



PEO
STRI

LIVE TRAINING

Live Training Transformation (LT2)

“The History and Future of Innovation and Excellence”

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LT2Portal.org



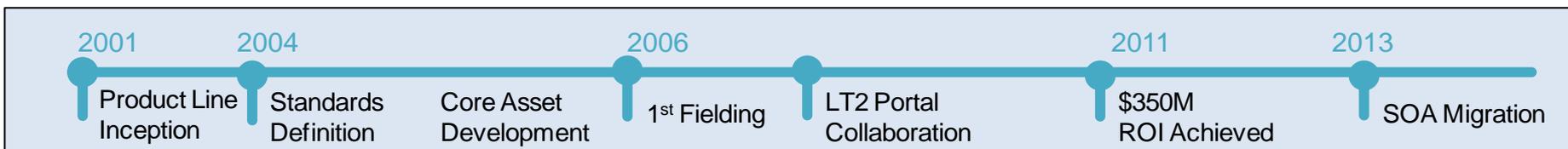
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Introduction to Live Training Transformation (LT2)



- Live Training Transformation (LT2) is the software product line strategy of U.S. Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI).
- Prior to the LT2 product line, live training systems were developed separately by a variety of different manufacturers
- LT2 uses a common architecture with common data, standards, processes, and components
- LT2 is a proven and mature product line

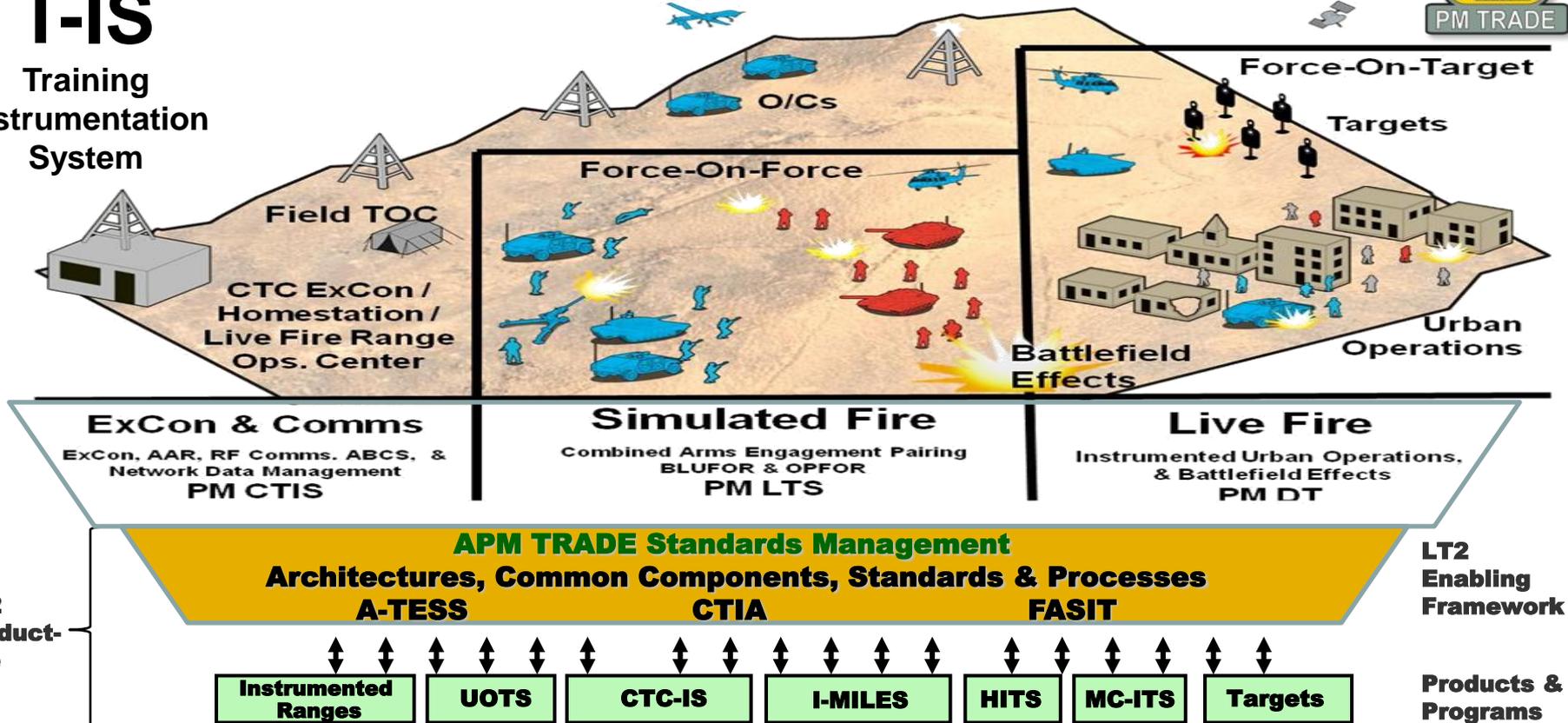


Live Training Lines of Operation LT2-FTS Operational View



T-IS

Training
Instrumentation
System



LT2
Product-
line

LT2
Enabling
Framework

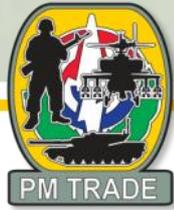
Products &
Programs

Legend:

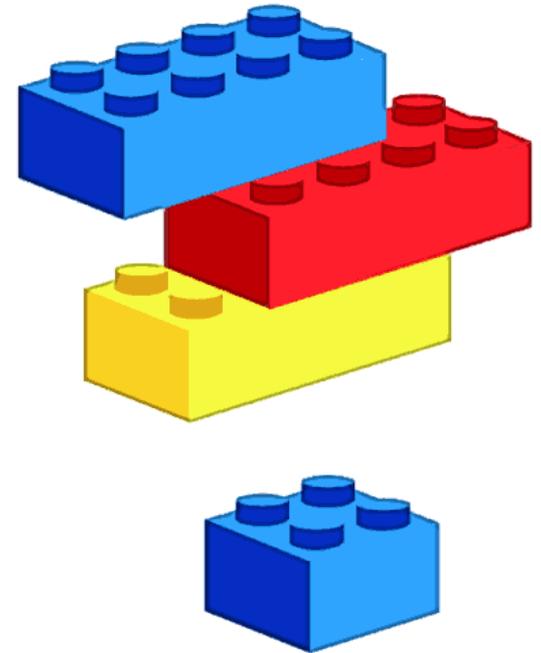
- CTC – Combat Training Center
- NTC – National Training Center
- JRTC – Joint Readiness Training Center
- JMRC – Joint Multinational Readiness Center
- CTIA – Common Instrumentation Architecture
- HITS – Homestation Instrumentation System
- I-MILES – Instrumented-Multiple Integrated Laser Engagement System
- MC-ITS – Marine Corp – Instrumented Training System
- A-TESS – Army-Tactical Engagement Simulation System
- UOTS – Urban Operations Training System
- FASIT – Future Army System of Integrated Targets

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What is CTIA?



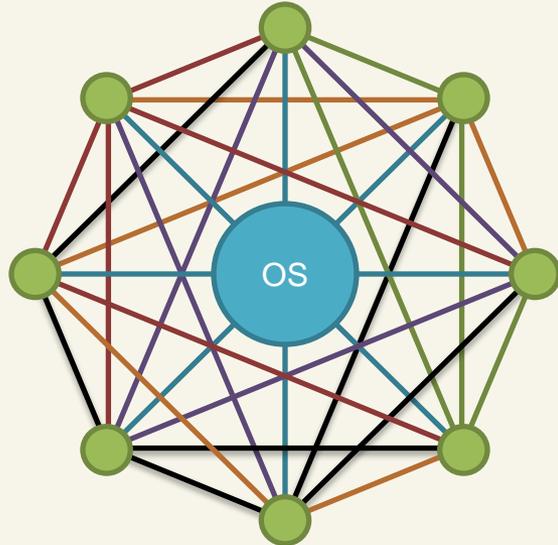
- CTIA
 - The component-based architectural infrastructure for LT2 Product Line (P/L)
 - Catalyst to PM TRADE P/L strategy
 - Foundation of the LT2 P/L
- Critical to PDSS and technology evolution for all live training products
 - 15 products
 - 130 sites
 - CTC IS program is dependent on CTIA to meet low-side requirements
 - Working with PM JBC-P TIGR to leverage mission command technology within instrumented training
- CTIA is the Live Instrumentation Architecture of the LVC-ITE
 - Single standard for Live Training
- DoD Adoption
 - U.S. Marine Corps (PM TRASYS) is a full partner, providing the Army additional ROI
 - OTC/ATEC is evaluating CTIA/LT2 to meet OT instrumented testing needs



Communication benefits of a common architecture

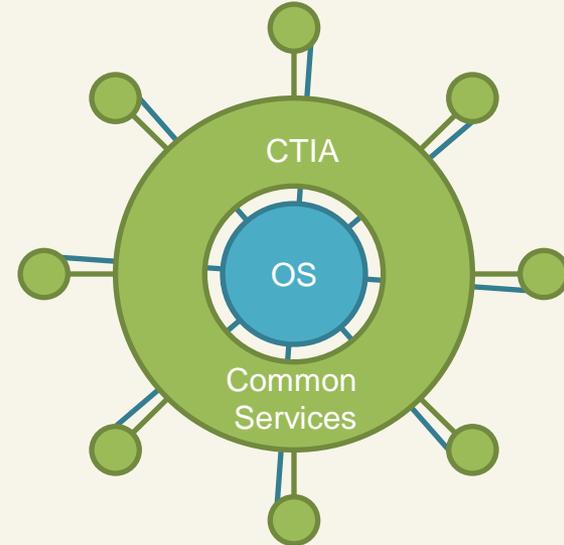


Tools without a common architecture



- Lots of communications channels
- Hard to maintain
- Hard to understand
- Limits reuse and interoperability

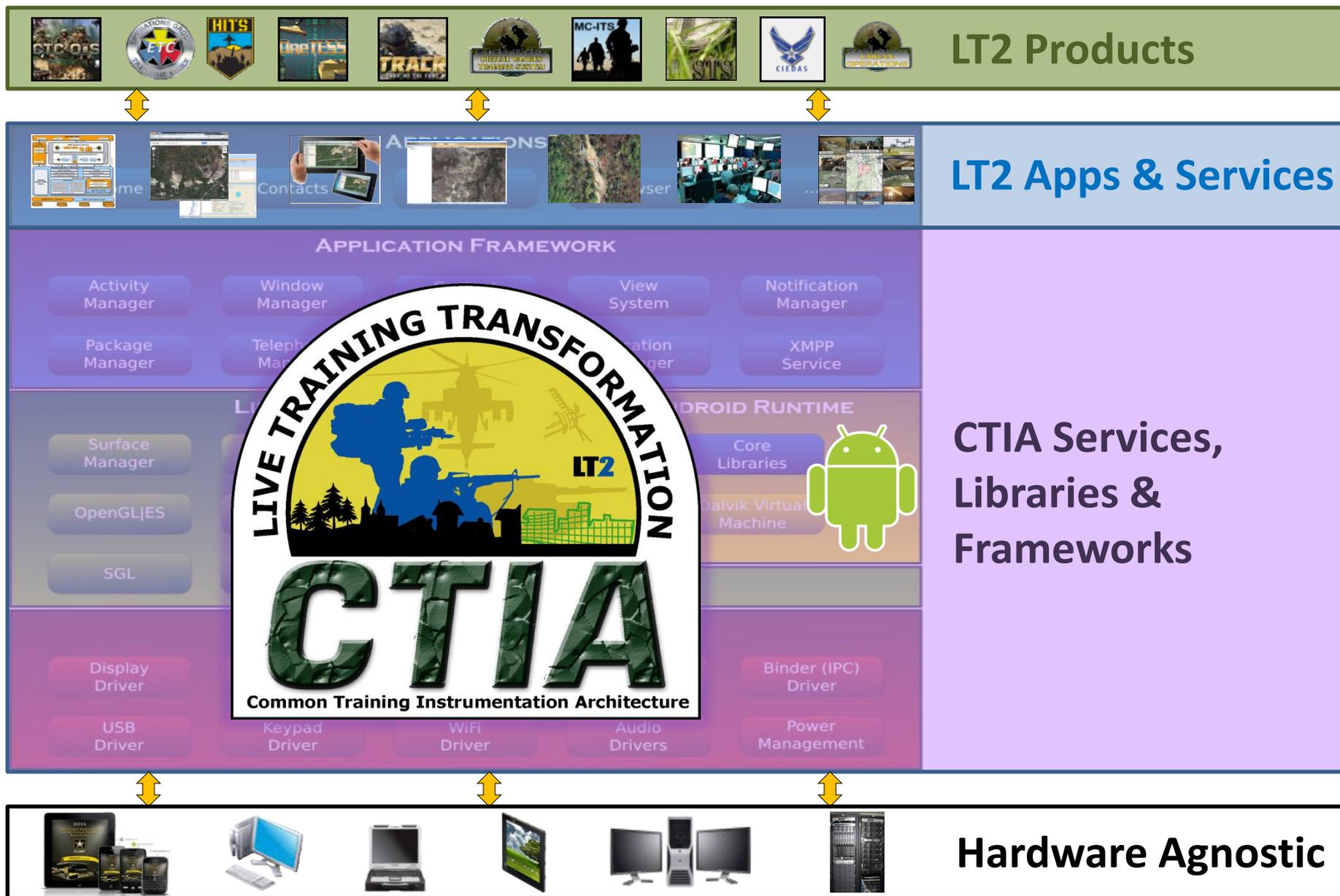
LT2 Components with CTIA



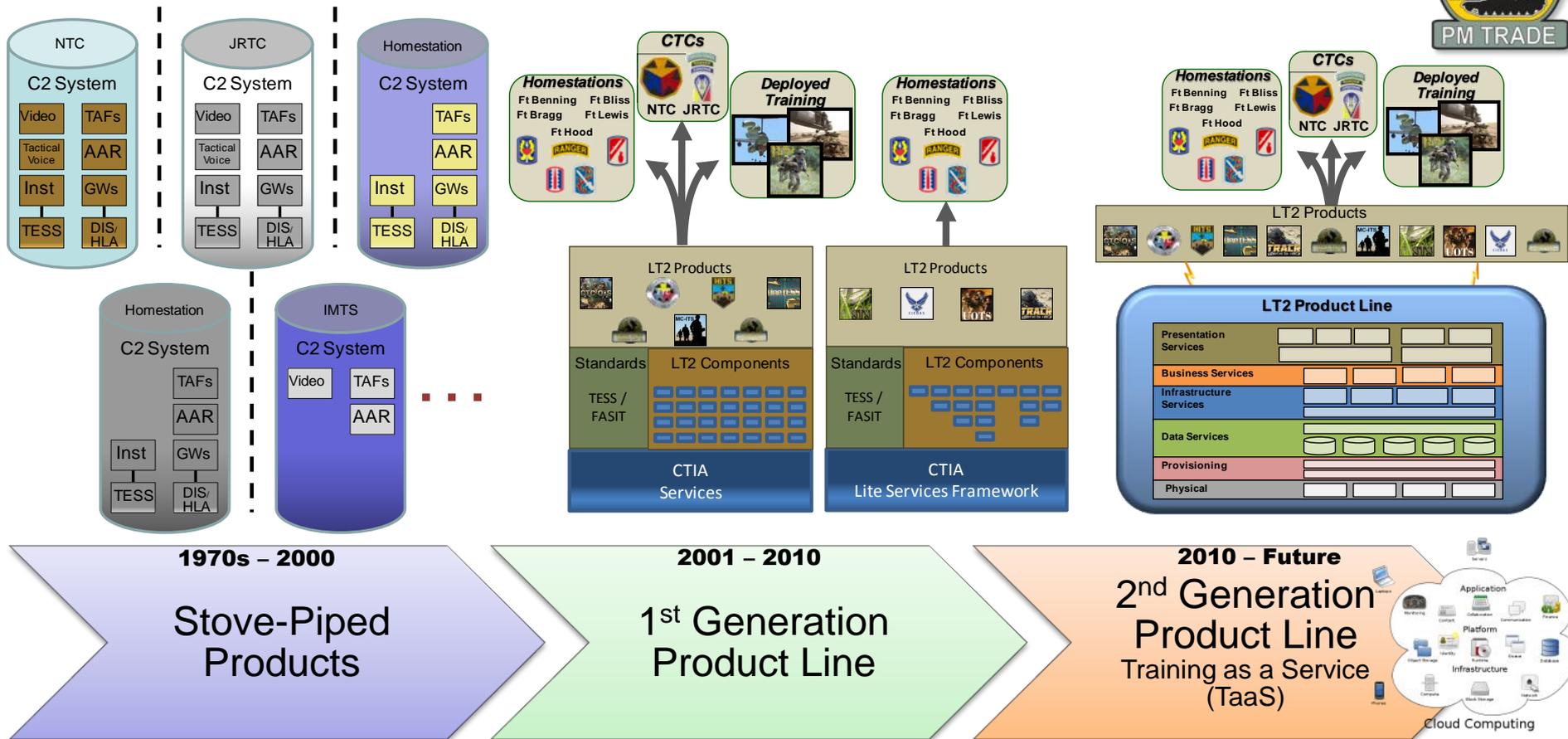
- Clearly defined communications
- Components are interoperable
- Reuse is inherent
- Growth doesn't increase complexity

Metcalfe's Law 80 components = 3160 channels

CTIA is core to LT2 like Android is core to smart phones



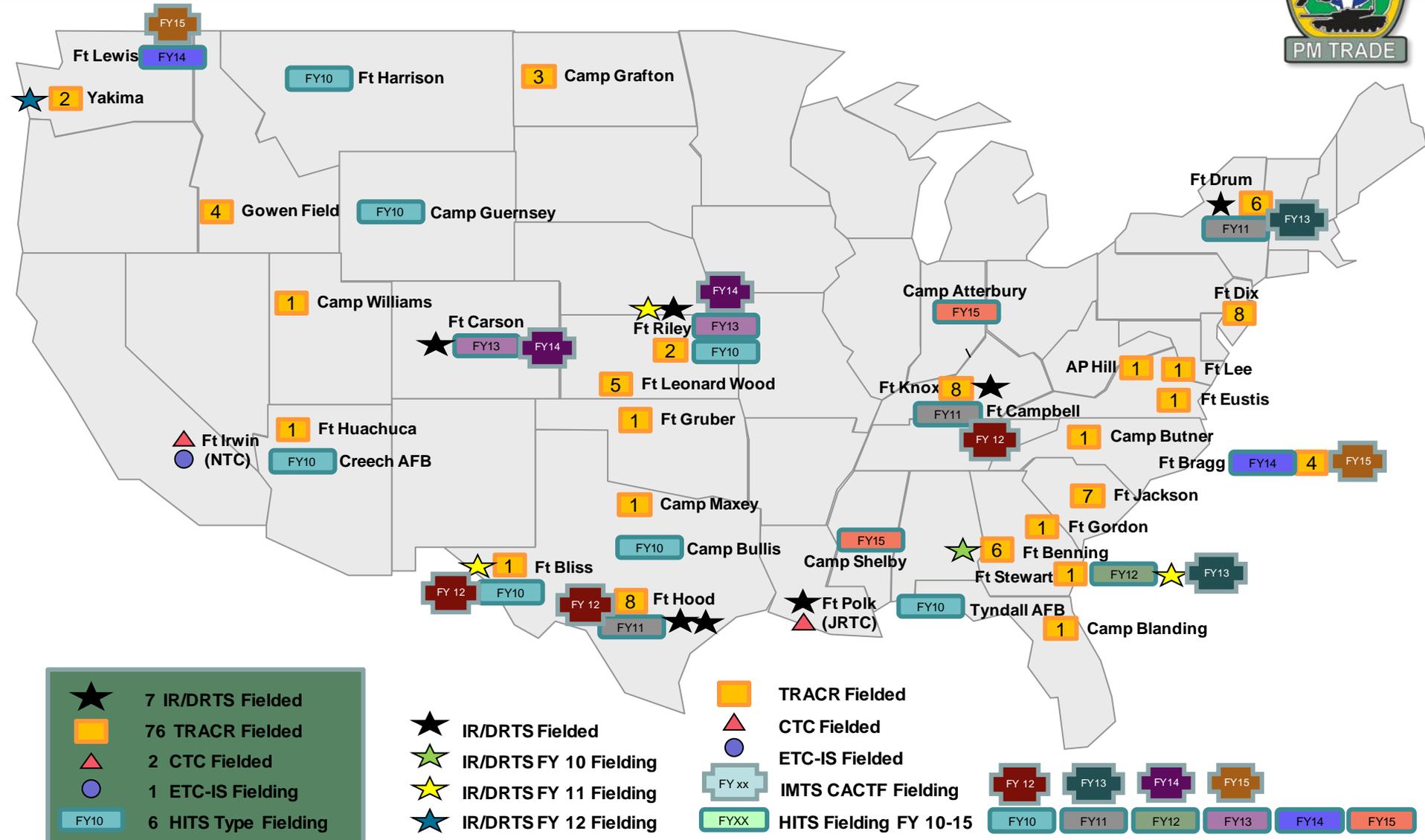
Live Training Transformation (LT2) Family of Training Systems (FTS) Evolution



LT2 Roadmap Influential Drivers

- Army Training Concept of 2020
- Army Enterprise Network Strategy
- Common Operating Environment
- Net Centric Enterprise Services
- Connecting Soldiers to Digital Apps
- Regionalized Training Capabilities

CONUS Deployments: LT2/CTIA-Based Products





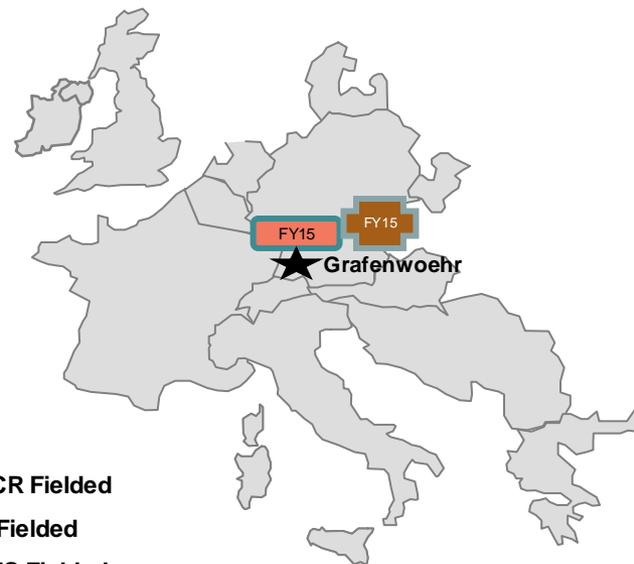
OCONUS Deployments: LT2/CTIA-Based Products



Alaska



USAREUR



Hawaii

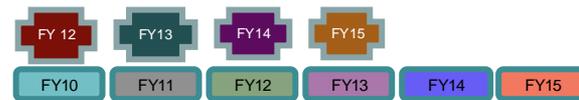


Korea

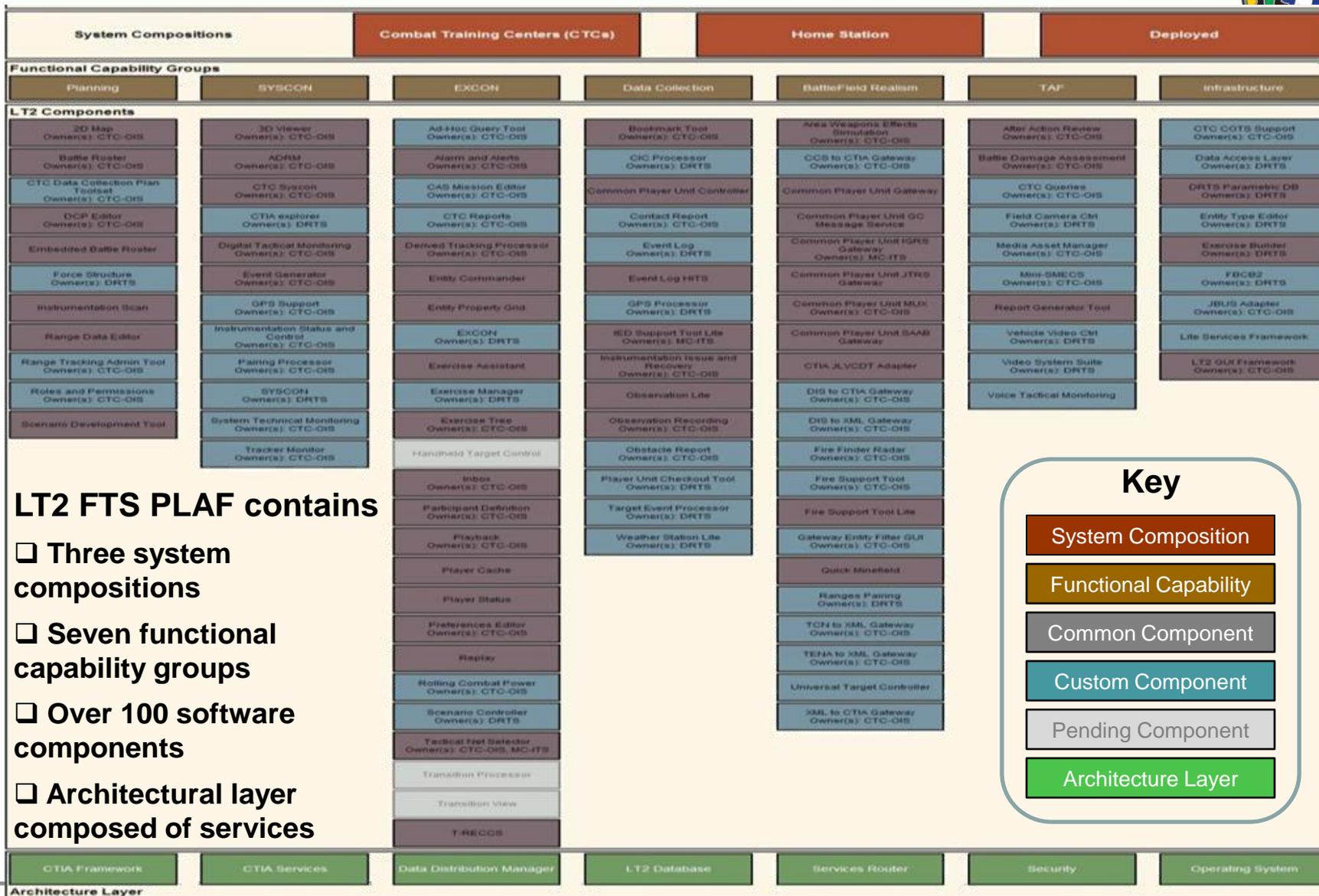


- ★ IR/DRTS Fielded
- ★ IR/DRTS FY 10 Fielding
- ★ IR/DRTS FY 11 Fielding
- ★ IR/DRTS FY 12 Fielding

- ★ TRACR Fielded
- ▲ CTC Fielded
- ETC-IS Fielded
- FY xx IMTS CACTF Fielding
- FYXX HITS Fielding FY 10-15

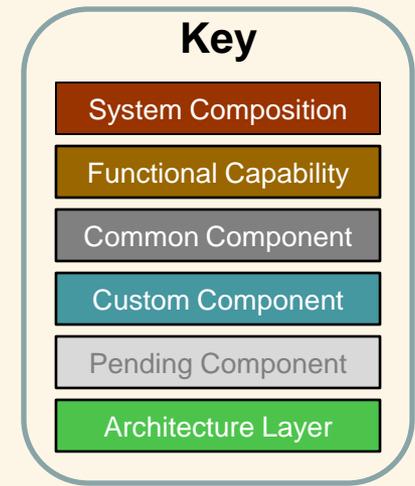


LT2 FTS Product Line Architectural Framework (PLAF)



LT2 FTS PLAF contains

- Three system compositions
- Seven functional capability groups
- Over 100 software components
- Architectural layer composed of services

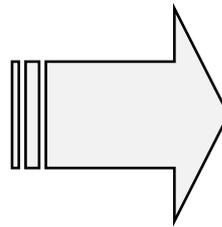


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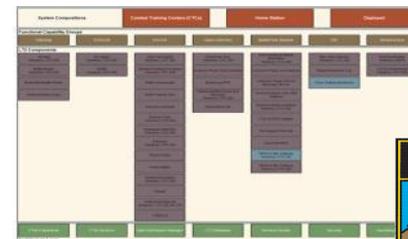
Example: Homestation Instrumentation Training System (HITS)

- ❑ Reused 35 common components
- ❑ Created 5 new common components
- ❑ Resulted in 80% reuse of common components



LT2 FTS PLAF

Example:
Cost Avoidance of \$38M
RDT&E for HITS
Development

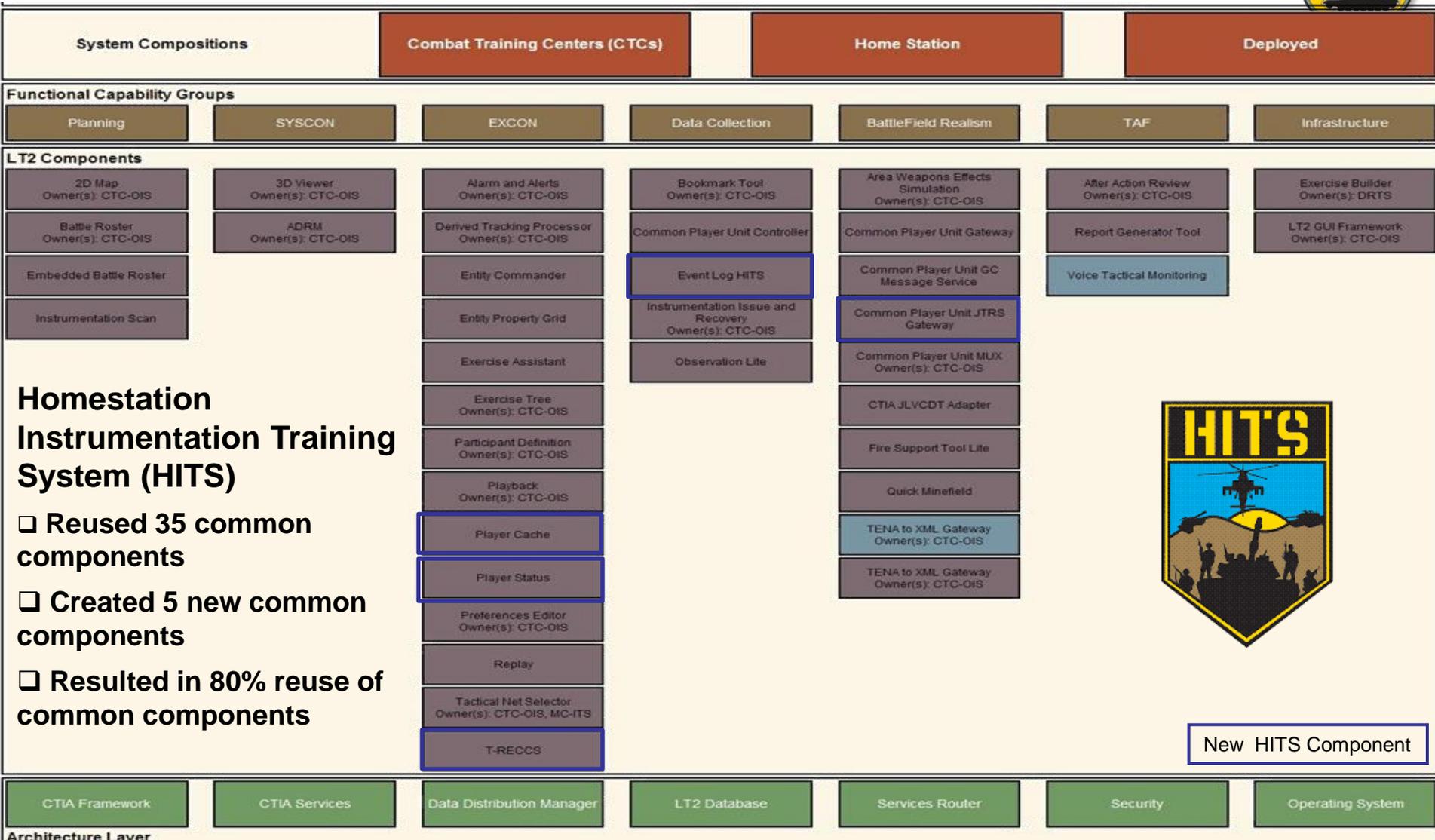


HITS 80% Reuse





Homestation Instrumentation Training System (HITS)



Homestation Instrumentation Training System (HITS)

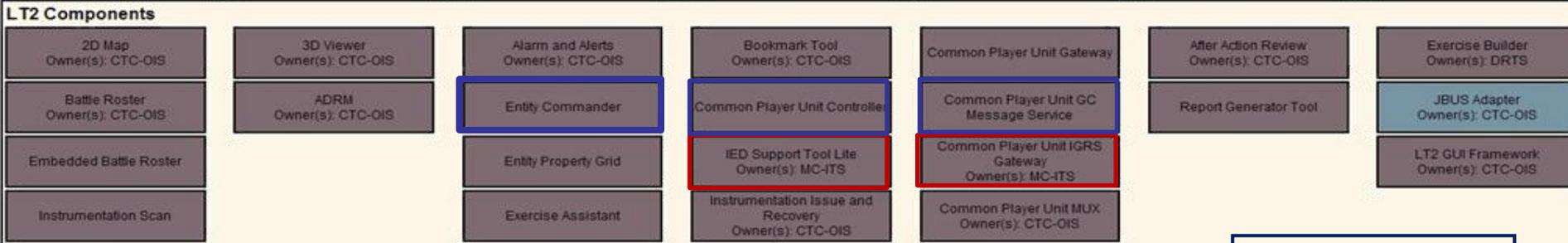
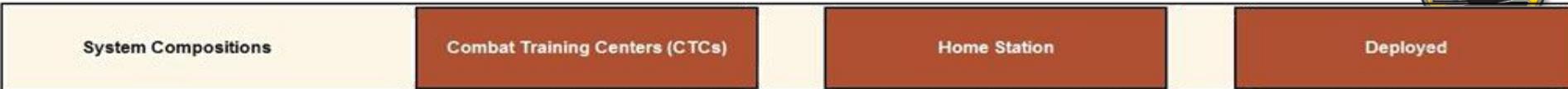
- Reused 35 common components
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- Resulted in 80% reuse of common components



New HITS Component



Marine Corps – Instrumentation Training System (MC-ITS)

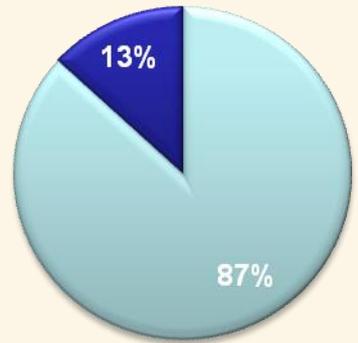
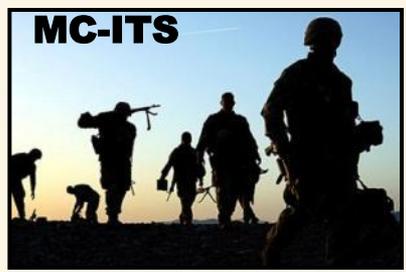


Modified LT2 Component

New MC-ITS Component

The Marine Corps – Instrumentation Training System (MC-ITS)

- ❑ Constructed by reusing the HITS baseline (87% reuse)
- ❑ Developed/modified 6 new common components

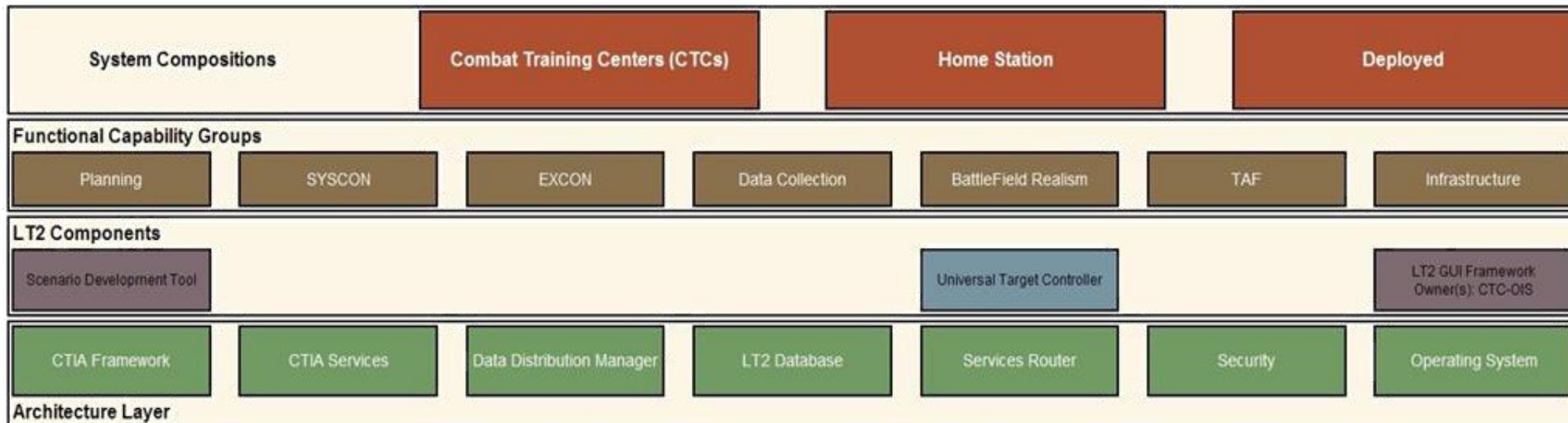


- Reused Source Lines of Code = 8,314,227
- New/Modified Source Lines of Code = 1,255,499





Target Range Automated Control & Recording (TRACR)



Target Range Automated Control & Recording (TRACR)
❑ Constructed with *100%* common component reuse!



1st Generation Product Line Management (1G PLM) Component Reuse



LT2 Perspective

- 80+ Components
- 2.8M Lines of Code

1 Example Component e.g. AAR

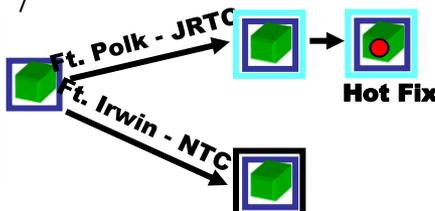


5 Unmanageable Fix & Feature Merges

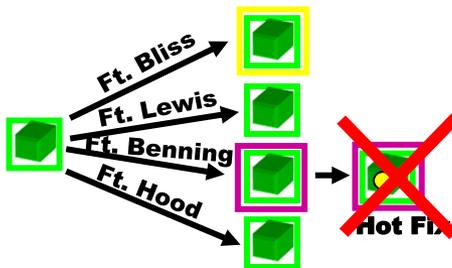
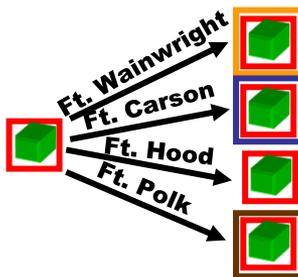
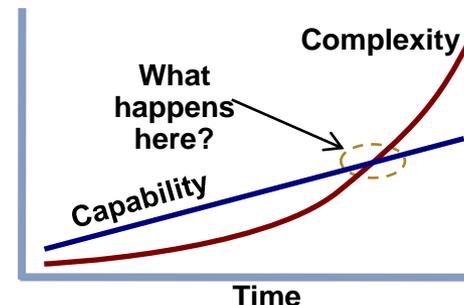
2 Product Teams Pull Components & Add Features



3 Site Specific Tailoring Increases Variations



4 Field Bug Fixes Further Complicate The Issue



Challenges

- Control
- Increased Costs
- Recurring Efforts
- Lost Bug-Fixes
- Product Quality
- Loss of Trust
- Customer Resistance to New Releases

Reuse Results in Complex CM Branching and Merging

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Consolidated Product-Line Management (CPM)

Description:

- Single Award IDIQ
- Develop / Support / Evolve PM TRADE Core Assets & Products
 - CTIA (Common Training Instrumentation Architecture)
 - FASIT (Future Army System of Integrated Targets)
 - OneTESS (One Tactical Engagement System)
- Support External Interoperability Initiatives (LVC-IA, Joint, FMS)
- Manage Core Assets as a Product Line
- PDSS / CM
- Synchronization with Warfighter Focus
- Manage IDE Facility

Contract Type:

CPFF, T&M, FFP – RDT&E, OMA, OPA

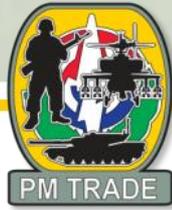
Value:

\$200M Ceiling

POP:

2010-2015

* Winner of the 2010 PEO STRI Team Achievement Recognition (STAR) Award – Contract Execution

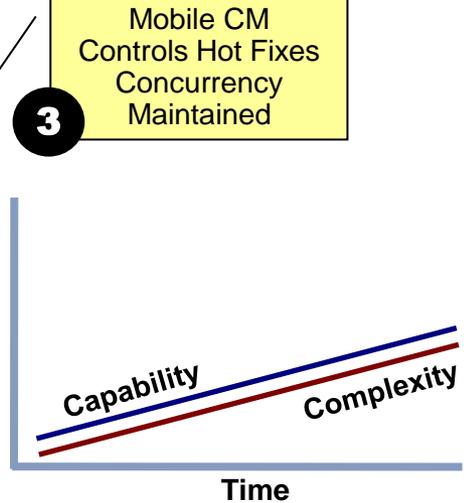
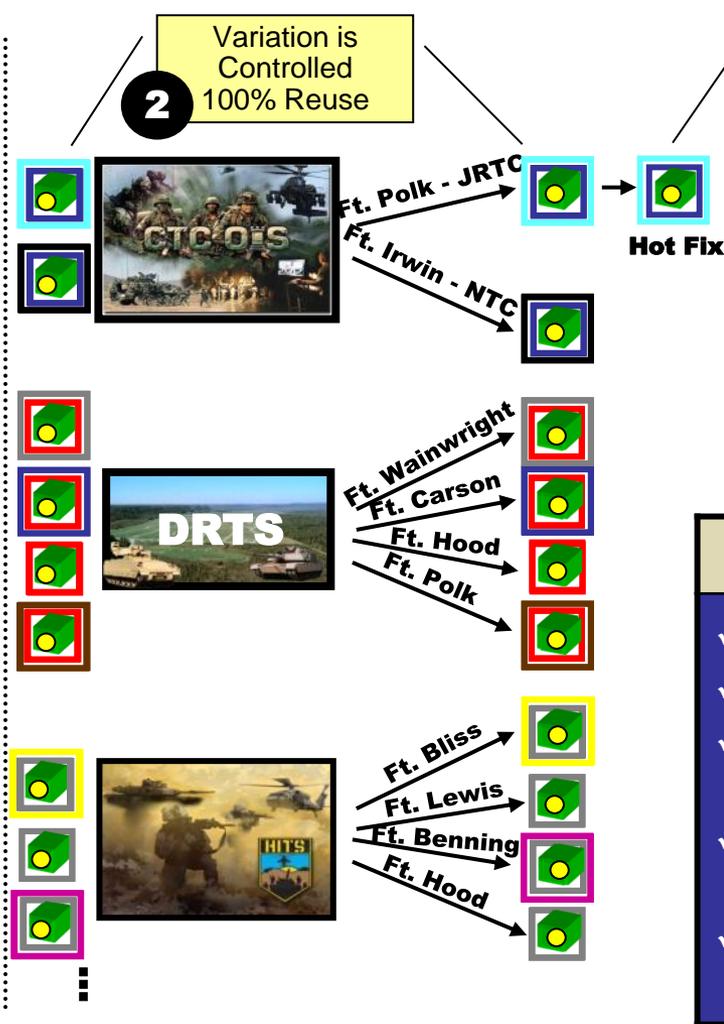
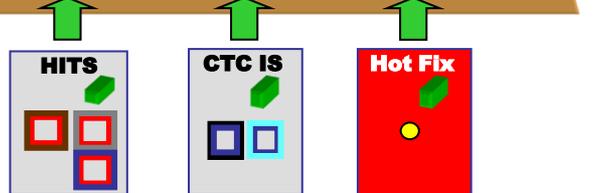
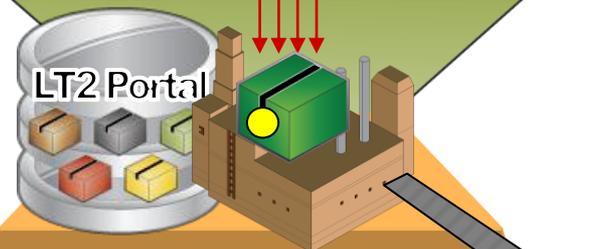
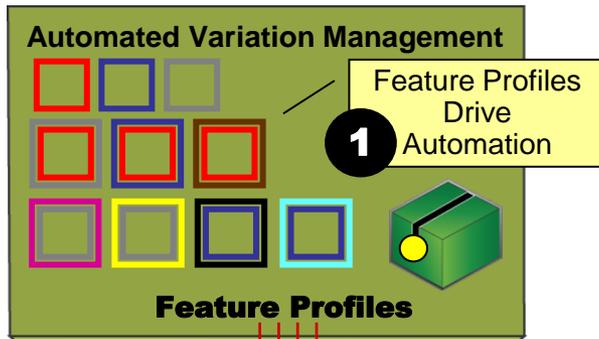


Status:

- DO 1: CTIA, CPM Construct, Misc
- DO 2: CTC IS Support
- DO 3, 8, 12: ETC IS Phase II
- DO 4: HITS, DRTS, IMTS, TRACR PDSS
- DO 5: OneTESS
- DO 6: PM TRASYS (USMC)
- DO 10: LVC IA
- DO 11: IDE Support
- DO 13: LT2 Frameworks

\$200M IDIQ Supporting Development, CTIA, IA, CM, PDSS, ...

2nd Generation Product Line Management (2G PLM)

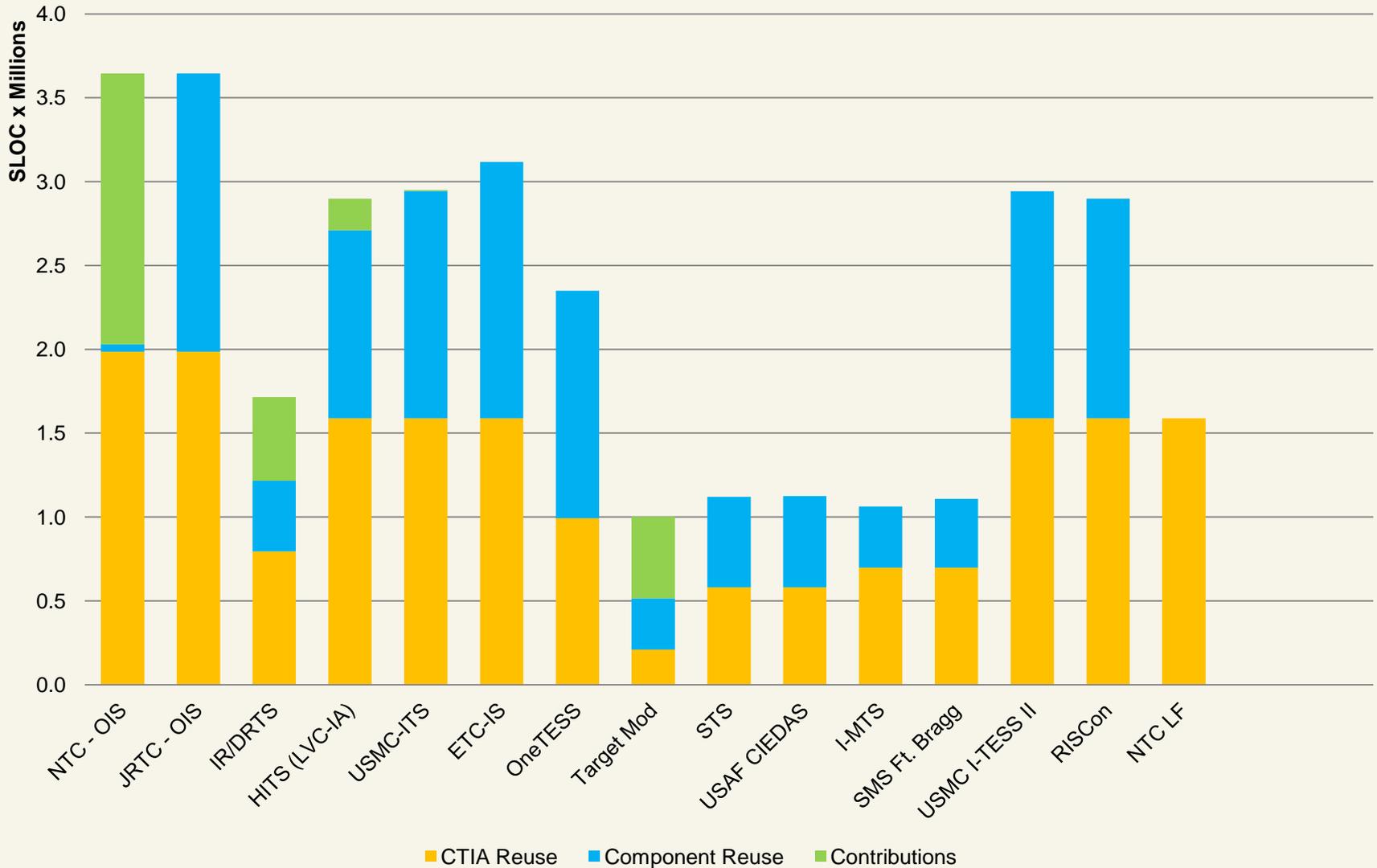


- Results**
- ✓ Configuration Control
 - ✓ Variation Management
 - ✓ Assets Leveraged by Programs
 - ✓ Improved Product Quality
 - ✓ Increased Customer Trust

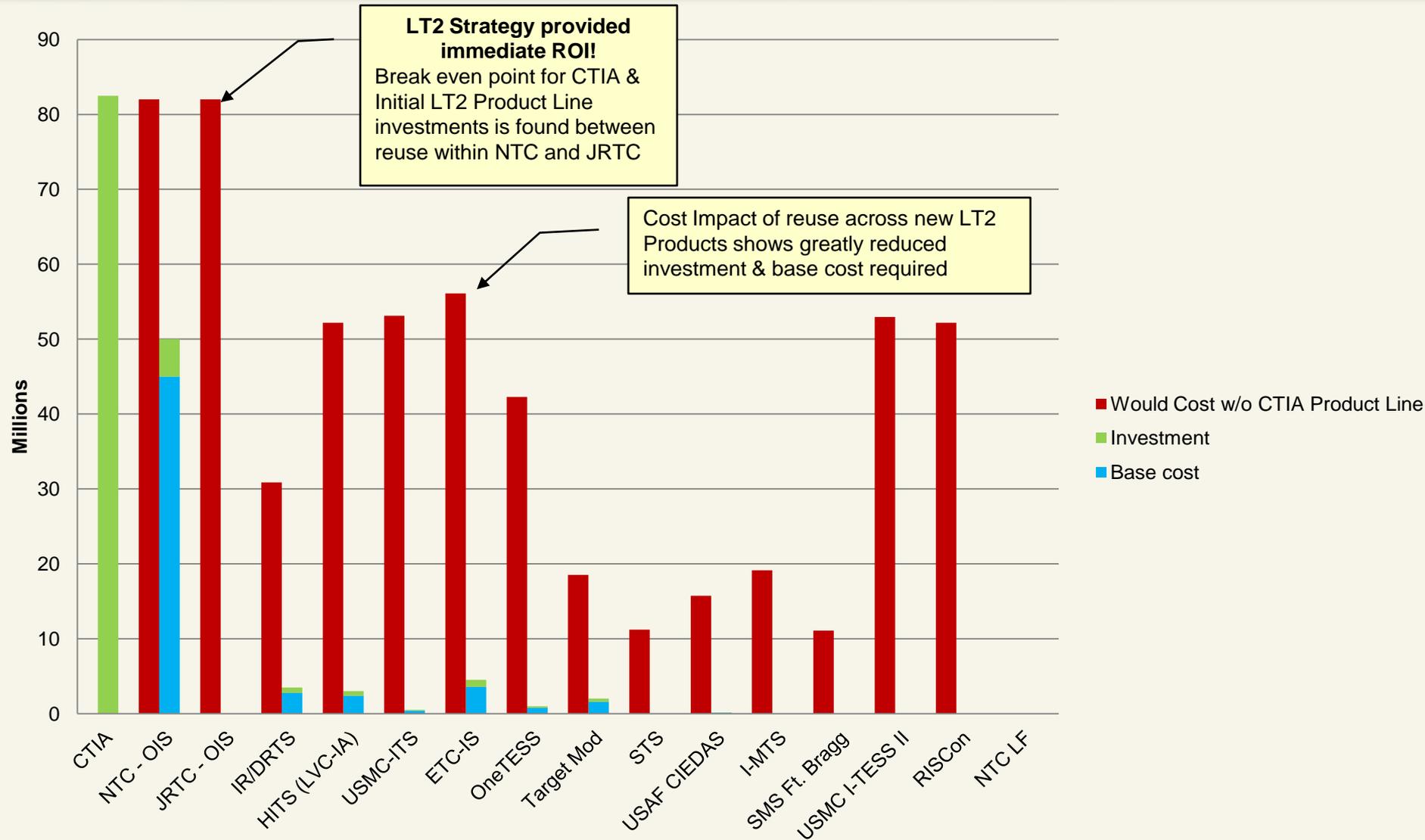
Core Asset Dev – Variation Management – Feature Profiles – Automated PL Factory

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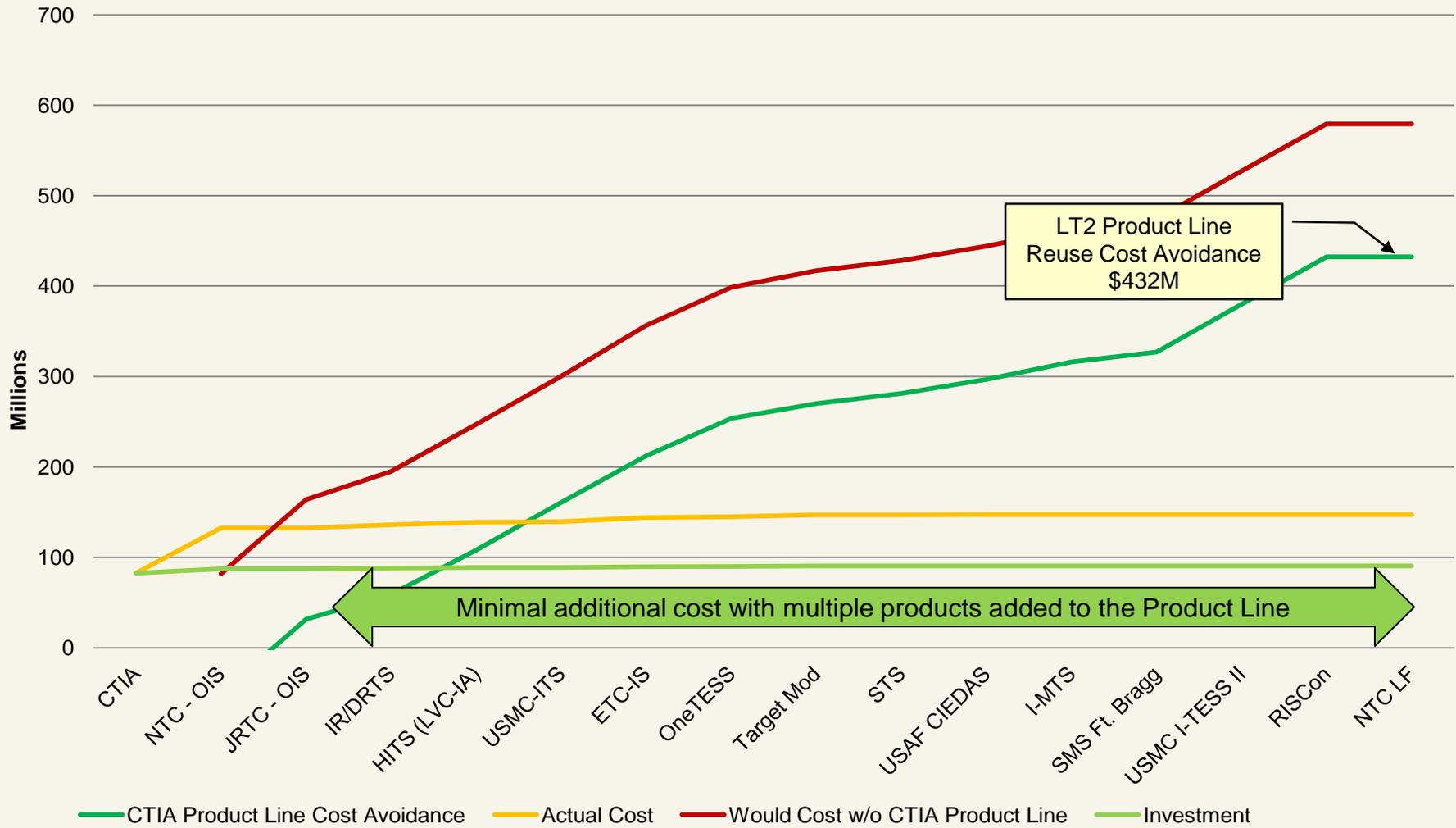
Core Asset Reuse and Contributions



LT2 Product Cost



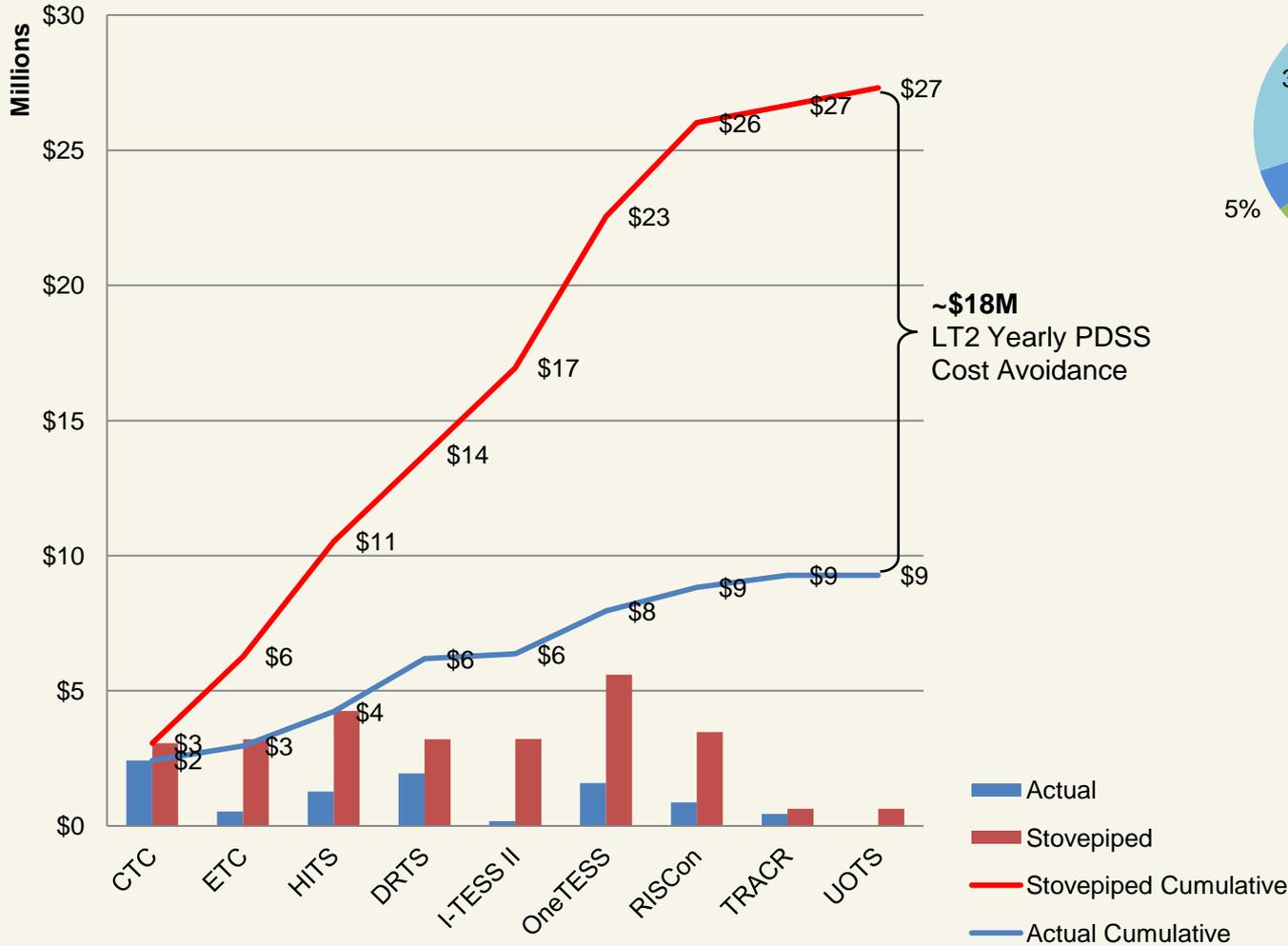
LT2 Product Cost Cumulative Cost Avoidance (Reuse)



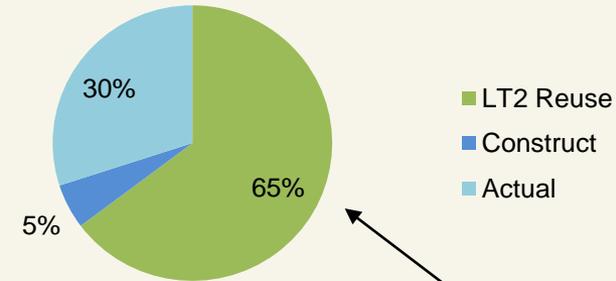
LT2 Annual PDSS/PPSS – Cost Avoidance (FY13 Projected)



2013 PDSS Cost Avoidance

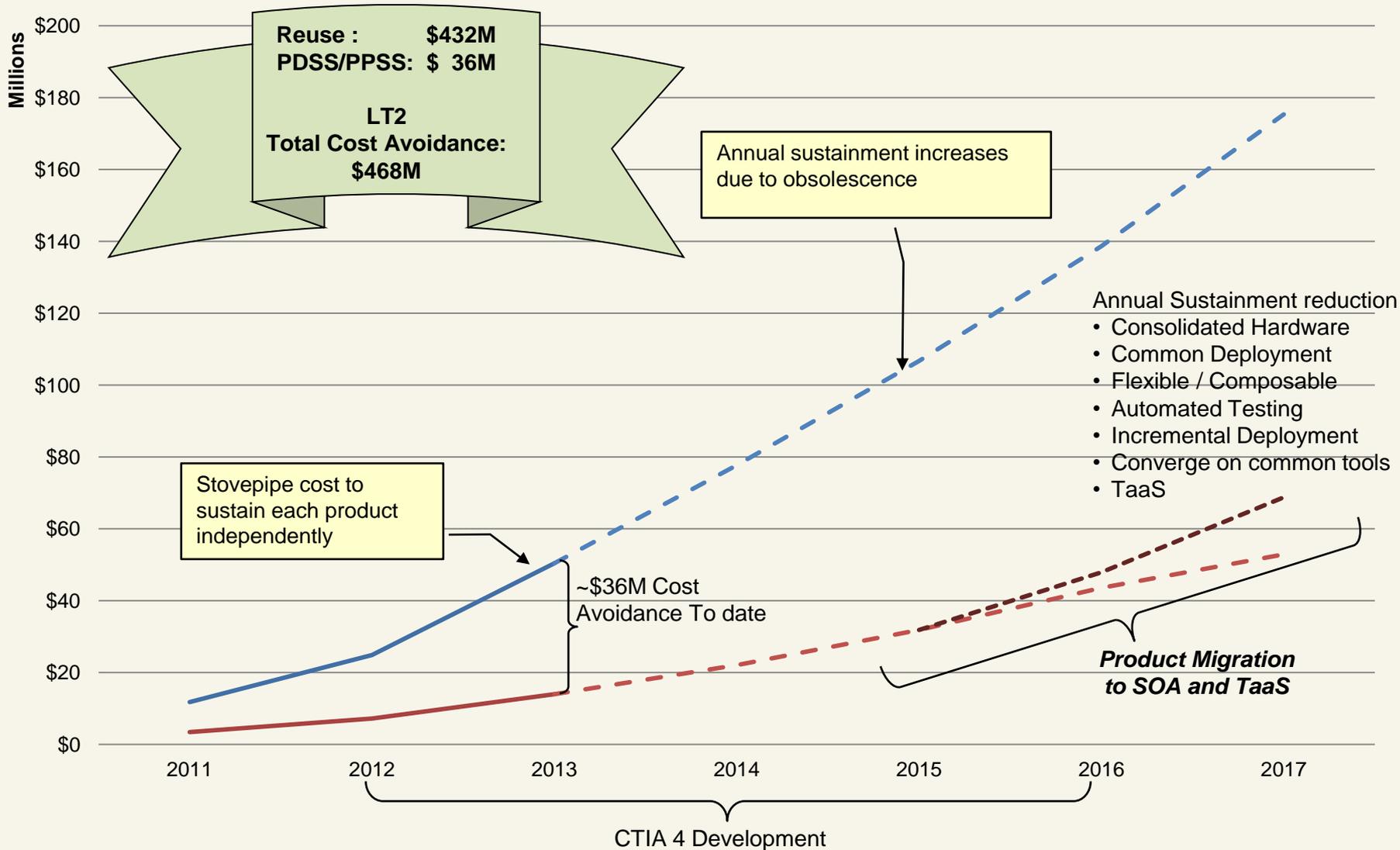


Typical Product

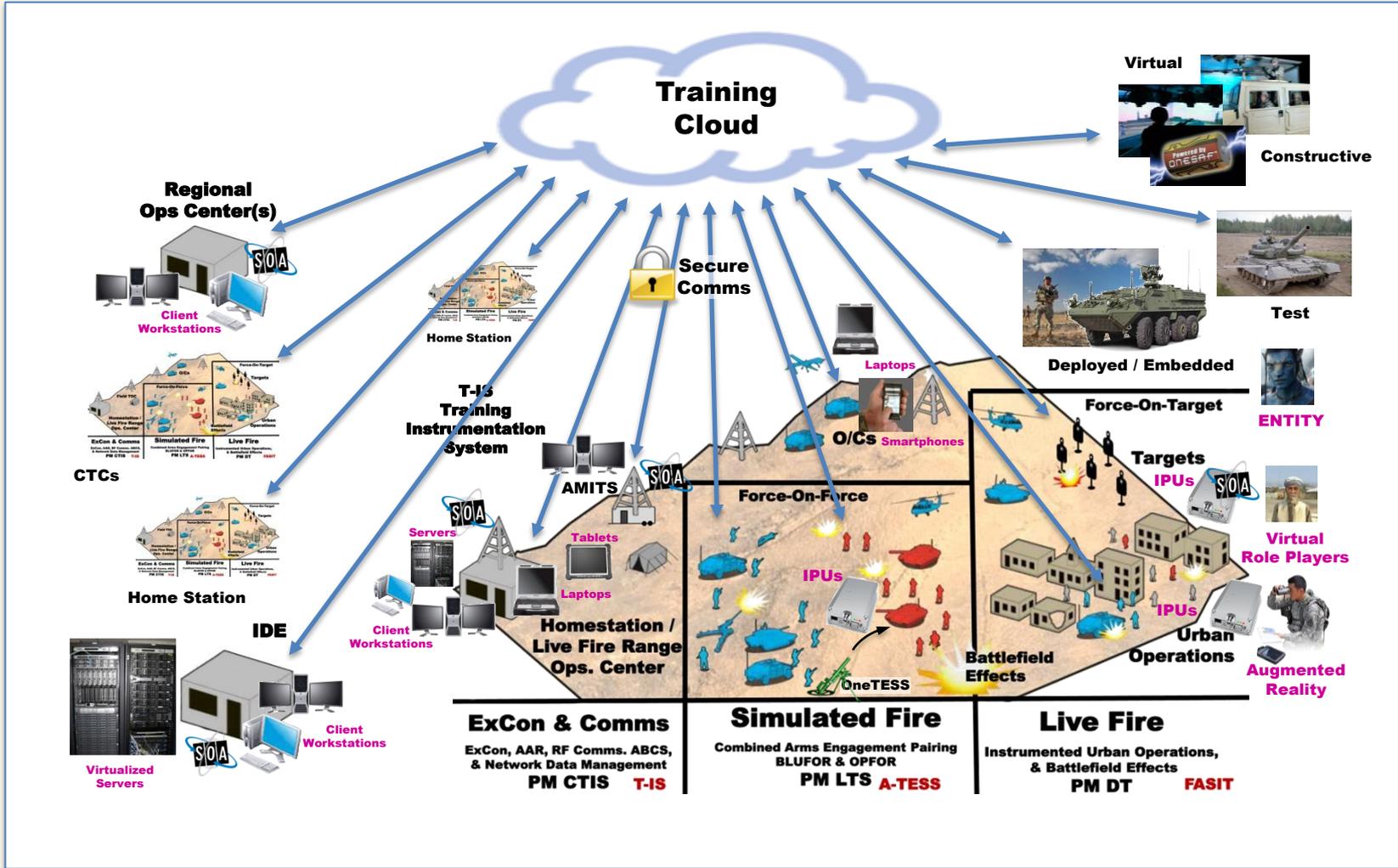


~3X efficiency per year typical

LT2 Software PDSS/PPSS – CPM Cost Avoidance (Future Projected)



Training as a Service (Taas)



Training as a Service (TaaS) Vision OV-1

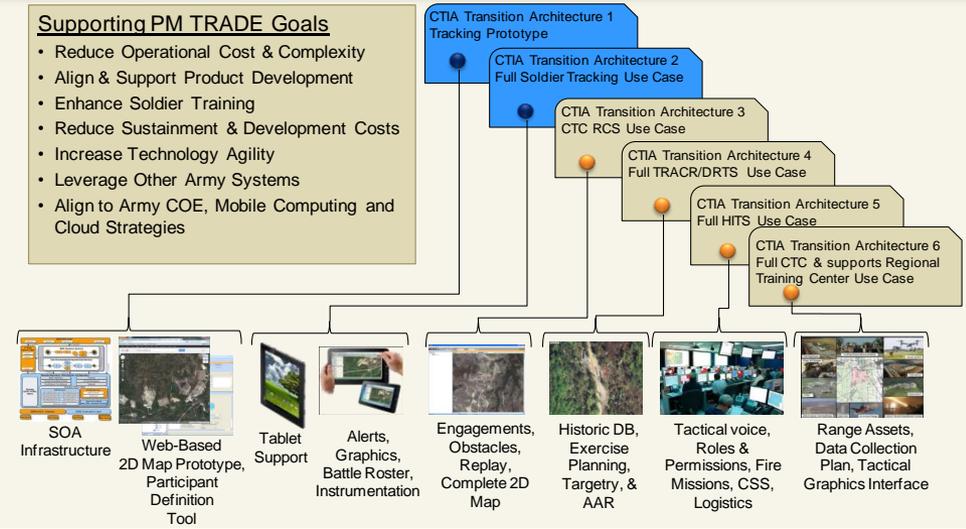
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CTIA 4 Service Oriented Architecture



- Supports Live Training next generation
- Create individually release-able capabilities
- Foundation to realize the TaaS Vision
 - Develop cloud-ready services
- Open community concept
 - Document capabilities in Service Contracts
- Upfront focus on integration and test
 - New approach to development and testing
- COE Ready Training

- Supporting PM TRADE Goals
- Reduce Operational Cost & Complexity
 - Align & Support Product Development
 - Enhance Soldier Training
 - Reduce Sustainment & Development Costs
 - Increase Technology Agility
 - Leverage Other Army Systems
 - Align to Army COE, Mobile Computing and Cloud Strategies

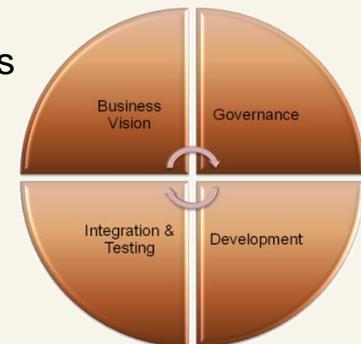


Benefits

- Support mobile and web computing platforms for LT2 components
- Decrease costs for future releases and updates
- Increased inter-operability across Enterprise Architecture
- Increased reliability
 - Increased test coverage, automated testing, and test reporting
- Enable horizontal scalability

Status

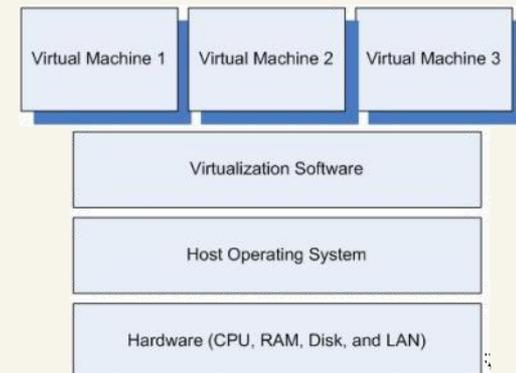
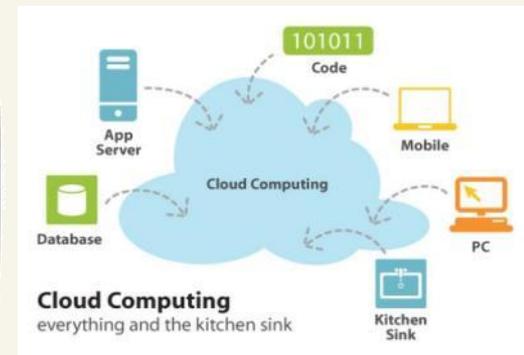
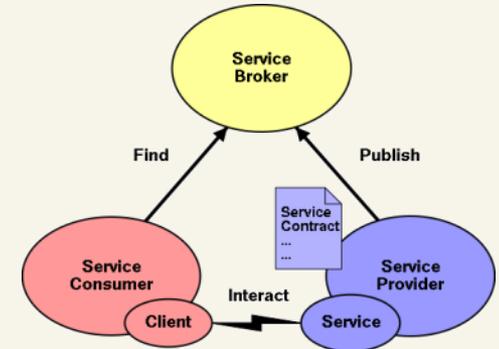
- Executing second transition architecture with basic services capabilities to support initial product adoption in 2014
- Developed auto-generated code from XML data models
- Created service implementation templates
- Defining a Service Inventory on the LT2 Portal
- Meeting and expanding Technical Performance Measures



Long Term Architecture Goals



- Loosely-coupled components
 - Separation of infrastructure, business and data services
 - Improves flexibility, composability, scalability
 - Example: Automated video tracking of player units
 - Less effort to update components when interfaces change
- Keep in line with market technology
 - Access to mobile computing devices
 - Web based applications
 - Virtualization
- Leverage investments made by other members of the community
 - Army Battle Command Collapse Architecture
 - High Performance Messaging Infrastructure
- Reduce total ownership costs against “-ilities”
 - Maintenance of developed infrastructure vs. reuse of off-the-shelf infrastructure
- Improve L/V/C interoperability
 - Use of mediation services to handle data transformations
 - Use of standard data models
- Align with “Big Army” Enterprise Infrastructure (GNEC)



Live Training at Home Station Today



I-MILES

Shoot House Systems



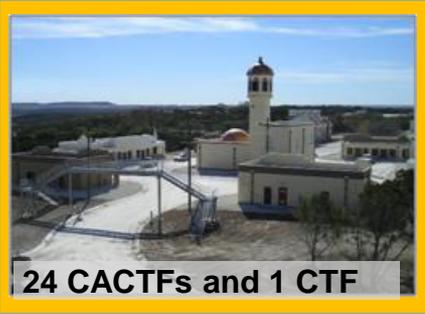
DRTS Systems

CACTF Systems

LIVE FIRE AREA

IMPACT AREA

HITS Systems



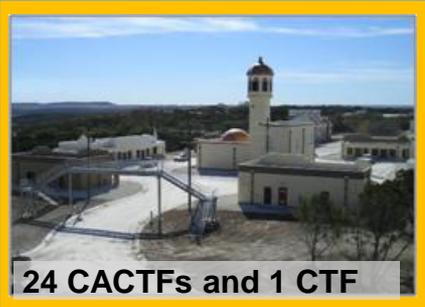
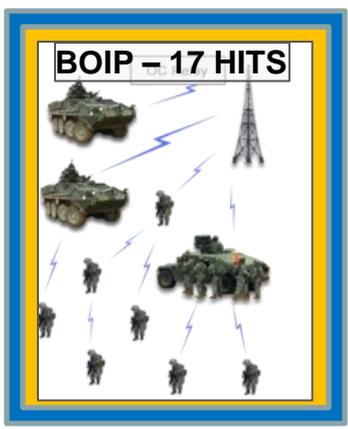
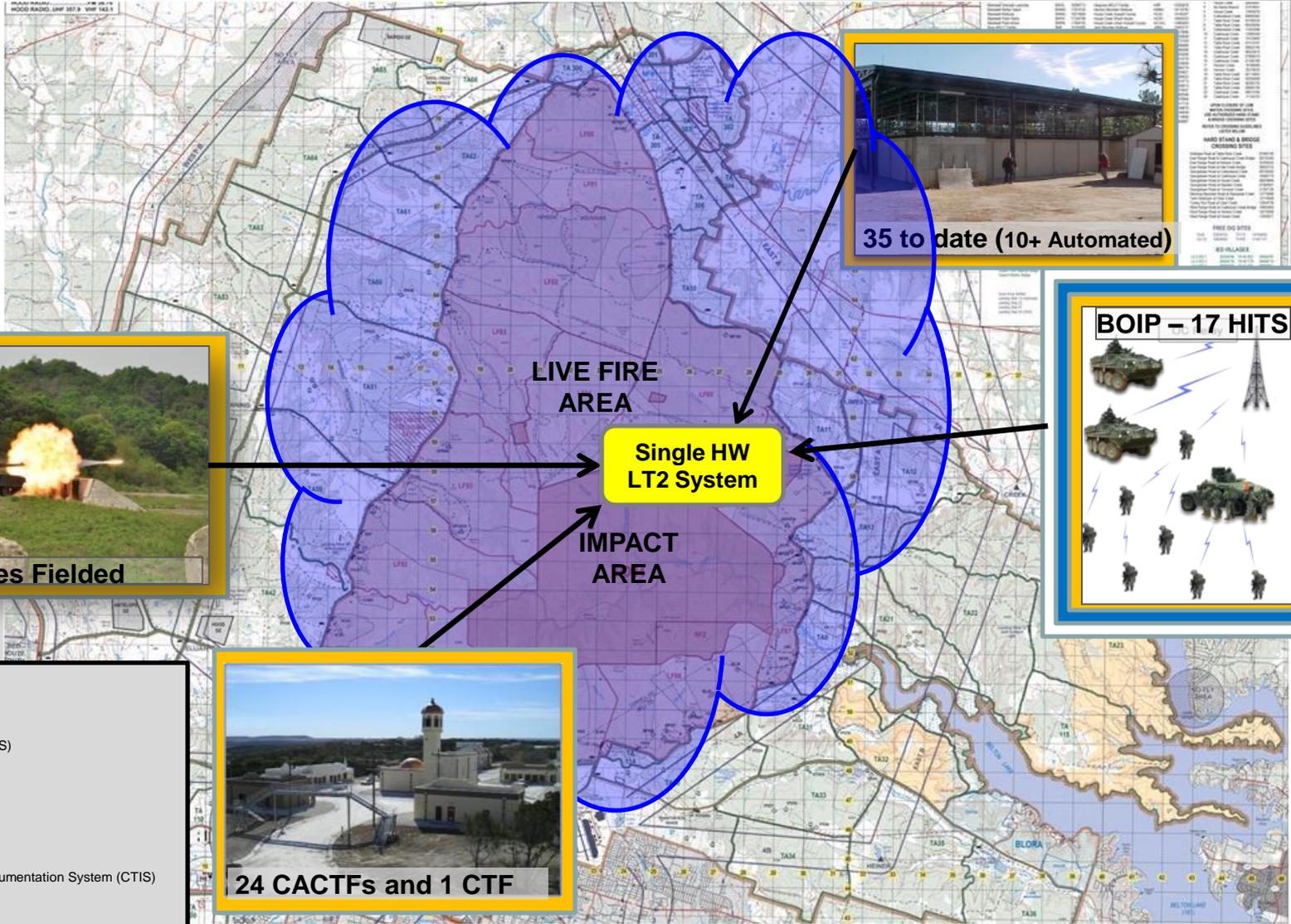
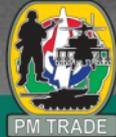
I-MILES



Legend

- Live Training Systems (LTS)
- Digitized Training (DT)
- Combat Training Instrumentation System (CTIS)

Example LT2 Initiative Impacts at Home Station



Legend

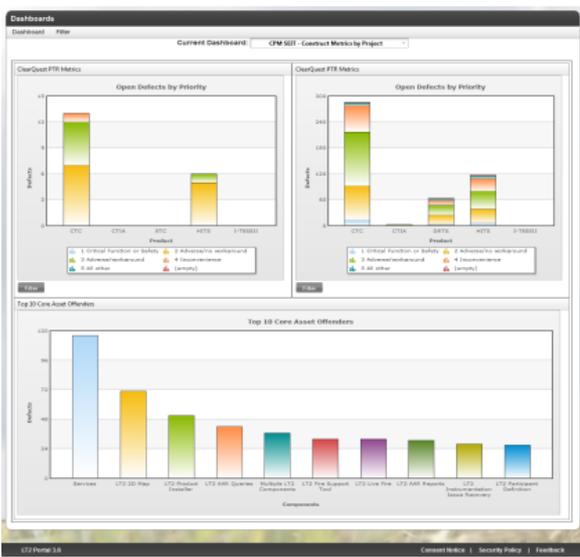
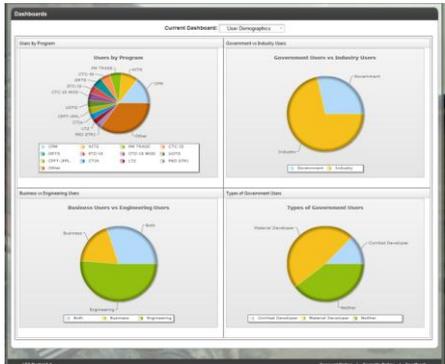
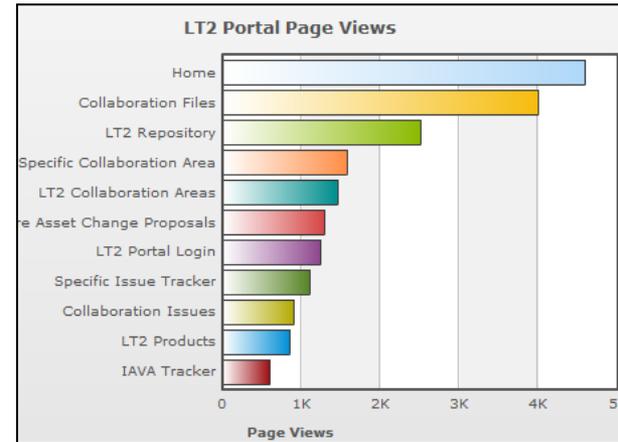
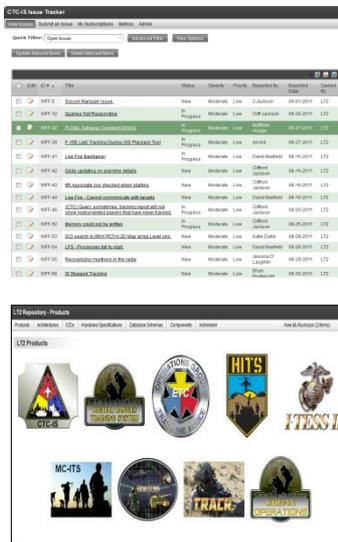
- Live Training Systems (LTS)
- Digitized Training (DT)
- Combat Training Instrumentation System (CTIS)

LT2 Portal (www.lt2portal.org)



Portal: www.lt2portal.org

- Shared knowledge repository
- Wiki / Forums
- Helpdesks
- Metrics
- CM Operational procedures guide
- Training Material
- Standards & ICDs
- 1600+ Users



LIVE TRAINING COMMUNITY

WELCOME

COL Vincent "Vince" Malone
Project Manager, TRADE

COL Stanley "Gene" Reedy
Director, TCM-Live

COL Michael Coolican
Program Manager, TRAYS

COL Anton H. Herad
Director, TECD

Welcome to the Live Training Community portal, where we develop, support and communicate our Live Training initiatives for the Army and Marine Corps. Our intent is to facilitate communication with developers, users, and our industry partners to support standards and common solutions for Live Training. Our goal is to reduce total ownership costs while improving quality, interoperability, and reusability across Live, Virtual, Constructive, and Joint trainertest domains for our Soldiers, Marines, our joint Services partners, and the Nation.

LT2 Influence



- LT2's influence as a model comes from
 - Being well known in the U.S. Army and beyond
 - Its strong programmatic and economic success
 - Its strong publication history (25+ journal papers, articles, and conference proceedings)
 - Cited by the Software Engineering Institute (SEI) at Carnegie Mellon University as the product line model for the DoD.



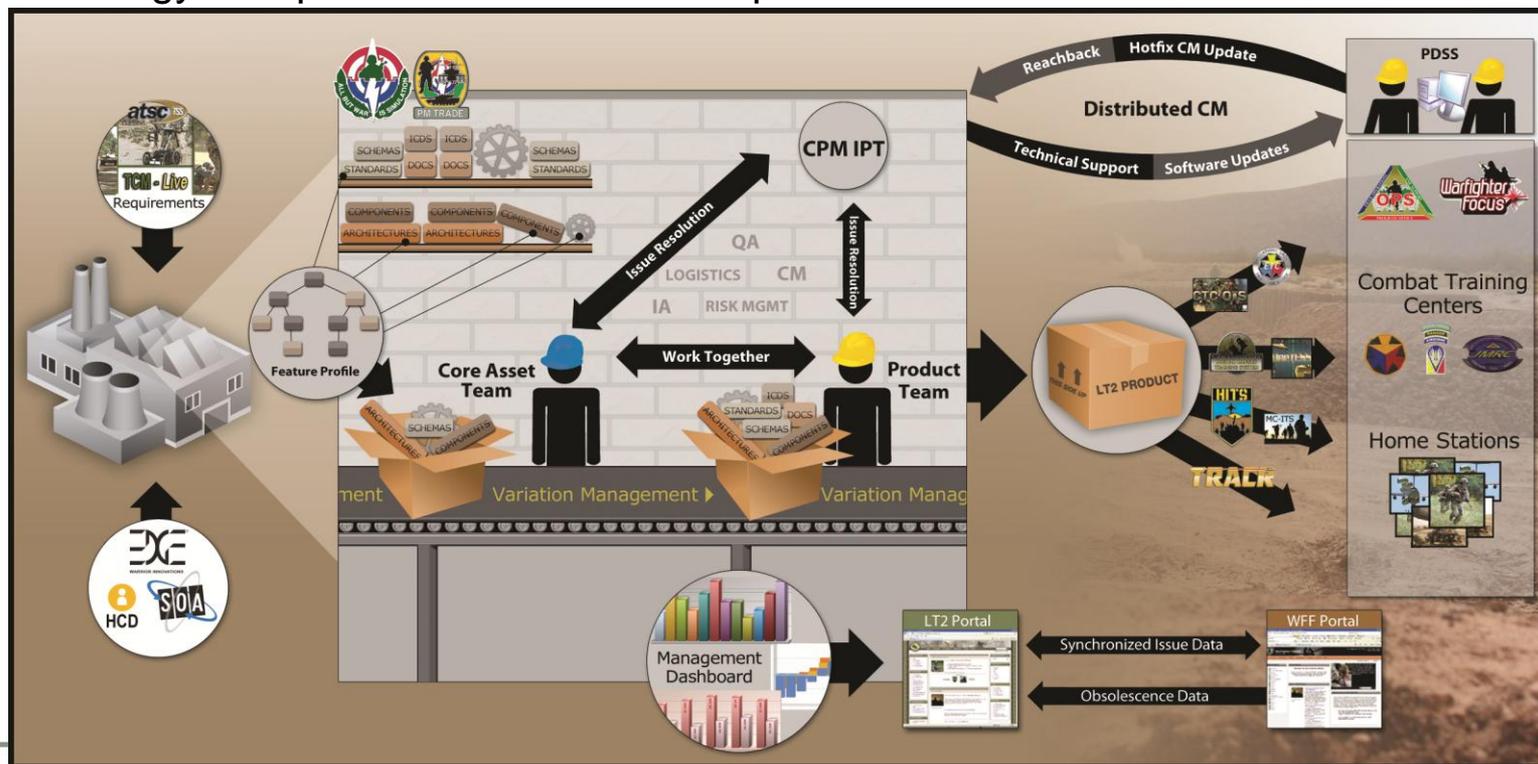
- Select Recognition

- U.S. Army Acquisition Excellence Award for Information Enabled Army from the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT))
- Excellence in Enterprise Information Award from the Association for Enterprise Information (AFEI)
- U.S. Army Modeling and Simulation Office (AMSO) award for Cross-Cutting category in applying LT2 product line to embedded training and development of common test and training solutions.
- U.S. DoD Defense Standardization Program Outstanding Performance Award in recognition of distinctive contributions promoting standardization within the Department of Defense.

Conclusion



- LT2 is one of the most successful systems and software product lines in the U.S. Department of Defense.
- It has spawned 13 family members distributed at over 200 sites globally
- It has saved the DoD about ***half a billion*** dollars in development cost
- It uses a well-defined, well-documented, state-of-the-art methodology that is well documented in literature
- A strategy is in place to evolve the LT2 product line for future innovation and ROI



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