

**Statement of Work
For the
Common Driver Trainer (CDT) Virtual Product Line (VPL) – Base
Version 2.0**

**Prepared by
U.S. Army PEO Simulation, Training, and Instrumentation (PEO STRI)**

And

Marine Corps Systems Command (MARCORSYSCOM)

14 SEPTEMBER 2018



**12211 Science Drive
Orlando, Florida 32826-3276**

DISTRIBUTION STATEMENT C: Distribution authorized to U.S. Government agencies and their contractors only, due to vulnerability information, effective 30 August 2018. Other request for this document shall be referred to U.S. Army PEO STRI, ATTN: SFAE-STRI-TRADE-VTS.

Engineering

Prepared By: DOAN.DUNG.T Digitally signed by DOAN.DUNG.THU.1250396437 Date: 2018.07.10 07:24:22 -0400
HU.1250396437

Yung Doan
Lead Systems Engineer
Date: _____

Concurrence: MEISTERJEFFREY.D.11869013 Digitally signed by MEISTERJEFFREY.D.11869013 Date: 2018.07.10 11:59:05 -0400
Y.D.1186901394

Jeff Meister
Chief Engineer, PM VTS
Date: _____

Acquisition Logistics

Prepared By: RAINE.WALTER.1114011068 Digitally signed by RAIN.WALTER.1114011068 Date: 2018.07.06 14:33:27 -0400

Walter Raine
Logistics Management Specialist
Date: _____

Concurrence: BROTHERS.MATTH Digitally signed by BROTHERS.MATTH.1067535703 Date: 2018.07.10 07:07:46 -0400
EWJR.1067535703

Matthew Brothers Jr.
Product Support Manager
PM TRADE
Date: _____

Program Management

Submitted By: KIROUAC.STEPHEN.FR Digitally signed by KIROUAC.STEPHEN.FR.EDERICK.1143277409 Date: 2018.07.06 11:23:48 -0400
EDERICK.1143277409

CPT Stephen F. Kirouac
Assistant Product Manager
Common Driver Trainer
Date: _____

Approved By: GUTIERREZ.STEVEN.D Digitally signed by GUTIERREZ.STEVEN.DANIEL.1178343161 Date: 2018.07.09 14:33:47 -0400
ANIEL.1178343161

LTC Steven Gutierrez
Product Manager
Virtual Training Systems
Date: _____

Change History

Revision	Date	Section	Description
1.0	04/14/2017	All	Initial Release
1.1	05/11/2017	All	Update spelling check and format review
1.1.1	06/09//2017	2.2, 3.2.11, 3.3.3	Add IEEE reference, Add "or equivalent" to CMMI Level III, Add iWATCH as mandatory. Update OPSEC
1.1.2	07/17/2017	Signature page 3.2.5, 3.2.5.4 3.3.1 3.3.5.7 3.3.1.2 and 3.10.1	Update Signature LTC and new APM Add subcontract management Update new DID RVTM Add Cybersecurity requirement of draft RMF submission Add Test Plan as new CDRL
2.0	06/21/2018	3.2.1, 3.2.11, 3.3.5, 3.3.9	Results of Draft RFP Release.
2.0	09/14/2018	Cover Page, 3.2.6, 3.2.9	G2, Quality and S3COE reviews.

Table of Contents

1.	SCOPE.....	1
<i>1.1</i>	<i>INTRODUCTION.....</i>	<i>1</i>
<i>1.2</i>	<i>GOAL AND OBJECTIVES.....</i>	<i>1</i>
<i>1.3</i>	<i>BACKGROUND.....</i>	<i>2</i>
2.	APPLICABLE DOCUMENTS.....	5
<i>2.1</i>	<i>DEPARTMENT OF DEFENSE DOCUMENTS</i>	<i>5</i>
<i>2.2</i>	<i>OTHER DOCUMENTS</i>	<i>6</i>
3.	REQUIREMENTS.....	8
<i>3.1</i>	<i>PRODUCT LINE (PL) MANAGEMENT AND PROCESSES.....</i>	<i>10</i>
<i>3.1.1</i>	<i>PL Configuration Management.....</i>	<i>10</i>
<i>3.1.2</i>	<i>PL Core Assets Development and Evolution.....</i>	<i>11</i>
<i>3.1.3</i>	<i>Product Development, Integration, Testing, and Fielding.....</i>	<i>11</i>
<i>3.1.4</i>	<i>CDT VPL LT2 Product-line Synchronization.....</i>	<i>11</i>
<i>3.1.5</i>	<i>Support within CDT VPL.....</i>	<i>11</i>
<i>3.1.6</i>	<i>System Problem Reporting.....</i>	<i>12</i>
<i>3.1.7</i>	<i>Computer Hardware, Enterprise Software Solutions (CHESS) Program....</i>	<i>12</i>
<i>3.2</i>	<i>PROGRAM MANAGEMENT.....</i>	<i>12</i>
<i>3.2.1</i>	<i>Earn Value Management System (EVMS).....</i>	<i>13</i>
<i>3.2.2</i>	<i>Integrated Master Schedule (IMS)</i>	<i>13</i>
<i>3.2.3</i>	<i>Financial Management.....</i>	<i>13</i>
<i>3.2.4</i>	<i>Risk Management.....</i>	<i>13</i>
<i>3.2.5</i>	<i>Management Reviews and Subcontractor Management.....</i>	<i>13</i>
<i>3.2.6</i>	<i>Intellectual Property Rights / Technical Data Rights</i>	<i>15</i>
<i>3.2.7</i>	<i>Government Furnished Information (GFI).....</i>	<i>16</i>
<i>3.2.8</i>	<i>Transition Period.....</i>	<i>16</i>
<i>3.2.9</i>	<i>Government Furnished Property (GFP)</i>	<i>16</i>
<i>3.2.10</i>	<i>Visitor Support.....</i>	<i>17</i>
<i>3.2.11</i>	<i>Operational Security (OPSEC) / Antiterrorism Training (AT).....</i>	<i>17</i>
<i>3.3</i>	<i>SYSTEMS ENGINEERING.....</i>	<i>20</i>
<i>3.3.1</i>	<i>System Design.....</i>	<i>20</i>
<i>3.3.2</i>	<i>Hardware Engineering.....</i>	<i>24</i>
<i>3.3.3</i>	<i>Software Engineering.....</i>	<i>25</i>
<i>3.3.4</i>	<i>Hardware and Software Integration</i>	<i>27</i>
<i>3.3.5</i>	<i>Cybersecurity (CS).....</i>	<i>28</i>
<i>3.3.6</i>	<i>Specialty Engineering.....</i>	<i>32</i>
<i>3.3.7</i>	<i>Integration of 3rd Party Products.....</i>	<i>35</i>
<i>3.3.8</i>	<i>Scenario Development.....</i>	<i>35</i>
<i>3.3.9</i>	<i>SE Core Terrain Database Integration</i>	<i>35</i>
<i>3.4</i>	<i>DESIGN REVIEWS.....</i>	<i>35</i>
<i>3.4.1</i>	<i>Preliminary Design Review (PDR)</i>	<i>36</i>
<i>3.4.2</i>	<i>Critical Design Review (CDR).....</i>	<i>37</i>
<i>3.5</i>	<i>PRODUCT DEFINITION DATA (PDD).....</i>	<i>38</i>
<i>3.5.1</i>	<i>Maintenance Services.....</i>	<i>40</i>

3.6	<i>INTEGRATED LOGISTICS AND SUPPORTABILITY.....</i>	40
3.6.1	<i>Logistics Support Analysis.....</i>	40
3.6.2	<i>Supportability Analysis and Logistics Product Data (LPD).....</i>	40
3.6.3	<i>Maintenance Concept.....</i>	41
3.7	<i>TECHNICAL PUBLICATIONS.....</i>	42
3.7.1	<i>Operator User's Manual (OUM).....</i>	42
3.7.2	<i>System Maintenance Manual (SMM).....</i>	43
3.7.3	<i>Commercial Off-the-Shelf (COTS) Manuals and Associated Lists</i>	43
3.7.4	<i>Publications In Process Review's (IPR's).....</i>	44
3.7.5	<i>Physical Configuration Audit (PCA)</i>	44
3.7.6	<i>Technical Manual Validation.....</i>	45
3.7.7	<i>Technical Manual Verification</i>	45
3.8	<i>ITEM UNIQUE IDENTIFICATION (IUID).....</i>	46
3.9	<i>TRAINING.....</i>	46
3.9.1	<i>Course Conduct Information Package (CCIP)</i>	46
3.9.2	<i>Training Conduct Support Document.....</i>	48
3.10	<i>INTEGRATED TESTING.....</i>	48
3.10.1	<i>Test Readiness Review (TRR)</i>	49
3.10.2	<i>In-Plant Acceptance Test (IPAT)</i>	51
3.10.3	<i>Legacy System Test.....</i>	51
3.10.4	<i>On-Site Acceptance Test (OSAT)</i>	51
3.10.5	<i>Modeling and Simulation Verification and Validation (M&S V&V).....</i>	52
3.11	<i>ENGINEERING AND LOGISTIC SERVICE.....</i>	52
3.12	<i>SITE SURVEY.....</i>	52
3.13	<i>INSTALLATION SUPPORT.....</i>	53
3.13.1	<i>Installation Tools and Test Equipment.....</i>	53
3.13.2	<i>Removal of Equipment.....</i>	54
3.13.3	<i>Packing, Handling, Storage, and Transportation (PHST).....</i>	54
3.13.4	<i>Facility and Equipment Repairs.....</i>	55
3.13.5	<i>Safety.....</i>	55
3.13.6	<i>Maintenance Equipment.....</i>	55

1. SCOPE

The U.S. Army Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI), Project Manager Training Devices (PM TRADE) and Product Manager Virtual Training Systems (PdM VTS) with Marine Corps Systems Command (MCSC) Program Manager Training Systems (PM TRASYS), intends to develop a joint solution to retrofit, procure, integrate, produce, test, refresh hardware/software, and upgrade capabilities to the Common Driver Trainer (CDT) systems. Additionally, PM TRASYS intends to fully replace the existing U.S. Marine Corps (USMC) Operator Driver Simulators (ODS) in accordance with the CDT System Requirements Document (SRD), PRF-PT-685.

1.1 INTRODUCTION

The single award CDT Virtual Product Line (VPL) Indefinite Delivery/Indefinite Quantity (ID/IQ) will incorporate a product line approach such as Live Training Transformation (LT2) and Consolidated Product-line Management (CPM) Next in support of the tasks described above. This SOW defines the general tasks that PM TRADE desires to have performed under the CDT VPL IDIQ contract in support of CDT VPL. PM TRADE envisions Product Line (PL) management, development, maintenance, and evolution of the CDT VPL assets under the CDT VPL IDIQ contract. Individual delivery orders (DOs) will define the detailed requirements in each respective delivery order (DO) SOW.

The CDT VPL contract facilitates the development, evolution, and maturity of the CDT VPL programs, products, and capabilities across the Army's/Marine Corps virtual crew/individual driver trainers' total life cycle. The CDT VPL contract will ensure product line relevancy via a consolidated, streamlined approach that protects, leverages, and matures the CDT VPL investment. Additionally, the CDT VPL contract will continue to evolve the CDT VPL assets and products. The CDT VPL contract will provide efficient, effective, and agile processes to accomplish development, production, fielding, Continuous Technology Refresh (CTR), obsolescence management, concurrency, upgrades, technology insertion, and disposal of legacy, obsolete hardware as needed. The contractor will ensure the following:

- a. Elimination of duplication across development and sustainment efforts
- b. Achieve a high degree of systematic reuse
- c. Consolidation and reuse of shared assets across the product line
- d. Use of a consistent set of tools and processes across the product line
- e. Reduction in time to fielding
- f. Increase of technology agility

1.2 GOAL AND OBJECTIVES

The objective of the CDT VPL IDIQ is to utilize the LT2 Governance to eliminate stove-piped development, obsolescence planning, improve system performance, improve

operational readiness, and improve system maintenance while reducing total ownership costs. It is the objective of the contract to develop a hardware and software Product Line (PL) ensuring standardization, commonality, synchronization, maximum reuse, core asset reuse, and interoperability within the CDT systems, current/future LT2 PL assets and systems. The PL support will include dynamic mechanisms for multi-phase configuration management, PL development, PL support, technology insertion, and growth.

The CDT VPL contract should support the business goals of PdM VTS and are as follows:

- a. Configuration Management
- b. Product Line Tools & Methodologies Management
- c. Engineering & Management Dashboards and Metrics
- d. Reduce Development Cost & Complexity
- e. Align & Support Product Development (common standards and interfaces)
- f. Maximum Reuse Government Products (OneSAF and SE Core)
- g. Reduce Development Costs
- h. Leverage LT2 and CPM Next Processes & Procedures
- i. CDT VPL Core Asset Development

1.3 BACKGROUND

The U.S. Army PEO STRI and PdM VTS has a requirement for driver training simulators to support the Training and Doctrine Command (TRADOC) schools with institutional drivers training and to support operational units with sustainment drivers training. The CDT product line is the Army's preferred solution for initial and sustainment driver trainer needs. This product line encompasses driver training simulators for military wheeled, tracked and specialty vehicles, to include both tactical / non-tactical vehicles with all utilizing a common system platform. Each CDT system will be reconfigurable to accommodate the different vehicle variants as defined in the product system specifications.

The systems will include the following variants:

- a. Tank Variant (TV)
- b. Tank Engineering Variant (TEV)
- c. Tactical Wheeled Variant (TWV)
- d. U. S. Army and USMC Mine Resistance Ambush Protected (MRAP) Variant (MV)
- e. Stryker Variant (SV)
- f. Joint Light Tactical Vehicle (JLTV)
- g. High Mobility Multipurpose Wheeled Vehicle (HMMWV)
- h. Medium Tactical Vehicle Replacement (MTVR)
- i. Logistics Vehicle System Replacement (LVSr) (i.e. MKR18, AMKR18, MKR16 and AMKR16)
- j. Capable of incorporating future vehicle variants training systems

The CDT and the USMC ODS are both virtual driver training simulators that leverage technology to fill a need for wheeled, tracked, and specialty vehicle driver training. The Government designed the CDT to meet specific training needs of institution and Major Army Commands (MACOM). The ODS is used to complement, licensing for tactical wheeled vehicles, entry and sustainment-level driver training. Both training systems provide initial familiarization training, skills progression, and sustainment for wheeled and tracked vehicles. The systems provide capabilities that allow students to become familiar with a realistic arrangement, operation of the vehicle, starting procedures, stopping procedures, instrument monitoring, instrument familiarization with procedures employed while driving under various terrain, environmental, visibility, and vehicle dynamics simulations.

Through the selection of scenarios, both systems train the physical and mental skills required to safely operate tactical vehicles. The systems permit the instructor to observe student driver performance, reactions to artificially induced malfunctions and emergency conditions through skills progression.

The CDT allows for training in all identified driving tasks as required for each variant, including individual and collective tasks up through platoon level. The CDT variants will provide the capability to train trainees to operate major appended subsystems. Appended subsystems will include, customer directed major system add-ons (e.g. plows, commander's station, gunner's station) based on the variant critical training requirements. The CDT variants will enable repetitively trained critical driver and crew tasks in simulated environments.

The CDT common components include the six degree-of-freedom (DOF) motion platform, Instructor Operator Station (IOS), After Action Review (AAR), visual system, and host system. The current ODS training system includes the CDT components plus three DOF facility based and three DOF trailer based platforms.

The U. S. Army has procured 53 CDT systems (13 in the Mobile Training Facility (MTF) configuration), all with various motion base stations, and 69 specific variant cabs. This includes a SV cab, MV cab, TV cab, TEV cab, and TWV cab under current development. The current driver training simulators for CDT allocate to vehicle configurations as follows:

- 1) SV consisting of a SV cab, ten software configurable instances with unique dynamics (each with slat armor option additionally) simulating equipment or components of the following:
 - a. Infantry Carrier Vehicle (ICV)
 - b. Mobile Gun System (MGS)
 - c. Reconnaissance Vehicle (RV)

- d. Mortar Carrier (MC)
 - e. Commander Vehicle (CV)
 - f. Fire Support Vehicle (FSV)
 - g. Medical Evacuation Vehicle (MEV)
 - h. Anti-Tank Guided Missile Vehicle (ATGMV)
 - i. Nuclear, Biological and Chemical (NBC) Reconnaissance Vehicle (NBCRV)
 - j. Engineer Squad Vehicle (ESV) (Plow or Roller)
- 2) MV vehicle variants consisting of an MV cab, five hardware (dash kit) and software configurable instances with unique dynamics simulating equipment or components of the following:
- a. RG 33L
 - b. RG 31
 - c. Caiman
 - d. MaxxPro with and without Independent Suspension System (ISS)
 - e. MRAP All-Terrain Vehicle (M-ATV)
- 3) TV vehicle variants consisting of a M1A2 SEPV2 cab baseline, three hardware (dash kit), and software configurable instances with unique dynamics simulating equipment or components (panels) of the following:
- a. M1A1 (with plow or roller) (each effects dynamics)
 - b. M1A2 SEPV2 (with plow or roller) (each effects dynamics)
 - c. AutoFlug Variant (AV) cab hardware only used standalone for egress with modular AutoFlug or regular driver seat
- 4) TEV vehicle variants consisting of a M1A2 SEPV2 cab baseline with M1A1 panels, two hardware and software configurable instances with unique dynamics simulating equipment or components of the following:
- a. Joint Assault Bridge (JAB) (adding or removing bridge effects dynamics)
 - b. Assault Breacher Vehicle (ABV) (adding or removing plow effects dynamics)
- 5) TWV vehicle variants consisting of a TWV cab, variant specific interchangeable dashes with other equipment, or components simulating the following:
- a. M1083A1, 5-Ton Truck with M1095 Light Tactical Vehicle Trailer (LTVT)
 - b. M915 A3 Line Haul Truck with M872A4 Flatbed Trailer
 - c. M915 A5 Line Haul Truck with M872A4 Flatbed Trailer
 - d. M1120A4 Truck with M1077A1 Palletized Load System (PLS) Flatrack and M1076 Palletized Load System Trailer (PLST)
 - e. HMMWV
 - f. BUFFALO
 - g. MRAP

- h. MATV
- i. HIMARS

Each CDT system configuration contains modules, consoles or workstations to facilitate training in a network system as identified below:

- a. Instructor Operator Station (IOS)
- b. After Action Review (AAR) Station
- c. Scenario Generation System (SGS)
- d. Semi-Automated Forces (SAF)
- e. Joint Capabilities Release Logistics (JCR Log) Interface (TWV Only)
- f. Local Area Network (LAN)
- g. Drivers Vision Enhancer (DVE)
- h. SV associated items
- i. MV associated items
- j. TV associated items
- k. TV Rear View Sensor System (RVSS)
- l. TEV associated items
- m. TEV ABV Commander's station associated items
- n. TWV associated items

This CDT VPL contract will be a joint effort to update, integrate, test, and produce the legacy Army's CDTs and the USMC's ODSs based on the current CDT Component Architecture. In addition, the CDT VPL contract will comply with the plans and processes identified in the Live Training Transformation (LT2) Governance.

To achieve specific networking training objectives, the CDT system will connect within the CDT family of platforms and interoperate with future external systems.

The following documents are applicable to this SOW to the extent specified herein. In the event of a conflict between documents referenced herein and the contents of this SOW, the contents of the SOW will be the governing requirement.

2. APPLICABLE DOCUMENTS

2.1 DEPARTMENT OF DEFENSE DOCUMENTS

MIL-STD-130N	Identification Marking of U.S. Military Property
MIL-STD-40051-2C	Preparation of Digital Technical Information for Page-Based Technical Manuals

MIL-STD-3046	Department of Defense (DOD) Interim Standard Practice, Configuration Management
MIL-STD-31000A	Technical Data Packages
MIL-PRF-29612	Training Data Product Specification
MIL-PRF-32216	Evaluation of Commercial Off-the-Shelf (COTS) Manuals and Preparation of Supplemental Data
TRADOC Regulation 350-70	Training, Army Learning Policy and Systems
DODM 5200.01 Vol. 4	Information Security Program
DODI 5200.46	DOD Investigative and Adjudicative Guidance for Issuing the Common Access Card (CAC)
DODM 5220.22M	National Industrial Security Operating Manual (NISPOM) with Change 2
DODI 5230.24	Distribution Statements on Technical Documents with Change 2
DODI 8320.04	Item Unique Identification (IUID) Standards for Tangible Personal Property
DODI 8500.01	Cybersecurity (CS)
DODI 8510.01	Risk Management Framework for DOD Information Technology
DOD 8570.01-M	Information Assurance Workforce Improvement Program
DODI 8582.01	Security of Unclassified DOD Information on Non-DOD Info Systems

2.2 OTHER DOCUMENTS

PRF-PT-685	System Requirements Document (SRD) for the Common Driver Trainer (CDT): common, appendixes A to G
SOW-2017-001	Statement of Work for the CDT VPL

CNSSI 1253F	Committee on National Security Systems Instruction (CNSSI) 1253
NIST SP 800-53	National Institute of Standards and Technology (NIST) Special Publication (SP) 800-53: Security and Privacy Controls for Federal Information Systems and Organizations
AR 25-2	Information Assurance
AR 380-5	Department of the Army Information Security Program
AR 380-10	Foreign Disclosure and Contact with Foreign Representatives
AR 380-49	Industrial Security Program
AR 381-12	Threat Awareness and Reporting Program
AR 530-1	Operations Security
AR 525-13	Force Protection Program
FAR clause 52.204-9	Personal Identity Verification of Contractor Personnel
Army Directive 2014-05	Policy and Implementation Procedures for CAC Credentialing and Installation Access for Uncleared Contractors
29CFR1910.1200	Occupational Safety and Health Standards Toxic and hazardous Substances
EM 385-1-1	Department of Army Manuals, US Army Corp of Engineers Safety and Health Requirements Manual 2014 (Manual is downloadable from www.usace.army.mil/CESO/Pages/EM385-1-1.aspx).
29 CFR 1910.119	Code of Federal Regulations (CFR), 29 CFR 1910 Occupational Safety and Health Standards (OSHA standards are downloadable from http://www.osha.gov)
FARS Sec.252.225-7043	Antiterrorism/Force Protection for Defense Contractors outside the US

GEIA-HB-0007-B	Logistics Product Data Handbook
GEIA-STD-0007-B	Logistics Product Data
NFPA 70	National Fire Protection Association (NFPA 70 National Electrical Code, 2017 Edition (Copies of this document are available from http://www.nfpa.org/Catalog/ or National Fire Protection Association, 11 Tracy Drive, Avon, MA 02322)
29 CFR 1910	Occupational Safety and Health Administration (OSHA) Regulations OSHA 1910, Subpart S Electrical (Copies of the above regulations are available from http://www.osha.gov)
8000001-PDD-003	Common Driver Trainer Tactical Wheeled Variant Product Drawings/Models and Associated Lists
LT2-TRADE_PLAN-2013-00009	Live Training Transformation (LT2) Product Line Configuration
LT2-TRADE-PLN-000384	Live Training Transformation (LT2) Operations Guide (Version H)
DFARS) 252.234-7001 DFARS 252.234-7002	Defense Federal Acquisition Regulation Supplement
IEEE Std 12207-2008	IEEE Standard Systems and software engineering -- Software life cycle processes
NSTISSP No. 11	National Security Telecommunications and Information System Security Policy – National Information Assurance Acquisition Policy

3. REQUIREMENTS

The CDT VPL contract shall provide efficient, effective, and agile processes to accomplish development/new development of CDT vehicle variants, production, fielding, Continuous Technology Refresh (CTR), obsolescence management, concurrency upgrades, technology insertion, and disposal of legacy, obsolete hardware as needed. The requirements defined herein shall form the basis for all work that shall perform as part of the DOs the Government will issue under the CDT VPL ID/IQ contract for the CDT VPL. Each DO will specifically specify the tasks performed as derived from the CDT VPL ID/IQ contract base SOW.

Concurrency Upgrades:

The contractor shall design, develop, fabricate, integrate, test, validate, deliver, and install concurrency upgrades to the existing CDT simulators to allow them to be concurrent with the tactical vehicle capabilities. The concurrency upgrades shall conform to the CDT Product Line architecture. The concurrency upgrades shall meet or exceed all requirements identified in the CDT SRD, PRF-PT-685.

Continuous Technology Refresh:

The contractor shall design, develop, fabricate, integrate, test, validate, deliver, and install technology refreshes on CDT systems. The contractor shall perform the analysis to determine which components will require refreshed, refurbished, redesigned, and/or replaced. The contractor shall design a solution that reduces the hardware footprint, or total number of computers and the physical space they require. Technology Refresh shall conform to the CDT Product Line architecture with the goal of establishing a single CDT SW and HW baseline. Technology refresh shall conform to all Cybersecurity requirements. Technology Refresh shall utilize current version of the Government-owned software (e.g. OneSAF and SE Core) and any applicable legacy SW and/or HW designs in which the contractor chooses to implement, but not required, to meet or exceed all requirements identified in the CDT SRD, PRF-PT-685. For example, Technology Refresh shall address, but is not limited to:

- a. CDT Software
- b. CDT Computing Systems
- c. CDT Visual Display and Image Generation
- d. Network Infrastructure and Data Storage
- e. Motion Base System
- f. Dashboard Kits
- g. Vehicle Cabs/Configurations
- h. Audio/Sound System

The Government will provide copies of drawings (if/when available), Operator and Maintenance manuals (if/when available), and current Equipment Inventory Records (if/when available) included in the Technical Data Package.

New CDT Vehicle Variants:

The contractor shall design, fabricate, integrate, test, validate, deliver, and install new CDT vehicle variants. The new CDT vehicle variants shall replicate the tactical vehicle counterpart. New CDT vehicle variants shall consist of one or more of the following: complete new CDT system, new CDT cab, or dashboard kits. The new CDT vehicle variants shall conform to the CDT Product Line architecture. The new CDT vehicle variants shall meet or exceed all requirements identified in the CDT SRD, PRF-PT-685

As specified in each DO, the Government will identify the Technology Refresh, Concurrency Upgrades, and/or New CDT Vehicle Variants requirement(s).

3.1 PRODUCT LINE (PL) MANAGEMENT AND PROCESSES

The contractor shall establish innovative, total system/subsystem life cycle management processes, which maintain or improve system's performance, operational readiness, ensure relevancy, increase realism, and improve system maintenance while reducing total ownership costs and logistics footprint. CDT VPL will allow for development, production, fielding, technology insertion, upgrades, obsolescence management, and evolution/improvement of currently fielded systems for Product Managers operating within the CDT VPL life cycle support framework. CDT VPL shall leverage to the maximum extent possible the LT2 Governance core processes, ensuring end-to-end systematic reuse, governance, integration, alignment, synchronization, and configuration management with the PM TRADE LT2 PL and consolidated PL management strategy. If the developer is remote from the LT2 IDE, the contractors shall access all tools using a web browser within the IDE network or via the IDE web Virtual Private Network (VPN) external to the IDE network.

In support of the CDT VPL, the contractor shall perform the programmatic activities and optimize PL organizational structure aligning with the LT2 PL. The contractor's approach shall ensure efficient PL processes for management and oversight of the PL technical activities, to include resources utilized across all CDT VPL DOs. The contractor shall ensure that everyone associated with this project have access to information required to properly perform his or her duties:

Reuse Analysis	Technical Reviews
Integrated Product Team Management	Software & Hardware Configuration Management
Risk Management	CTR Strategy and Management
Technical Data Management	Obsolescence Management

3.1.1 PL Configuration Management

The contractor shall implement a multi-dimensional PL Configuration Management Plan which executes PL Configuration Management and Software (SW) Version control across all CDT Core Assets and CDT Variants.

DI-SESS-80639D Engineering Change Proposal (ECP)

DI-SESS-80640D Request for Variance

DI-SESS-81022D Configuration Audit Summary Report and Certification

3.1.2 PL Core Assets Development and Evolution

The contractor shall perform tasks and activities necessary to continue the development, evolution, and sustainment of the CDT PL Core Assets. The Government will identify specific requirements in each DO.

3.1.3 Product Development, Integration, Testing, and Fielding

The contractor shall perform the necessary product development integration, prototype production, testing, fielding, and sustainment tasks and activities. The Government will address the specific requirements in each DO. The following table, at a minimum, shall provide a representative list of tasks and activities that require by specific DOs:

Concept Development	Functional Analysis
Requirements Analysis	System Engineering
Software Engineering	System Design
System Integration	Software Integration
Fielding	Testing & Test Engineering
Verification Testing	Training
System Demonstration	Validation Testing
Configuration Management	Quality Engineering

3.1.4 CDT VPL LT2 Product-line Synchronization

The contractor shall develop and manage a software, hardware PL for all of the programs utilizing the CDT VPL contract. The contractor shall work with the Government and other stakeholders to update the CDT VPL governance policies and documentation to account for the development of the hardware PL. The contractor shall insure that PM TRADE leverages the LT2 Product Line existing Product line management & engineering processes to the maximum extent possible.

The contractor shall follow LT2 Configuration Management (CM) processes in accordance with the LT2 Product Line Configuration Management Operational Procedures Guide and the LT2 Operations Guide and LT2 Interface Control Documents (ICD). The contractor shall synchronize, populate, and maintain description data and other pertinent information for the CDT VPL systems and common components within the construct of the LT2 tools and processes. The contractor shall identify, describe, and track all of the work products, components, and systems' baselines produced or utilized under this contract.

3.1.5 Support within CDT VPL

The contractor shall actively support, as required, the development and refinement of the systems and components fielded. The contractor shall support the system/product-line by implementing appropriate processes to support the CDT VPL. The contractor shall monitor direct components within the scope of CDT VPL systems and secondary (affiliated) components as well as maintain their component agreements/specifications. This support shall range between collection and adjudication of problems and issues, and providing assistance in verifying and/or installing hardware or software changes as issued via the CDT VPL repository.

3.1.6 System Problem Reporting

The contractor shall report any suspected design and/or capability inadequacies, as well as any performance anomalies that might indicate a systemic flaw/fault or require hardware PL or software PL re-baselining. The contractor shall include the nature of the suspected flaw, the time, and conditions surrounding the occurrence, and affected systems/locations. These reports shall be implemented, e.g. tools within the framework and processes utilized to support the CDT VPL.

3.1.7 Computer Hardware, Enterprise Software Solutions (CHESS) Program

The contractor shall utilize the Army's CHESS program. Under PEO Enterprise Information Systems (EIS), CHESS is the mandatory source for commercial Information Technology (IT) purchases. CHESS contracts provide IT products and services that comply with Network Enterprise Technology Command (NETCOM), Army and DOD policy and standards. Purchasers of commercial hardware and software shall satisfy their IT requirements by utilizing CHESS contracts and DOD Enterprise Software Initiative agreements first, regardless of dollar value. Any purchase made outside of CHESS contracts shall require a waiver. A completed list of the on-line waiver process for CHESS contracts is located at <https://chess.army.mil>.

3.2 PROGRAM MANAGEMENT

The contractor shall provide the overall management and administrative effort necessary to ensure the requirements of this contract are accomplished. The contractor shall track program progress utilizing metrics. The contractor shall define and monitor metrics and Technical Performance Measures (TPMs) to evaluate each critical technical and management process and the conformance of evolving products with contract, cost requirements, and objectives. The contractor shall identify progress, issues, and status of the program. The contractor shall identify problem areas and corrective actions required to eliminate or reduce schedule impacts. The contractor shall, at a minimum, report the following:

- a. Problems and solutions
- b. Time-lines and schedules
- c. Plan of next month activities

- d. Development and fabrication progress
- e. Expenditures to date and cost projections

DI-MGMT-80227 Contractor's Progress, Status, and Management Report

3.2.1 Earn Value Management System (EVMS)

N/A.

3.2.2 Integrated Master Schedule (IMS)

The contractor shall develop, implement, manage and update the contract Integrated Master Schedule (IMS). All program and technical reviews shall present the IMS which shall contain all exit criteria, accomplishments, critical events, predecessors events, successors events, and their dependencies. The IMS shall address and identify total program activities including activities performed by major subcontractors.

Accomplished IMS activities and event times shall reflect any updated changes. The contractor shall conduct critical path analysis of the tasks and identify problem areas and corrective actions required to eliminate or reduce schedule impacts.

DI-MGMT-81861A Integrated Program Management Report (IPMR)

3.2.3 Financial Management

The contractor shall plan, budget, schedule, and control resources allocated to meet the requirements of the contract. The contractor shall document and track status of all appropriated funds associated with the contract to include payments, cancellations, and invoices against each contract line/sub line item. The contractor shall document and track the status of all work directives issued and remaining balances.

DI-MGMT-81651 Contract Invoicing and Payment Report

3.2.4 Risk Management

The contractor shall prepare, implement, and maintain a cost, technical and schedule risk management process. This shall include risk detection and identification, assignment of risk categories, action triggers, and corrective action, tracking of compliance, reporting of status and planning for risk abatement. The contractor shall:

- a. Identify and document moderate and high-risk items for each risk assessment area
- b. Identify, implement risk handling approaches, and track over time each moderate and high-risk item
- c. Document risk issues that have been successfully resolved and schedule each open item into the program IMS

- d. Develop mitigation plans to identify the recommended critical path for contract completion and the appropriate risk handling approach to lower the level of uncertainty identified

3.2.5 Management Reviews and Subcontractor Management

The contractor shall conduct Management Reviews at the request of the Government with a minimum of one every quarter. The Government and contractor shall mutually agree upon the review location. The Management Reviews shall provide an accurate program overview and a detailed discussion of pre-selected topics. The contractor shall manage subcontractors and shall be responsible for the performance of subcontractors.

3.2.5.1 Post Award Conference (PAC) / Start of Work Meeting

As specified for each DO, the contractor shall conduct a combined PAC/Start of Work Meeting held at the contractor's facility, at mutually agreed upon date with the Government, within 20 working days after contract award. The purpose of the conference shall be to establish the framework of the contractor and Government interaction during the performance period of the contract. The contractor shall place emphasis on the operating procedures, methodologies, and processes used in the execution of the contract. The meeting shall include the contractor's key team members identified in the proposal with emphasis on top level management of the program, agreement on metrics used as management indicators during the program and partnering approach to implement. The contractor shall present the program IMS, Integrated Product Team (IPT) structure, management concept, organizational structure, and the interfaces with the Government that are employed to perform the CDT mission. The contractor shall document action items, due dates and coordinate resolution and track action items until closure. Action item closure shall require contractor and Government approval.

DI-ADMIN-81505 Report, Record of Meeting/Minutes

3.2.5.2 Program Management Reviews (PMR)

The contractor shall conduct program management reviews on a quarterly basis in accordance with the IMS. The first PMR shall be no more than 90 calendar days after the combined PAC/ Start of Work Meeting. The Procuring Contracting Officer (PCO) and the contractor shall mutually agree upon the location of the PMRs. The contractor shall coordinate and provide all facilities and infrastructure for Government-contractor meetings and separate breakout rooms for Government only meetings during the PMR. The PMR shall provide a program overview and shall include as a minimum:

- a. Hardware and software design status
- b. Risk and problem identification
- c. Subcontract management/progress

- d. Data collection and modeling
- e. CDT Government Furnished Equipment (GFE) planning and status
- f. Logistics planning
- g. Test planning
- h. Provisioning for training and technical publications status
- i. Schedule status
- j. Pre-selected topics of interest
- k. Cybersecurity status and progress
- l. Human Factors Engineering

Status and information at the review shall reflect currency since the previous review. When possible, other program reviews such as technical reviews, technical manual reviews, etc. shall combine into the PMR. The contractor shall also be responsible for generating minutes of the meetings and provide them to the Government for approval. The contractor shall document action items, due dates, coordinate resolution, and tracking of action items until closure. Action item closure shall require contractor and Government approval.

DI-ADMIN-81505 Report, Record of Meeting/Minutes

3.2.5.3 Integrated Product and Process Management (IPPM)

The contractor shall establish and maintain a management process in conjunction with the LT2 Operations Guide and structure that integrates all design and production activities to optimize design, manufacturing, and supportability processes. The contractor shall utilize systems engineering tools and overlay a management concept that encourages the use of IPTs. The contractor's IPPM shall interact with Government Contracting Officer Representative (COR) in its role as a customer. The contractor's IPPM shall establish performance requirements, monitor and manage total program progress, and evaluate product quality.

The contractor shall establish an IPT structure to address major areas of system development (e.g., systems engineering, hardware design, software design, integrated logistics support testing). The contractor shall establish IPT charters and host regularly schedule IPT meetings or teleconferences. Management reviews shall use IPT meetings/teleconferences to address systems development status of activities, questions, and issues in a timely manner. The contractor shall document action items, due dates and coordinate resolution and track action items until closure. Action item closure shall require contractor and Government approval.

DI-ADMIN-81505 Report, Record of Meeting/Minutes

3.2.5.4 Subcontractor Management

The contractor shall manage and have agreements with subcontractors and partners as required. The contractor shall integrate subcontractors and partners into program IPT.

The contractor shall ensure the requirements of this contract apply to all subcontracts and associate contracts.

3.2.6 Intellectual Property Rights / Technical Data Rights

The contractor shall provide the Government intellectual property rights and technical data rights identified in solicitation provision DFARS Subpart 252.227-7017 in any software and/or technical data developed under this contract with the Government. The Government will retain those rights for the life of this contract. The Government shall procure sufficient rights with the addition of new software and/or hardware proposed for the CDT. The Government shall procure rights such that the Government can maintain / modify the system using Government personnel and third party contractors.

3.2.7 Government Furnished Information (GFI)

The Government will provide agreed upon technical data necessary to accomplish the objectives of this contract upon contractor request, or at the earliest possible opportunity. The contractor shall secure alternate data collection or generation methods if the Government does not provide the technical data. The contractor shall be responsible to secure, protect, and maintain the data provided as GFI.

3.2.8 Transition Period

If the contractor is an unsuccessful offeror in any subsequent Government solicitation for these services or the contract terminates for any reason, the contractor shall provide support to the Government and the successor contractor ensuring an orderly transition to minimize impact on operational readiness. The contractor shall assist both the Government and successor contractor with GFI and Government Furnished Property (GFP) inventories, transition, requests for information and personnel management. The contractor shall provide the successor contractor access to the site and to all technical documentation and publications on a not-to-interfere basis during the transition phase-out period. The contractor shall permit the successor contractor to observe the contractor performing the support services and equipment operations on a not-to-interfere basis during the transition phase-out period. The contractor shall retain full responsibility for all services and equipment in accordance with the SOW until completion of the phase-out period. Transitional support provided to the Government shall not exceed a three month period.

3.2.9 Government Furnished Property (GFP)

Upon contract award, the contractor shall inventory all GFP and subsequently, maintain records of all GFP. The contractor shall submit annual inventory reports to the Government. The contractor shall be responsible for the maintenance, custody, control, movement, disposal, and storage of all GFP. The contractor shall maintain the equipment in the same functional and physical state as received except for normal wear and tear.

FAR Part 52.245-1, Government Property, shall determine the definitions, clauses, policies and procedures for Government Property, unless otherwise specified in this contract. Government property in the possession of the contractor shall be maintained and serviced to a fully operational state.

DI-MGMT-80441 Government Property Inventory Report

3.2.10 Visitor Support

The contractor shall host Very Important Person (VIP) visits, arrange for, and provide demonstrations of system performance, program progress, and other system characteristics when notified by the Government as required.

3.2.11 Operational Security (OPSEC) / Antiterrorism Training (AT)

The contractor's employees and all subcontractor's employees shall complete all Operations Security (OPSEC) training, as required, in the performance of tasks bounded by OPSEC requirements. The contractor shall attach certifications of completion to the contractor status reports. The contractor shall identify and include in the contractor's status report a list of required personnel and their required training for review and approval by the Government.

All contractor employees, to include Subcontractor employees, requiring access Army and Marine Corps installations, facilities and controlled access areas shall complete AT Level I awareness training in accordance with AR381-12 within thirty (30) calendar days after contract start date or effective date of incorporation of this requirement into the contract, whichever is applicable. The Contractor shall submit certificates of completion for each affected Contractor employee and Subcontractor employee, to the COR or to the contracting officer, if a COR is not assigned, within thirty (30) calendar days after completion of training by all employees and Subcontractor personnel. AT level I awareness training is available at the following website: <http://jko.jten.mil>.

3.2.11.1 iWATCH Training

The contractor and all associated subcontractors shall brief all employees on the local iWATCH program (training standards provided by the requiring activity AT Office). This local developed training will inform employees on the types of behavior to watch for and instruct employees to report suspicious activity to the COR. This training shall be completed within 30 calendar days of contract award and within thirty (30) calendar days of new employees commencing performance with the results reported to the COR no later than sixty (60) calendar days after contract award.

3.2.11.2 Access and General Protection Policy and Procedures for Contractor Requiring Common Access Card (CAC)

The contractor and all associated sub-contractors employees shall provide all information required for background checks to meet installation access requirements accomplished by the installation Provost Marshal Office, Director of Emergency Services, or Security Office. The contractor workforce shall comply with all personal identity verification requirements (FAR clause 52.204-9, Personal Identity Verification of contractor Personnel) as directed by DOD Headquarters, Department of the Army (HQDA), Department of the Navy and/or local policy. In addition to the changes otherwise authorized by the changes clause of this contract, should the Force Protection Condition (FPCON) at any individual facility or installation change, the Government may require changes in contractor security matters or processes.

Before CAC issuance, the contractor employee requires, at a minimum, a favorably adjudicated National Agency Check with Inquiries (NACI) or an equivalent or higher investigation in accordance with Army Directive 2014-05. The Government will issue a CAC to contractor employees only if duties involve one of the following:

- a. Both physical access to a DOD facility and access, via logon, to DOD networks on-site or remotely
- b. Remote access, via logon, to a DOD network using DOD-approved remote access procedures or
- c. For a period of six months or more, the requirement of recurring physical access to multiple DOD or federally controlled non-DOD facilities on behalf of the DOD.

At the discretion of the sponsoring activity and based on a favorable review of the Federal Bureau of Investigation (FBI) fingerprint check and a successfully scheduled NACI at the Office of Personnel Management, the Government will issue a CAC.

The Government will address the specific RAPIDGate requirements in each DO if requires. The contractor shall obtain and maintain the base and installation access for employees; this includes RAPIDGate access if required by site. The RAPIDGate Program performs background checks and authenticates participants' identities. Upon passing the background check, each participant receives a personalized RAPIDGate Credential. The participant presents the RAPIDGate Credential at installation perimeter gates to receive authorization to enter. Company enrollment and employee registration are renewable yearly.

3.2.11.3 AT Awareness Training for US Based Contractor Personnel Traveling Overseas

All US based contractor employees and associated subcontractor employees shall take Government provided Area of Responsibility specific AT awareness training as directed by AR 525-13. The combatant commander with the unit AT Office being the local point

of contact directs specific Area of Responsibility training content.

3.2.11.4 Army Training Certification Tracking System (ATCTS) Registration for Contractor Employees Who Require Access to Government Information Systems

All contractor employees with access to a Government information system shall be registered in the ATCTS at commencement of services, and shall successfully complete the DOD Information Assurance Awareness prior to access to the IS and then annually thereafter. The Government will provide information and guidance regarding the ATCTS training requirement, if and when is required.

3.2.11.5 OPSEC Program

The contractor shall comply with the OPSEC Standing Operating Procedure (SOP)/Plan within 90 calendar days of contract award, to be reviewed and approved by the responsible Government OPSEC officer. The contractor shall implement OPSEC measures as ordered by the commander. In addition, the contractor shall have an identified certified Level II OPSEC coordinator per AR 530-1.

3.2.11.6 Requirements for OPSEC Training

Per AR 530-1, Operations Security (OPSEC), new contractor employees shall complete Level I OPSEC training within thirty calendar days of their reporting for duty. All contractor employees shall complete annual OPSEC awareness training. The contractor shall ensure all applicable employees have completed OPSEC initial training and annual refresher training and shall certify that their work force has completed the training through the submission of completion certificates(s) to the COR within 30 days of arrival on the installation. OPSEC training for certification is located at the Defense Security Services website:
<http://cdsetrain.dtic.mil/opsec/index.htm>.

3.2.11.7 Cybersecurity (CS)/Information Technology (IT) Training

All contractor employees and associated subcontractor employees shall complete the DOD CS awareness training before issuance of network access and annually thereafter. All contractor employees working CS/IT functions shall comply with DOD and Army training requirements in DODD 8570.01, DOD 8570.01-M and AR 25-2 within 30 days of contract award or employment. CS/IT training for certification is located at <https://ia.signal.army.mil/dodiaa/default.asp>.

3.2.11.8 CS/IT Certification

Per DOD 8570.01-M, Defense Federal Acquisition Regulation Supplement (DFARS) 252.239.7001 and AR 25-2, the contractor employees supporting CS/IT functions shall be appropriately certified upon contract award. The baseline certification as stipulated in DOD 8570.01-M shall be completed upon contract award.

3.2.11.9 Performance or Delivery in a Foreign Country

The contractor shall comply with DFARS clause 252.225-7043, Antiterrorism/Force Protection for Defense contractors Outside the US. Non-local national contractor personnel shall comply with theater clearance requirements.

3.2.11.10 Threat Awareness Reporting Program (TARP)

For all contractors with security clearances, per AR 381-12 Threat Awareness and Reporting Program (TARP), contractor employees shall receive annual TARP training by a counterintelligence agent or other trainer as specified in 2-4b.

3.3 SYSTEMS ENGINEERING

The contractor shall assist the Government in translating requirements and objectives, interface and other design constraints including cost, into preliminary, verifiable, functional requirements and objectives, while conducting cost-benefit trades to support refinement of the preliminary functional requirements. The contractor shall develop and manage the CDT design (balanced with respect to performance, cost, schedule, and risk) and verify it meets the systems requirements, PRF-PT-685. The contractor shall assess proposed changes in the evolving functional architecture, physical hierarchy, and baselines and objectively trade alternatives to balance performance, cost, schedule, and risk prior to approval. The proposed solution will work within the existing footprint, power and Heating, Ventilation, and Air Conditioning (HVAC) building requirements. As part of the system design and component selection process requirement, CS shall consider all systems used to enter process, store, display, or transmit information. The contractor shall provide all tools, SW, and equipment necessarily to perform their duties.

The contractor shall develop and deliver the contractor's Systems Engineering Management Plan (SEMP). The SEMP shall describe the contractor's proposed efforts for planning, controlling, and conducting a fully integrated engineering effort. The purpose of the SEMP is to understand and evaluate the contractors' engineering processes and procedures as part of the CDT VPL contract. The SEMP shall coincide with the Government's Systems Engineering Plan (SEP).

DI-SESS-81785A Systems Engineering Management Plan (SEMP)

3.3.1 System Design

The contractor shall use the SRDs associated with the CDT as the basis for development of all implementing specifications. The design concept shall establish one common software design baseline, one common hardware design baseline, and an open systems architecture, with system interfaces, products, practices, and tools, to support all vehicle variants development. The design concept shall base the engineering specifications and standards adopted by industry standards bodies or de facto standards (set by the market place). Performance, cost, industry acceptance, long

term availability, supportability, and upgrade potential shall assist in determining selected designs and specifications. The Government's intent is to maximize the CDT product-line and reuse the existing architecture (to include software and hardware design and implementation) to preserve and improve training capabilities.

3.3.1.1 System Definition Phase

The contractor shall define, document, manage, and apply a requirements definition process IAW IEEE Std 12207-2008, section 6.4.1 for all requirements and derived requirements from PRF-PT-685. The Requirements Definition phase shall require the creation of or update to the Requirements Traceability Verification Matrix (RTVM). The RTVM shall be a direct input to the System/Subsystem Specification. The RTVM shall capture requirements from traceability, analysis, validation, functional analysis, functional verification, synthesis and includes the capture of all elements resulting from test and evaluation efforts. The RTVM shall include the verification criteria for each requirement for testing purposes. The RTVM shall provide backwards and forward traceability, (i.e. the RTVM shall document each requirement from its source through definition, analysis, design, testing, and acceptance). The contractor shall institute a configuration review process with the Government for requirements review, approval, and control process to assist in the RTVM data entry decisions.

The contractor shall establish the definition of the system with a focus on system products required to satisfy performance requirements PRF-PT-685. The contractor shall complete the system, product, and subsystem interface requirements and verification definition, system and product requirements and verification definition, and preliminary subsystem requirement and verification definition; establish a system baseline; and complete technical reviews. The requirements and initial design documentation generated during the system definition stage shall guide subsystem development. The contractor shall conduct the System Requirements Review (SRR), with Government's participation, at the completion of the systems definition stage for determining whether the system definition is sufficiently mature to progress to preliminary design stage. The contractor shall review system definition to ensure that:

- a. The design is sufficiently mature to meet systems engineering criteria
- b. System functional requirements and system non-functional requirements (e.g., performance, design goals (e.g., Modular Open System Approach (MOSA)) are identified
- c. System-level risks adequately address to justify continued development
- d. Trade-study data are adequate to substantiate that system requirements are achievable
- e. Interface requirements between human and products or subsystems identifies performance, workloads, design constraints, and usability
- f. Selected CS products that are National Information Assurance Partnership (NIAP) validated or on the DOD Unified Capabilities (UC) Approved Products List (APL) (<https://aplits.disa.mil/processAPList.do>)

- g. Decisions made in arriving at the system definition configuration support by analysis, test, and other technical data

DI-IPSC-81431A System/Subsystem Specification (SSS)

DI-MGMT-82133 Requirement Traceability Verification Matrix, RTVM

3.3.1.2 System Requirements Review (SRR)

In order for the Government to authorize the contractor to proceed into the preliminary design phase, the contractor shall conduct the SRR as a product process assessment to ensure the system definition is complete. The purpose of the SRR is to ensure performance requirements, derived from overall requirements, is complete, properly identified, defined, testable, and consistent with schedule, risk, technology readiness, and other system constraints. The review shall include the presentation and discussion of information and data relating to the following:

- a. System Requirements Document
- b. System software functionality description
- c. Preferred system solution definition
- d. Hardware/software allocation
- e. Human interfaces
- f. Data collection
- g. Test Plan

3.3.1.2.1 SRR Entrance Criteria:

Entry criteria for the SRR shall consist of:

- a. Government review of the SRR (preliminary) presentation material indicates it is sufficient to support the SRR
- b. Documented results of the data collection and GFI/GFE tasks are complete
- c. Draft Requirements Traceability Matrix (RTM) document submitted for review
- d. M&S V&V draft plan with focus on methodology established

3.3.1.2.2 SRR Exit Criteria:

The SRR shall be complete when:

- a. Government concurrence that all required SRR topics have been satisfactorily presented, discussed, and documented
- b. The system requirements, as disclosed, satisfy the requirements of PRF-PT-685
- c. The system requirements detail and enable system functional definition, functional decomposition, test, and evaluation
- d. The program risks are identified
- e. The minutes and presentation materials have been submitted and agreed to

- f. All action items have been assigned with suspense date for closure
- g. Government acceptance of M&S V&V draft plan with focus on methodology

DI-ADMIN-81505 Report, Record of Meeting/Minutes

3.3.1.3 Preliminary Design Phase

The contractor shall ensure that the design considerations include systems functional requirements, systems non-functional requirements (e.g., performance, design goals (e.g., MOSA, and Human System Interfaces)). The contractor shall ensure that functional design considerations integrate CS functional requirements and that these requirements are included throughout the development process. The contractor shall decompose identified subsystem functions into lower-level functions and allocate functional and performance requirements to component-level functional and physical architectures. Each preliminary subsystem requirements, verification definition, and preliminary design-to baseline shall evolve into a subsystem requirement, verification definition, and design-to baseline. Preliminary component requirements, verification definition, and build-to baselines shall define the components and the subsystem developed. Final subsystem definition shall include identification of recommended components and interfaces; resolution of subsystem-level risks; assessment of component risks; and design for quality factors to include producibility, verifiability, usability, CS, supportability, trainability, and disposability for each subsystem. The contractor shall complete subsystem reviews for each subsystem at the completion of its preliminary design stage. The contractor shall document the results of the evaluation. The purpose of each review is to assure that:

- a. The subsystem definition is sufficiently mature to meet systems engineering criteria
- b. The subsystem functional requirements and non-functional requirements (e.g., performance, design goals (e.g., MOSA)) are identified in the subsystem design and are traceable to the system functional and non-functional requirements
- c. Component allocations and preliminary component specifications are reasonable and provide a sound subsystem concept
- d. Software architecture is described using four views: 1) software module view; 2) software runtime view, 3) use case view, and 4) software deployment view
- e. Subsystem risks have been assessed and mitigated to a level appropriate to continue development
- f. Trade-study data are adequate to substantiate that subsystem requirements are achievable
- g. Human system interfaces are identified and described in the subsystem design and are traceable to design requirements
- h. Decisions made in arriving at the subsystem configuration definition are well supported by analysis and technical data
- i. Security engineering processes are integrated into the design to achieve an integrated secure solution

- j. Complete analysis of the proposed GFI/GFE/COTS/GOTS integrated solution conducted and any outstanding issues identified to the IPT for assessment.

The contractor shall present the CDT preliminary design to the Government at the Preliminary Design Review (PDR).

3.3.1.4 Detailed Design Phase

As defined in each DO, the contractor shall complete subsystem design down to the lowest component level, and create a component requirements, verification definition, and build-to component baseline for each component. Final component definition shall include identification of recommended parts and interfaces; resolution of component-level risks and for each component, down to the lowest sub-component, the design for quality factors to include producibility, verifiability, usability, CS, supportability, trainability, and disposability. The contractor shall complete component reviews at the completion of the detailed design stage for each component with Government participation. The contractor shall integrate security engineering processes into the design to achieve an integrated secure solution. The contractor shall document the results of the evaluation. The purpose of this review shall be to ensure that:

- a. Each detailed component definition is sufficiently mature to meet measure of effectiveness and measure of performance criteria
- b. Component specifications are reasonable and provide a sound component concept
- c. Component and related life cycle process risks assess and mitigate to a level appropriate to support the fabrication, assembly, integration and test phases
- d. Trade-study data are adequate to substantiate that detailed component requirements are achievable
- e. Software architecture describes using four views: 1) software module view; 2) software runtime view, 3) use case view, and 4) software deployment view
- f. Human system interfaces are identify and describe in the detailed design and are traceable to design requirements
- g. The detailed software design (to include COTS/GOTS product name and version number) describes in terms of the satisfaction of functional and non-functional systems requirements
- h. Decisions made in arriving at the detailed component definition configuration supports analysis and technical data
- i. Security engineering processes integrates into the design to achieve an integrated secure solution
- j. Government approves inspection of all incremental development

The contractor shall present the completed CDT PL design to the Government at the Critical Design Review (CDR).

3.3.1.5 Fabrication, Assembly, Integration and Test Phase

When inspection, analysis, demonstration, or tests determined product deficiencies exist, the contractor shall resolve any product deficiencies for the system, product, subsystem, assembly, or component. The contractor shall verify that the products designed satisfy specifications. The contractor shall integrate security engineering processes into the design to achieve an integrated secure solution. The contractor shall complete functional configuration audits, with Government participation, to verify that products have achieved requirements; that they satisfy the characteristics as specified in specifications, interface specifications, and other baseline documentation; and that test plans and procedures were complied. The contractor shall informally present results at the CDT IPT meeting.

3.3.2 Hardware Engineering

As specified by individual DO, the contractor shall design, develop, integrate, assemble, and test CDT system hardware that satisfies the performance and CS requirements stated in the DO. The contractor shall conduct market surveillance and market investigations in order to maximize the use of commercial and non-developmental items. The contractor shall apply the systems engineering process during each level of system development (system, subsystem, and component) to add value (additional detail) to the products defined in the prior application of the process. The contractor shall document in the integrated database information gathered throughout each of the design stages. The contractor shall consider the development of hardware in context of a virtual environment product line; ensuring attention was given to architecture and reuse at each phase and DO.

3.3.3 Software Engineering

As specified by individual DO, the contractor shall develop the system software and firmware, and maximize leveraging the PM TRADE LT2 processes for software development practices. The contractor shall develop the system software and firmware in accordance with recognized industry standards and internal documented process. The design process shall incorporate features that promote assessment of open source software products, ease of operation, CS, ease of software maintenance, ease of future updates and modifications, data void work around, and any smart designs that can justify a reduction in the amount of documentation. Computer programs and computer data system shall be fully integrated In Accordance With (IAW) the system specification. The contractor shall conduct market surveillance and market investigations, in order to maximize the use of open source software, commercial software and non-developmental software. The contractor shall avoid recurring software licensing fees and minimize recurring software support requirements cost. The contractor shall employ well-defined security policy models, structured, disciplined, and rigorous hardware and software development techniques, and sound system/security engineering principles. The contractor shall follow formal industry-accepted software

development practices that are consistent with at least Level 3 or equivalent of the Capability Maturity Model Integration for Development (CMMI-DEV).

3.3.3.1 Software Requirements and Architecture Development and Review

The contractor shall develop software requirements and architecture IAW the contractor's software development process plan. The contractor shall document all analyses, and the software will be forward- and backward-compatible within the CDT VPL. The contractor is encouraged to suggest revisions to Government requirements where such revisions would result in cost or schedule reduction or performance improvements. As part of this activity, the contractor shall work within the IPTs to re-iterate the PL and System-of-System (SoS) software requirements and architecture.

The contractor shall define and record the operational concept for the system, and define and record the architectural design of the system (identifying the components of the system, their interfaces, and a concept of execution among them) and the traceability between the system components and system requirements. Based upon analysis of system requirements, system design, and other considerations, the contractor shall define and record the software requirements met by each software item, methods used to ensure each requirement is satisfied, and the traceability between the software item requirements and system requirements.

The contractor shall evaluate the CS requirements to assess any impacts on developed software and provide potential solutions, if applicable. The contractor shall use modeling and simulation as appropriate for architecture validation. In addition, the contractor shall determine if existing open source software products are capable of meeting any operational capabilities, perform a detailed software reuse evaluation, and document the results of the analysis. The contractor shall conduct architecture evaluations, including stakeholders external to the contractor's organization, for each software build.

3.3.3.2 Software Design and Implementation

The contractor shall design software, develop executable code, perform unit testing, and integrate software components (with each other and with hardware components) to meet system PL requirements. Software design includes not only design to requirements, but selection of existing software products including open source software to meet system PL requirements, and iterating the requirements to allow use of existing products when indicated by Cost As an Independent Variable (CAIV) or Schedule As an Independent Variable (SAIV) trades. The contractor shall select products that perform CS functions and CS-enabled Information Technology (IT) from the DOD UC APL, and configure IAW DOD-approved security configuration guidelines. These include databases which shall comply with the Defense Information Systems Agency (DISA) database Security Technical Implementation Guide (STIG).

DI-IPSC-81435A Software Design Description (SDD)

DI-IPSC-81441A Software Product Specification (SPS)

DI-IPSC-81442A Software Version Description (SVD)

3.3.3.3 Software Development Test

The contractor shall establish and execute a software item qualification test program consisting of program or module and cycle or system levels of testing. The contractor shall document the life cycle activities for each software item subject to verification, the required verification tasks for each life cycle activity, and related resources, responsibilities, and schedule. The contractor shall establish test cases (in terms of inputs, expected results, and evaluation criteria) and establish traceability between the test case and the requirements. The contractor shall develop detailed procedures for conducting the test, and test data for testing the software corresponding to each software item. The testing shall be in accordance with the unit test cases and procedures. The contractor shall analyze the results of item testing and shall record the test and analysis results. Prior to the start of final test, the contractor shall upgrade the commercial off the shelf (COTS) products to the latest versions approved by the Configuration Control Board (CCB)/IPT. The contractor shall also identify at the start of each unit test event the COTS products that have changed for the existing system and the files that were updated to work with the latest COTS and what files need to be upgraded as well as identifying the version(s) of the COTS products for that unit test event. The contractor will apply all software patches before initiating the formal qualification test. The contractor shall identify and provide rationales at the Test Readiness Review explaining why certain software patches did not apply to the CDT system. The Government shall approve contractor readiness to test before the formal qualification test. The contractor shall conduct a software item test readiness review as part of the system Test Readiness Review prior to initiating the formal qualification test.

3.3.3.4 Software Integrity Certification

The contractor shall verify and certify that designed system application software functions are in a properly secured operating system environment and all software is free of elements that might be detrimental to the secure operation of the resource operating system, as described in DODI 8500.2.

3.3.4 Hardware and Software Integration

The contractor shall perform all activities to integrate and assemble the hardware and software to achieve a fully functional and accreditable system, with all support systems, that performs and operates IAW the system specification and contractor generated specifications. The contractor shall develop and document all external interfaces to other systems and all internal interfaces between hardware and software configuration items. The contractor shall provide interface descriptions for the entire design and for any of its modifications. The contractor shall include references to all applicable

electrical and mechanical interfaces, commercial standards, message protocols, security issues, and precautions in descriptions. The contractor shall verify the complete integration of the hardware and software of each hardware and software subsystem and the overall system through the utilization of formalized test procedures. A system level production approval review shall be completed to demonstrate that the total system has been verified to satisfy specification and baseline requirements for each system level, and to confirm readiness for production, distribution, operations, support, training, continuing improvement, and disposal. The review shall ensure that:

- a. Issues for the component, assemblies, subsystem, products and life cycle process and services are resolved
- b. Test procedures for components, assemblies, and products were completed and were accurate
- c. The system and products were confirmed ready for function and CS testing and accreditation
- d. Test were conducted IAW established procedures
- e. An audit trail from design reviews, held after detailed design, establish with changes substantiated, and all component, subsystem, and system products meet specification requirements
- f. Risk-handling procedures are satisfactory for production
- g. Evolutionary development requirements and plans have been refined
- h. Planning is complete and procedures, resources, and other requisite people, products, and processes are available (or programmed to be available) to initiate production, distribution, operations, support, training, disposal, and evolutionary development (if any)

DI-SESS-81248B Interface Control Document

3.3.5 Cybersecurity (CS)

The contractor shall leverage LT2 software, CDT VPL hardware and cybersecurity processes to the maximum extent possible for ease of transition to sustainment. The contractor shall follow the latest DOD Cybersecurity process to ensure CDT meets the requirements. The contractor shall provide cybersecurity scans of the system with Army approved automated vulnerability scanning tools to demonstrate Security Technical Implementation Guide (STIG) and Information Assurance Vulnerability Alert (IAVA) compliance throughout the Period Of Performance (POP) and make those scan results available to the Government for reviews during major milestone (i.e. CDR, TRR) reviews. The contractor shall be required to support a Government scan (up to five days) at least two weeks prior to system Test Readiness Review (TRR).

The contractor shall integrate cybersecurity functions into their programmatic processes, document decisions, specify and track requirements, document certification efforts, identify possible solutions, and maintain operational systems security in accordance with DODD 8500.01, DODI 8510.01, and AR 25-2. All CS enabled

products shall be securely configured IAW DOD-approved security configuration guidelines. The contractor shall provide documentation demonstrating training and certification compliance at the start of work for all personnel responsible for performing CS functions in accordance with DODD 8570.01. The contractor shall secure all unclassified DOD information on Non-DOD information systems in accordance with DODI 8582.01.

3.3.5.1 Cybersecurity Hardware and Software Purchases

The contractor shall purchase CS compliance hardware and software products. A CS approved operating system shall be configured IAW the latest DISA STIG, written for that operating system and Government approval is required before design and implementation of any operating systems.

The contractor shall select the CS validated products IAW the National Security Telecommunications and Information System Security Policy (NSTISSP) No. 11 – National Information Assurance Acquisition Policy. Government approval requires for any unapproved CS product.

3.3.5.2 Cybersecurity Artifacts

The contractor shall comply with the Cybersecurity process in accordance with DOD 8510.01 Risk Management Framework (RMF) for DOD Information Technology (IT), Committee on National Security Systems Instruction (CNSSI) 1253, and the National Institute of Standards and Technology (NIST) SP 800-53.

The contractor shall produce all components of the RMF package necessary to deliver and operate a fully accredited system. This shall include the System Security Plan, accreditation boundary diagram, data flow diagram, hardware and software lists, incident response plan, acceptable use policy, configuration management plan, configuration and recovery instructions and the ports, protocols and services list. The contractor shall ensure that the security requirements and procedures are in accordance with all required DOD and Army regulations per the Confidentiality, Integrity and Availability levels of Low for the system. The NETCOM Stand-Alone Information System and Closed Restricted Network Assessment and Authorization Operations Tactics, Techniques, and Procedures shall use to determine the control set for the system.

3.3.5.3 Cybersecurity Process and Controls

The contractor shall develop and maintain a robust CS process to guide the system's design, document CS decisions, and identify and implement CS requirements IAW DODI 8500.01 and DODI 8510.01. The contractor shall produce all components of the RMF package necessary to deliver and operate a fully accredited system. The contractor shall establish configuration management of the product baseline, implement

control measures for operational system security, and support CS certification testing. The contractor shall identify and use DOD and Army CS approved solutions to include operating systems, network devices, and software.

3.3.5.4 CS Control Review/RMF Package

The contractor shall support a RMF Review held as part of the PDR. The CS Control Review shall address at a minimum:

- a. Update on RMF Package
- b. Update Preliminary Data Flow and Accreditation Boundary Diagram
- c. Update on the hardware/software/firmware lists and procurement action
- d. Update on contractor CS training as applicable and the use of CS Scanning tools
- e. Update on design and system integration schedule

DI-MGMT-82001 DOD Risk Management Framework Package Deliverables

3.3.5.5 Security Control Assessment (SCA)

The contractor shall support a SCA Readiness Review held approximately 14 working days prior to the SCA Event. The SCA Readiness Review and Scan Report shall address at a minimum:

- a. Final CS Scans Report of the system
- b. Corrective actions taken and written analysis of any open deficiencies
- c. Update of CS system documents
- d. Finalization of travel arrangement in support of the SCA event

3.3.5.6 Security Control Assessment (SCA) Event

The CS independent certifier assesses the overall security posture of the system prior to system test. After the SCA event scorecard provides from the certifier, the contractor shall provide support addressing all identified findings deriving from the SCA event and assisting the Government in the preparation of the Plan of Actions and Milestones (POA&M) documentation.

3.3.5.7 Cybersecurity Training, Testing, and Certification

The contractor shall use DOD approved assessment tools to assess the system prior to the Governments performance of the Authorization and Assessment (A&A) or the System Test & Evaluation (ST&E). The contractor shall draft the RMF documentation 45 days prior to the A&A. The contractor shall complete a test readiness review no less than two weeks prior to the government conducted A&A to demonstrate readiness to conduct testing. The contractor shall support the government testing of the system and

address any open finding prior to government acceptance of the system. The contractor shall support the creation of a POA&M for any remaining findings with mitigation actions.

3.3.5.7.1 Authorization and Assessment (A&A)

A Government-provided independent certifier will conduct the A&A. The contractor shall conduct the A&A prior to the start of In Plant Acceptance Test (IPAT). The purpose of the A&A is to assess the overall security posture of the system.

3.3.5.7.2 A&A Readiness Review and CS/IS Scan Reports

The contractor shall host an A&A Readiness Review approximately 15 working days prior to the A&A. The purpose of the A&A Readiness Review is to:

- a. Review the final scans of the system prior to IPAT and the A&A
- b. Review corrective actions taken and the written analysis of any open deficiencies discovered during the Final scans
- c. Update certification documents for the system

DI-MISC-80711A Scientific and Technical Reports, CS Scan Reports

3.3.5.7.3 Certification, Test and Evaluation Event

The contractor shall host the A&A event. At the conclusion of the A&A, the Government and the independent certifier will present the results of the A&A.

The contractor shall support and implement the security controls necessary to eliminate vulnerabilities found during the A&A. The contractor shall assist the Government in the preparation of the POA&M.

3.3.5.7.4 Training and Certification

The Contractor shall ensure that personnel accessing information systems have the proper and current information assurance certification to perform information assurance functions in accordance with DOD 8570.01-M, Information Assurance Workforce Improvement Program. The Contractor shall meet the applicable information assurance certification requirements, including-

- a. DOD-approved information assurance workforce certifications appropriate for each category and level as listed in the current version of DOD 8570.01-M.
- b. Appropriate operating system certification for information assurance technical positions as required by DOD 8570.01-M.

3.3.5.8 Federal Information Security Management Act (FISMA)

The contractor shall support annual FISMA of 2002 reporting for the system to include documentation reviews and updates; security control validation; demonstration recovery procedures; and other activates to maintain the system security and FISMA compliance of the system. The contractor shall support the reaccreditation of the systems every 3 years or as deemed necessary due to changes made to the system.

3.3.5.9 Information Assurance Vulnerability Management Program (IAVMP)

As part of the Information Assurance Vulnerability Management Program (IAVMP), the contractor shall document the incorporated and unincorporated Information Assurance Vulnerability Alerts (IAVAs), Information Assurance Vulnerability Bulletins (IAVBs), and Information Assurance Vulnerability Technical Advisories (IAVTAs). The IAVMP plan shall include, but is not limited to, identifying and assessing potential threats to determine risks. It also involves developing and implementing controls, countermeasures, or solutions. The contractor shall monitor the system for compliance and success, while evaluating and refining the IAVMP as necessary. The contractor shall incorporate all applicable DOD and Department of the Army (DA) Information Assurance Vulnerability Management messages issued on behalf of the Department of Army G3, CIO/G6 and Joint Task Force-Global Network Operations. The contractor shall provide justification for each unincorporated IAVMP message (i.e., describe the specific negative impact the IAVMP message incorporation would have on the system operation).

3.3.6 Specialty Engineering

The contractor shall provide Supportability Engineering, Reliability, Availability and Maintainability (RAM) Engineering, Safety Engineering, Quality Engineering, Human Factors Engineering, Electromagnetic Environment Effects (E3) Engineering, Containment and Corrosion Control and Standardization as defined in the sections below.

3.3.6.1 Reliability, Availability and Maintainability (RAM) Engineering

The contractor shall develop, implement and manage a process satisfying all RAM requirements and be completely integrated within the systems engineering process. RAM status shall be included as part of each program review. The contractor shall conduct design trade-off studies to consider quantitative issues such as stress levels, selection of parts, parts simplicity, and redundancy. The contractor shall verify through analysis, the attainment of reliability requirements.

DI-SESS-81497A Reliability and Maintainability Predictions Report

DI-SESS-81495 Failure Modes, Effects and Criticality Analysis Report

3.3.6.2 Safety Engineering

The contractor shall develop and implement tasks and activities to identify, evaluate, and eliminate or control hazards throughout the program's life cycle. The contractor shall ensure the safety of the system's design, operation, transportation, maintenance, and support. The contractor shall conduct safety analyses, hazard identification, hazard classification, and hazard tracking integral to the system design effort. The contractor shall develop a hazard risk index including hazard severity and hazard probability levels for all hazards. The contractor shall document the system safety IAW the Safety Assessment Report (SAR) to meet the final design specifications.

DI-SAFT-80102C Safety Assessment Report (SAR)

3.3.6.3 Health Hazard Assessment

The contractor shall identify potential health hazards and recommend engineering controls, equipment and protective procedures to reduce the associated risk to an acceptable level. The contractor shall assess system, facility, and personnel protective equipment design requirements to allow safe operation and maintenance. When feasible engineering designs are not available to reduce hazards to acceptable levels, the contractor shall develop alternative protective measures. The contractor shall address the hazardous materials listed in the Environmental Protection Agency's (EPA) toxics release inventory and the list of Class I and Class II stratospheric Ozone Depleting Substances (ODSs), as listed 29CFR1910.1200. The contractor shall update the current Health Hazard Assessment Report (HHAR) to meet the final design specifications.

DI-SAFT-80106C Health Hazard Assessment Report (HHAR)

3.3.6.4 Quality Engineering

The contractor shall establish a measurement system that will provide maximum visibility into new and prior processes to assure the meeting of contractual requirements. The contractor shall select the proper methods to analyze these processes to continuously improve the system. The contractor shall develop metrics to assist management visibility into an adequate process control system. The contractor shall establish and maintain a computerized discrepancy tracking system within the IDE with the ability to produce complete permanent records of all discrepancies or a database listing. The contractor shall document in the integrated database (e.g. JIRA), all discrepancy corrections.

3.3.6.4.1 Test Discrepancy

The contractor shall establish a suspense system to ensure timeliness of analysis and corrective action of each test discrepancy. The contractor shall establish a process to receive test discrepancies and update the tracking system. The contractor shall establish a hardcopy discrepancy reporting system to document contractor and

Government verification of corrective actions. The contractor shall be responsible for informing the Government of the status of each discrepancy. Upon closeout of a discrepancy, the contractor shall notify the Government designated Test Director the correction of the discrepancy and then updating of the tracking system. Final test reports shall include scanned copies of all test discrepancy sheets with signatures.

3.3.6.4.2 Discrepancy Processing

The contractor shall document a detailed description defining the changes made to the equipment, hardware, and software to correct each discrepancy. The contractor shall document and enter in the Configuration Management system each discrepancy correction that modifies or changes the system baseline. Configuration items include but are not limited to hardware asset version, software asset version and system asset version. The CCB will approve the resolution of the test discrepancy before implementing the described resolution. The contractor shall recheck all discrepancies prior to completion of test.

3.3.6.4.3 Test Discrepancy Severity

The contractor shall assign the priority of effort used to address test discrepancies based on the test discrepancy severity designated by the test team, in accordance with the ground rules established by the CCB. The contractor, with Government concurrence, shall assign severities for test discrepancies at the completion of system tests, with the understanding that the Government reserves the right to make the final determination of the severity of any test discrepancy. Severities assigned shall be as follows:

- Severity 1 Safety issue or issue that prevents accomplishment of an operational or mission essential capability or requirement
- Severity 2 Adversely affects the accomplishment of an operational or mission essential capability or requirement and there is no work-around solution acceptable to the Government
- Severity 3 Adversely affects the accomplishment of an operational or mission essential capability or requirement but there is a work-around solution acceptable to the Government
- Severity 4 Results in user/operator inconvenience or annoyance but does not affect a required operational or mission essential capability or requirement
- Severity 5 Any other effect (e.g., documentation error)

3.3.6.5 Human Factors Engineering

The contractor shall plan and implement a human factors engineering program to ensure the satisfaction of system objectives and personnel safety of the trainees, operator, and maintainer. Identify and eliminate program risk associated with critical human factors that have a significant impact on readiness, usability, life cycle cost, schedule, performance, or safety. The contractor shall ensure that early human engineering analyses used to develop manpower, personnel, training, and logistics support information as a method of influencing the design effort. The contractor shall verify through test and evaluation that trained personnel can safely, effectively, and efficiently operate, maintain, and control the system in its intended operational environment. The contractor shall document results from the Human Factors Engineering efforts in the Logistics Product Data (LPD) summaries.

3.3.6.6 Electromagnetic Environmental Effects (E³)

The contractor shall determine the criteria and verification method to ensure that the CDT system's electronics or electrical hardware configuration is not a source of Electromagnetic Interference (EMI) or a victim of E³ in its intended operational environment. The contractor shall include grounding and wire shielding for CDT fixed and mobile sites from EMI. The contractor shall establish and maintain a process to verify and assure E³ does not affect the system operations functionality.

3.3.6.7 Contaminate and Corrosion Control

The contractor shall incorporate the latest state-of-the-art corrosion control into the system design process, manufacturing process, all levels of maintenance, supply and in the storage processes. Design concepts shall reflect realistic environments and resource availability as determined by logistic support analysis.

3.3.6.8 Standardization

The contractor shall influence the system design to achieve maximum subsystem, component, and repair parts commonality within the CDT system. The contractor shall minimize equipment and parts proliferation through a standardization effort.

3.3.7 Integration of 3rd Party Products

The contractor shall support development, integration, configuration management, test, and fielding of 3rd party hardware and software as directed by the Government.

3.3.8 Scenario Development

The contractor shall update and/or create 50 new scenarios that will support the training objectives for each DO variant type. The Government will provide all existing Army scenarios as GFI for reference-purposes. However, for the CDT VPL TWV PH II DO, there will not be any legacy scenarios provided.

3.3.9 SE Core Terrain Database Integration

The contractor shall integrate SE Core terrain databases to support CDT variants driver training tasks and scenarios. Each DO will identify the total number of required terrain databases.

3.4 DESIGN REVIEWS

As specified by individual DO, the contractor shall conduct reviews, with Government participation, to include design reviews (system, subsystem, component, life cycle processes, test readiness, production approval) and audits (functional and physical configuration), for assessing technical progress. The contractor shall document the results of the review, including any resulting action items. The contractor shall conduct a design review at the completion of each application of the system-engineering phase. Each review shall accomplish the following:

- a. Assess the system requirements and allocations to ensure that requirements are unambiguous, consistent, complete, feasible, verifiable, and traceable to top-level system requirements.
- b. Assess the design maturity based on technical development goals, IMS events and accomplishments, and empirical analysis and test data supporting progress to date
- c. Present the risks associated with a continued development effort
- d. Assess the life cycle processes and infrastructure necessary for product sustainment throughout the system life cycle
- e. Identify resources required for continued development
- f. Determine whether to proceed with the next application of the systems engineering process, to discontinue development, or to take corrective actions before proceeding with the development effort

The contractor shall conduct component, subsystem, and system design reviews, with Government participation, for each level of development. Systems may need lower-level reviews depending on the complexity. Trade-off analysis and verification results shall be available during design reviews in order to substantiate design decisions. Reviews may result in the need to iterate through the system engineering process to resolve identified deficiencies before progressing further into the development activity. The contractor shall perform component, subsystem, and system functional-and design-configuration audits. The contractor shall ensure satisfactory completion of supporting documentation and completion of qualification tests for each specification requirement. The contractor shall ensure all requirements were satisfied and products comply with final drawings.

At design reviews, the contractor shall present the systems security design, initial security risk assessment, security test approach, security training approach, and any other security relevant information.

3.4.1 Preliminary Design Review (PDR)

The contractor shall conduct a PDR to present the results of the Preliminary Design phase of the Systems Engineering effort. The PDR shall address the preliminary design criteria in 3.2.1.3. The contractor shall notify the Government no less than 30 calendar days prior to the planned PDR in order to extend invitations to all program stakeholders. The contractor shall have PDR materials delivered to the Government at least five business days prior to PDR event. The contractor shall document action items, due dates and coordinate resolution and track action items until closure. Action item closure shall require contractor and the Government's approval.

DI-ADMIN-81505 Report, Record of Meeting/Minutes

3.4.1.1 Preliminary Design Review Entrance Criteria

Entrance criteria for the PDR shall consist of Government concurrence with the following items:

- a. Completed SRR and Action Items from prior SRR, IPTs, and CCBs are closed
- b. Contract Data Requirement List (CDRL) items scheduled to be delivered prior to PDR have been delivered and accepted (when applicable) IAW CDRL requirements
- c. Allocated baseline has been evaluated, updated, and defined
- d. Risk assessments and risk mitigation plans have been developed
- e. RAM requirements have been allocated to the design to include the analysis of the R&M predictions
- f. IMS shows critical path through CDR
- g. Program technical risk is medium or lower
- h. Program execution risk is medium or lower
- i. PDR agenda has been submitted and accepted
- j. Program is properly staffed
- k. PDR presentation materials are available at least 5 business days prior
- l. Software CM tools
- m. Developmental and Non-developmental Software and Databases
- n. Complete hardware architecture
- o. Trade-off analysis (if any)
- p. Preliminary Data Flow and Accreditation Boundary Diagram
- q. Network Topology Diagram
- r. Approved Government inspection of all incremental development
- s. Final report of the proposed GFI/GFE/COTS/GOTS integrated solution with all issues identified at PDR, including other Non-Developmental Items.

3.4.1.2 Preliminary Design Review Exit Criteria

The contractor shall consider PDR complete when the Government signs off all action items with the understanding that there is an acceptable level of program risk and the CDT Assistant Project Manager/Project Director (APM/PD) signs and delivers a Memorandum for Record.

3.4.2 Critical Design Review (CDR)

The contractor shall conduct a CDR to present the results of the Detailed Design phase of the Systems Engineering effort. The contractor shall notify the Government no less than 30 calendar days prior to the planned CDR in order to extend invitations to all program stakeholders. The contractor shall have CDR materials delivered to the Government at least five business days prior to CDR event. The contractor shall document action items, due dates and coordinate resolution and track action items until closure. Action item closure shall require contractor and Government approval. The contractor shall address design changes made since the PDR.

After the Government has approved the design at CDR, the contractor shall submit ECPs to the Government for review and approval, prior to proceeding to implementing the proposed changes to the configuration management baseline.

DI-ADMIN-81505 Report, Record of Meeting/Minutes

3.4.2.1 Critical Design Review Entrance Criteria

Entry criteria for the CDR shall consist of Government concurrence with the following items:

- a. PDR action items are closed
- b. CDRL items scheduled to be delivered prior to CDR have been delivered and accepted (when applicable) IAW CDRL requirements
- c. CDT baseline has been updated and established
- d. Updated risk assessment and risk mitigation plans are available
- e. Risks and their respective mitigation plans are in place and manageable for implementation of the functional requirements into a final design
- f. The design addresses Reliability and Maintainability (R&M) requirements
- g. Trade-off analyses have been completed
- h. Logistics analysis has been completed and plans have been established
- i. IMS shows critical path through testing
- j. CDR agenda has been submitted and accepted
- k. Program schedule is executable within the anticipated cost and technical risks
- l. Program is properly staffed
- m. CDR presentation materials are delivered to the Government at least 5 business days prior

- n. Detailed Hardware Listing to include manufacturer, type and model
- o. Software Listing to include manufacturer and version
- p. Ports, Protocols, and Services (PPS)
- q. CS Scanning Tools and plans
- r. Updates to draft Technical publications are complete
- s. Approved Government inspection of all incremental development
- t. Final report of the proposed GFI/GFE/COTS/GOTS integrated solution with all issues identified at PDR resolved, including other Non-Developmental Items.
- u. M&S V&V Plan completed

DI-SESS-81613A Reliability and Maintainability (R&M) Program Plan

3.4.2.2 Critical Design Review Exit Criteria

After the CDT APM/PD considers there is an acceptable level of program risk and then subsequently signs off all Requests for Action (RFA), delivers a Memorandum for Record to the contractor; the contractor shall consider the CDR complete.

3.5 PRODUCT DEFINITION DATA (PDD)

As specified by individual DO, the contractor shall receive existing GFI PDD produced by the previous vendor or DO. The contractor shall revise and update PDD to accurately reflect the configuration.

The contractor shall create new documents when required data documents were not included in the GFI. The contractor shall create the new documents IAW the requirements specified in this section and the Data Item Description (DID) referenced.

During the systems engineering and design, as applicable, and in accordance with MIL-STD- 31000A, the contractor shall assess, update, and maintain all GFI PDD and new PDD so that it accurately depicts the final product. The Configuration Control Management (CCM) process shall evaluate all changes to the baseline and then subsequently approved by the Government CCB as described earlier in this document.

The PDD is the technical description of items adequate for supporting an acquisition strategy, production, engineering, and logistics support. The PDD shall disclose complete design (production level drawings), logistics, manufacturing requirements, and the means of measuring compliance with the requirements. Piece part information (e.g. drawings, computer-aided design files, models, and meta-data) and associated lists shall provide the necessary design, engineering, manufacturing, and quality assurance requirements information necessary to enable, maintain, and sustain the procurement or manufacture of an interchangeable item that duplicates the physical and performance characteristics of the original product. Development of this information shall take place without additional design engineering effort or recourse to the original design activity.

The contractor shall produce and maintain documentation for all electrical assemblies and subassemblies in such a manner to ensure their functional integration without recourse to special test equipment or installation of the assemblies or subassemblies into a next higher assembly. The contractor shall utilize established Government-approved maintenance procedures, identify repetitively procured or procured independently, higher level components and assemblies as spare components and assemblies. For each higher level component or assembly, the contractor shall determine and document the functional requirements for the item, the environment in which it must operate, interface and interchangeability characteristics, and criteria for verifying compliance. The contractor shall include all electronic models for assemblies and subassemblies from the lowest level component to the top level system component. The contractor shall provide as part of the Product Baseline Index (PBLI) Contract Data Requirements Lists (CDRL) a Government owned copy of each software program necessary to view the deliverables. The contractor shall obtain document numbers from the Government for the PDD elements. The contractor shall not add prefixes or suffixes to the numbers. The contractor shall return all unused numbers upon completion of PDD preparation.

DI-SESS-82019	Product Baseline Index (PBLI)
DI-SESS-81000E	Product Drawings/Models and Associated Lists
ANNEX to EXHIBIT B	PBLI Option Selection Worksheet
DI-ADMN-80925	Revisions to Existing Government Documents, CDT Hardware and Software PDD

3.5.1 Maintenance Services

The contractor shall maintain the PDD. This shall include maintenance of changes to the PDD baselines and the engineering release changes.

3.6 INTEGRATED LOGISTICS AND SUPPORTABILITY

3.6.1 Logistics Support Analysis

The contractor shall ensure supportability of the CDT through planning, implementation, and verification of materiel and services to meet operational requirements. Readiness, availability, maintainability, and supportability shall be the primary design factors.

The contractor shall identify support resources and infrastructure necessary for test and evaluation activities. The contractor shall analyze existing Life Cycle Contractor Support (LCCS) structures to develop and define an optimized support infrastructure for production and deployment. The recommended support resources shall be sufficient to allow another contractor with comparable skills to assume operation; maintenance and support; and sustain the systems availability requirements.

The contractor shall evaluate reliability, supportability, maintainability, and availability factors in the design process. Updates to design for supportability shall include the use of common fasteners and connectors, common commercial standards, and proven technology. Updates to system design shall minimize life-cycle costs and maximize life-cycle supportability by avoiding the use of proprietary items; components with limited sources for spare parts, support, or maintenance; recurring usage or service fees; and the need for special tools or test equipment.

3.6.2 Supportability Analysis and Logistics Product Data (LPD)

The contractor shall conduct repair level analyses, develop diagnostic, preventative maintenance and repair procedures, conduct facilities analyses, refine hardware/software maintenance and support concepts, and identify life cycle support resource requirements including required initial spares, repair part, consumables, and support equipment. The contractor shall update the CDT GFE listing of items requiring repair, discarding, and the required level of maintenance to perform along with its associated cost. The contractor shall identify any/all post CDT GFE support issues that may pose Life Cycle support risks. All Logistics Product Data (LPD) elements shall be developed and provided in Excel format. The contractor shall document the following:

- a. All input data and their corresponding value and source of the data
- b. Operational scenario modeled, assumptions made, constraints assumed, and non-economic factors imposed
- c. Maintenance alternatives considered
- d. Analytical method and models used to perform economic evaluations
- e. Discussion of the sensitivity evaluation performed and results obtained

DI-SESS-81758A Logistics Product Data

DI-SESS-81759A Logistics Product Data Summaries

3.6.2.1 Initial Spares

To reduce cost and mitigate obsolescence risk, the contractor shall procure initial spares as part of delivery of each system. The contractor shall provide the Government a recommended spare parts list and the rational for reviewed and Government approval. The contractor shall consider as part of the rational items such as lead time, criticality, and failure rate. When possible, the contractor shall procure initial spares on the same purchase order as the system hardware. After on site delivery, the Government reserves the right to test all or a portion of the initial spares. The contractor shall replace all failed or utilized spares prior to Government acceptance. The contractor shall document in LPD recommended spares lists.

3.6.3 Maintenance Concept

The contractor shall update all CDT logistics data, manuals, and training in accordance with the designated sustainment concept to maximize utility of delivered services, and data to the intended target audiences. A third-party LCCS provider will provide sustainment for the systems after fielding. The maintenance concept will consist of two levels of maintenance: Field and Sustainment.

3.6.3.1 Field Maintenance

The contractor shall identify and provide documentation for operator specific tasks for preventive maintenance checks, inspection, lubrication, adjustment, and operator level repair and replacement tasks. The contractor shall identify all required spare parts, consumables, tools, and test/support equipment associated with the operation and operator's preventive maintenance tasks. Field level maintenance defined as, on-system maintenance including preventative maintenance, daily readiness checks and services, adjustments to controls and other maintenance that can be accomplished without removing the affected major assembly from its deployed location for extensive repair. Accomplishment of field maintenance shall take place without the aid of special tools, support equipment, additional training knowledge, or skills. Field level mechanics will perform inspections, diagnose faults, and replace components on end items for return to the user.

3.6.3.2 Sustainment Maintenance

Sustainment Maintenance defines as off-system maintenance to include troubleshooting and the removal and replacement of failed components performed at the Field Maintenance level. Sustainment maintenance actions are beyond the capability of field level maintenance and include extended diagnostics, overhaul, refurbishment, rebuild, or other prolonged repair actions. Sustainment maintenance utilizes Government designated repair points to overhaul, rebuild, replace, or calibrate failed equipment.

3.7 TECHNICAL PUBLICATIONS

The contractor shall describe required work in a detailed, logical, and systematic approach each operation and maintenance task. The operations and maintenance instructions shall accurately provide the technician with all the information needed to keep the CDT operational. It shall provide system and subsystem oriented instructions for installation, operation, maintenance, and testing. All tools, test equipment and consumable items required to accomplish maintenance shall be identified just prior to and as part of the task. The contractor shall use Government furnished material, military technical manuals or Government-approved commercial operation and maintenance manuals as references for system and subsystem maintenance. When installing components, the contractor shall review Government technical manuals and Commercial Off-the-Shelf (COTS) manuals to ensure completion of changes, updates, revisions, or supplementation. All publications shall reflect the configuration of fielded hardware as documented in the CDT product baseline. The contractor shall deliver a

complete set of documentation in usable condition with the latest revisions incorporated at each fielding location.

The prime contractor shall be responsible for the protection and distribution of Controlled Unclassified Technical Information to their employees and authorized subcontractors IAW DODM 5220.22M (NISPOM). All documents, drawings and blue prints shall be marked with the appropriate security markings. Distribution statement and/or Export Control Warnings shall adhere per DODM 5220.22M and DODM 5200.01 Vol. 4.

3.7.1 Operator User's Manual (OUM)

The contractor shall deliver an OUM documenting tasks necessary to operate the trainer. The OUM shall also document tasks necessary to operate and create scenario from the Scenario Generation System (SGS) application. The contractor shall identify and document operator specific tasks for preventive maintenance checks, inspection, lubrication, adjustment, and operator level repair and replacement tasks. The contractor shall identify all required spare parts, consumables, tools, and test/support equipment associated with the operation and operator's preventive maintenance tasks.

MIL-STD-40051-2C

**Preparation of Digital Technical Information for
Page Based Technical Information (Table A-II)**

Annex to Exhibit C:

**TM Requirements Matrix for Operator User's
Manual.**

3.7.2 System Maintenance Manual (SMM)

The contractor shall deliver an SMM documenting tasks necessary to maintain the trainer. The contractor shall identify and document maintainer specific tasks for detailing installation, fault isolation, Line Replaceable Units (LRU) procedures, software update procedures, and all necessary maintenance procedures to maintain the trainer. The contractor shall identify all required spare parts, repair parts, consumables, tools, and test/support equipment associated with the maintenance tasks.

MIL-STD-40051-2C

**Preparation of Digital Technical Information for
Page Based Technical Information (Table A-IV)**

Annex to Exhibit C:

**TM Requirements Matrix for System Maintenance
Manual.**

3.7.3 Commercial Off-the-Shelf (COTS) Manuals and Associated Lists

The contractor shall deliver updated Commercial Off-the-Shelf (COTS) Technical Manuals (TMs) for all commercial equipment delivered with the CDT. The COTS manuals shall be sufficient to support the operation, service, and maintenance of all

COTS components. The contractor shall deliver operations and maintenance manuals documenting how users operate and maintain the system, to include drawings and descriptions showing the integration and interface of all COTS components into the trainer. The Government considers the following to constitute a complete COTS manual:

- a. The Parts Manual shall display figure “breakouts” of the major component assemblies in order to identify parts for procurement
- b. The COTS Operators Manual
- c. The Service/Maintenance Manual shall display the complete assembly breakdown of major components of the COTS equipment

The following requirements for commercial manual development and/or delivery also apply:

- a. The right to use and reproduce the manual shall transfer to the Government.
The following additional requirements apply:
 - i. The Commercial manuals shall be available off-the-shelf in support of commercially available systems or pieces of equipment
 - ii. The Commercial manuals precisely reflect the configuration of the hardware installed on the trainer
 - iii. The principal users can comprehend the technical information
- b. Commercial manuals provided to the Government, with all supplementary data, shall be Government property

The COTS manuals shall include supplemental data as applicable. The manual(s) shall contain operating instructions and maintenance data to support the planned level of maintenance.

DI-TMSS-80527C

**Commercial-Off-The-Shelf (COTS) Manuals and
Associated Supplemental Data**

3.7.4 Publications In Process Review's (IPR's)

The contractor shall host and co-chair publication reviews to ensure the technical publications are being prepared according to the contract. The contractor shall hold initial publications IPR in conjunction with the start of work meeting. The contractor shall schedule each subsequent IPR to coincide with a system level program review defined in the IMS. The contractor shall document and act on reported decisions and discrepancies resulting from or associated with each IPR. Each subsequent IPR shall include a review of incorporated corrections or comments from previous IPR's prior to proceeding with the current IPR. The contractor shall consider an IPR incomplete if any

IPT member identifies previous IPR comments that are not included in the technical publications.

3.7.5 Physical Configuration Audit (PCA)

The PCA is the formal technical examination of the system “as-built” configuration against its technical documentation to establish or verify the configuration item’s product baseline. It is used to examine the actual configuration of each item (down to the lowest level of repair) in order to verify that the related design documentation matches the physical configuration. The PCA addresses accuracy of the documentation to include inspection of inventory/equipment lists, logistics product data, documentation, drawings, spares, and all manuals. The contractor shall examine the documentation and equipment verifying that all applicable safety labels incorporate applicable warnings.

In addition to the activity, the contractor shall support a Government run inspection of the complete system inventory (new and legacy). The contractor shall inspect each item ensuring:

- a. Government property sticker affixed in a prominent location.
- b. The verification of Serial number and Item Unique Identification (IUID) for all items requiring an IUID marking, per contractual guidance, shall mark with an IUID label that is constructed of a material designed to last the life of the item/system in its intended environment and operation. The IUID data shall be enter into the central registry for accountability/visibility
- c. Equipment Inventory Records (EIR) for Government property accountability, Government specified format and data elements are accurate. Equipment record shall contain the following data: Complete Item Description, Original Part Number, National Stock Number (NSN), Serial Number, Quantity, Vendor Name, Vendor Point of Contact (POC), and Warranty Period
- d. Cable naming, source, destination, and numbering details are on both ends of the wiring

The contractor shall support the Government’s verification of the “as-built” drawings. The drawings shall include complete system level drawings of all equipment, wiring, network topology, and system architecture. Drawings shall be either new or revised with changes incorporated.

3.7.6 Technical Manual Validation

The contractor shall validate all updates to CDT publications for operation and maintenance to ensure they meet the requirements of the system and reflects compatibility with the overall operation, maintenance and support plan for the system. The contractor shall validate all updates to CDT technical publications, changes, supplemental data, and revisions thereto. The contractor shall validate all technical

data and publications prepared by subcontractors and vendors. The contractor shall provide the Government opportunity to observe all contractor's validation efforts and access to validation redlines. The contractor shall validate publications prior to system testing. A technical publication shall not be ready for validation until the contractor fulfills the following conditions:

- a. Engineering technical review has been completed.
- b. Information, illustrations, and parts lists reflect correct configurations of the system and equipment, to include all engineering changes.
- c. Procedural instructions are readily understandable by the intended user and adequate to perform all operations and maintenance functions.
- d. All procedures have been performed to assure accuracy and performance requirements.
- e. Adequacy of data is checked to ensure that it supports the maintenance and support concept.
- f. Hardware of the proper configuration is available for the validation and verification effort.
- g. All safety hazards identified in the safety assessment report are resolved and identified within the text as Warnings, Caution and Note statements necessary to protect the equipment and personnel.

3.7.7 Technical Manual Verification

The Government shall verify publications no later than one week after the In-Plant Acceptance Test event. The contractor shall assist the Government in the verifying the publications are accurate. The Government IPT may choose to perform verification concurrently with the validation effort. Correction of discrepancies and changes resulting from training, testing, and reviews shall be incorporated into the publications. The contractor shall provide system equipment, technical and engineering support and facilities as required to aid in the performance of verification efforts. The contractor shall incorporate all comments from compliance-reviews, technical accuracy reviews and verification reviews into final submission of publications. The contractor shall reschedule the verification event if the Government discovers uncorrectable malfunctions/discrepancies during the original verification event. The contractor shall support re-verification of corrections/updates as required. Publications shall be validated IAW the Technical Manual Validation section of this document before the verification can begin. A technical publication shall not be ready for verification until the contractor incorporates all validation comments.

3.8 ITEM UNIQUE IDENTIFICATION (IUID)

The contractor shall coordinate with the Government to determine items requiring unique identification including embedded subassemblies, components, and parts. The Government will approve the final IUID selection and subsequently document in the LPD. The contractor shall provide unique item identification for all identified items delivered. IUID marking of each item shall be both machine readable and human

readable in accordance with MIL-STD-130N. The contractor shall provide data resulting from IUID marking activities and indicating pass/fail for each IUID marked item verified. The contractor shall upload all IUID labels into the IUID registry.

DI-MGMT-81858

**Unique Identification (IUID) Marking and
Verification Report**

3.9 TRAINING

The contractor shall analyze, design, develop, implement, and evaluate training data products in accordance with TRADOC Regulation 350-70, Army Learning Policy and Systems, and its supporting TRADOC Pamphlets for the training system as identified in the SOW. The contractor shall use, to the maximum extent possible, all previously developed data that applied toward satisfying the data requirements of MIL-PRF-29612B (section 3 and 4) and its supporting data items. This includes Government Furnished Information (GFI) and data developed by the contractor incident to other contractual requirements. The contractor shall maintain and ensure training data products reflect the current design.

3.9.1 Course Conduct Information Package (CCIP)

The System training data products shall support both operator and maintainer personnel requirements. The System training data products shall provide the information necessary to support the attainment of the physical and mental skills and attitudes required for mission accomplishment. The product shall inform students of the training syllabus, organization, operation, scheduling, and other pertinent information. The product shall also provide information on an evaluation of a trainee's performance and the trainee evaluation of training. The CCIP and shall provide the trainee with a certificate of training.

DI-PSSS-81522C Course Conduct Information Package

3.9.1.1 New Equipment Training (NET)

The contractor shall provide NET training to the receiving organizations. This training shall be a self-contained course that provides detailed operational and maintenance knowledge of the fielded systems. The contractor shall develop and provide system operation, scenario generation, and maintenance training through a combination of classroom, written instructions, and hands-on operation. The contractor shall analyze, prepare all training courseware including Program of Instruction (POI), practical exercises, and a train-the-trainer package to accommodate new equipment training, Scenario Generation System (SGS) training, sustainment training, and training of testers and evaluators.

The contractor shall ensure that instructors possess the required knowledge/skill level and familiarity with the system to effectively deliver system instruction. In addition, the

contractor shall provide the course to a Government team for validation/approval prior to the first on-site course presentation.

The contractor shall conduct the system training courses at the installed site locations or at the contractor's facility location only with prior Government approval. The contractor shall provide all required classroom and training equipment for the course.

3.9.1.1.1 Instructor / Operator Training

The contractor shall plan, develop, conduct, and document the completion of the initial instructor and operator course for the initial cadre instructors. The course shall provide comprehensive training for instructors in the concepts, skills, and aptitude to efficiently operate the system. The course shall provide familiarization with simulator operating techniques and shall emphasize the utilization of the instructor facility, its functions, and controls. The course shall address the physical and functional descriptions and operation of the equipment including features, advantages, and configurations.

3.9.1.1.2 Maintenance Training

The contractor shall plan, develop, conduct, and document the completion of the initial maintainer course for the initial cadre of maintenance personnel prior to Government acceptance. The course shall provide comprehensive training for maintainers in the concepts, skills, and aptitude to efficiently operate and maintain the system. This course shall consist of instruction in troubleshooting and maintenance, diagnostics to fault isolation, calibration, adjustments, remove and replace procedures, use of built in test, and repair that is beyond operator level maintenance. After completion of the course, all personnel shall be capable of operating, maintaining, and troubleshooting the simulator to the board replacement level.

3.9.1.1.3 Scenario Generation System (SGS) Training

The contractor shall provide Scenario Generation System (SGS) training course for selected personnel prior to Government acceptance. The course shall provide comprehensive training in the concepts, skills, and aptitude to efficiently create, edit, delete, import, export, and arrange scenarios for use on the CDT system. This course shall consist of instruction in creating scenarios to support individual training tasks (single ownship) and collective training tasks (multiple ownships). This course shall provide instruction on how to import the scenario for use on the CDT system. This course shall provide instruction on how to adjust scoring parameters and arrange scenarios for use with the Class Manager application. After completion of the course, all personnel shall be capable of creating, editing, importing, exporting, arranging, and managing scenarios on the simulator.

3.9.2 Training Conduct Support Document

The contractor shall utilize the CCIP information, findings, and conclusions to develop the Training Conduct Support Documents (TCSD). The contractor shall develop a warfighter training support package to include, at a minimum, an instructor guide,

trainee guide, and instructional visual aids in support of both the operators and maintainers training. The system training data product shall provide definition and direction for instructors and trainees for the conduct of training. The system product shall support the trainee's mastery of knowledge, skills, and attitudes for a given learning objective. The contractor shall conduct the training courses developed for maintenance personnel and users/operators functions and operational capabilities.

The contractor shall develop a complete and exportable training support package that integrates training products, materials, and other pertinent information necessary to train the system.

The contractor shall develop a complete and exportable training support package to train the system and shall provide a Compact Disc (CD) or digital video disc (DVD) as a leave behind package for on-site trainers. The quantity of training packages for the students shall be determined by the Government 30 days prior to the scheduled New Equipment Training.

DI-PSSS-81523C Training Conduct Support Document

3.10 INTEGRATED TESTING

The contractor shall plan, coordinate, establish, and implement a comprehensive Test and Evaluation (T&E) program, with Government participation, to include all configurations of the CDT system. System T&E refers to the test and evaluation activities which use the development and production hardware together with the software to validate that the system meets the operational and technical performance requirements as stated in the system specifications. System test shall include a process to prepare the executable software, including any batch files, data files, or other software files needed to install and operate the software on a newly formatted (blank media) target computer. The contractor shall develop step-by-step testing operations for items undergoing testing. The contractor shall identify items requiring testing; test equipment and support required; imposed test conditions to be imposed; measuring parameters; and the pass and fail criteria against which the test results will be measured. The contractor shall have test plans and procedure to meet specific testing objectives, ensuring the system capabilities satisfy the requirements IAW the CDT VPL SRDs. All testing events (e.g. Regression, Build and Spiral) and IAW the scheduled IMS shall include Government participation. In addition, the contractor shall establish incremental testing events, with Government participation, to verify progress have been satisfied from the start of the system design to final testing, leading up to IPAT.

3.10.1 Test Readiness Review (TRR)

The contractor shall address the following key issues at the system engineering TRR prior to the start of formal testing on a complete CDT System to ensure that the system and all the test resources are ready to begin testing:

- a. Test procedures comply with plans and descriptions, are adequate to accomplish test requirements and satisfy requirements for verification
- b. Pre-test predictions and informal tests indicate testing will confirm performance
- c. New or modified test equipment and facilities and procedure manuals required to accomplish planned test and evaluation, are available and satisfy the test requirements
- d. Data acquisition and reduction provisions are in place (if applicable)
- e. Technical publications are completed and validated
- f. System to be tested has completed an official Government CS scan
- g. The contractor shall maintain Software Support Environment (SSE) hardware and software as specified per DO.

The contractor shall review during TRR the following documentation:

- b. Evidence that the test management system as required under the contract is ready to accept the qualification tests and their results
- c. Evidence that the requirements in the development specification have been traced to qualification tests or tests on which the qualification tests rely
- d. A list of outstanding discrepancy reports, both external and internal cross-referenced to the contracted deliverable end items or development hardware and software products
- e. Evidence of all internal process tests and inspections has been completed by the contractor and support transition into formal tests
- f. Test requirements
- g. Requirements changes pending
- h. Design changes since the last design review
- i. Test constraints based on previous testing or test hardware limitations
- j. Test configuration (test article and instrumentation and support equipment)
- k. Approved test plan and test procedures
- l. Plans for collection, reduction and analysis of the test data
- m. Calibration plan and status
- n. Problem areas and their resolution
- o. Validated technical publications
- p. CS Scan results
- q. Contractor's in process test results
- r. Present test procedures inclusive of M&S V&V tests

DI-ADMN-81505 Report, Record of Meeting/Minutes

DI-NDTI-80566A Test Plan

3.10.1.1 TRR Entry Criteria

The contractor shall provide:

- a. Configuration of the CDT system under test has been defined, updated and agreed to. All interfaces place under configuration management or define in accordance with an agreed to plan.
- b. All applicable functional, unit level, subsystem, system, and qualification testing has been conducted successfully to include official Government CS scan.
- c. All TRR specific materials such as Government approved test plans, cases, and procedures have been available to all participants prior to conducting the review (minimum of 7 working days).
- d. All known system discrepancies identify and resolve in accordance with an agreed to plan.
- e. All previous design review exit criteria and key issues have been satisfied in accordance with an agreed to plan.
- f. All required test resources (people, facilities, test articles, test instrumentation) identify and are available to support required tests.
- g. Define roles and responsibilities of all test participants and agreed to.

3.10.1.2 TRR Exit Criteria

The contractor shall provide:

- a. Proper Government disciplines represented at the review. If applicable, were all of the required independent evaluators involved and do they concur with the planned tests and expected results.
- b. Adequate test plans are completed and approved for the system under test.
- c. Adequate identification and coordination of required test resources is completed.
- d. Previous component, subsystem, system test results form a satisfactory basis for proceeding into planned tests.
- e. Risk level identified and accepted by Program leadership as required.
- f. CS Scan results and mitigation plan

3.10.2 In-Plant Acceptance Test (IPAT)

The contractor shall test the CDT system in its final configuration, with Government's participation, at in-plant acceptance testing, prior to shipment to the location in accordance with the approved test procedures. The contractor shall provide a test schedule covering the CDT testing event. The contractor shall notify the Government at

least two weeks in advance prior to being ready for test. These tests shall verify the functionality and performance of the system and that the CDT complies with the approved specification requirements. The contract shall document, correct, and re-test any discrepancies/problems found during testing.

DI-NDTI-80603A Test Procedure

DI-NDTI-80809B Test/Inspection Report

3.10.3 Legacy System Test

The contractor shall support the Government personnel on-site in performing a test of all the legacy components which have potential for reuse in the technology refreshment. The contractor shall use the results of the legacy test as a basis for determining which equipment is operational prior to the existing system taken off-line. In addition to the new equipment installed, the contractor shall be responsible for all functionalities at the On-Site Acceptance Test (OSAT) that was working at the time of the legacy test.

3.10.4 On-Site Acceptance Test (OSAT)

The contractor shall support the Government site acceptance test for CDT systems to verify that the installed CDT system functions properly and operates to the specified performance requirements. The contractor shall conduct testing using Government approved sub-set of the In Plant Acceptance Test procedures. Prior to Government acceptance, the contractor shall document, correct, and re-test any discrepancies/problems found during testing. The contractor shall document the results of the OSAT.

DI-NDTI-80603A Test Procedure

DI-NDTI-80809B Test/Inspection Report

DI-MSSM-81751 Modeling and Simulation Verification and Validation Plan

DI-MSSM-81752 Modeling and Simulation Verification and Validation Report

3.10.5 Modeling and Simulation Verification and Validation (M&S V&V)

The purpose of the M&S V&V process is to provide objective evidence that the performance of the installed system, when in use, meets the requirements of this SOW and that the simulator accurately and completely represent the operational environment. The contractor shall define, document, manage, and apply an M&S V&V process IAW MIL-STD-3022 that evaluates the system's modeling of vehicle performance in terms of dynamic steering, acceleration, braking, roll, towing, and related effects compared to real world vehicle dynamics and the physical controls look, feel, and

response/resistance. The report shall notate any limitations in M&S replication of real world vehicles and driving conditions.

DI-NDTI-80603A

Test Procedure

DI-NDTI-80809B

Test/Inspection Report

3.11 ENGINEERING AND LOGISTIC SERVICE

The contractor shall provide engineering and logistic services for hardware and software support and/or updates for the CDT through Government request only. The contractor shall also provide studies to support obsolescence management efforts for CDT through Government request. The Government approximates that there will be five of the obsolescence studies/efforts through the life of this contract. The contractor shall provide engineering and software support for CDT training events and system operation through Government request only. The Government approximates that there will be five of these efforts. The Government estimates there will be two trips to Continental United States (CONUS) sites and one trip to an Outside the Continental United States (OCONUS) site to support and/or update hardware/software and obsolescence efforts through the life of this contract. The contractor shall address the delivery of the common/updated baseline to the sites/locations that have already been technology refreshed or fielded; and thus, maintain a single baseline to all locations.

3.12 SITE SURVEY

The contractor shall provide personnel to support site surveys at Government request when fielding to a new location or when a system moves from one location to a new location. The purpose of the survey is to discuss and confirm arrangements for the installation and to provide information on any modifications required at the installation site. The contractor shall document site survey results in the Trainer Facilities Report (TFR). During the survey, the contractor shall:

- a. Review the status of the building or location where the CDT system currently is or will be located.
- b. Confirm the required positions of the CDT, assemblies, cableways, access ways, and any other unique feature, and measure to insure clearance during the installation.
- c. Review and confirm the existing and proposed location of power distribution boxes, switches, network, fire detection, height clearance, entrance criteria, water and air supply points, heating, ventilation, air conditioning, humidification, dehumidification and all other unique building or location features for the CDT.
- d. Determine the availability of required services.

- e. Track and resolve any CDT system outstanding issues pertaining to the preparation of the installation.

DI-FACR-80966 Trainer Facilities Report (TFR)

3.13 INSTALLATION SUPPORT

The contractor shall be responsible for and provide all support equipment, special handling equipment, data, and qualified maintenance personnel needed to support this effort. The contractor shall be responsible for the repair of equipment damaged to a “like new” condition, during removal, transportation, off-loading, installation, and delivery.

The contractor shall coordinate the software and hardware installation with the receiving sites and the Government representative to ensure the update does not degrade system functionality. The contractor shall ensure identification of proper hardware, support equipment and support personnel are coordinated before software install. The contractor’s installation team shall ensure that equipment is in working condition before start of installation. Prior to installation, the contractor shall identify hardware discrepancies and notify the LCCS and PEO STRI on-site representative for proper disposition. In the event that corrections are not possible due to shortage of parts, the contractor shall document discrepancies and proceed with install. The contractor shall support all Government Acceptance Test events that require official software versions as requested by the Government.

3.13.1 Installation Tools and Test Equipment

The contractor installation team shall be equipped with all the standard tools required for the system installation.

3.13.2 Removal of Equipment

The contractor shall dispose of all control panels, power supplies, display units, lights, circuit breakers, fuses, support structures, displays, beam splitters, personal computers, and all other training device equipment that are removed from the training device and are not reinstalled, including any remaining spares. Disposal shall be IAW local salvage procedures. The local training device Contracting Officer Representative (COR) shall have the choice of parts and components for repair purposes. The contractor shall transport the remaining equipment to the local Defense Logistics Agency (DLA) facility. The contractor shall fill and refinish all excess and exposed holes created within the training device and training facility due to the removal of the equipment mentioned above.

The contractor shall provide a list of hardware removed to the Government. The contractor shall prepare the inventory of the hardware removed IAW Annex to Exhibit A.

The contractor shall coordinate with the Government the location or staging area for the removed hardware. The contractor shall place all removed hardware in the staging area, designated by the Government. The contractor shall protect all removed hardware from potential environmental/meteorological damage. The contractor shall conduct an inventory of all hardware removed. After verification of the inventory, the contractor shall provide the removed hardware to the Government, or Government representative, for disposition. Equipment that is not re-utilized shall be disposed. The contractor shall perform all required disposal functions from equipment identification thru shipment to Defense Logistics Agency (DLA). The contractor shall perform at a minimum the following tasks:

- a. Identify equipment being removed and available for distribution.
- b. Provide inventory records and coordinate equipment disposition with the CDT Lead Logistician.
- c. Document condition and equipment details (manufacturer, model number, part number, serial number, etc.) for each item removed from the legacy system.
- d. Make recommendations for equipment disposition to the CDT Lead Logistician.
- e. Prepare transfer documents to enable equipment transfer to other locations or the DLA.
- f. Coordinate equipment transfer with the closest DLA facility.
- g. Pack and ship equipment for disposal to the closest DLA facility.
- h. Pack and ship re-utilized equipment as directed by the Government.

3.13.3 Packing, Handling, Storage, and Transportation (PHST)

Transportation to the trainer site shall be by commercial means and shall be the responsibility of the contractor. Marking for shipment of the training devices shall be IAW the contract terms. The contractor shall insure the device during shipment. The contractor shall prepare and document packaging data IAW the contract terms.

3.13.4 Facility and Equipment Repairs

The contractor shall repair any facility and equipment damage caused by the contractor during transportation, installation and integration of the trainer modifications to a "like new" condition. The contractor shall replace any damaged floor tiles and replace all abandoned penetrations with new tiles. The contractor shall install grommets on all utilized penetrations.

3.13.5 Safety

In performing the contract, the contractor shall provide for protecting the lives and health of employees and other persons, and for preventing damage to property, materials, supplies, and equipment IAW the latest revision of the Safety and Health Requirements Manual EM-385-1-1 and OSHA 29 CFR 1910. Prior to commencement of the work, the contractor shall meet in conference with representatives of the Base Safety Officer to

discuss and develop mutual understandings relative to the administration of safety. The contractor shall follow all OSHA work standards including lockout and tag out procedures. Specifically, the contractor shall follow NFPA 70 and OSHA 1910, Subpart S.

3.13.6 Maintenance Equipment

The contractor shall purchase and deliver equipment to support the maintenance concept for the CDT program. The contractor shall identify specific equipment in each DO.