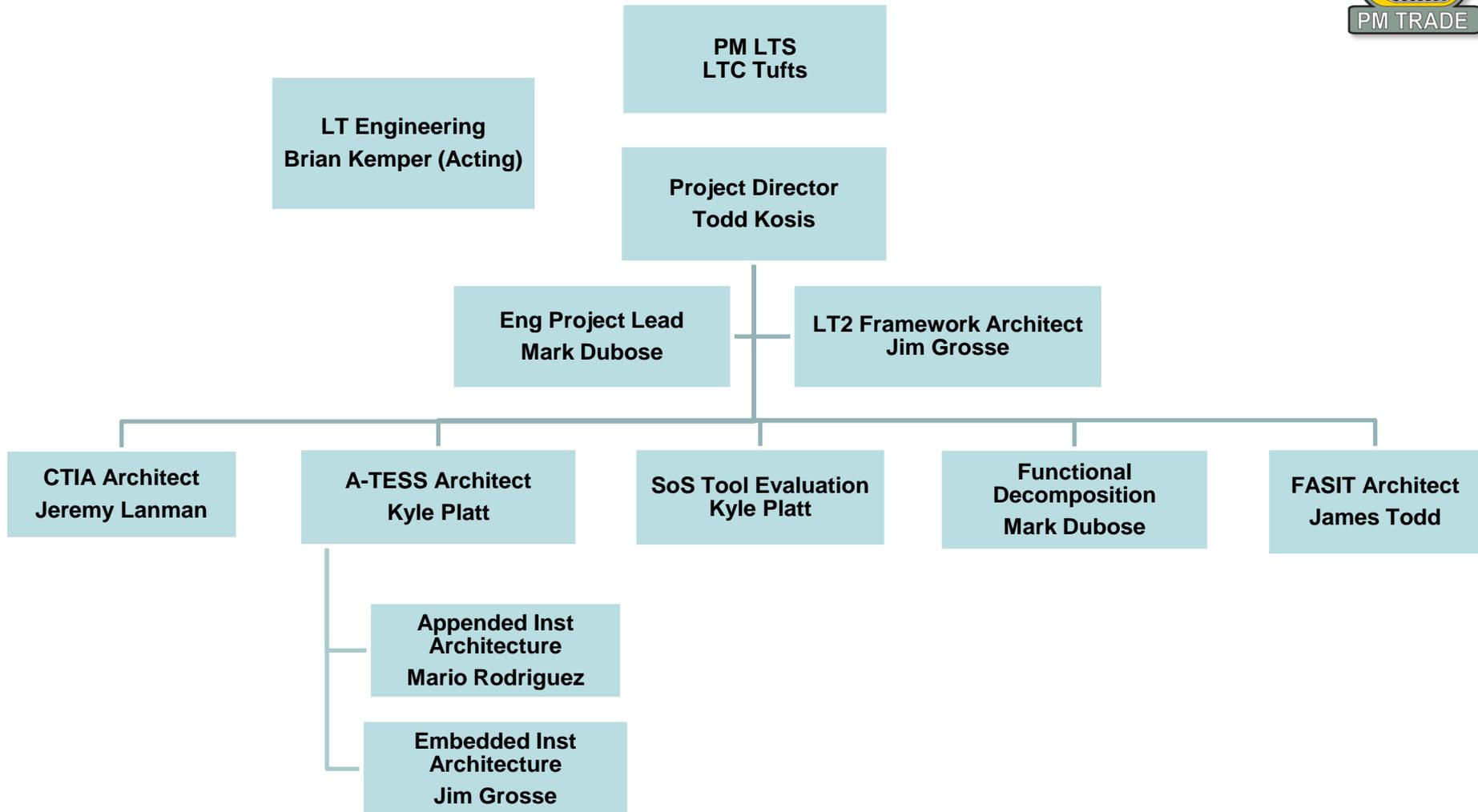
- As complexity of the product line increases, it becomes difficult to manage the interfaces between systems
- As we add new capabilities to the product line, it is difficult to keep the system documentation up to date with the implementation
- To support the JCIDS process, our customer (TCM-Live) requires DODAF compliant viewpoints of the future architecture

- **Approach**

- Acquire a Commercial Off The Shelf (COTS) tool to help us manage the System of Systems Architectures, interfaces and dependencies
- Create a model that captures these dependencies
- Define governance processes that ensure that the model is kept up to date



LT2 Framework Organization Chart





SYSTEM OF SYSTEMS TOOL EVALUATION

Introduction

Program Overview

System of Systems Tool Evaluation/Selection

Functional Decomposition

LT2 Framework Architecture Maturation

Live Training Engagement Component (LTEC)

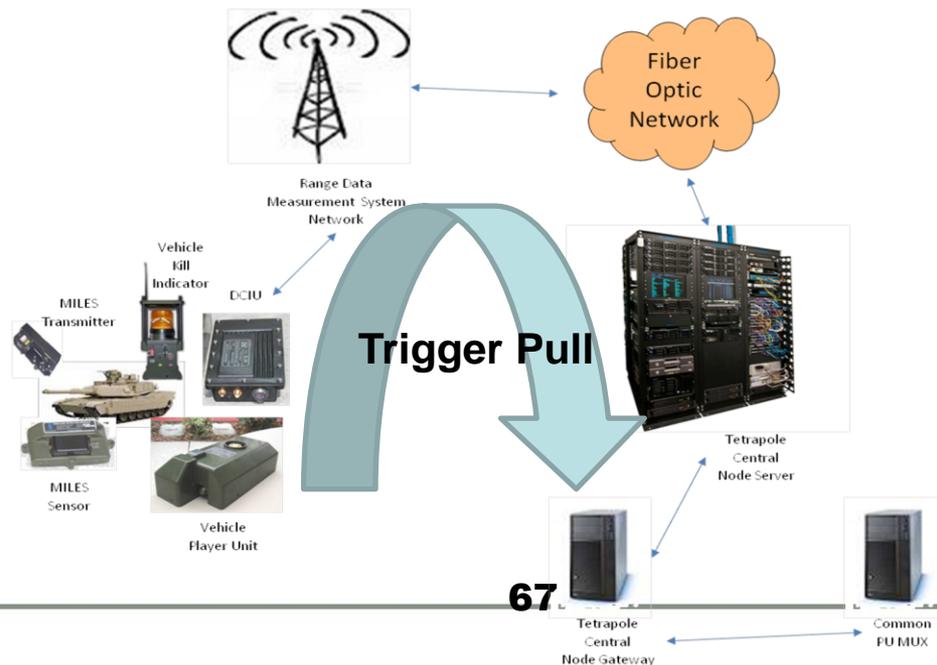
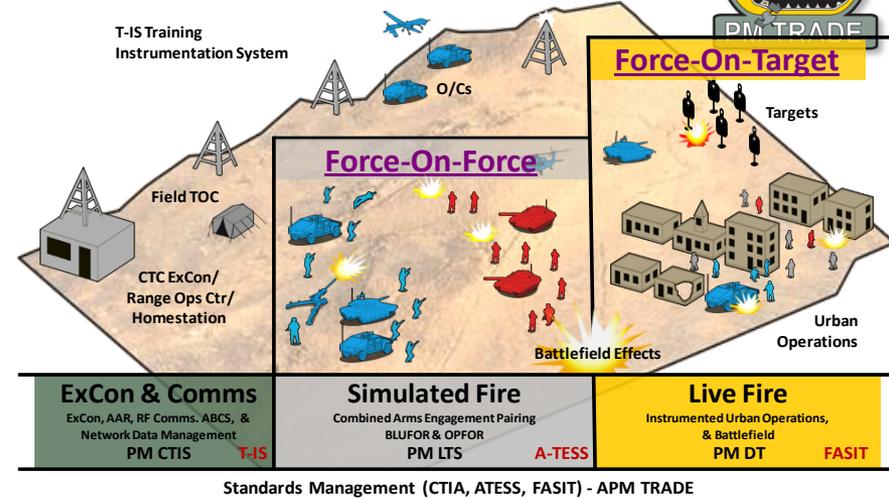
Communicating with Industry

Summary

System-of-Systems (SoS) Tool Evaluation



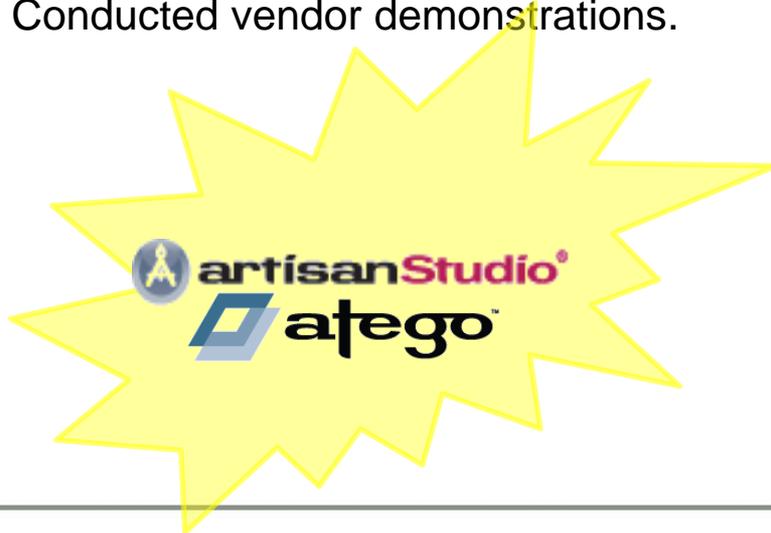
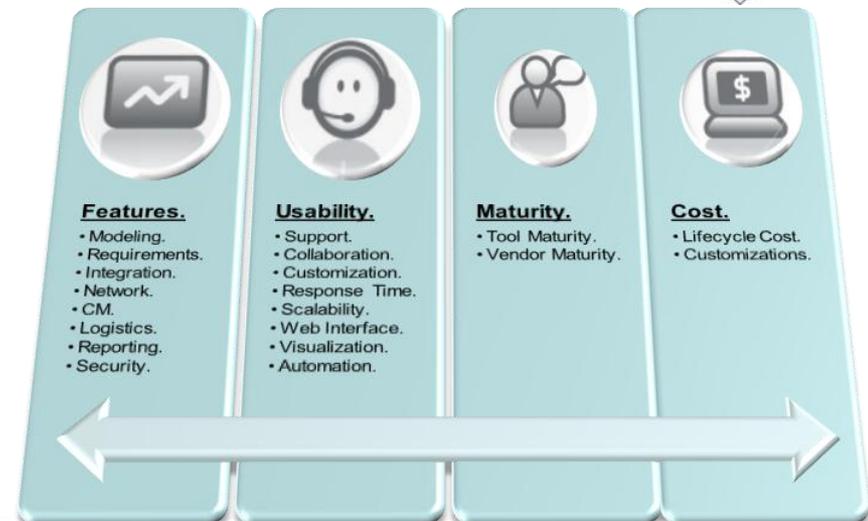
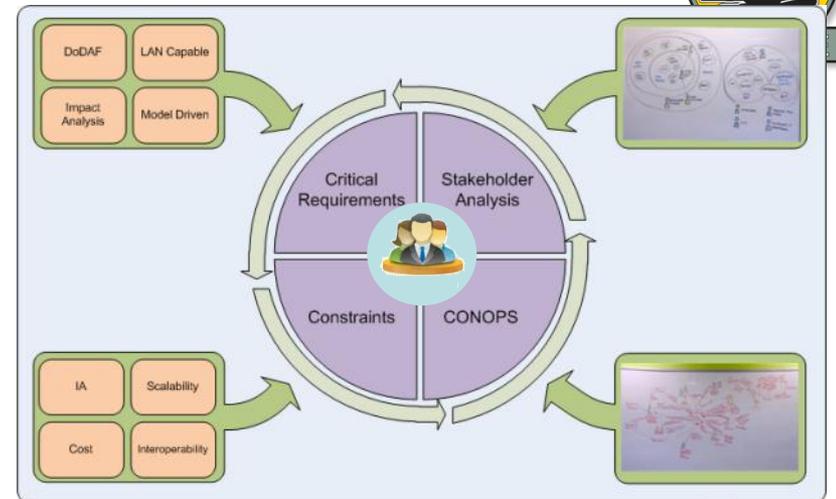
- Purpose.
 - Research, analyze compare and document a market research effort to identify a tool suite to effectively manage the LT2 SoS challenges of today and beyond.
 - Provide an initial Model Based Systems Engineering (MBSE) capability by the end of FY12.
- Near-term goals.
 - Conduct impact and “what-if” analysis as to properly plan for change and capability insertion throughout the product line.
 - Generate DoDAF 2.0.2 compliant data and documentation.
 - Perform system modeling, using UPDM, to describe system elements and interfaces.
 - Ability work dynamically in a collaborative environment.



System-of-Systems (SoS) Tool Evaluation



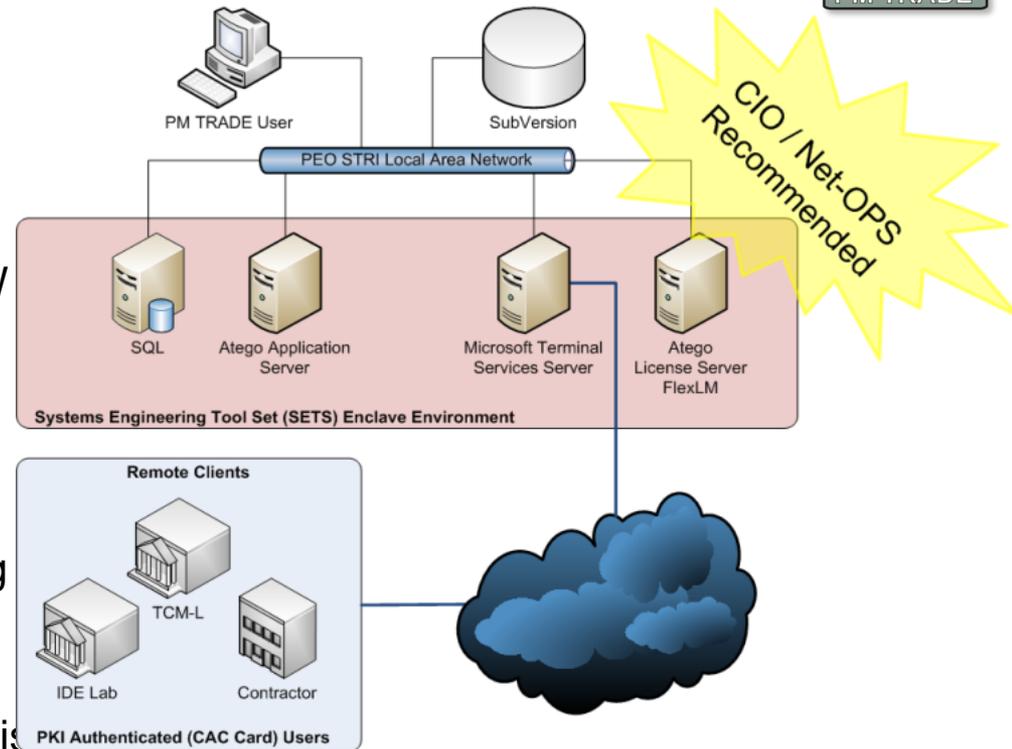
- Data and Capability driven analytical process.
 - I. Collaborative capability definition session.
 - Identify Threshold and Objective requirements for tool.
 - Prioritized/Weighted requirements using Analytical Hierarchy Process (AHP).
 - II. Conducted Market Research.
 - III. Conducted vendor demonstrations.



System-of-Systems (SoS) Tool Evaluation



- What does this mean?
 - Remote access planned to be made available with use of a CAC.
 - Growth potential for remote model development possible.
 - PM TRADE is working to develop SOW and CDRL language to allow for UPDM/SysML deliveries on acquisition programs.
 - Needed to prevent stale data.
 - Draft governance methodology is being developed.
- Industry suggestions on Governance, contract verbiage and architectural content is critically needed.



Effective collaboration between Government and industry is key to evolving the LT2 product line.



FUNCTIONAL DECOMPOSITION

Introduction

LT2 Framework Program Overview

System of Systems Tool Evaluation/Selection

Functional Decomposition

LT2 Framework Architecture Maturation

Live Training Engagement Component (LTEC)

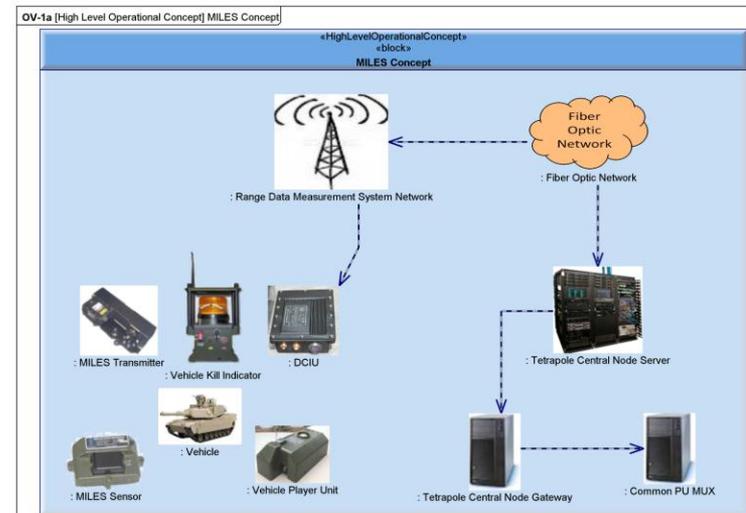
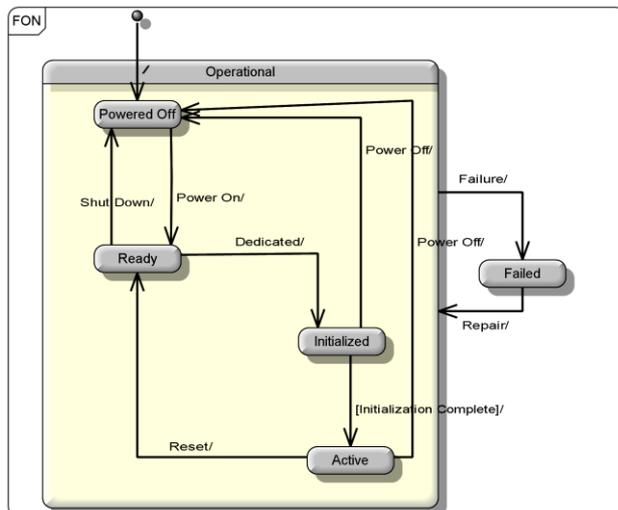
Communicating with Industry

Summary

Functional Decomposition



- Purpose
 - Document systems as they exist today
 - National Training Center (NTC) – Fort Irwin, CA
 - Joint Readiness Training Center (JRTC) – Fort Polk, LA
 - Representative Homestation Instrumented Training System (HITS)
 - Support “what-if” analysis
 - If we change an Interface Control Document (ICD) or standard, what else is affected in the product line?
 - Generate DODAF 2.02 compliant viewpoints of the architecture
 - Use as a basis for future architecture efforts
 - Governance process defined for maintaining the model

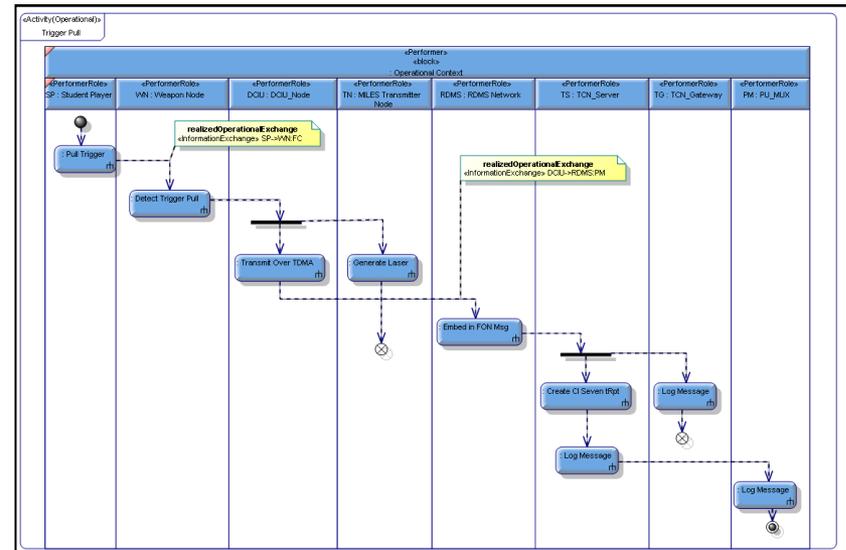


Functional Decomposition



- Process/Strategy
 - Identify system elements (with varying levels of detail)
 - Collect documentation and information regarding the ICDs, standards, message and protocols
 - Identify use cases (Operational Capabilities)
 - Collect documentation of the message flows, states and business logic with respect to each system element involved in the use cases
- Conduct Model Based Systems Engineering (MBSE) of the system elements and operational capabilities using the tool selected in the SoS Tool Evaluation (Artisan Studio)
- Output is a SysML/UPDM model that defines the interfaces between systems and between system elements within each subsystem

Information Exchange		Producer		Needline	Consumer	
Name	Conveyed	Performer	Activity (Operational)	Name	Performer	Activity (Operational)
DCIU->RDMS.PM	«InformationElement» Proprietary Msg	«Performer» DCIU_Node	«Activity (Operational)» Transmit Over TDMA	DN - RN	«Performer» RDMS Network	«Activity (Operational)» Embed in FON Msg
DCIU->VPU.TA	«InformationElement» TES_Acknowledge	«Performer» DCIU_Node	«Activity (Operational)» Transmit Over TDMA	VPU - DN	«Performer» VPU	«Activity (Operational)» Embed in FON Msg
FON->TS.PM	«InformationElement» Proprietary Msg	«Performer» FON		Needline	«Performer» TCN_Server	
GPS->DCIU.PD	«InformationElement» Position Data	«Performer» GPS		GPS - DN	«Performer» DCIU_Node	
MS->VPU.MCM	«InformationElement» Miles Component Messages	«Performer» MILES Sensor		SN - VPU	«Performer» VPU	«Activity (Operational)» Determine Damage
PM->CDS.WF	«InformationElement» (U)GvWeaponFire	«Performer» PU_MUX		Needline	«Performer» Cross Domain Solution	
RDMS->FON.PM	«InformationElement» Proprietary Msg	«Performer» RDMS Network		RN - TS	«Performer» FON	
SP->WN.FC	«InformationElement» Fire Command	«Performer» Student Player	«Activity (Operational)» Pull Trigger	SP - WN	«Performer» Weapon Node	«Activity (Operational)» Detect Trigger Pull
TG->PM.UWF	«InformationElement» (U)GvWeaponFire	«Performer» TCN_Gateway		TG - PM	«Performer» PU_MUX	
TN->SN.ML	«InformationElement» Miles Laser	«Performer» MILES Transmitter Node	«Activity (Operational)» Generate Laser	Needline	«Performer» MILES Sensor	«Activity (Operational)» Decode Laser Information
TS->TG.UER	«InformationElement» (U)CIS_Event_Report	«Performer» TCN_Server		TS - TG	«Performer» TCN_Gateway	
VKI->SP.VI	«InformationElement» Visual Indicator	«Performer» Vehicle Kill Indicator		Needline	«Performer» Student Player	
VPU->DCIU.DER	«InformationElement» DCI Event Report	«Performer» VPU		VPU - DN	«Performer» DCIU_Node	
VPU->TN.MCM	«InformationElement» Miles Component Messages	«Performer» VPU		VPU - TN	«Performer» MILES Transmitter Node	
VPU->VKI.ICC	«InformationElement» Indicator Control Commands	«Performer» VPU	«Activity (Operational)» Send Kill Indicator Msg	Needline	«Performer» Vehicle Kill Indicator	«Activity (Operational)» Indicate Kill
WN->VPU.TP	«InformationElement» Trigger Pull	«Performer» Weapon Node		WN - VPU	«Performer» VPU	



Functional Decomposition System Elements/Levels of Detail



Level System Elements	1 (Less Detail)	2	3	4 (More Detail)
ICDs (HW and SW)	ICD (Name, revision, date, etc..)	Specific Protocol Messages (Event Report, Position Report, etc)	Message Semantics (Position, Time, Player ID, Kill Code, etc)	Message Field Characteristics (Lat Long vs UTM, 16 vs 32-bit, integer vs float, etc)
TES	TES (MILES XXI, WITS, vehicle vs dismount, etc)	TES Components (Detector, Transmitter, etc)	Internal TES messages	Internal TES algorithms
Player Unit	DCIU, etc	DCIU Components (GPS, Display, Radio, etc)	Internal DCIU messages	Internal DCIU algorithms
Wired/Wireless Communications Infrastructure	Access Node, Backhaul	Infrastructure Components (towers, fiber rings, etc)	Physical connections (routers, switches, cables)	
C2 Facility	Facilities (CIS, TAF, AAR, etc)	LANs (CIS UNCLAS, CIS SECRET, etc)	Compute Hosts (servers, workstations)	Physical Connections (routers, switches, cables)
Software Application	Applications (CTIA Services, EXCON, Oracle, etc)	Software Components (2D Map, PDT, etc)	Software Modules (C++ Framework, Exercise Tree, etc)	Software Objects/Algorithms (Classes, data structures, etc)
External System	System (GPS, JCATS, ABCS, etc)			

 Shows proposed depth of functional decomposition by system element/area

 Shows proposed partial decomposition (to include only non-proprietary messages)

Functional Decomposition Scope Operational Capabilities (Use Cases)



Proposed Operational Capabilities (Use Cases) to model:

- System Initialization
- Instrumentation Issue
- Instrumentation Recovery
- MILES Contact Team Component Replacement
- Direct Fire Engagement
 - Trigger Pull
 - Hit Detection
 - Pairing
- Area Weapons Effect
 - Indirect Fire
 - CBR
 - Minefield
- Position Reporting
- Out of Comms Event Recovery
- Administrative Control
 - Admin Kill
 - Admin Resurrect
 - Controller Gun Kill
 - Controller Gun Resurrect

- **Instrumented Shooter/Target vs Un-instrumented**
- **Exercise Planning (Exercise Creation, Battle Roster Import, Overlay Creation) ***
- **Exercise Monitoring (Situational Awareness)**
- **Generate Queries and Reports**
- **After Action Review Production**
- **After Action Review Presentation**
- **2D Map Playback**

Variants:

- **MILES system**
 - IWS vs MILES XXI vs etc...**
- **Weapon System**
 - Primary Weapon vs Missile vs etc...**



LT2 FRAMEWORK ARCHITECTURE MATURATION

Introduction

LT2 Framework Program Overview

System of Systems Tool Evaluation/Selection

Functional Decomposition

LT2 Framework Architecture Maturation

Live Training Engagement Component (LTEC)

Communicating with Industry

Summary

LT2 Framework Architecture Maturation

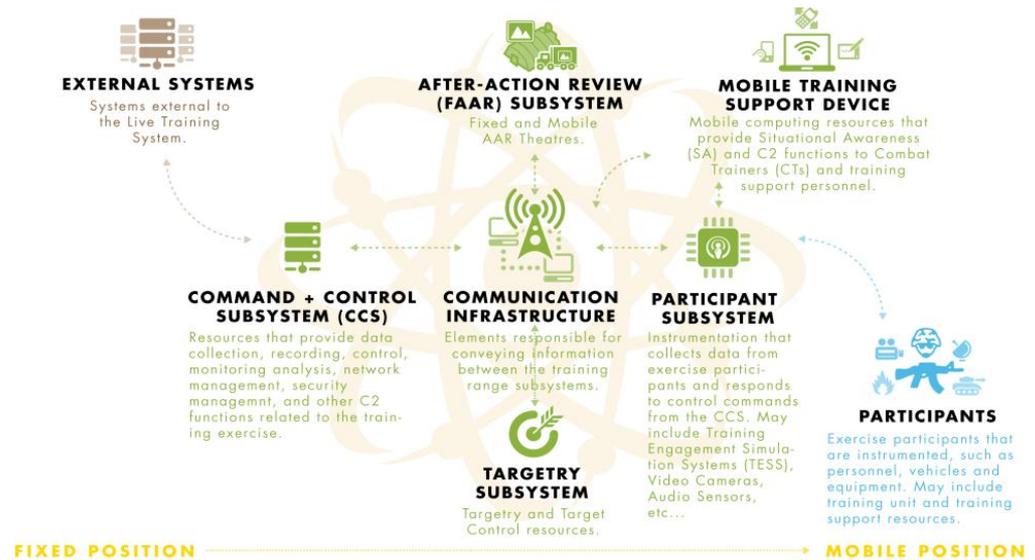


- **Purpose**

- Define A-TESS Architecture
- Extend CTIA to Player Units

- **Approach**

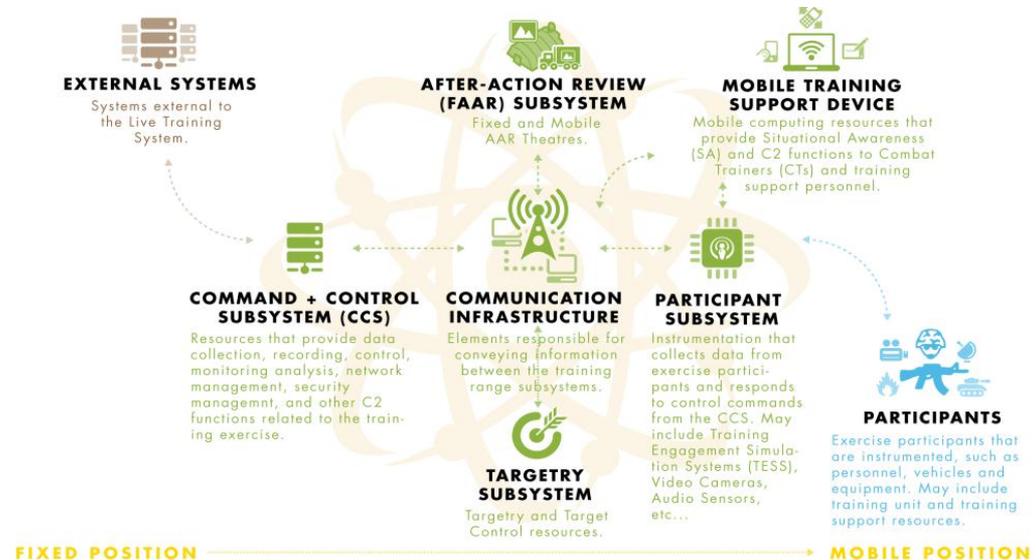
- Stakeholder session held last week to refine the objectives for this task
 - Definition of LT2 Framework Architecture
 - Identify A-TESS Operational Capabilities and Architecture
 - Define boundaries between A-TESS, CTIA (and FASIT)
- Start with model created during Functional Decomposition task
 - Extend the model to include A-TESS capabilities and evolution of CTIA/FASIT



LT2 Framework Architecture Maturation

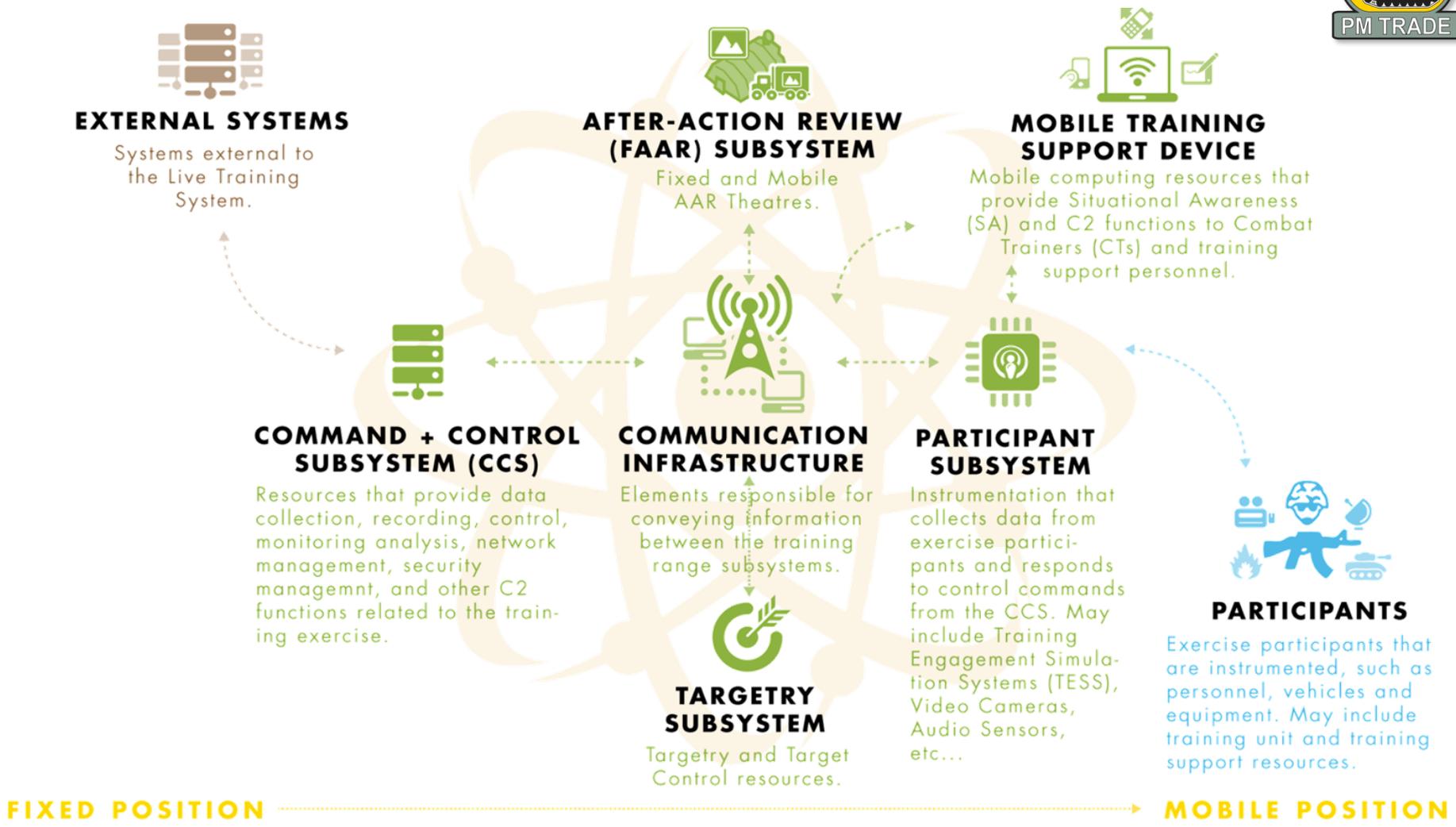


- **Approach (continued)**
 - Use of existing ICDs and standards to define Over The Air (OTA) messages for Player Units
 - Reuse of existing IS-TES Standard and CTIA PUXML ICD to use as basis for OTA messages
 - Eliminate proprietary OTA messages, protocols
 - Simplify or eliminate the instrumentation gateways used today
 - Extend OTA messages to support A-TESS operational capabilities
 - Develop (and sustain) and LT2 Framework Architecture
 - Identify LT2 Framework model governance process to keep model and architecture in sync with development efforts across the product line



Now is the time for industry to impact this architecture

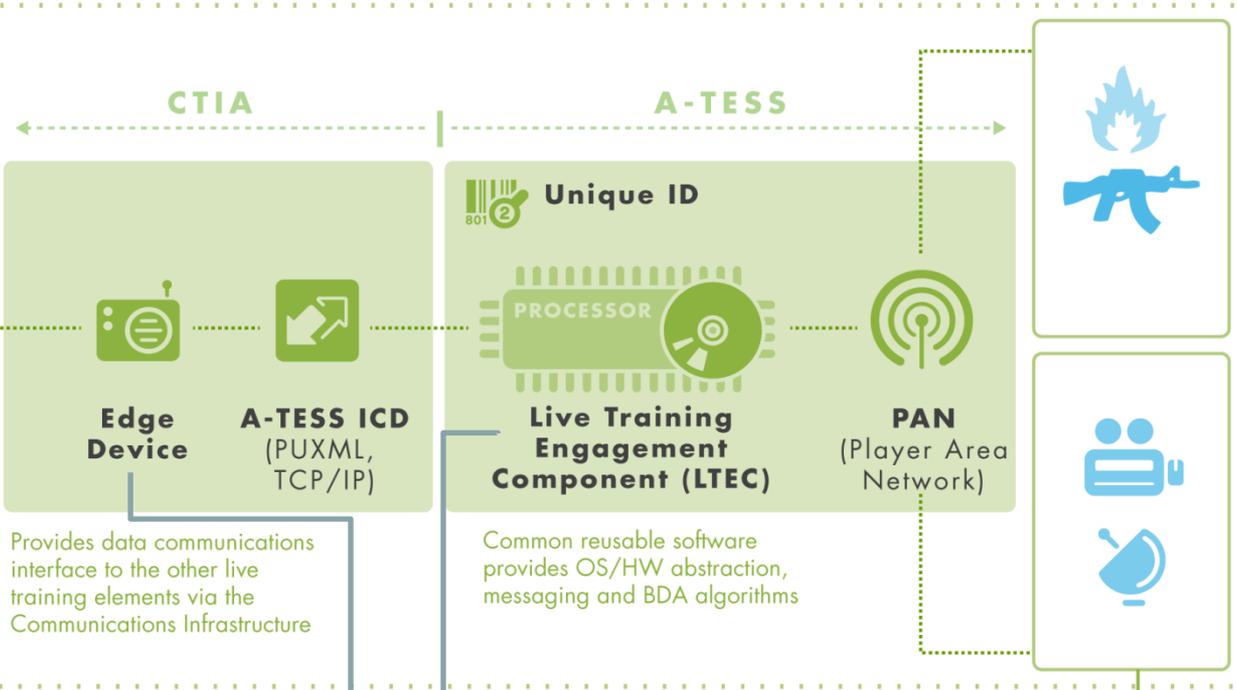
LT2 Framework Top-Level Block Diagram



LT2 Framework Participant Subsystem



INSTRUMENTED PLAYER UNIT



COMMUNICATIONS INFRASTRUCTURE

Elements responsible for conveying information between the training range subsystems.

Provides data communications interface to the other live training elements via the Communications Infrastructure

Common reusable software provides OS/HW abstraction, messaging and BDA algorithms

Some elements may communicate directly with the Communications Infrastructure (e.g. Fixed Video Camera).

Hardware Interfaces are encapsulated by service plug-ins that communicate with LTEC.

Communications Infrastructure

may use any technology to communicate with the edge device, but the edge device still presents a standard interface (TCP/IP) to the Player Unit.

Edge Device: Radio or physical network interface (e.g. switch) that connects the Player Unit to the communications infrastructure.

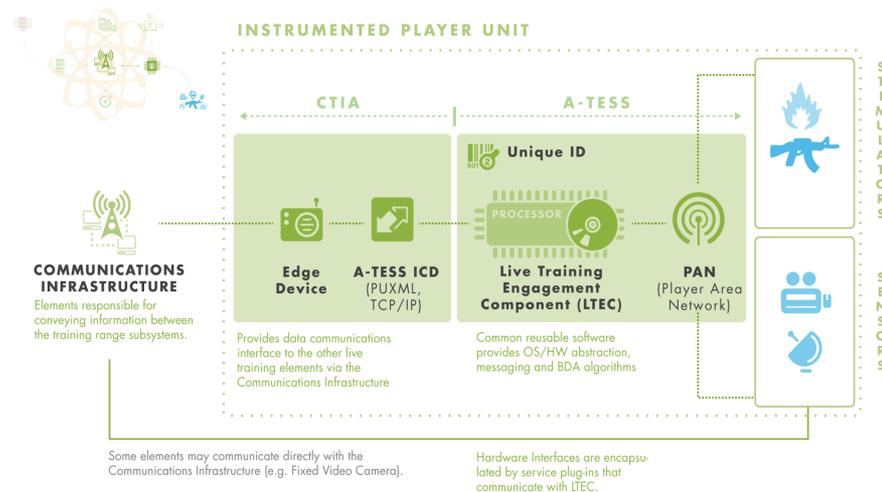
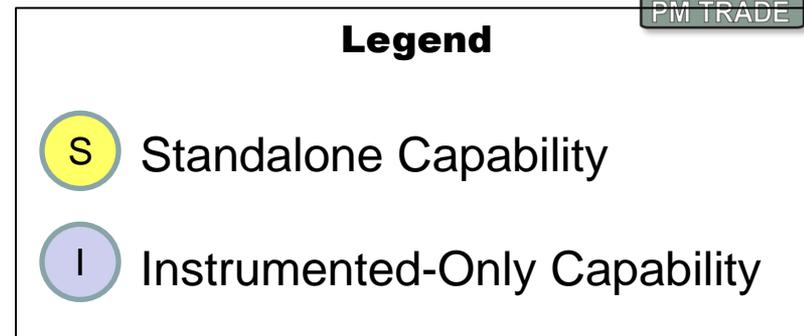
LTEC: Live Training Engagement Component. Reusable software that encapsulates live training business logic (e.g. BDA, data collection, sensor/stimulator interfaces).

Sensors/stimulators: Some may connect directly to the edge device or communications infrastructure w/o the need for a player unit (e.g. fixed video camera).

A-TESS Near Term Capabilities



- S** BCT Weapons/Platforms
- S** MILES enhancements
 - Position encoded within laser
 - Unique Id of Shooter
- I** NLOS
 - Mortars
 - Artillery
 - MK-19, M203
- I** Forward Observer
- I** Interoperability with HITS
- S** Automated Battle Damage Assessment
 - Enhanced Casualty/Simulated Damage
- S** IED Damage Assessment
- I** IED Jamming
- S** IED Remote Control
- S** Compatibility with I-MILES
- I** Aviation



LT2 Framework Player Unit Data Exchange with Training Instrumentation System (T-IS)



From PU to CIS

- TSPI
- Weapon System Firing
 - “Trigger Pull”
 - May not be in near real time (depends on QoS and network load)
- Casualty/Hit Detection
 - Shooter Id, weapon, munitions
 - Casualty assessment/treatment
 - Simulated damage/repairs
- Participant Status
 - Fuel levels, resupply status
 - Biometrics
 - Defensive/CBRN posture
- Audio/Video feeds
 - Vehicle intercom
 - Through sight video

From CIS to PU

- Casualty Command
 - Admin Commands
 - Centralized BDA (e.g. AWE)
- Battlefield Effects Stimulation
 - Round impacts
 - Mine detonations
 - IED
- GPS Data
 - Differential Correction Factors
 - Ephemeris Data
- Over the air data/software updates
 - PK/PH data
 - Software revisions
- Encryption keys
- Configuration data
 - Player Type, Id
 - Reporting rates

Legend

- Existing CTIA/TES Capability
- New T-IS/A-TESS Capability

A-TESS Participant Sensors and Stimulators



Sensors	New Capability	Stimulators	New Capability
Directed Energy (MILES, LRF)		Kill Indicator	
Platform Services Intercom audio Through sight video Vehicle status Simulated Maintenance	New New New New	Platform Services Intercom audio Video (sights, vision blocks) Tactical display	New New New
Position Reporting System		Simulated Resupply	New
Unique ID (RFID)	New	Human Computer Interface (status display)	
Video Camera	New	Battlefield Effects	New
Casualty Treatment	New	Enhanced Casualty/Maintenance Feedback	New
IED Detonation	New	Aviation (IFF)	New
Weapon Firing			
Proximity (Minefield, CBRN, IED)	New		
Aviation (IFF)	New		
Defensive/CBRN Posture	New		
Simulated Resupply	New		
Dynamic Configuration Discovery	New		
Weapon Loading (Artillery, Mortars)	New		

LT2 Framework Model Governance Process



CORE ASSET CHANGE PROPOSAL (CACP)



ASSESSMENT



APPROVAL



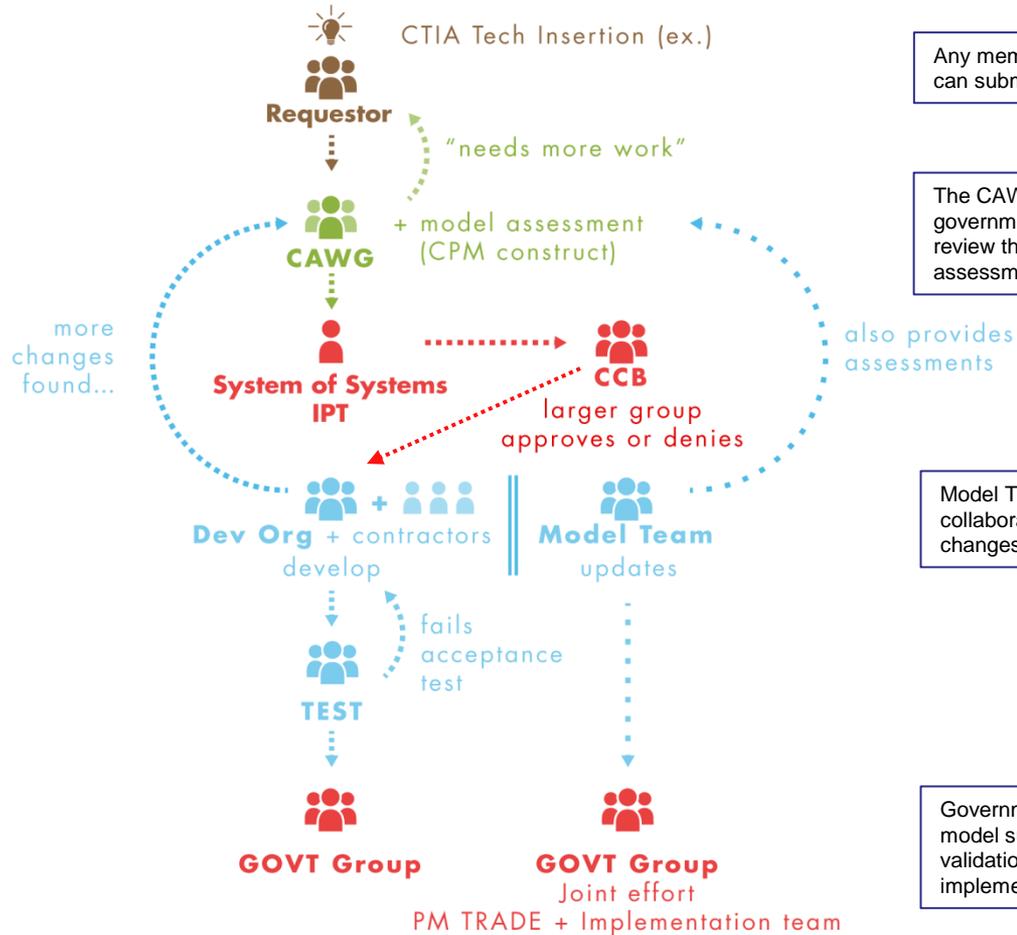
DEVELOPMENT / MODEL UPDATE



VALIDATION



DEPLOYMENT

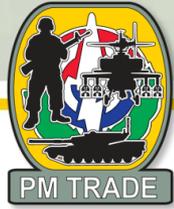


Any member of the LT2 Product Line can submit a CACP

The CAWG consists of industry and government representatives that review the CACP and conducts impact assessments.

Model Team and Development Team collaborate to make sure model changes match implementation

Government teams for developer and model sustainer collaborate during validation, to ensure model matches implementation



LIVE TRAINING ENGAGEMENT COMPONENT

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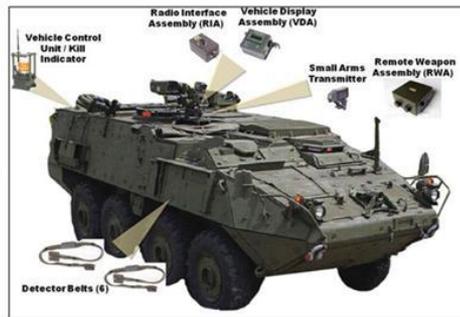
Live Training Engagement Component



- **Purpose**

- Define standards and ICDs for embedded and appended training components
- Provide common reusable software components to allow different platforms to reuse the same software for both embedded and appended training systems
- Eliminate proprietary interfaces to allow the best training solution for any platform
- Conduct a demonstration of this capability using real instrumentation and platform

• **Multiple MILES Systems**
• **Multiple vendors**



MILES WITS (SAIC)



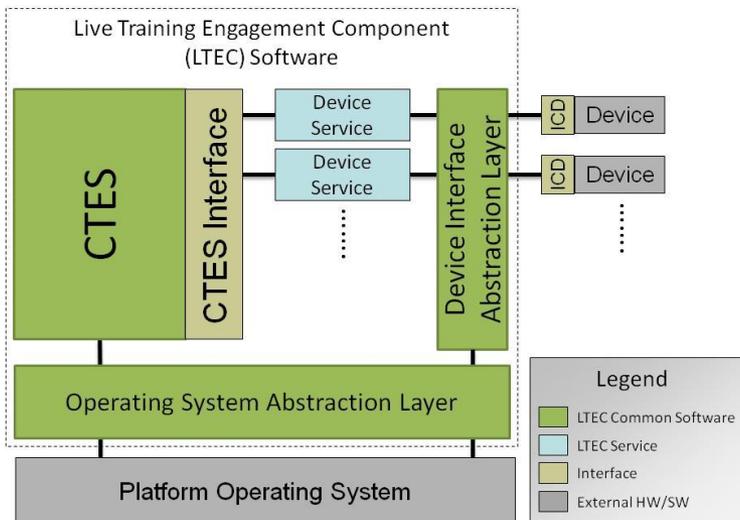
MILES TVS and MILES IWS (Cubic)

Live Training Engagement Component

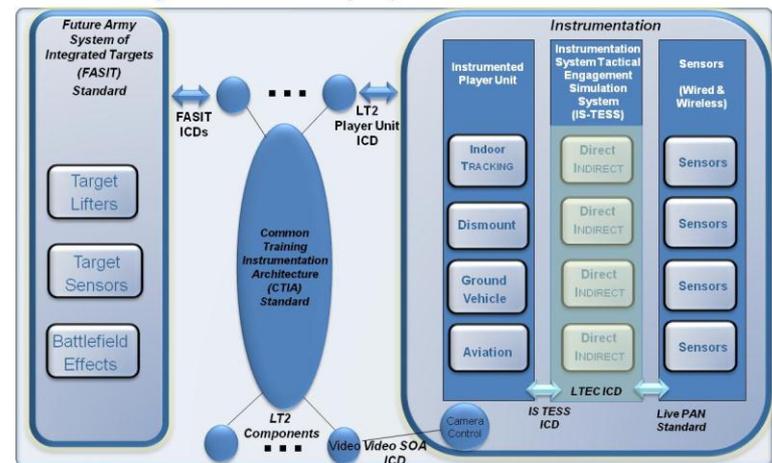


• Approach

- Open architecture/APIs/message protocols
 - See subsequent slides for overview of LTEC architecture
- LTEC software will be available on the LT2 Portal to the entire LT2 community
- Leverage existing standards where appropriate
 - e.g., Player Area Network (PAN) Standard, Instrumentation System – TESS (IS-TESS) Standard
- Operating System/Hardware platform agnostic
 - Encapsulate interfaces to OS/Hardware platform to allow reuse on multiple platforms
- Leverage work being done by Oasis to provide a mechanism to interface to host software and interface to vehicle platform for the demonstration
 - Demonstration to be held at the Maneuver Conference (Ft. Benning, September 2012)



Live Training Transformation (LT2) Standards



MILES System Details



- System component interfaces are proprietary
- System software is proprietary
- Interoperate through laser (MCC Standard)



Main Gun Laser Transmitter



Detector Belt



Proprietary

MILES software

Proprietary

Proprietary



Vehicle Control Unit

MCC Standard





PM TRADE ET Vision

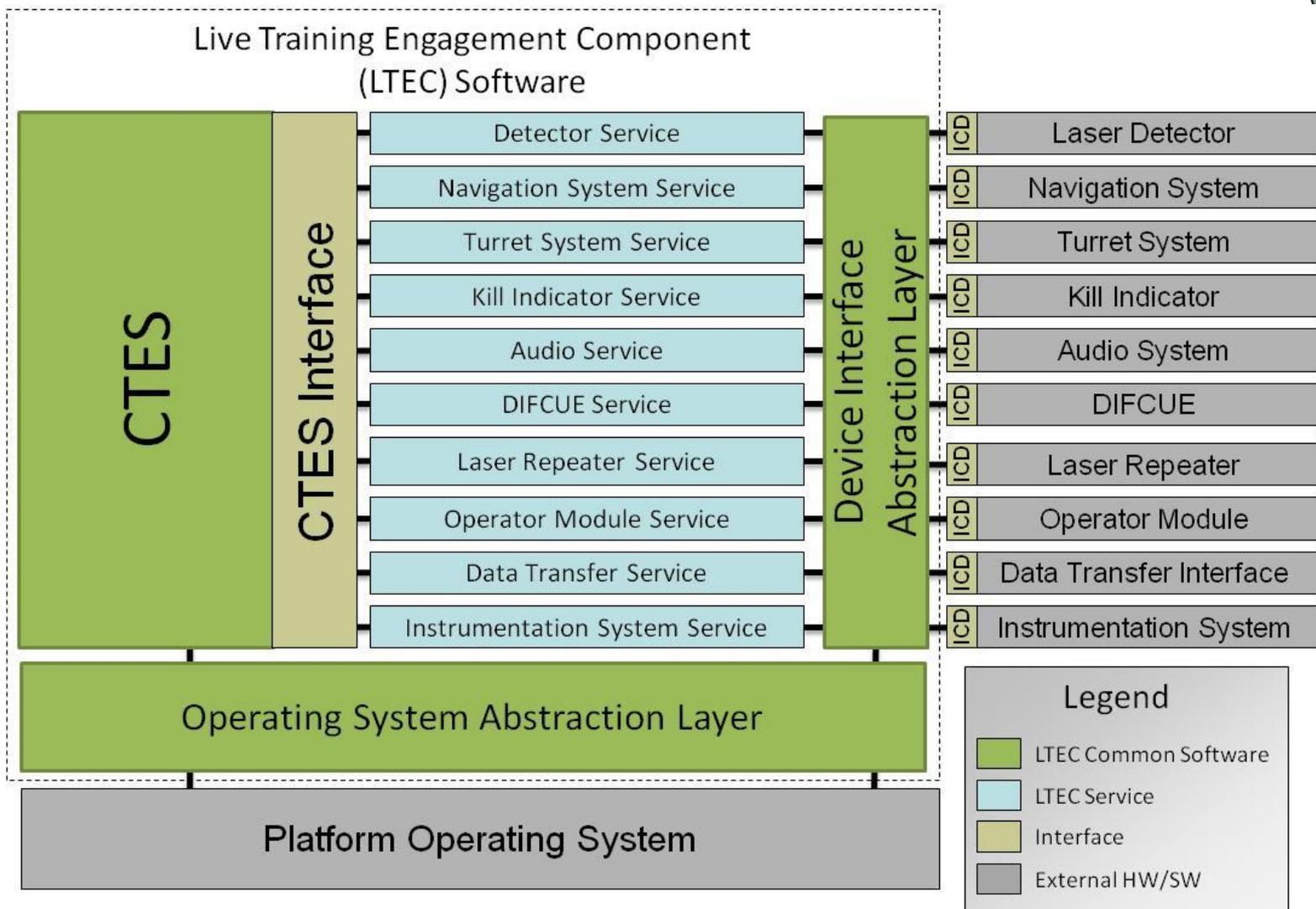


- System component interfaces are open standards
- System software is Gov't owned and reusable



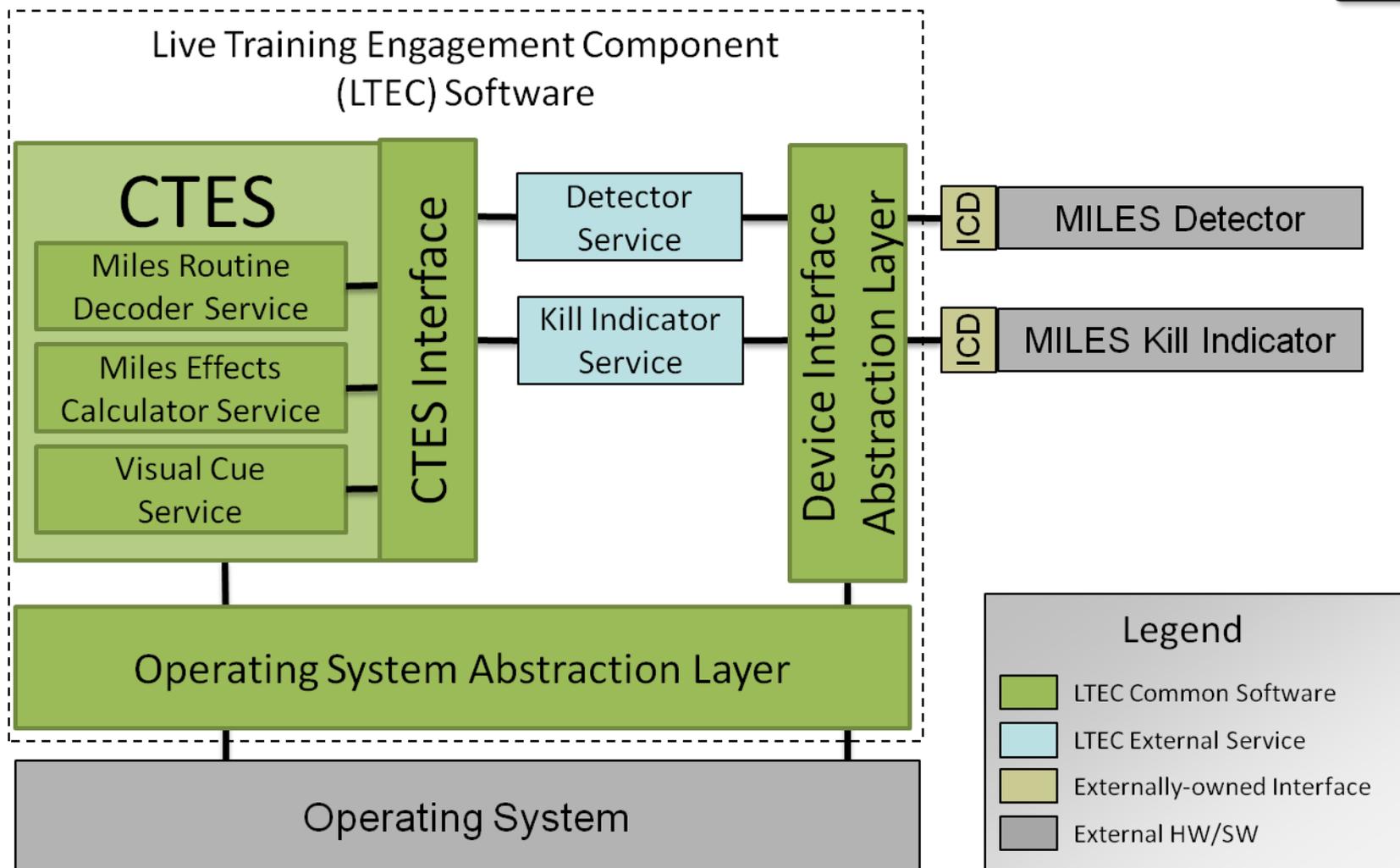


LTEC Architecture

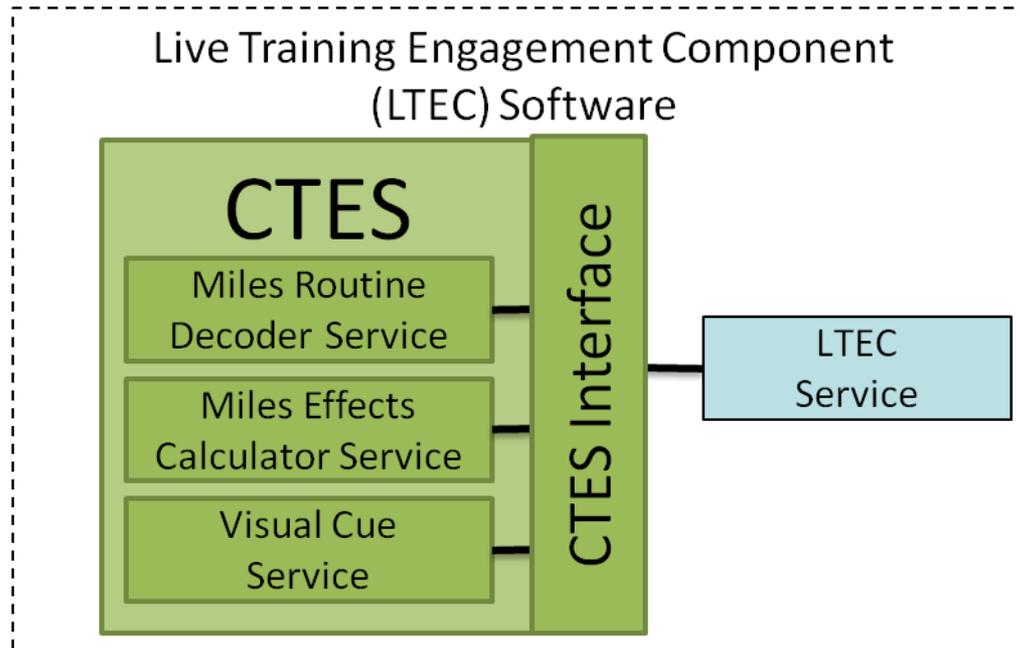




LTEC Architecture



LTEC Architecture



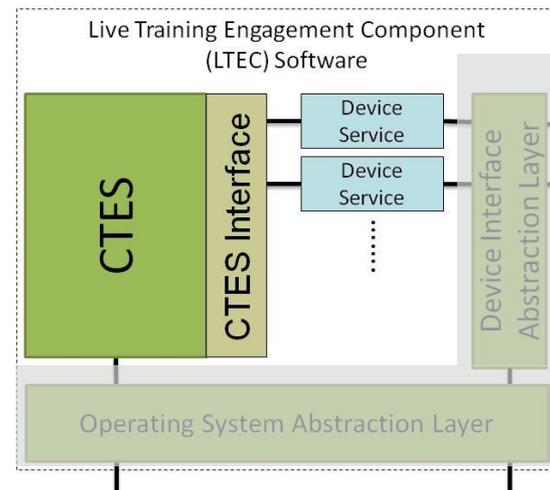
- CTES functionality broken up into CTES Services
- All services (CTES and LTEC) communicate through the CTES Interface
- LTEC ICD defines msgs sent between LTEC Service and CTES Service
- LTEC Service could also receive msgs intended for CTES Service(s)
 - Since CTES Interface uses a publish/subscribe messaging pattern



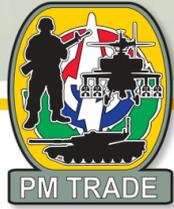
LTEC Architecture



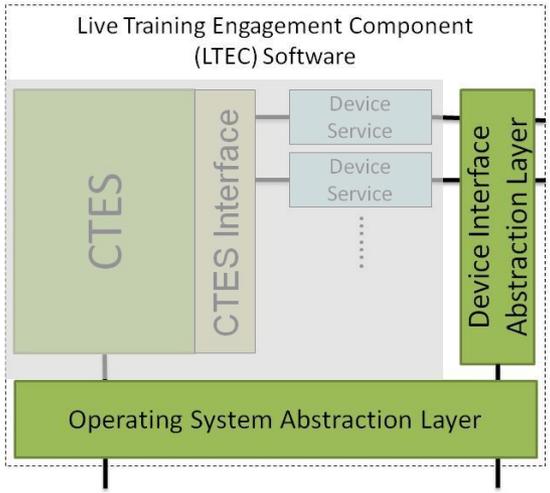
- **CTES – Common Tactical Engagement Simulation**
 - Provides reusable Tactical Engagement Simulation (TES) software, for example:
 - MILES laser routine (hit) decoding
 - MILES lethality assessment
 - Command the stimulation of the kill indicator
- **CTES Interface**
 - Brokers communication between CTES and Services
 - Follows local pub/sub messaging pattern via API calls
- **Services**
 - Integrates a device with CTES
 - Abstracts device interface data format and business logic



LTEC Architecture – cont'd

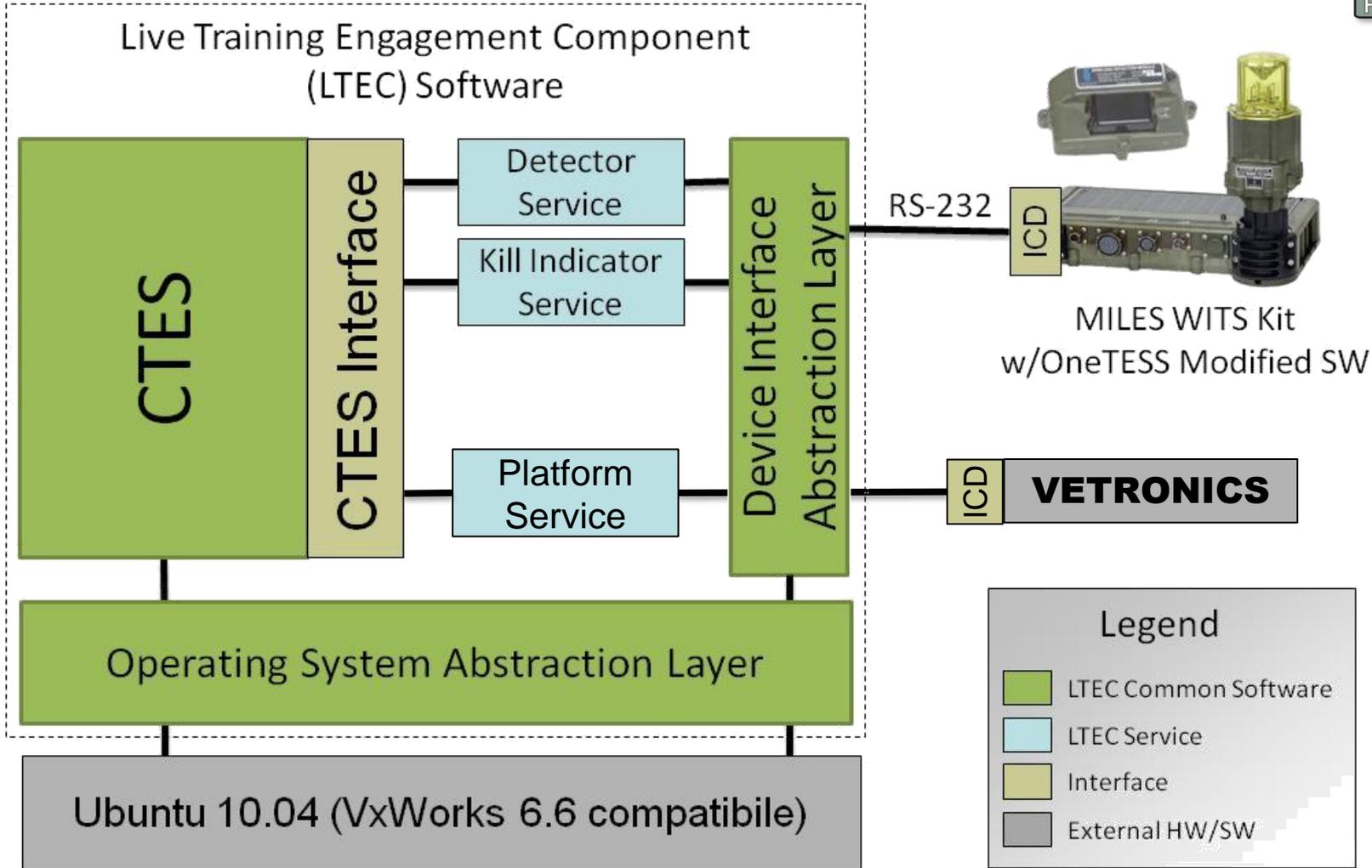
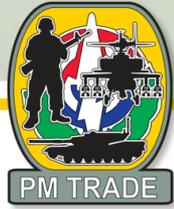


- **DIAL – Device Interface Abstraction Layer**
 - Abstracts the communication protocols of a device from the service that interfaces with it
 - Encompasses all but the application layer of the OSI Model
- **OSAL - Operating System Abstraction Layer**
 - Abstracts operating system APIs from all other components





LTEC Near-term Application



Demo Configuration (MCOE Conf Sept 12)



1. MILES Laser

Controller Gun



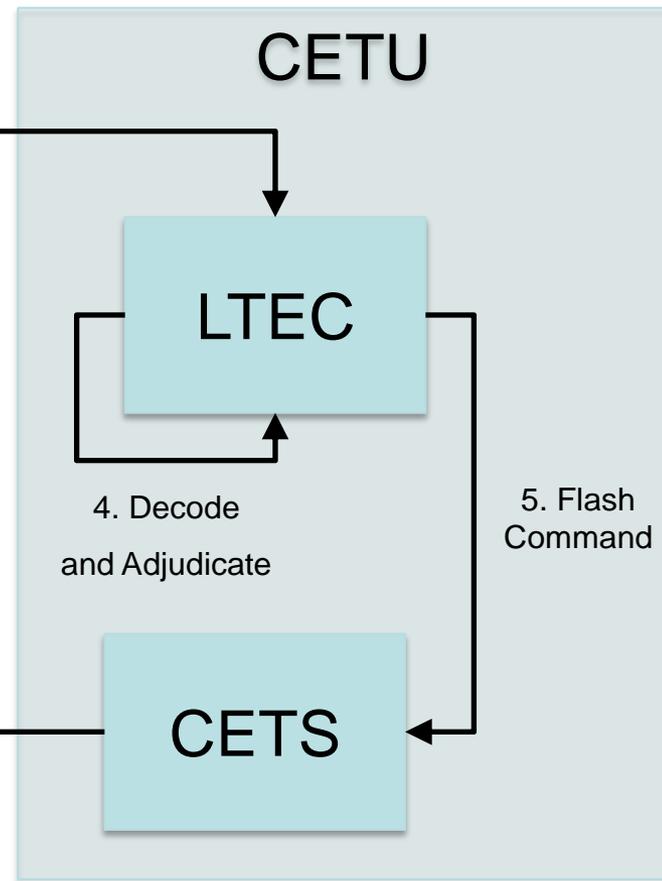
Detector Unit

2. Laser Detection



WITS Unit
w/ OneTESS SW

3. Laser Detection



4. Decode and Adjudicate

5. Flash Command

6. Stimulate Vehicle (Intercom, Tactical Display, Panel Lights)





COMMUNICATING WITH INDUSTRY

Introduction

LT2 Framework Program Overview

System of Systems Tool Evaluation/Selection

Functional Decomposition

LT2 Framework Architecture Maturation

Live Training Engagement Component (LTEC)

Communicating with Industry

Summary

Communicating with Industry



- **Bi-directional communication with industry is important to us**
 - We intend to keep industry informed and involved in LT2 Framework
 - Government wants feedback and participation from industry in the definition of LTEC interfaces, A-TESS Architecture
- **LT2 Portal Community Collaboration Area**
 - From LT2 Portal (<https://lt2portal.org/>):
 - Select “Collaborate” (must register for an account, but no security clearance required)
 - Collaboration area name:
 - [Live Training Transformation Framework](#)
- **Future industry day presentations**
 - Twice per year
- **How to provide feedback**
 - Use Portal Collaboration Area
 - Create Issues/Topics, Forum Posts, Email Community
 - POC: Todd.kosis@us.army.mil



SUMMARY

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Summary

Summary



- **LT2 Framework Tasks**
 - SoS Tool Evaluation (complete)
 - Functional Decomposition of NTC, JRTC, HITS (in progress)
 - Live Training Engagement Component/Embedded Prototype (in progress)
 - LT2 Framework Architecture Maturation (in progress)
- **Industry Involvement**
 - Looking for comments on the architecture
 - Good Ideas
 - Concerns