## REVISION HISTORY

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<th>Description</th>
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<td>–</td>
<td>Initial Release</td>
<td>23 August 2012</td>
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<tr>
<td>A</td>
<td>Changes for Integration and Testing</td>
<td>28 Feb 2014</td>
</tr>
<tr>
<td>B</td>
<td>Updated links based on IDE Facility ATO</td>
<td>27 February 2015</td>
</tr>
<tr>
<td>C</td>
<td>Major realignment of processes to prepare for CPM Next</td>
<td>8 October 2015</td>
</tr>
<tr>
<td>D</td>
<td>- Updated logo on the title page to the LT2 logo</td>
<td>25 January 2016</td>
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<tr>
<td></td>
<td>- Standardized Title Page layout and updated with CPM Next contract number</td>
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<tr>
<td></td>
<td>- Added PDSS Deployment and Testing information</td>
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<td></td>
<td>- Changed Revision History to use alpha revisions instead of numeric revisions</td>
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<tr>
<td>E</td>
<td>- Added CAWG process Quick Reference Guide (QRG)</td>
<td>19 April 2016</td>
</tr>
<tr>
<td>F</td>
<td>Added LT2 Portal account registration information</td>
<td>02 September 2016</td>
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<tr>
<td>G</td>
<td>- Revised JIRA entry in table in Product Line Development Tools topic</td>
<td>16 December 2016</td>
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<tr>
<td></td>
<td>- Updated document based on changes from Synthetic Simulation Training (S2T) version</td>
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<tr>
<td>H</td>
<td>CPM-21023: Misc document maintenance updates to support product line philosophy like using variables and conditions to control content.</td>
<td>16 February 2017</td>
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<tr>
<td>J</td>
<td>CPM-22323: Add in COTS language updates for FAR compliance.</td>
<td>01 June 2017</td>
</tr>
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<td>K</td>
<td>CPM-51305: Updated to latest processes</td>
<td>15 October 2018</td>
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<tr>
<th>Table</th>
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<td>1</td>
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<td>Table 2.</td>
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1. Live Training Transformation (LT2) Operations Guide

1.1 Sublevel Process Guides

The Operations Guide is the top-level process guide for LT2. The following table (Table 1, below) lists the subordinate-level process guides associated with this document.

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Document Name</th>
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<tbody>
<tr>
<td>LT2-TRADE-PLAN-2013-00009</td>
<td>LT2 Product Line Configuration Management Guide</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000424</td>
<td>LT2 Documentation Management Process Guide</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000448</td>
<td>LT2 Product Lifecycle Management Process</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000385</td>
<td>LT2 Integration &amp; Test Process</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000447</td>
<td>LT2 Requirements Process Guide</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000446</td>
<td>LT2 Software Process Guide</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000462</td>
<td>LT2 SOA Governance Policy</td>
</tr>
<tr>
<td>LT2-TRADE-PLN-000496</td>
<td>LT2 Model Based Systems Engineering Process</td>
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2. Referenced Documents

The following table (Table 2, below) provides a summary of the documents used as a reference in the preparation of this document.

Table 2. Referenced Documents.

<table>
<thead>
<tr>
<th>Name of Document</th>
<th>Description</th>
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<tbody>
<tr>
<td>LT2 Construct Roadmap.docx</td>
<td>Defines a roadmap for implementing the LT2 Construct for LT2 PLM.</td>
</tr>
<tr>
<td>LT2 Construct Training</td>
<td>Slides that define LT2, the construct, and the concepts of second generation product line management and variation management.</td>
</tr>
<tr>
<td>CTIA Compliance Definition Document</td>
<td>Defines levels of Product and Core Asset compliance with CTIA, specifying whether or not a product is compliant with CTIA and to what degree a Core Asset is designed for reuse.</td>
</tr>
<tr>
<td>LT2 Product Line Configuration Management Guide</td>
<td>Defines the configuration management procedures that should be followed by all developers of Product Line shared assets and products.</td>
</tr>
<tr>
<td>LT2 Database Standards</td>
<td>Defines the set of standards to be used in defining databases for use in the Product Line.</td>
</tr>
<tr>
<td>LT2 Standards Vision</td>
<td>Describes the common set of standards, defines their relationships, and describes how they apply across training systems.</td>
</tr>
<tr>
<td>Component Agreement Template</td>
<td>Document template for developing a Component Agreement (CA), required when a new component is developed.</td>
</tr>
<tr>
<td>LT2 Software User Manual Template</td>
<td>Document template for use in standardizing the look and content of user manuals developed for the Product Line.</td>
</tr>
<tr>
<td>LT2 Component Test Procedure Template</td>
<td>Document template for use in standardizing the look and content of test procedures documents developed for the Product Line.</td>
</tr>
<tr>
<td>LT2 Test Verification Log Template</td>
<td>Document template for use in standardizing the look and content of test verification logs created while testing products in the Product Line.</td>
</tr>
<tr>
<td>LT2 Integration &amp; Test Process</td>
<td>Documents the testing methodology and processes used in the software Product Line.</td>
</tr>
<tr>
<td>Information Assurance (IA) Vulnerability Management Plan (VMP)</td>
<td>Describes how product line programs will implement an IAVM policy as required by Army Regulation (AR) 25-2.</td>
</tr>
<tr>
<td>Live Training Standards Development and Maturation Plan</td>
<td>Provides a plan for developing and maturing simulated training standards.</td>
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</table>

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3. Definitions and Terms

This section contains a set of terms used throughout the document. The definitions of the terms as used in this document are provided here to set the context for the remainder of the document.

Table 3. Definitions and Terms Used.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>2G PLM</td>
<td>Second Generation Product Line Management–The software engineering approach to PLM that includes shared-asset-focused development, first-class variation management, automated product line generation based on product feature profiles, and multidimensional Configuration Management (CM).</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>APM ITE</td>
<td>Assistant Project Manager Integrated Training Environment</td>
</tr>
<tr>
<td>ATO</td>
<td>Authority to Operate</td>
</tr>
<tr>
<td>BAM</td>
<td>Basic Accreditation Manual</td>
</tr>
<tr>
<td>BCR</td>
<td>Baseline Change Request</td>
</tr>
<tr>
<td>CA</td>
<td>Component Agreement</td>
</tr>
<tr>
<td>CACP</td>
<td>Core Asset Change Proposal–Request from a Live Training Transformation (L2T) Product Line stakeholder for a change to a core asset.</td>
</tr>
<tr>
<td>CAWG</td>
<td>Core Asset Working Group</td>
</tr>
<tr>
<td>CCB</td>
<td>Configuration Control Board</td>
</tr>
<tr>
<td>CDD</td>
<td>Capability Description Document</td>
</tr>
<tr>
<td>CM</td>
<td>Configuration Management–Standard management of software baseline changes over time.</td>
</tr>
<tr>
<td>CMMI</td>
<td>Capability Maturity Model Integration</td>
</tr>
<tr>
<td>Core Asset</td>
<td>Modularized part of a superset that can be consumed by a product. Anything that goes into the management, construction, and engineering of the product line is a core asset of LT2. A core asset may be an architecture, source code, an Interface Control Document (ICD), a database schema, a domain model, a requirements specification, a design document, a test plan, a test case, a process description, or any other useful element.</td>
</tr>
<tr>
<td>COTS</td>
<td>Commercial Off-the-Shelf</td>
</tr>
<tr>
<td>Dashboards</td>
<td>A consolidated display of management information in the form of charts, graphs, and/or tables. Information used in dashboards may originate from one or more sources, but is displayed in an easy-to-read single-user interface.</td>
</tr>
<tr>
<td>DO</td>
<td>Delivery Order</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DODAF</td>
<td>Department of Defense Architecture Framework</td>
</tr>
<tr>
<td>ECR</td>
<td>Engineering Change Request</td>
</tr>
<tr>
<td>EVMS</td>
<td>Earned Value Management System</td>
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</table>

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<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Factory</td>
<td>An automated process of generating one or more products in a managed product line from a common set of shared assets and a feature profile.</td>
</tr>
<tr>
<td>FAI</td>
<td>Failure Analysis Item</td>
</tr>
<tr>
<td>FAIR</td>
<td>FAI Report</td>
</tr>
<tr>
<td>FAR</td>
<td>Federal Acquisition Regulation</td>
</tr>
<tr>
<td>Feature</td>
<td>A feature provided by LT2 shared assets. The feature provided may be a specific requirement, a section of a design document to implement that requirement, a section of code to implement that requirement, a section of a test plan to test the requirement, or a section of a user manual that describes how to use the feature.</td>
</tr>
<tr>
<td>Feature Profile</td>
<td>Set of optional and varying feature choices specified for the product line. Each product in a product line has a feature profile that defines the set of features for the product.</td>
</tr>
<tr>
<td>FODA</td>
<td>Feature-Oriented Domain Analysis</td>
</tr>
<tr>
<td>FRACAS</td>
<td>Failure Reporting and Corrective Action System</td>
</tr>
<tr>
<td>FRB</td>
<td>Failure Review Board</td>
</tr>
<tr>
<td>FTS</td>
<td>Family of Training Systems</td>
</tr>
<tr>
<td>Gears</td>
<td>Gears is the software Product Line Engineering (PLE) tool and framework used to create an automated production line to generate LT2 products from feature profiles and shared assets.</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>IA</td>
<td>Information Assurance</td>
</tr>
<tr>
<td>IAVA</td>
<td>Information Assurance Vulnerability Alert</td>
</tr>
<tr>
<td>IAVM</td>
<td>Information Assurance Vulnerability Management</td>
</tr>
<tr>
<td>ICD</td>
<td>Interface Control Document</td>
</tr>
<tr>
<td>IDD</td>
<td>Interface Definition Document</td>
</tr>
<tr>
<td>IDE</td>
<td>The government Integration and Development Environment building located on Technology Parkway in the Research Park near the University of Central Florida (UCF). The IDE houses contractors and computing resources used to develop and support the Product Line.</td>
</tr>
<tr>
<td>IPT</td>
<td>Integrated Product Team</td>
</tr>
<tr>
<td>ISSE</td>
<td>Information System Security Engineering</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LCC</td>
<td>Lifecycle Contractors consolidate operations and maintenance, systems integration, and engineering support services for the Army's training systems.</td>
</tr>
<tr>
<td>LCDS ICD</td>
<td>Lifecycle Contractor Data Service Interface Control Document</td>
</tr>
<tr>
<td>Local CM</td>
<td>Configuration Management performed by developers within the IDE.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>LT2</td>
<td>Live Training Transformation is a strategy under the purview of the U.S. Army Program Executive Office (PEO) Simulation, Training &amp; Instrumentation (STRI) and the Project Manager Integrated Training Devices (PM TRADE) that uses Product Line Engineering (PLE) development concepts and principles to guide the acquisition of the Family of Training Systems (FTS).</td>
</tr>
<tr>
<td>MBSE</td>
<td>Model-Based Systems Engineering</td>
</tr>
<tr>
<td>Mobile CM</td>
<td>CM performed by developers while traveling to deployment sites to provide support. CM is performed either through a Virtual Private Network (VPN) connection or by using offline CM tools that allow synchronization once the developer returns and has connectivity to the repository in the IDE.</td>
</tr>
<tr>
<td>MSDN</td>
<td>Microsoft Developer Network</td>
</tr>
<tr>
<td>OS</td>
<td>Operating System</td>
</tr>
<tr>
<td>OV-1</td>
<td>Operational View 1</td>
</tr>
<tr>
<td>PCO</td>
<td>Procuring Contracting Officer</td>
</tr>
<tr>
<td>PDSS</td>
<td>Post Deployment Software/System Sustainment</td>
</tr>
<tr>
<td>PL</td>
<td>Product Line</td>
</tr>
<tr>
<td>PLS</td>
<td>Product Line Specification</td>
</tr>
<tr>
<td>PM ITE</td>
<td>Project Manager Integrated Training Environment</td>
</tr>
<tr>
<td>POC</td>
<td>Point of Contact</td>
</tr>
<tr>
<td>PRB</td>
<td>PTR Resolution Board</td>
</tr>
<tr>
<td>Product</td>
<td>A single instance of a software system created from the software product line set of shared assets providing a specific set of features (or capabilities).</td>
</tr>
<tr>
<td>Product Lifecycle Management (PLM)</td>
<td>A consolidated approach that manages a product from inception to disposal.</td>
</tr>
<tr>
<td>Product Line</td>
<td>A group of related software products that share a common, managed set of optional or variable features and originate from a common set of shared assets.</td>
</tr>
<tr>
<td>PTR</td>
<td>Product Tracking Report</td>
</tr>
<tr>
<td>QRG</td>
<td>Quick Reference Guide</td>
</tr>
<tr>
<td>Remote CM</td>
<td>CM performed by developers working outside the IDE, but connected to the IDE either through a VPN connection or using remote CM tools via the Internet (e.g., Subversion [SVN]).</td>
</tr>
<tr>
<td>RMF</td>
<td>Risk Management Framework</td>
</tr>
<tr>
<td>SEIT</td>
<td>System Engineering Integration Team</td>
</tr>
<tr>
<td>Shared Asset</td>
<td>Another LT2 name for Core Asset. It is exactly the same thing. Modularized part of a superset that can be consumed by a product. Anything that goes into the management, construction, and engineering of the product line is a core asset of LT2. A core asset may be an architecture, source code, an Interface Control Document (ICD), a database schema, a domain model, a requirements specification, a design document, a test plan, a test case, a process description, or any other useful element.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SOA</td>
<td>Service-Oriented Architecture–A loosely coupled set of software services with well-defined interfaces that provide business functionality and can be discovered and accessed through a supportive infrastructure.</td>
</tr>
<tr>
<td>SPL</td>
<td>Software Product Line</td>
</tr>
<tr>
<td>SVN</td>
<td>Subversion</td>
</tr>
<tr>
<td>SWIT</td>
<td>Software Integration and Test</td>
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<tr>
<td>TAG</td>
<td>Technical Advisory Group</td>
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<td>TIR</td>
<td>Technical Information Report</td>
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<td>UI</td>
<td>User Interface</td>
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<tr>
<td>US-CERT</td>
<td>US Computer Emergency Readiness Team</td>
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<tr>
<td>USCYBERCOM</td>
<td>United States Cyber Command</td>
</tr>
<tr>
<td>UX</td>
<td>User Experience</td>
</tr>
<tr>
<td>V&amp;V</td>
<td>Validation and Verification</td>
</tr>
<tr>
<td>Variation Management</td>
<td>A software engineering approach for managing differences in features and functions of multiple products in a software product line over time and over the software life cycle.</td>
</tr>
<tr>
<td>Variation Point</td>
<td>An encapsulation of a difference (or variation) in a shared asset file (including software files, requirements, documentation, etc.). A variation may include entirely different files or directories, or differences in subsections within the same file. The encapsulation of the variation includes logic that maps a feature to the proper variant selection (the file, directory, or file subsection associated with the selected feature and defined by the logic).</td>
</tr>
<tr>
<td>WFF</td>
<td>Warfighter FOCUS–Warfighter Field Operations Customer Support (FOCUS) program is a U.S. Army program under PEO STRI to consolidate operations and maintenance, systems integration, and engineering support services for the Army's training systems.</td>
</tr>
<tr>
<td>Wiki</td>
<td>What I know is</td>
</tr>
<tr>
<td>WO</td>
<td>Work Order</td>
</tr>
</tbody>
</table>

Use or disclosure of data contained in this document is subject to the restriction on the title page.
4. Scope

This LT2 Operations Guide provides an overview of the simulated training concept and defines the tools, roles and responsibilities, and processes and procedures for organizations and software developers to successfully produce and support shared assets and the products in the LT2 FTS\(^1\) Product Line.

4.1 Audience

The target audience for the Operations Guide includes product teams, requirements personnel, designers, developers, testers, quality personnel, and PDSS\(^2\) engineers. The document is also applicable to any other stakeholder responsible for acquisition, program management, development, deployment, and support of products in the LT2 Product Line and the assets from which they are derived.

4.2 Document Change Requests

This Operations Guide is managed and updated by the LT2 Construct team. To request a change to this document, submit an issue to the CM\(^3\) Help Desk on the LT2 Portal on the CM Help Desk.

4.3 Document Organization

The remaining sections of this Operations Guide are:

- Section 5–Live Training Transformation (LT2) Overview
- Section 6–Live Training Transformation (LT2) Roles and Responsibilities
- Section 7–Live Training Transformation (LT2) Product Line Operations
- Appendix A–Reusable Software
- Appendix B–Live Training Transformation (LT2) Portal Account

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\(^1\)Family of Training Systems
\(^2\)Post Deployment Software/System Sustainment
\(^3\)Configuration Management

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5. Live Training Transformation (LT2) Overview

PM TRADE\(^1\) is a leader within PEO STRI\(^2\) and the US Army in evolving shared asset-based product lines through the introduction and development of the LT2-FTS\(^3\) and its underlying architectures CTIA\(^4\) and LTEC\(^5\). The previous paradigm for managing the LT2 Product Line could be characterized as a clone-and-own mentality where software components were downloaded from the LT2 Portal and tailored to create a unique configuration for each product or program. The primary downfall of this approach was that each new product created a new baseline, and the task of merging features and fixes from each product back into the shared assets grew exponentially with each new component, product, release, etc.

Within this new strategy, there is a new paradigm that breaks the previous mentality and creates a factory paradigm where the LT2 Construct solution creates products from a feature-driven product line factory, generating all variants of products for programs from a consolidated set of shared assets. This approach eliminates the uncontrolled growth in complexity management and allows more of a focus on the evolution of the Product Line rather than current product issues. This 2G PLM\(^6\) approach is illustrated in the Product Line OV\(^7\)-1 diagram (Figure 1, on the next page).

The LT2 Product Line is PM TRADE’s strategy for realizing its product line vision. The product line provides product developers with a large number of off-the-shelf, reusable assets, including architectures, source code, ICDs\(^8\), standards, and database schemas. The product line is modeled on the concept of open-source development with a live training community of developers contributing to the evolution of the common product line. Enhancements to the product line are reviewed and agreed upon by the community and implemented by the product line teams. The open community review and approval process helps to manage requirements across the product line and to ensure the reusable assets meet the requirements of all products: reliability, usability, performance, common APIs\(^9\), coding standards, and documentation (e.g., CAs\(^10\), test plans, etc.). Products benefit from the stability of the assets from which they are built.

This feature-driven approach provides stability because:

- Shared assets are tested and partially integration tested.
- Shared assets have baseline versions.
- Products only use baseline versions of shared assets.
- Releases are based on iterative testing of the product line variations.
- Shared assets are validated for current OSs\(^11\), architectures, and IAVAs\(^12\).

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1. Project Manager Training Devices
2. Program Executive Office for Simulation, Training & Instrumentation
3. Family of Training Systems
4. Common Training Instrumentation Architecture
5. Live Training Engagement Composition
7. Operational View
8. Interface Control Document
9. Application Program Interface
10. Component Agreement
11. Operating System
12. Information Assurance Vulnerability Alert

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In support of the product line vision, all product line team members operate under this process defined in this *Operations Guide*, use the *Product Line Configuration Management Guide*, and will develop using the consolidated CM\(^1\) source repository located in the IDE\(^2\).

This *Operations Guide* is used to deploy the 2G PLM approach incrementally while using transparency and an open partnership with the Government. The activities described in this phased approach enable the team to:

- Protect the current shared assets, manage existing processes, support deployed products, and ensure there are no disruptions to ongoing Product Line activities.
- Consolidate the product baselines using variation management and an automated, feature-driven factory approach; and consolidating maintenance and support activities through LT2 and WFF\(^3\) integration.
- Innovate using the 2G PLM approach; management dashboards; and architecture, product line, and process evolution.

![Diagram](image.png)

**Figure 1. Construct OV-1.**

---

\(^1\)Configuration Management
\(^2\)Integration and Development Environment
\(^3\)Warfighter FOCUS

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6. Live Training Transformation (LT2) Roles and Responsibilities

PM TRADE and the product line team work hand-in-hand to implement and sustain the LT2 Product Line. PM TRADE provides requirements, direction, and management of product line activities while the product line team supports the implementation and sustainment by the product teams. For each product line position, there is a related PM TRADE position. The four major categories of interaction are:

- Programmatic leadership
- Contractual guidance
- Technical leadership
- Governance

The Construct executive steering committee (Figure 2, below) is composed of the corporate decision makers and exists to provide the Government priority access to the contractor staff.

Government and industry partners work together to achieve the goals of LT2. Figure 3, on page 12 illustrates the roles and responsibilities assumed by Government and contractor teams over the life cycle of a product in the LT2 Product Line.

6.1 Government Team

The following descriptions provide a summary of the roles and responsibilities of the members of the Government team.

- **APM TRADE**—Provides the overall management of the Product Line. The APM is responsible for establishing and operating the LT2 programs. In addition, this individual provides standards and common solutions for synthetic simulation training, with a focus on reducing total ownership costs and improving quality, interoperability, and reusability across live, virtual, constructive, and joint training/test domains for warfighters and the nation.

- **PCO**—As a government representative, the PCO has the ultimate responsibility for contract execution, administering the contract, and resolving any contract-related issues.
• **LT2 Chief Engineer**–Responsible for the technical oversight of the product line by evaluating technical alternatives for product line technology insertion, management, and obsolescence.

• **LT2 Chief Architect**–Responsible for LT2 Product Line architectures by evaluating technical alternatives for the design, development, maintenance, and support of LT2 Product Line architectures.

• **Project Director**–Provides **PM ITE** a product line strategy to efficiently and effectively address future, live instrumented training system acquisitions by focusing on the shared requirements of all domain training systems and promoting the strategic objectives to maximize commonality and systematic asset reuse and ensure interoperability across the constructive domains.

### 6.2 Contractor Team

The following descriptions provide a summary of the roles and responsibilities of the members of the contractor team.

• **Program Director**–The program director is ultimately responsible for the execution of all work performed under the contract from the contractor team. This role involves managing corporate relationships within the industry subcontractor team as well as interfacing directly with the **AM TRADE** on high-level program direction.

• **Contracts**–This individual is responsible for the billing, proposals, subcontract management, **EVMS**, reporting, and other contractual obligations.

• **PL Architect**–This architect is responsible for the technical specification of the PL architecture, including tool selection, technology insertion and road maps, implementation strategies, and other technical tasks. The primary interface for the PL architect is the government chief engineer, PL chief engineer, and **CTIA** and **LTEC** architects.

• **PL Chief Engineer**–The PL chief engineer is the primary technical interface to the customer and is responsible for technical coordination across the PL. This engineer manages resources, organizational interfaces, and scope; and works in concert with the PL architect to ensure the appropriate development of the PL.

• **Program Manager**–The program manager is responsible for the execution of a **DO** within an LT2 contract. Each DO has an assigned program manager. This role involves managing the industry team relationships as well as interfacing directly with the Government Project Director and **APM TRADE** on DO-specific status and direction.

• **Project Manager**–The project manager manages the overall cost, schedule, and performance of the project; conducts customer reviews; and serves as an advocate for customer issues. Additionally, the project manager manages resources, organizational interfaces, and project task scope; and develops and reports project metrics. This individual also serves as the technical **POC** lead for LT2 subcontractors and provides concurrence on recommended changes to requirements.

---

1 Project Manager Integrated Training Environment  
2 Assistant Project Manager Training Devices  
3 Earned Value Management System  
4 Product Line  
5 Common Training Instrumentation Architecture  
6 Live Training Engagement Composition  
7 Delivery Order  
8 Point of Contact

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and design configuration. Since there is no direct mapping to a Government representative for this role, it is not shown on Figure 2, on page 10.

Figure 3. Roles and Responsibilities.

6.3 Second Generation Product Line Management Roles (2G PLM) (Contractor Team)

The 2G PLM roles consist of Release Management, Feature Management, Profile Management, Variation Management, and Gears Management. It is important to note that these are contractor roles and not positions, which means one person may serve multiple roles and multiple people may assume the same
role depending on the assets with which they are involved, or management’s request to have backups to eliminate single-point failures.

The 2G PLM approach introduces a duality in the way that most engineering roles perform tasks. On one hand, an engineer may be thinking vertically on applying the product line and a subset of LT2 assets to create a particular training system deployment or subsystem deliverable. On the other hand, this engineer must also be thinking horizontally about how the engineering activities apply in the context of the superset of all assets and all products in the LT2 Product Line. The core objective of LT2 is for all engineering activities to continuously enhance the health of the overall product line rather than improve one product at the expense of other products.

6.3.1 Release Manager

For the LT2 Product Line, shared asset and product release preparation and delivery are extensions of CM\(^1\) and are conducted in parallel with V&V\(^2\) and CM audit activities. The Release Manager schedules weekly release planning meetings at least six weeks prior to each release. This individual also chairs the meetings, which all key stakeholders attend (developers, IA\(^3\), logistics, and, if applicable, a representative from WFF\(^4\) for smooth transition to field operations). Release meetings cover the scope and schedule of the release and the status of all activities leading up to the release including test and audit review, logistics planning, IA review, and, if applicable, coordination of deployment with LCC(s) formerly WFF in the near future ATMP and field operations.

6.3.2 Features Manager

Managing features entails expressing the features relevant to a particular product line shared asset. For the LT2 Product Line, the role of Features Manager is assumed by the CAWG, which uses an FODA\(^5\) methodology to manage features appropriately based on the requirements of all products in the product line. The CAWG is responsible for approving and naming features for the LT2 Product Line based on requests submitted via CACPs for consideration by the shared asset team and/or product teams. The role of the CAWG is explained further in the Product Line Configuration Management Guide.

The optional and variable features for the products in the product line are defined and managed using the Gears tool. There are two potential types of features sets in a Gears production line.

- Module Features which are declarations that are localized and applicable to only one shared asset.
- Mixin Features that are declarations applicable to and shared by two or more modules in a production line.

6.3.3 Profile Manager

Profiles are managed for multiple products over time and throughout the software life-cycle. The Profile Manager ensures the proper set of features required to meet a product's requirements are specified in the product’s feature profile, which is used to instantiate a product from the LT2 Data Warehouse. Feature declarations specify those features that can vary from product to product in a production line. The values assigned in feature profiles must satisfy the constraints and dependencies expressed by assertions in the feature declaration.

6.3.4 Variation Point Manager

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\(^1\)Configuration Management  
\(^2\)Validation & Verification  
\(^3\)Information Assurance  
\(^4\)Warfighter FOCUS  
\(^5\)Feature-Oriented Domain Analysis

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Variation management is considered a software engineering approach to managing differences in features and functions of multiple products throughout the software life-cycle. Variation points encapsulate the variations in software shared assets and map the feature declarations to choices at these variation points. There are three primary abstractions that make up the infrastructure of managing variations. Feature declarations (Features Manager role), feature profiles (Profile Manager role), and variation points. These three abstractions consummate the instantiation of the products within the production line.

Variation points are determined after analysis of requirements, ECRs\(^1\), PTRs\(^2\), and shared assets that have known differences between products. If the differences in the assets are true variations versus differences that should become common, variation points are created and actuated in the production line. Variation Point Managers are managing the low-level asset-based implementation of the product line variations in assets, such as requirements, architecture and designs, source code, and test cases. Variation points are the realization of the abstract features managed by the Features Manager.

**6.3.5 Gears Architect**

To operate efficiently and effectively, all development roles must understand how to use Gears and the recommended best practices that apply to their specific roles. The Gears Architect role (Gears tool expert) acts as a resource and source of knowledge whenever questions, challenges, or the educational/instructional needs arise in the application of Gears to the LT2 Product Line sharedassets. This responsibility implies that the Gears Architect has both in-depth knowledge about the tool itself as well as broad knowledge about how the tool should be applied across the organization.

The Gears Architect acts both proactively and reactively to provide the following tasks:

- **Gears training**—Training and refresher classes ensure that everyone has the basic skills and knowledge on the effective use of Gears in his/her specific roles.
- **Gears Help Desk**—Whenever questions or problems arise, this individual serves as the Help Desk to provide accurate guidance quickly.

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\(^1\)Engineering Change Request  
\(^2\)Product Tracking Report  

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7. Live Training Transformation (LT2) Product Line Operations

7.1 Live Training Transformation (LT2) Shared Assets

The definition of a shared asset is a modularized part of a superset that can be consumed by a product. Any item that goes into the management, construction, and engineering of the product line is a shared asset of LT2.

By default, every item is a shared asset governed by the CAWG. Some items that are not shared assets of products are treated and governed as shared assets by the product line. These include the LT2 governance processes and the Gears Feature Model.

7.2 Integrated Product Teams (IPTs)

IPTs are organized to provide an efficient means of exchanging information between stakeholders. Each IPT has a charter document and government and contractor co-chairs. Typically, the contractor chair (or a representative) facilitates the meeting and the Government chair has final decision-making authority. IPT meetings are published on the LT2 Portal and electronic collaboration mechanisms (Webex, teleconference, etc.) are available for remote participants. Additional, short-term IPTs, or working groups, may be formed as needed to address specific issues. The overall IPT description is presented in the sections that follow.

7.2.1 Assistant Project Manager (APM) Training Devices (TRADE)

The APM defines the LT2 product vision, incorporating requirements and impacts from all stakeholders. This participant is the comprehensive authority for changes to the product line and the associated shared assets. As the ultimate authority for approving product line configuration changes, the APM resolves issues that were not satisfactorily remedied by the lower level IPTs. Refer to Figure 4, below.

Figure 4. Product Line IPT Structure.

1Integrated Product Team
7.2.2 Shared Asset Management

Shared Asset Management is conducted by the CAWG and the PRB\(^1\), shown in Figure 4, on the previous page. These working groups manage the evolution and sustainment of the LT2 shared assets, defining workflows and approval processes for asset additions or updates, ensuring consistency across the product line, and supporting asset feature variability as needed to meet the requirements of all products in the LT2 product line.

7.2.2.1 Product Tracking Report (PTR) Resolution Board (PRB)

All development on the shared assets used to create the LT2 Product Line is tracked through a PTR, which is created to track bugs found in shared assets and to request enhancements (new features or capabilities) to shared assets. The PTR must be created and approved before work can begin on shared assets and is required to check shared assets into the CM\(^2\) repository. The PRB is responsible for managing (approving, denying, and changing statuses) and prioritizing PTRs written against the LT2 Product Line shared assets.

During the PRB, new PTRs are assessed, prioritized, and (if valid) assigned to a development team lead to implement. The PRB also approves or denies the recommendations of the CAWG as to which baseline(s) a change should be applied and whether or not a change requires a Variation Point due to differences in requirements across the product line. In cases where a new PTR is determined to be invalid, the PRB has authority to close the PTR with feedback to the originator as to why the PTR was closed.

In addition to new PTRs, the PRB also reviews PTRs that have been implemented by the development team and are being submitted to a build. The PRB ensures that all required information has been submitted prior to authorizing a PTR for inclusion in a build.

Detailed information on the PRB and its governing processes is contained in the LT2 Product Line Configuration Management Guide.

7.2.2.2 Shared Asset Working Group (CAWG)

The CAWG is a formal TAG\(^3\) co-chaired by the LT2 contractor(s) and Government counterpart(s). The CAWG is the working group that manages changes to LT2 shared assets and performs the functions of a CCB\(^4\) in managing technical, cost, and schedule change requests. Requests for changes to assets, including the creation of new assets, called CACPs, must be submitted through the LT2 Portal, assessed, and approved by the CAWG prior to starting any work to implement the changes.

The CACP page on the LT2 Portal defines a workflow for managing asset change requests and provides the LT2 community transparent access to status, impacts, notifications, and historical results at any time. The CAWG meetings are the forum for all LT2 Product Line stakeholders to stay informed of proposed new additions or changes to the assets. Representatives from all organizations in the LT2 Product Line community are strongly encouraged to regularly attend and participate in the CAWG meetings, including actively reviewing and providing impact assessments to emerging CACPs.

The CAWG and PRB\(^5\) processes are complementary. The CAWG uses CACPs to inform the LT2 community and ensures changes are beneficial to the entire product line. The PRB uses PTRs to track the work associated with approved changes from implementation, to CM check-in, to build and release. For details of the CAWG and PRB processes, refer the Product Line Configuration Management Guide

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\(^1\)PTR Resolution Board  
\(^2\)Configuration Management  
\(^3\)Technical Advisory Group  
\(^4\)Configuration Control Board  
\(^5\)PTR Resolution Board

Use or disclosure of data contained in this document is subject to the restriction on the title page.
Assets are common artifacts that have:

1. Gears Feature variations (Any new feature or change that requires a Gears Feature.)
2. PLS\(^1\) requirements
3. ICDs\(^2\)
4. Standards
5. Simulated components and services, including source, requirements, and documentation
6. Common tools used by multiple LT2 product teams
7. LT2 policies, processes, and procedures (This guide is an asset.)
8. Third-party dependencies (License verification is required before any third-party dependency is included or upgraded.)

The CAWG is also responsible for communication, coordination, disposition, and resolution of any architectural-related issues. In addition to the responsibilities, the CAWG reviews any issues submitted through the LT2 Portal Help Desk and/or relevant issues or discussions submitted on the LT2 Portal forums.

### 7.2.2.2.1 CAWG Membership

Members of the CAWG include, but are not limited to:

- Product Line Manager (CAWG Chair)
- Architecture development leads
- LT2 Component Management lead
- LT2 Product representatives (e.g., Combat Training Center – Instrumentation System (CTC-IS), Instrumented Ranges, Live Tactical Engagement Simulation System (LTESS), etc.)
- CACP Task Teams

### 7.2.2.2 CAWG Meeting Overview

The CAWG agenda is compiled from the CAWG collaboration areas on the LT2 Portal. During the meeting, new and updated CACPs are presented and discussed. When sufficient analysis and documentation of a CACP is completed, the CAWG members conduct a peer review of the CACP offline and provide feedback about the CACP on the LT2 Portal. After a CACP passes peer review successfully, representatives from the LT2 products provide impact assessments and indicate if they concur with the recommendation of the CACP. These CACPs must be created from the Power Point Template provided on the LT2 Portal. This template ensures all the necessary information is captured for the other Product teams and Government to understand the extent of the new or updated capability such that they can provide an adequate Impact Assessment.

### 7.2.2.2.1 Frequency of CAWG Meetings

The CAWG convenes once a week and attendance and minutes are taken at all CAWG meetings. All presentation materials and attendance records are stored on the LT2 Portal in the Architecture Change Process collaboration area.

Consensus is the preferred mechanism for CAWG decisions and recommendations. Every effort is made to reach a consensus whenever possible. If consensus cannot be reached, the CAWG Chair selects one of the options under consideration or requests further analysis. Final escalation proceeds to the LT2 IPT\(^3\).

### 7.2.2.3 CAWG Responsibilities

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\(^1\)Product Line Specification  
\(^2\)Interface Control Documents  
\(^3\)Integrated Product Team

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Responsibilities of the CAWG include:

- **Chair**
  - Selects and prioritizes issues.
  - Provides resource management.
  - Forms CACP task teams.
  - Provides and enforces CACP development process.
  - Separates disposition CACP into Type I, II, or III.
  - Acts as approving authority for Type II CACP.
  - Elevates CACP to APM\(^1\) when necessary.

- **CACP preparers**
  - Conduct CACP overview and peer review.
  - Ensure decisions are documented.
  - Create BCRs\(^2\) if necessary.
  - Address comments on CACP
  - Represent back to the CAWG for Close Out of CACP upon Completion

- **Other members**
  - Participate as necessary in overviews, peer reviews, and impact assessments.
  - Advise where applicable.

### 7.2.2.3 CAWG Quick Reference Guide (QRG)

The QRG provides a summary of the functions of the CAWG. ([Figure 5, on the next page](#)).

\(^1\)Assistant Project Manager  
\(^2\)Baseline Change Request
Figure 5. Quick Reference Guide.

- **LT2 Asset**—Modularized part of a superset that can be consumed by a product, including anything that goes into management, construction, and engineering of the product line. By default, everything is a shared asset.
- **PRB**—Provides coordination during evolution; repository for change management, and peer review of discrete changes.

### 7.2.2.3.1 Frequently Asked Questions (FAQs)

**Q. Does PLE\(^1\) require more work?**

A. Yes, but only a little bit. The process should match any good engineering process already followed with additional review by community stakeholders.

**Q. Why does PLE save money?**

---

\(^1\)Product Line Engineering
A. Reduction in the duplication of efforts by implementing solutions that meet the needs of the larger community saves substantial future work.

7.2.3 Product IPTs

Product IPTs\(^1\) represent the interest of each product and work to ensure all of a product’s requirements can be satisfied by the product line assets. The product teams accomplish this approach through regular participation in the CAWG. Product IPTs evaluate LT2 shared assets against the product requirements and submit portal CACP requests to the CAWG to fill requirements gaps, through either new capabilities or variations to existing capabilities. The CAWG works with each Product IPT to prioritize and schedule shared asset development to meet the requirements and required dates for the products across the product line. If a Product IPT is unable to resolve a resource, schedule, or technical issue to its satisfaction while working with the CAWG, the group may escalate the issue to APM TRADE\(^2\) for resolution.

7.3 Product Line Development Tools

The following tables summarizes the IDE\(^3\) tools used by local and remote users.

<table>
<thead>
<tr>
<th>Tool Name</th>
<th>Usage</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyzer</td>
<td>Analytic and reporting tool for Flare projects</td>
<td>MadCap Software</td>
</tr>
<tr>
<td>App Detective Pro</td>
<td>Database vulnerability assessment software</td>
<td>Trustwave</td>
</tr>
<tr>
<td>ATRT</td>
<td>Automated Test and Retest tool</td>
<td>IDTUS</td>
</tr>
<tr>
<td>Beyond Compare</td>
<td>Windows utility that combines directory- and file- compare functions</td>
<td>Scooter Software</td>
</tr>
<tr>
<td>ClearCase</td>
<td>Configuration Management (CM) of archived source code and other development assets Tool used primarily for accessing historic builds; current product line CM does not use ClearCase.</td>
<td>International Business Machines (IBM)</td>
</tr>
<tr>
<td>Cobertura</td>
<td>Cobertura instruments the Java classes, and when executed with JUnit, specifies the number of lines and branches tested.</td>
<td>Cobertura</td>
</tr>
<tr>
<td>Collabnet Subversion (SVN) Software Support</td>
<td>CM of source code and other development assets. SVN is supplied and managed through Collabnet Subversion.</td>
<td>Collabnet</td>
</tr>
<tr>
<td>Confluence</td>
<td>Collaboration tool in conjunction with JIRA and Crucible. Houses pages and information describing the processes, procedures, and guidelines to be used in the development of the product line.</td>
<td>Atlassian</td>
</tr>
<tr>
<td>Contributor</td>
<td>Tool used to provide content updates to the main content repository, similar to the Flare tool, but with limited capabilities.</td>
<td>MadCap Software</td>
</tr>
</tbody>
</table>

---

\(^1\)Integrated Product Teams  
\(^2\)Assistant Project Manager Training Devices  
\(^3\)Integrated Development Environment
<table>
<thead>
<tr>
<th>Tool Name</th>
<th>Usage</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUCIBLE</td>
<td>Tools for collaborative code review</td>
<td>Atlassian</td>
</tr>
<tr>
<td>DevExpress Dxperience</td>
<td>User Interface (UI) Controls library</td>
<td>DevExpress</td>
</tr>
<tr>
<td>Dynamic Object Oriented Requirements System (DOORS)</td>
<td>DOORS is the database tool used as the repository for system and software requirements used for tracking the traceability management.</td>
<td>IBM</td>
</tr>
<tr>
<td>Elastic Stack</td>
<td>Real time software data analysis</td>
<td>Elastic.co</td>
</tr>
<tr>
<td>Enterprise Architect Sparx Ultimate</td>
<td>UI tool for software development and modeling</td>
<td>Sparx Systems</td>
</tr>
<tr>
<td>FISHEYE</td>
<td>Revision-control browser and search engine</td>
<td>Atlassian</td>
</tr>
<tr>
<td>Flare</td>
<td>Content management system and editor for reusable documentation.</td>
<td>MadCap Software</td>
</tr>
<tr>
<td>Gears</td>
<td>Product Line Engineering (PLE) profile-management tool used for actuation of product assets from the common baseline. Provides bridges that integrate with other tools in order to control multiple asset types.</td>
<td>Big Lever Software, Inc.</td>
</tr>
<tr>
<td>Innovator</td>
<td>Product Line Management (PLM) database</td>
<td>Aras</td>
</tr>
<tr>
<td>Integrity Modulator (Artisan Studio)</td>
<td>Manages and models Live Training Transformation (LT2) standards and Department of Defense Architecture Framework (DODAF) modeling.</td>
<td>Atego</td>
</tr>
<tr>
<td>Jenkins</td>
<td>The open-source tool for performing software builds.</td>
<td>Jenkins</td>
</tr>
<tr>
<td>JIRA</td>
<td>JIRA is configured as an issue tracking system that includes bug, new feature, task, user story, doc task, epic, hardware task, story, etc issue types</td>
<td>Atlassian</td>
</tr>
<tr>
<td>JPROFILER</td>
<td>Java Profiler for profiling on the Java Virtual Machine (JVM)</td>
<td>EJ Technologies</td>
</tr>
<tr>
<td>Junit</td>
<td>Test tool used to write Java tests for Software Integration Test (SWIT) testing of a service/component.</td>
<td>Junit.org</td>
</tr>
<tr>
<td>Kendo UI Professional</td>
<td>Toolkit for web and mobile applications with server-side wrappers</td>
<td>Telerik</td>
</tr>
<tr>
<td>LT2 Portal</td>
<td>The primary source for obtaining LT2 Family of Training Systems (FTS) information for users, developers, and management.</td>
<td>Portal Working Group</td>
</tr>
<tr>
<td>Microsoft® Excel</td>
<td>Used to export module data from the DOORS database and as a tool to import data into the modules.</td>
<td>Microsoft</td>
</tr>
<tr>
<td>Tool Name</td>
<td>Usage</td>
<td>Vendor</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Microsoft Word</td>
<td>Used as a tool to perform text comparisons of DOORS attributes. DOORS interfaces with Microsoft Word to output requirements from the database.</td>
<td>Microsoft</td>
</tr>
<tr>
<td>MS Project Pro</td>
<td>Project management software program</td>
<td>Microsoft</td>
</tr>
<tr>
<td>MS Visio Pro</td>
<td>Diagramming and vector graphics application</td>
<td>Microsoft</td>
</tr>
<tr>
<td>MS Visual Studio 2013</td>
<td>Software development Integrated Development Environment (IDE) subscription</td>
<td>Microsoft</td>
</tr>
<tr>
<td>MS Visual Studio with Microsoft Developer Network (MSDN) License and Software Assurance</td>
<td>Software development IDE subscription</td>
<td>Microsoft</td>
</tr>
<tr>
<td>Nipper Enterprise</td>
<td>Configuration auditing tool</td>
<td>Titania-Security.com</td>
</tr>
<tr>
<td>Npm (node)</td>
<td>Package manager for JavaScript</td>
<td>NPMJS</td>
</tr>
<tr>
<td>Protractor</td>
<td>Angular automation components</td>
<td>Protractortest.org</td>
</tr>
<tr>
<td>Selenium</td>
<td>Browser automation components</td>
<td>Seleniumhq.org</td>
</tr>
<tr>
<td>Telerik Rad Controls ASP &gt; NET Ajax Pro Developer</td>
<td>Web application development toolkit</td>
<td>Telerik</td>
</tr>
<tr>
<td>TortoiseSVN</td>
<td>Graphical User Interface (GUI) interface to SVN repository</td>
<td>TRTS</td>
</tr>
<tr>
<td>Visual Studio Professional with MSDN</td>
<td>Software development IDE with subscription to Microsoft MSDN</td>
<td>Microsoft</td>
</tr>
<tr>
<td>VMware vCenter</td>
<td>Centralized and extensible platform for managing virtual infrastructure</td>
<td>Vmware</td>
</tr>
<tr>
<td>VMware vCloud Suite</td>
<td>Tools for rapidly provisioning applications on private clouds</td>
<td>Vmware</td>
</tr>
<tr>
<td>Warfighter FOCUS Portal</td>
<td>A secure, Web-enabled portal used in the execution of the Program Executive Office for Simulation, Training &amp; Instrumentation (PEO STRI) Warfighter FOCUS (WFF) Indefinite Delivery/Indefinite Quantity (IDIQ) contract</td>
<td>PEO-STRI</td>
</tr>
<tr>
<td>Xray</td>
<td>A software tool that manages manual and automated tests as Jira issues, customize screens, fields and workflows.</td>
<td>XpandIT</td>
</tr>
</tbody>
</table>

### 7.3.1 Document Numbering

All documents released to or published on the Portal must include a document number. This requirement pertains to any document provided in support of an asset, including CAs, SA\(^1\)s, etc. Documents provided

\(^1\)Service Agreements

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to a customer, but not posted to the Portal may use document numbers or customer-provided numbers. These documents typically include drawings associated with a particular project.

NOTE

Use of contractor-generated numbers is discouraged for related documentation efforts.

Use the Document Number Generator provided on the Portal with following schema: LT2-OC-DC-Six-Digit Number

- LT2—Copy as is.
- OC—Organization Code: LTS, DT, CTIS, APM, TRADE, or TRASYS
- DC—Document Code
- Digit Number—Auto-generated successive list from 000000 to 999999.

Example 1: LT2 SOA Governance Document:

- LT2-TRADE-PLN-000462

Example 2: RISCon Software Version Description - SVD

- LT2-TRASYS-TD-000093

7.3.1.1 Document Naming Convention

This section provides general guidance for naming a document. Adhere to this convention unless extenuating circumstances dictate another convention (e.g., CDRL documents or specific customer direction). Document names are a continuation of the document number, document type, and a short title separated by underscores.

- Common acronyms for document type and title are permitted.
- Revisions are tracked within the document and should not be represented in the document name.
- Include project name only if necessary.

Convention: [LT2 Document#]_[Type]_[Short Title]

Examples

LT2-TRADE-TNG-000074_User Manual_Urban Training AAR-THP
LT2-APM-RPT-2013-000032_SAR_FASIT SES Safety Assessment

7.3.2 Warfighter FOCUS (WFF) Portal

The Warfighter FOCUS Portal is a secure, web-enabled portal operated and maintained as part of the MIS\textsuperscript{1} infrastructure used in the execution of the PEO STR\textsuperscript{2} IDIQ\textsuperscript{3} contract. The WFF Portal serves as the single location for WFF help desk personnel to enter and receive updates on LT2-related system issues. It also contains historical life-cycle information on equipment, such as the hardware on which the LT2 software is hosted. Implementation of the LT2 Construct includes an integration of the WFF portal and the LT2 Portal to share issue-tracking information. For more information on the LT2 Construct, refer to the Product Line Deployment Concept of Operations.

WFF help desk staff use the WFF Portal as their system of record for all issues. An LT2-related issues entered into the WFF portal are forwarded to the LT2 Portal for disposition and resolution. WFF issues that

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\textsuperscript{1}Management Information System
\textsuperscript{2}Program Executive Office for Simulation, Training & Instrumentation
\textsuperscript{3}Indefinite Quantity/Indefinite Delivery

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appear on the LT2 Portal can be used to create a PTR in JIRA. If a PTR is created from the LT2 Portal its status and updates are synchronized on the LT2 and WFF Portals without user interaction. The integration is bidirectional so any changes made on either side, requests for additional information, comments, status updates, etc, is immediately visible to users of both portals. The benefits of this integration include better communication, reduced issue resolution time, enhanced LT2 product quality, and improved customer insight and satisfaction.

### 7.4 Live Training Transformation (LT2) Processes

Product line development under LT2 is founded on shared asset focused development, a shift in focus highlighted in the processes defined for LT2 implementation.

The LT2 team, in partnership with product teams, is responsible for developing and maintaining a set of reusable shared assets that are available for the benefit of all LT2 products. The CAWG controls and approves all development on the product line for new enhancements and the PRB for PTRs. LT2 Product Line developers use the CACP process on the LT2 Portal for requesting new enhancements and the common PTR tracking system in the IDE for creating PTRs. The CAWG and PRB manage development work to closure, including ensuring that proper peer reviews are conducted, if applicable.

The LT2 team works closely with the product teams to define and refine requirements to ensure the assets meet the needs of the products. Any requirements differences resulting in variations within the product line are actively managed using the Gears variation management tool. Proactive variation management allows LT2 to eliminate duplicate or divergent code and migrate to a common solution across the product line.

Product teams, under the direction of the LT2 team, may also perform shared asset development with the understanding that all implementation must occur using the same standard 2G PLM processes. The resulting partnership between these two teams, using well-defined, documented 2G PLM processes, results in more consistent, more reusable, and higher-quality software.

*Figure 6, on the next page* illustrates the reusable LT2 core assets and how product teams benefit from this synergistic approach by making use of assets developed or enhanced by other products.

Specifically, the example in the figure shows that HITS contributes funding for the LT2 Construct team to develop or enhance core asset Cx while TRACR contributes funding for development or enhancement of core asset Cz. Both products benefit from reuse of core assets and HITS is able to reuse core asset Cz, which was developed or enhanced by TRACR.

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1. PTR Resolution Board
2. Product Tracking Reports
3. Integrated Development Environment
4. Second Generation Product Line Management
5. Homestation Instrumentation Training System
6. Targetry Range Automated Control and Recording

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In addition to developing the software for the shared assets, the product teams are also responsible for updating the CAs\(^1\) or SAs\(^2\), build scripts, (automated) test scripts, and test procedure documentation as applicable. When delivering a new shared asset into the common single source CM\(^3\) repositories of the LT2 data warehouse at the IDE, product teams must ensure the build scripts integrate into the overall build and must also execute (automated) test procedures in the IDE environment.

The following sections describe the processes used to develop and sustain the LT2 Product Line under LT2. The process sections begin with CM and continue with processes that span the software development life-cycle in logical order from Requirements Management to PDSS\(^4\).

### 7.4.1 Product Line Management

Prior to the implementation of the LT2 Product Line, the training systems and devices consisted largely of products developed separately by a variety of different manufacturers to comply with different requirement sets designed and implemented without a common framework. Commonality was not attempted, and interoperability among systems was rare, difficult, and costly to achieve. Configuration changes to both hardware and software were most often performed on-site as part of the sustainment effort, making configuration control virtually impossible.

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\(^1\)Component Agreements  
\(^2\)Service Agreements  
\(^3\)Configuration Management  
\(^4\)Post Deployment Software/System Sustainment
The LT2 vision is to create an FTS\textsuperscript{1} using a common architecture with common data, standards, processes, and shared assets. This approach facilitates the development of new products and ensures that products across the LT2 Product Line can communicate and interoperate. The LT2 Product Line makes use of shared assets that are common between products, thereby allowing changes, upgrades, and fixes developed for one product to be applied to others. This concept provides the inherent logistics support benefits that derive from commonality, standardization, and interoperability, including the reduction of total life-cycle costs.

The PM ITE\textsuperscript{2} has the mission of managing the configuration baseline of systems throughout the total life-cycle to ensure the integrity of the product line and that systems remain relevant to evolving requirements, changing technology, and other emerging systems. The process by which PM ITE manages products must be deliberate, disciplined, and coordinated in order to maximize use of shared assets in the development of new systems to synchronize the production of products to gain efficiencies, enable supporting efforts, and maintain seamless interoperability between shared assets, products, and systems.

LT2 is the framework that provides the ability to execute the LT2 strategy to maximize the commonality, reuse, and interoperability of the product lines.

This framework provides the means to:

- Protect the significant training investment.
- Support development, production, and sustainment of LT2 products.
- Realize the ROI\textsuperscript{3} and sustainment cost-avoidance objectives.
- Enable managers to maintain visibility and configuration control of their systems.
- Ease changes in new technology.
- Establish the mechanism for PDSS\textsuperscript{4} of the LT2 products.
- Execute new IA\textsuperscript{5} mandates efficiently.
- Avoid duplication of efforts.
- Support US Army vision to be joint and train in a simulated environment.

The innovative systems and SPL\textsuperscript{6} engineering and delivery approach enables organizations to develop, deliver, and evolve an entire product line portfolio through each stage of the development life-cycle with increased efficiency than has been possible before.

Companies across a diverse range of industries, including aerospace, defense, automotive, medical, consumer electronics, computer systems, alternative energy, telecommunications, semiconductor fabrication, software applications, computer games, e-commerce\textsuperscript{7}, and industrial automation systems, have successfully employed the product line approach to extend and evolve their product line portfolios more efficiently, thereby achieving new levels of competitiveness and profitability.

As suggested in Figure 7, on the next page, the characteristic that distinguishes the SPL approach from previous efforts is when an organization invests in a means of production that enables it to create a product line of similar systems efficiently from a consolidated set of soft assets, such as requirements, designs, source code, and test cases. Manufacturers of hard goods have long employed analogous engineering methods to create a product line of similar systems using a common factory that assembles and configures parts from a supply chain designed to be reused across the product line.

\textsuperscript{1}Family of Training Systems
\textsuperscript{2}Product Manager Integrated Training Environment
\textsuperscript{3}Return on Investment
\textsuperscript{4}Post Deployment Software/System Sustainment
\textsuperscript{5}Information Assurance
\textsuperscript{6}Software Product Line
\textsuperscript{7}Commercial transactions conducted electronically on the Internet.
7.4.2 Product Line Configuration Management (CM)

The LT2 Product Line shared assets are baselined under a consolidated version control system secured in the LT2 Data Warehouse at the IDE\(^1\). Software baselines are managed using robust CMMI\(^2\) CM processes and supporting software tools. The CAWG and PRB\(^3\), with their respective CACP and PTR\(^4\) processes, define the governance for product line change management. The Product Line Configuration Manager is responsible for maintaining the integrity of the shared asset baseline, performing version control and releases, enforcing governance processes, and publishing product line information to the LT2 community through the portal. For detailed information on CM, refer to the *LT2 Product Line Configuration Management Guide*.

7.4.3 Product Line Requirements Management

Requirements are managed as a shared asset and governed at the highest level as with all other shared assets though the CAWG. The CACP is the mechanism by which new capabilities are added and modified within the LT2 Product Line. CACPs related to the product line products and architectures must contain appropriate requirements traceability to ensure complete coverage and traceability throughout the system. In the CACP Power Point template a place holder slide exist as a reminder to include

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\(^1\)Integration and Development Environment  
\(^2\)Capability Maturity Model Integration  
\(^3\)PTR Resolution Board  
\(^4\)Product Tracking Report

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requirements. Requirements are referenced for all implementations in the product line and linked for traceability to ensure complete system capabilities are met.

For additional information refer to the *Requirements Management Process Guide*.

### 7.4.4 Model Based Systems Engineering (MBSE)

The MBSE practices described in the *Model-Based Systems Engineering (MBSE) Guide* establish the definitions, processes, and guidelines for the LT2 FoS\(^1\) projects. The associated LT2 models and associated modeling tools apply and maintain these practices.

The *MBSE Guide* provides a best-practices reference for the FoS projects over a project's full acquisition life-cycle in order to produce and exploit models, architectures, and MBSE tools for planning, preparing, executing, and assessing each project. This guide does not specify modeling practices or styles used by the Combat Developer for acquisition architectures, but does attempt to bridge common terms and definitions to remain consistent across stakeholders.

### 7.4.5 Live Training Transformation (LT2) Product Life-Cycle Management (PLM) Overview

The LT2 approach to PLM applies the best practices of PLE\(^2\) to all portions of product development. Shared reusable LT2 components are managed as shared assets through the CAWG to ensure concurrence from the community and Government.

The ability to generate products from shared assets requires LT2 to maintain an LT2 Product Line superset product structure, which is actuated to build individual products. Applying site-specific configuration creates an as-designed product. Site changes to the as-fielded configuration are tracked in the as-maintained baseline to provide history and current state of fielded products.

### 7.4.6 Life-Cycle Analysis

The life-cycle analysis processes, defined by future product line efforts, will contain the *FRACAS*\(^3\) that follows the general process of recording WO\(^4\)/FARs\(^5\), which are then consolidated, grouped by failure type/site, and prioritized. The *FRB*\(^6\) convenes with both contractor and Government representatives to disposition the WOs/FARs as actionable. The FRB assigns the actionable WOs/FARs an FAI\(^7\) number and tracks the items in the FRACAS system. When the FAI is completed, an *FAIR*\(^8\) is generated.

### 7.4.7 Document Content Management Process

Documentation artifacts are managed by a team consisting of Technical Writers and Training personnel that ensures the standardization of LT2 documentation by following the processes defined in the *Documentation Management Operational Procedures Guide*. The LT2 Documentation Management Process identifies the key roles and responsibilities of the team and the tools used to manage the documentation and training content.

### 7.4.8 Service-Oriented Architecture (SOA) Governance Process

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\(^1\)Family of Systems  
\(^2\)Product Line Engineering  
\(^3\)Failure Reporting and Corrective Action System  
\(^4\)Work Order  
\(^5\)Federal Acquisition Regulation  
\(^6\)Failure Review Board  
\(^7\)Failure Analysis Item  
\(^8\)Failure Analysis Item Report  

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The SOA\(^1\) governance process establishes a set of enforceable policies, procedures, practices, tools, standards, and organizational structure to support the effective creation, reuse, management, maintenance, and retirement of services.

This governance supports the following SOA goals:

- Develop services with broad (enterprise-wide) reuse.
- Ensure services are compliant with enterprise policies.
- Establish an Agile service-development environment.

SOA governance defines the relationships of different groups, participants, and service providers, describing how they work together in a cohesive unit within the larger SOA development environment.

In order to develop services with broad, reuse potential, services must be developed with the current and future goals of the LT2-FTS\(^2\) in mind. Ensuring compliance with enterprise policies guarantees that services are standardized, normalized, and consumable across the enterprise. The first two goals contribute to the goal of Agile development by allowing new processes to be assembled quickly using existing services.

### 7.4.9 Live Training Transformation (LT2) Product Line Development

Shared asset development may be performed by either the LT2 team or by a product team working closely with the LT2 team and following the LT2 PLM\(^3\) processes. Development includes both new asset development and sustainment of or enhancements to existing assets. Shared asset development activities span all life-cycle phases (analysis, design, implementation, integration, and test).

Regardless of which team is performing the development, this activity must consider not only the requirements of the specific product, but also the requirements for the products in the product line with respect to the specific shared asset. For example, when one product team is modifying a shared asset, such as adding a new feature, the implementation team is responsible for coordinating the change with other product advocates and LT2 architects to ensure that the implementation is consistent with other uses of the shared asset. Ideally, this coordination should take place in the planning phase to ensure that sufficient resources are allocated to meet the needs of the entire product line.

### 7.4.9.1 Shared Asset Development

LT2 shared assets, used in the development of LT2 products, are developed, enhanced, and maintained under the guidance of the CAWG and are available through a common CM\(^4\) repository for use in LT2 products. Stakeholders should use the LT2 Portal for the following topics related to LT2 shared assets:

- Use the LT2 Components Collaboration Area (PM ITE Product Line Analysis) to exchange information between stakeholders.
  
  https://www.lt2portal.mil/Collaboration/Collaborate/CollaborationAreas/SpecificCollaborationArea/tabid/83/PagId/SpecificCollab/CollabId/1eee9499-76e8-4f34-8e6f-3dec994e6926/Default.aspx

- Use the help desk issue tracker to submit bugs, enhancements, and informational requests for any shared asset. Go to Support > LT2 Help Desk > LT2Components, then click on Issue Tracker.

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\(^1\)Service-Oriented Architecture  
\(^2\)Family of Training Systems  
\(^3\)Product Line Management  
\(^4\)Configuration Management
Access FAQs\(^1\) and forum posts associated with architectures by navigating to Support > LT2 Help Desk > LT2Components and clicking either FAQ or Forums.

**NOTE**

Product developers should obtain shared asset software directly from the CM repository located at the IDE\(^2\).

The following sections outline how LT2 shared assets may be developed by the LT2 team or by LT2 product developers; however, all proposed development must be reviewed and approved by the CAWG prior to the start of work.

Shared assets might also be referred to as shared assets. No difference exists between those two terms.

7.4.9.1.1 Interface Control Document (ICDs) and Standards

Development of and modifications to ICDs and standards are governed by the LT2 Standards Working Group. Due to the inherent interoperability impacts, all changes to existing ICDs/standards and any new ICDs/standards must be submitted to the LT2 Standards Working Group, who ensures that CACPs are created and monitored for any ICD/standard efforts.

7.4.9.1.2 Architecture Development

LT2 architectures, part of the shared assets used in the creation of LT2 products, are developed solely by the LT2 team. The CAWG serves as the working group for evolving the LT2 architectures (e.g., CTIA\(^3\), OneTESS\(^4\), FASIT\(^5\)) through requests to modify architectures and ICDs\(^6\). As additional architectures and ICDs and/or updates are identified, the CACP process (defined in the LT2 Product Line Configuration Management Guide) is used to manage these change requests. Stakeholders should use the LT2 Portal for the following topics related to LT2 architectures.

- Use the LT2 CAWG > Architecture Collaboration Area to exchange information between stakeholders. This area also serves as the system of record for architecture specifications.
- Submit architecture topics for discussion at the CAWG using the CAWG meeting topic request form. This is the first step in requesting an enhancement or new feature in an architecture.
- Use the help desk issue tracker to submit bugs, enhancements, and informational requests for any architecture.
- Go to Support > LT2 Help Desk. Select an architecture and click Issue Tracker.
- Access FAQs\(^7\) and forum posts associated with architectures by navigating to Support > LT2 Help Desk. Select an architecture and click either FAQ or Forums.

**NOTE**

Product developers should obtain architecture software directly from the CM\(^8\) repository located at the IDE\(^9\).

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\(^1\)Frequently Asked Questions  
\(^2\)Integration and Development Environment  
\(^3\)Common Training Instrumentation Architecture  
\(^4\)One Tactical Engagement Simulation System  
\(^5\)Future Army System of Integrated Targets  
\(^6\)Interface Control Documents  
\(^7\)Frequently Asked Questions  
\(^8\)Configuration Management  
\(^9\)Integrated Development Environment
7.4.9.1.3 Service-Oriented Architecture (SOA) Service Development

All new development must be developed in accordance with the LT2 SOA Governance Policy to ensure that services are developed consistently with the architecture goals for service orientation. Refer to the LT2SOA Governance Policy for specific details on service-oriented design principles, naming conventions, and other governance topics.

7.4.9.1.4 Component Development

Software components (LT2 components) are developed in accordance with the Software Process Guide and Product Line Configuration Management Guide. As a general rule, new capabilities for the product line should be developed as services in order to migrate the product line to SOA\(^1\); however, bug fixes and minor enhancements to existing components are still allowed. Refer to SOA services.

7.4.9.1.5 Other Shared Assets

Other shared assets include assets that do not fit into those previously established. All shared asset development, regardless of the type of shared asset, follows the same basic process and is governed by the CAWG and documented through the CACPs.

7.4.9.1.6 Documentation Update

Whenever a shared asset is modified by either the LT2 Construct or a product team, the accompanying documentation must also be updated. CAs\(^2\)/SAs\(^3\), technical/user manuals, installation procedures, requirements, test plans, and training materials must be updated in conjunction with source code/binaries updates.

Whenever a shared asset is modified by either the team or a product team, the accompanying documentation must also be updated. CAs/SAs, technical/user manuals, installation procedures, requirements, test plans, and training materials must be updated in conjunction with source code/binaries updates.

7.4.9.2 Commercial Off-the-Shelf (COTS) Product Development

Vendors who want to create COTS products for use in the LT2 Product Line must work within the processes of the CAWG, creating one or more CACPs, defining their intentions, and obtaining feedback or impacts from the product teams. The CAWG has approval authority over any vendor-submitted CACPs. When COTS products are approved for use in the product line, their associated vendors must follow the asset handover process described in the Product Line Configuration Management Guide to make the COTS product available for product line usage.

Similarly, developers who use specific vendor’s COTS products in development of the product line must work with the CAWG to obtain feedback and approval. All product teams working on the product line must have the opportunity to provide inputs and impacts associated with the use of specific COTS products for development. The CAWG has approval authority over final selection of COTS products.

COTS are Commercial Items [FAR 15.403-1(c)(3)] and must meet definition in FAR 2.101.

7.4.10 Live Training Transformation (LT2) Product Development

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\(^1\)Service-Oriented Architecture

\(^2\)Component Agreement

\(^3\)Service Agreement

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Product development starts with the product team, who obtains its requirements from source documents (such as the CDD\textsuperscript{1}). Under the LT2 contract, each LT2 product has a product IPT\textsuperscript{2} that works closely with the CAWG to ensure development and sustainment activities meet the requirements of the product while taking advantage of the reuse offered by the product line.

For example, for a new product, the product team works with the LT2 team and the CAWG to perform an initial reuse analysis of existing shared assets. The reuse analysis results in a candidate reuse list which includes reused shared assets. Where there are requirements gaps, a decision is made to develop new shared assets or modify/extend existing shared assets to meet those requirements. Development to fill capability gaps may also require changes to the domain model or to an architecture, which requires CAWG approval.

The product team also works with the LT2 team and the CAWG to define the product feature profile that contains the variability for each product instance. The feature profile and project files are version controlled in CM\textsuperscript{3}. Product baselines include not only the software itself, but also requirements, documentation, test plans and procedures, and the feature profiles.

Once development begins, a product team, using the Gears 2G PLM\textsuperscript{4} tool, makes use of the automated production line capability to create tailored instances of shared assets for the product based on the product’s feature profile. The automated production line incorporates the variability for each shared asset as required by the specific product’s feature profile.

**7.4.11 Product Line Integration and Testing**

V&V\textsuperscript{5} is performed continuously throughout product life-cycle management. Testing is performed from requirements analysis through operational support at sites. Unit, integration, and system tests help to verify and validate the software against its specifications and intended usage. Validation continues through product testing and product release to individual sites.

**7.4.11.1 Automated Testing**

Automated testing is performed continuously on shared asset software using the product line feature profile: a generic feature set representing the most used features of a shared asset. Testing results are used to continuously evaluate the state of the product line shared assets and provide feedback to development teams to ensure shared assets are meeting the standards of quality expected from the product line.

Defects found during automated testing are assessed for a root cause and addressed immediately by creating a new PTR\textsuperscript{6} or correcting the open PTR that introduced the defect. Automated testing is updated by product teams as new features are added to a shared asset and reflect the current state of the test procedures for the shared asset. Not all test procedures can be addressed through automated testing processes. Those that cannot be automated are addressed during shared asset and integration testing by the product teams. Refer to the LT2 Product Line Test Process for more details.

**7.4.11.2 Development Integration Testing**

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\textsuperscript{1}Capability Description Document  
\textsuperscript{2}Integrated Product Team  
\textsuperscript{3}Configuration Management  
\textsuperscript{4}Second Generation Product Line Management  
\textsuperscript{5}Validation and Verification  
\textsuperscript{6}Product Tracking Report
The product line development team performs development testing (unit, software functional, and automated software testing) and SWIT\(^1\) (shared asset testing and some level of minimal system testing) prior to release. Testing teams are expected to perform full system tests prior to any release.

The IDE\(^2\) provides lab resources that may be used to support integration and test activities.

### 7.4.11.3 Test Plan Variation Points

One special consideration for 2G PLM\(^3\) is that assets containing variability and constraints should contain corresponding variation points and assertions in assets across the life-cycle phases. For example, if there is an optional feature described in optional requirements variation points, then the software implementing the optional requirements and the test cases that test these optional requirements must also be optional. That is, variation points must be consistently applied across the artifacts of the development life-cycle from requirements through test plans; if not, the software would not meet the requirements and the test cases would fail whenever executed.

### 7.4.12 Product Line Cybersecurity

Cybersecurity, formally known as IA\(^4\), is applied throughout the life-cycle of LT2 products developed under LT2. Cybersecurity is separated into two disciplines: ISSE\(^5\) and Security Certification and Accreditation (in the form of the DOD\(^6\) RMF\(^7\)). These two processes, while distinctly different, are executed in concert with each other as described in the PEO STRI\(^8\) BAM\(^9\), and ensure that all Product Line systems implement security controls commensurate with the confidentiality, integrity, and availability requirements of the system.

#### 7.4.12.1 Information System Security Engineering (ISSE)

ISSE activities are performed as part of the systems and software engineering processes. These activities are part of the system and software engineering IPTs\(^10\) that identify security requirements early in the design process to ensure a secure architecture. Integrated ISSE concepts coupled with the 2G PLM\(^11\) processes ensure required products, including requirements, architecture definitions, and designs are captured as part of the product shared assets. The strategic approach of embedding cybersecurity early, or as described by the PEO STRI BAM\(^12\) as baked-in cybersecurity, forms the foundation of the LT2 cybersecurity strategy. The result is a collaborative final product that includes the appropriate ISSE artifacts, reducing rework and risk.

#### 7.4.12.2 Cybersecurity Certification and Accreditation

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\(^{1}\)Software Integration and Test  
\(^{2}\)Integration and Development Environment  
\(^{3}\)Second Generation Product Line Management  
\(^{4}\)Information Assurance  
\(^{5}\)Information System Security Engineering  
\(^{6}\)Department of Defense  
\(^{7}\)Risk Management Framework  
\(^{8}\)Program Executive Office for Simulation, Training & Instrumentation  
\(^{9}\)Basic Accreditation Manual  
\(^{10}\)Integrated Product Teams  
\(^{11}\)Second Generation Product Line Management  
\(^{12}\)Program Executive Office for Simulation, Training & Instrumentation Basic Accreditation Manual

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Just as ISSEs\(^1\) are integrated into the engineering processes, the RMF\(^2\) and ATO\(^3\) are executed in parallel with the systems, software, and security engineering processes. They rely on artifacts they produce to attain a successful system certification and accreditation. Figure 8, below shows the concept of integrating cybersecurity into the system development life-cycle.

The RMF, as defined in DOD\(^4\) 8510.01, is the process by which systems (a combination of hardware and software) attain certification and accreditation. The RMF is used for both type accreditations at the IDE\(^5\) as well as site/system accreditations at specific sites, which are both integrated into the LT2 processes. While some information contained within a system's artifacts is invariably unique to the system itself, reuse of the core cybersecurity processes, tools, and documentation is integral to product line cybersecurity. The LT2 Cybersecurity Working Group maintains a large repository of reuse candidates to create efficient compliance solutions across the product line. In summary, integrating the RMF processes into the development life-cycle of LT2 products, following guidelines established by the LT2 project, enables reuse of critical cybersecurity artifacts, such as architectures, product selections, documentation, tools, and processes. This process enables product teams to reuse the artifacts that are now a part of the shared assets within the LT2 Product Line.

![Figure 8. Integrated Concept.](image)

### 7.4.12.3 Information Assurance Vulnerability Management (IAVM)

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\(^1\)Information System Security Engineers
\(^2\)Risk Management Framework
\(^3\)Authority to Operate
\(^4\)Department of Defense
\(^5\)Integration and Development Environment

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Many of the LT2 shared assets rely on both COTS\(^1\) and GOTS\(^2\) software to provide critical functionality. The reliance on COTS and GOTS software enhances the need for a robust IAVM process ensuring critical vulnerabilities are addressed as early as possible to limit the risk of compromise. Under LT2, both product lines and shared assets are managed using this robust IAVM process.

The LT2 Cybersecurity Lead subscribes to the major notification services for cybersecurity-related alerts to include the following:

- Security Alerts, Bulletins, and other information of interest as published by the US Army on behalf of the USCYBERCOM\(^3\).
- Security Alerts, Bulletins, and other information of interest published by the US-CERT\(^4\).

All security-related alerts issued are maintained for continuity regardless of their applicability to installed LT2 systems. This process provides the capability to determine quickly if new systems acquired in the future have any security-related impacts associated with the systems before they are actually fielded. The LT2 Cybersecurity Lead is responsible for evaluating the alerts upon receipt to determine their applicability. Once the evaluation is complete and a determination of applicability to an LT2 product is made, the product security lead is responsible for implementing, testing, and reporting the updated status.

For most programs on a periodic patch cycle, the applicable alerts may remain in a queued state for several months since that particular system only performs block updates twice a year. As updates to programs and/or software releases are implemented, their status is reported back through the portal with the LT2 Cybersecurity Lead generating the necessary notification to the Government Cybersecurity Manager for the affected programs. This approach ensures that the security posture of products and programs under LT2 CM\(^5\) are maintained throughout the life-cycle.

### 7.4.13 Product Deployment

LT2 product teams deploy their products at a training location (e.g., CTC\(^6\), HITS\(^7\), and TRACR\(^8\)) following a deployment process in which a product development team member delivers the product release to the site, and with the approval of the local field operations representative, installs the product in the operational environment.

### 7.4.14 Product Line Post Deployment Software/System Sustainment (PDSS)

The LT2 product teams provide PDSS for the LT2 products at their fielded sites. Product installation, training rotation support, bug fixes, and help desk personnel, all included in LT2 field support, are described in the following sections.

### 7.4.14.1 LT2 Help Desk

The LT2 Help Desk is available to the LT2 community for issue resolution. Users may access the LT2 Help Desk by visiting the LT2 Portal at https://www.lt2portal.mil/ and navigating to the LT2 Help Desk under Support. The full resources of the IDE\(^9\) are leveraged as needed to resolve issues reported with the

\(^{1}\)Commercial Off-the-Shelf  
\(^{2}\)Government Off-the-Shelf  
\(^{3}\)United States Cyber Command  
\(^{4}\)US Computer Emergency Readiness Team  
\(^{5}\)Configuration Management  
\(^{6}\)Combat Training Center  
\(^{7}\)Homestation Integration Training System  
\(^{8}\)Targetry Range Automated Control and Recording  
\(^{9}\)Integrated Development Environment

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LT2 products and shared assets. The centralized nature of the IDE allows issues to be approached simultaneously from multiple perspectives through collaboration.

7.4.14.2 Non-Warfighter FOCUS (WFF) Post Deployment Software/System Sustainment (PDSS)

The LT2 Portal provides the access to all LT2 stakeholders, allowing the LT2 product teams to distribute new products to the field and the users to submit issues associated with those deployed products. Users at non-WFF\(^1\) deployment sites should report product and shared asset issues by visiting the LT2 Portal at www.lt2portal.mil and navigating to the LT2 Help Desk under Support.

7.4.14.3 Warfighter FOCUS (WFF) Post Deployment Software/System Sustainment (PDSS)

The WFF\(^2\) help desk is the single point of contact for all WFF users to report problems or request enhancements. The WFF staff provides initial support using a detailed troubleshooting knowledge base to resolve most issues; however, they also have two key LT2\(^3\) Construct resources available to assist them in responding to WFF customers: the synchronized WFF and LT2 issue tracker and on-site product team help desk personnel.

7.4.14.3.1 Live Training Transformation (LT2) Portal – WFF Portal Synchronization

The WFF Portal issue tracker is synchronized with the LT2 Portal Help Desk issue tracker. WFF help desk personnel may enter issues (product reports, enhancements requests, or informational requests) into the WFF Portal issue tracker and submit the issues to LT2 for resolution. This portal issue-tracking synchronization enables prompt issue dissemination and escalation between the field and the product development team. The LT2 community experiences heightened, real-time visibility of issue tracking and issue resolution using information transparently available through the LT2 Portal. Figure 9, on the next page illustrates the synchronization of issue tracking between the LT2 and WFF Portals.

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\(^1\)Warfighter FOCUS  
\(^2\)Warfighter FOCUS  
\(^3\)Live Training Transformation

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Issue data are synchronized between the LT2 and WFF Portals as follows:

- WFF help desk personnel enter issues into the WFF Portal issue tracker and submit issues to LT2 Portal to be addressed.
- The LT2 Portal receives issues from the WFF Portal as a help desk ticket associated with the product of the reported issue (e.g., CTC-IS\(^1\)).
- LT2 Portal help desk administrators receive e-mail notifications when new issues are submitted for their products by WFF users.
- Information exchange is bidirectional:
  - Updates to LT2 Portal tickets, including status, comments, attachments, or requests for more information are automatically synchronized so WFF personnel can view the updates.
  - Updates to WFF portal tickets, including comments, attachments, etc., are automatically synchronized and available for viewing on the LT2 Portal.
  - The update rate is near real time.

### 7.4.14.4 Troubleshooting

Any system issues that arise on-site use the following process to ensure the issue is addressed and processed appropriately and efficiently for the quickest resolution. This process employs a three-tiered process (Figure 10, on the next page) to confirm that personnel at each tier perform the necessary troubleshooting steps on-site before reporting issues to product teams.

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\(^1\) Combat Training Center - Instrumentation System
7.4.14.5 Problem Reporting

Any system issues that arise on-site use the following process (Figure 11, on the next page) to ensure they are created correctly and completely so they can be resolved successfully. The process uses a portal to ensure that issues are tracked appropriately and all necessary information is gathered for a problem report. This portal allows sites to track, verify resolution, and close out issues.

Figure 10. Site Troubleshooting Process Workflow.
7.4.14.6 Site Configuration Changes

Before implementing any configuration changes to a site system, authorized personnel create and distribute a TIR\(^1\), which is used to track any changes made to the site system and provide specific details regarding the change (Figure 12, on the next page). The TIR is distributed to the customer and site for approval and requires signatures from site representatives to confirm approval. Once a TIR has been approved by all representatives, it is filed for tracking, and the described configuration change is implemented. If for whatever reason the software configuration changes fail verification while following the described process, authorized personnel follow the described uninstall steps to revert the site to an operational system.

\(^{1}\)Technical Information Report
Figure 12. Site Configuration Change Process.
APPENDIX A Reusable Software

A.1 What Is Reusable Software?

The reusable software product is one developed for one use, but has other uses; or one developed specifically to be usable on multiple projects. Examples include: COTS\(^1\) software products, client-furnished software products, software products in reuse libraries, and software products developed for other projects or products. Reusable software products are selected as an economic alternative to developing new software to satisfy defined requirements.

**NOTE:**

COTS are Commercial Items [FAR 15.403-1(c)(3)] and must meet definition in FAR 2.101.

Candidate reusable software products are evaluated by the developing project for their ability to satisfy defined software requirements. Since exact matches are rare, the selection process includes analysis of costs and benefits associated with unneeded capability and with capability shortfalls for which other options must be selected. Analysis of potential software products includes a validation to ensure that terms of the license do not conflict with the intended purpose and with use by others within the LT2 Product Line.

A.2 Acquiring Reusable Software

Any additional or updated software to be released with LT2 code is submitted to and approved by the CAWG. Submissions include licensing information and a review of the software by IA\(^2\) for compliance with IA requirements. The customer, PEO-STRI\(^3\), is the final approver of CACP. License and IA validation is the responsibility of the development team.

IDE\(^4\) CM\(^5\) maintains a list of all third-party software and their dependencies that are included in released software or software delivered to sites. These licenses are tracked in the third-party dependencies database and are available on the LT2 Portal.

License information stored in the third-party database includes:

- Supplier
- Intended use (e.g., incorporate into deliverable or build dependency)
- License agreement
- Right to use certificate, if required by license
- Storage and handling (e.g., SVN\(^6\))
- Other data relevant to the product line

The IDE IT\(^7\) acquires, controls, and maintains appropriate licensing, certificates, and all other control and tracking mechanisms for all purchased and transferred software. For software purchased on behalf of the customer that is not delivered to sites, the software ownership/license is transferred to the IDE.

A.3 Live Training Transformation (LT2) Dependent Software

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1. Commercial Off-the-Shelf
2. Information Assurance
3. Program Executive Office for Simulation, Training & Instrumentation
4. Integration and Development Environment
5. Configuration Management
6. Subversion
7. Information Technology

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The following table (Table A-1, below) shows the responsibilities and approvals required for each of the general software categories.

<table>
<thead>
<tr>
<th>Software category</th>
<th>Description</th>
<th>Examples</th>
<th>Configuration Control Board (CCB) Approval Required</th>
<th>License Compliance Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runtime Dependent Software</td>
<td>Software fielded to sites that is required for LT2 shared asset software to function.</td>
<td>Products that provide runtime capabilities, such as encoding, compression, database, system drivers, or rendering.</td>
<td>Shared Asset Working Group (CAWG) before included as a dependency.</td>
<td>It is the responsibility of the fielding project at the time of release to ensure that all software delivered is properly licensed and Information Assurance (IA) approved.</td>
</tr>
<tr>
<td>LT2Compile Time Dependent Software</td>
<td>Software that is not necessarily fielded to sites, but is required to compile and build LT2 shared assets.</td>
<td>Products that provide compile and build time capabilities, such as compilers, installers, or documentation generation tools.</td>
<td>Integration and Development Environment (IDE) facilities; Configuration Control Board (CCB) required. CAWG if it is also classified as Runtime Dependent Software.</td>
<td>It is the responsibility of the developing project to ensure that the development team is in compliance with all software licenses.</td>
</tr>
<tr>
<td>LT2 Infrastructure Software</td>
<td>Software that is used to maintain the LT2 shared assets, but is not required to be built or to function at runtime.</td>
<td>Products that provide source control, product tracking, requirements databases, automated build schedulers, test tools, and editors.</td>
<td>IDE facilities; CCB required. CAWG if it is also classified as Runtime Dependent Software.</td>
<td>LT2 team</td>
</tr>
<tr>
<td>Non-LT2 Software</td>
<td>Enterprise software that is not related to the direct development of LT2 shared assets.</td>
<td>Antivirus protection and office products, such as e-mail clients and document publishing</td>
<td>Not covered by LT2</td>
<td>This software is managed entirely by the IDE Information Technology (IT) team, including licensing compliance and purchasing.</td>
</tr>
<tr>
<td>Evolution/Prototype Software</td>
<td>Short-term evaluation for potential use in the above use cases.</td>
<td>Evaluation of Software Development Kit (SDK), toolkits, or software for product/infrastructure use.</td>
<td>IDE facility CCB approval required for IDE development network use. After evaluation, comply with license (s) as categorized in the applicable use cases above.</td>
<td>Product team responsible for complying with evaluation license(s) and terms.</td>
</tr>
</tbody>
</table>

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A.4 Product Team Responsibilities

The responsibilities of the product team are as follows:

- Ensure that all software delivered to site is appropriately licensed and IA\(^1\) approved.
- Obtain approval from the CAWG before including or updating the LT2 dependent runtime software.
- Provide all software dependencies to the CM\(^2\) team to include in the release.

A.5 Configuration Management (CM) Responsibilities

The responsibilities of the CM team are as follows:

- Update all software dependencies on the LT2 Portal and in the third-party license database during product releases.
- Add dependencies to SVN\(^3\) source control as needed.

A.6 Notes to Product Teams

The following notes apply to the product teams:

- Third-party license verification is the responsibility of the product team.
- Presence in the LT2 source repository does not condone use.
- Presence in the LT2 source repository does not imply license approval for use by team’s product.

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\(^1\)Information Assurance
\(^2\)Configuration Management
\(^3\)Subversion

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APPENDIX B Live Training Transformation (LT2) Portal Account

B.1 Introduction

The LT2 Portal, a Web-enabled interface to the assets and supporting tools of the LT2 Product Line, provides general information about LT2 architectures, products, and components as well as many collaborative tools.

The LT2 Portal contains all released LT2 work assets:

- LT2 products
- LT2 architectures
- LT2 components
  - Software (libraries, executables, and source code)
  - CAS\(^1\)
  - Tools used to develop LT2 products
- Hardware specifications
- Database schemas
- IDDs\(^2\)

The portal also contains the following documents and functionality:

- News, events, and briefings for download
- Community of Interest Collaboration Areas
- LT2 shared asset documentation
- LT2 Help Desk
- LT2 FAQs\(^3\)
- Developer documents
- Links to other LT2 programs

The LT2 Portal is intended to be the LT2 developer’s one-stop shopping area for obtaining LT2 products, documentation, and related links. This document describes the step-by-step process (Figure B-1, below) for navigating to the LT2 Portal, registering for a portal account, and logging on to the portal.

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\(^1\) Component Agreement
\(^2\) Interface Definition Document
\(^3\) Frequently Asked Question

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B.2 Navigate to the LT2 Portal

- Open Internet Explorer and navigate to http://www.lt2portal.mil. The portal public home page displays (Figure B-2, below).

![LT2 Portal](image)

Figure B-2. LT2 Portal Home Page.

B.3 Register for an LT2 Portal Account

Follow the steps below to register for an LT2 Portal account.
1. Click the Register button. The Register For An Account page displays (Figure B-3, below).

![Register For An Account Page]

**Figure B-3. Register for an Account Page.**

2. Enter all the information requested in the first three sections of this form.
   a. First Name
   b. Last Name
   c. Email Address
   d. Telephone Number
   e. Time Zone
   f. Password
   g. Confirm Password
   h. Password Question and Answer
   i. Organization (the company for which you work)
   j. Program (the government program/contract on which you are working)
   k. Contractor (leave unchecked if direct government employee or military)
   l. U.S. Citizen
   m. Are you a Business or Engineering User?
n. Are you a Government or Industry User?
   o. Service Affiliation—Select appropriate checkbox.

3. Click the View LT2 Portal Security Policy link to open and read the current security policy.

4. Select the Agree to Portal Security Policy checkbox to agree to the policy.

5. Select the type of access required.
   a. Community Access (LIMITED ACCESS)—This level seriously limits the viewable content. Only select this option if the user does not have a secret clearance or above, or if the community-accessible collaboration areas are the only areas of interest. This level of access does not allow access to non-public collaboration areas, more detailed documentation and briefings, source code, or executable files. No security clearance is required to be approved for a Community Access account.
   b. Document Only Access—This level of access provides the user access to all Community Access materials as well as access to collaboration areas not open to the general public (requires approval of collaboration area lead), most LT2 documents and briefings, the LT2 help desk, LT2 product line shared assets, and program management tools. This access does not include any source code, executable files, CAs\(^1\), or other documents that may contain source code. Although all content is unclassified, proof of a minimum interim Secret-level clearance is required to be approved for this access account.
   c. Source Code Access—This level of access provides the user to all Document Only Access materials as well as access to LT2 source code, executable files, and CAs. Although all content is unclassified, proof of a minimum interim Secret-level clearance is required to be approved for this access account. There is a requirement to sign a distribution agreement that restricts the use and dissemination of LT2 products and components.

6. Click the Register for a Portal Account button at the bottom of the page to begin processing the account request.
   a. If requesting Source Code Access, a Distribution Statement window displays (Figure B-4, on the next page).
   b. Click the LT2 Distribution Agreement in PDF Format link to open the LT2 Distribution Agreement.
   c. Print, complete, sign, scan, and email the distribution agreement to the address provided.
   d. Click the Complete Registration button.

7. The system generates an e-mail to confirm the registration on the portal. This e-mail contains the username; however, the portal administrator must still approve the registration prior to logging on to the LT2 Portal.

8. Once the portal administrator approves the registration, the system generates an e-mail informing you that your account has been approved. Upon receipt of the approval e-mail, log on to the portal.

\(^1\)Component Agreement

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B.4 Log On to the LT2 Portal

Upon receipt of the approval e-mail from the portal administrator, follow the steps below to log on to the LT2 Portal.

2. Enter the username from the approval e-mail and the password entered on registration in the login area on the left-hand side of the public home page.
3. Click the Login button.
4. Once there is a successful logon to the LT2 Portal, click the name in the upper right-hand corner of the page to update the account information.