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14.ABSTRACT

Proper medical training is critical to ensure that Service component members are prepared for wartime deployment, with a particular emphasis to support the en route care of patients from initial point of injury through several echelons to Continental U.S. (CONUS)-based military hospitals. Currently, medical training is generally conducted within each Service component "independently" (i.e., Army, Navy, Air Force, etc.) and our NATO/Coalition allies, with only occasional combined training. In addition, there is a wide repertoire of tools, devices, and approaches used to provide deployable training to Service members, ranging from devices (e.g., manikins) to computerized simulations to formal didactic training through internet-based, video, or classroom style instruction. This study and design effort systematically gathered and transformed requirements for JETS into an architecture description that provides a basis for understanding the current state of the potential component parts, the work required to achieve the Medical Simulation Enterprise (MSE) vision, and the staging of further development to successfully bring the full family of systems online.

15. SUBJECT TERMS

Medical simulation, casualty care, high level architecture, federation object model, capability development document, training

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PROTOTYPE OF JOINT EVACUATION AND TRANSPORT SIMULATION (JETS) SYSTEM

MTEC-17-07-JETS-03

PHASE II: Final Technical Report

Version 1.0
Date: 22 July 2019

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TABLE OF CONTENTS

1. INTRODUCTION

"The intra-theater transport system is a unique and significant part of the Force Health Protection concept for "clearing the battlefield" (United States Army Institute for Surgical Research, 2008). Medical evacuation is the timely, efficient movement and en route care (ERC) of patients by medical personnel from the battlefield and/or medical facilities, to higher echelons of care during the full spectrum of military operations. ERC is designed to be part of the continuum of care that incorporates the delivery of "Damage Control Resuscitation", the initiation of life-saving interventions and resuscitation (Bailey et al., 2013). The goal is to provide every patient who is injured on the battlefield, or in the area of responsibility (AOR), the optimal opportunity for survival and the maximum potential for a functional recovery.

Transitions in care, or handoffs, have long been considered danger points in the patient care process, contributing to medical errors and adverse events. Communication breakdowns, decreased situational awareness, absent or non-effective training, and lack of resources are common threats to patient safety. Training the process for patient handoffs is often not conducted or is inadequate.

Using Live, Virtual, Constructive and Gaming (LVCG) simulations to train and study joint evacuation and transport in a controlled and standardized way can help overcome current gaps in medical training and operational readiness. A system of systems for joint evacuation and transport training should map the integration of service specific, cross-cutting operational sub-system components, including but not limited to the functions of inter-service qualifications, communication, mission planning, mission rehearsal, ERC, patient movement, command and control, and logistics and their associated operational supporting sub-systems for training and assessment, i.e., the Virtual Patient System (VPS), Instruction Support System (ISS), Medical Training Command and Control (MT-C2), and the Medical Training Evaluation and Review (MeTER) system.

Data exchange mechanisms in medical simulation represent a significant gap in the translation of clinical conditions from the real world to a virtual patient. Therefore, standards for data transmission for medical simulation training must be established. A standardized Federation Object Model (FOM) has proven to be a viable vehicle for a priori interoperability in other operational simulation domains and

will be utilized in this effort as a proof of concept implementation strategy for the architecture. To accommodate changing needs, and the evolving technologies that support them, the Joint Evacuation and Transport Simulation (JETS) and Point of Injury Training System (POINTS) operational architectures will need to include standards-based interfaces, while still supporting the integration of legacy systems.

1.1 PROJECT MISSION

The mission of this program was to develop architectural models that will be used to guide the construction of integrated simulations and training modules for the JETS and POINTS systems, which will be utilized throughout the Department of Defense's (DoD) medical departments. The study aimed to add to the current body of knowledge by identifying and addressing gaps in joint ERC training and constructing a top-level interoperable architectural framework for a training system of systems.

Phase I focused on creating prototype knowledge products that will interoperate and integrate with future programs within the Medical Simulation Enterprise (MSE). The program produced designs for an overarching architecture, including a common, objective, and engineering-oriented lexicon, along with a governance strategy, a definition of shared services, and application programming interfaces (APIs) for interoperability. A collection of architecture views was developed and integrated into the Capabilities Development Document (CDD).

1.2 PROJECT INTENT

The intent of this effort was to provide an architectural design for a comprehensive simulated system of procedures and protocols to represent the joint patient evacuation and transport occurring in the continuum of care. The architecture includes improved mechanisms for training and test and evaluation of ERC. The study identified design requirements for an interoperable architectural framework for a training system of systems that can track individual and team performance. Phase I of this program focused on the JETS system architecture designs. Phase II of this program focused on the POINTS system architecture designs.

2. KEY WORDS

Roles of care, patient handoffs/transfers, ERC, aeromedical evacuation, patient movement, point of injury (POI), point of demand (POD), high level architecture (HLA), federation object model (FOM), CDD

3. ACCOMPLISHMENTS

3.1 PROGRAM OBJECTIVES

The objectives of the study effort and research outcome summaries are as follows:

3.1.1 OBJECTIVE #1: Conduct Front-End Domain Analysis

"Evidenced-based and combined-arms-lessons-learned literature research to identify critical variables and determinants of patient evacuation and transport will be conducted as well as to identify system requirements".

"Current curriculums, protocols and programs of instruction across the DoD Service components, currently in use for training and skills sustainment of joint patient evacuation and transport will be reviewed to identify educational elements for the acquisition and assessment of cognitive, psychomotor, and decision-making skill sets".

During Phase II, a literature search was conducted to collect information surrounding POI care, roles of care, and global patient movement (GPM) along the care continuum while simultaneously maintaining the progression of patient care. PubMed, Google Scholar, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane, and Medline were queried for articles, reports and resources

pertaining to these topics, and the resulting 137 citations were selected (from among hundreds) as applicable to the *Prototype of Joint Evacuation and Transport Simulation Project Phase II* effort.

The collected citations include 137 scholarly articles from peer reviewed medical journals (both military and civilian), medical texts, documents, presentations, reports professional institutions (Joint Commission, American College of Surgeons, etc.), Government institutions (Agency for Healthcare Research and Quality), and international publications (World Health Organization – WHO, etc.). Furthermore, 71 doctrinal documents from individual and Joint Service components, the DoD and North Atlantic Treaty Organization (NATO) were included. Table 1 below summarizes the citations by source area.

Table 1. Citations By Source Area

SOURCE AREA	NUMBER OF CITATIONS
Peer Reviewed Articles	137
U.S Army Doctrine	16
U.S Air Force Doctrine	18
U.S. Navy/Marine Doctrine	6
Joint Service Doctrine	10
DoD Doctrine	6
NATO Doctrine	15

As part of the above Phase II analysis, two annotated bibliographies were generated for future reference and to summarize the pertinent information for each citation contained in Table 1.

Reference ANNEX A: POINTS BIBLIOGRAPHY

Reference ANNEX B: MILITARY MEDICAL DOCTRINE BIBLIOGRAPHY

During Phase II, research was conducted to identify educational programs available for individual and joint Service components, NATO and civilian agencies. The identified courses were decomposed to show instructional methodology, course type, applicability to Tactical Combat Casualty Care (TCCC) as well as identification of applicable Clinical Practice Guidelines (CPG). A total of 72 educational programs were identified and are summarized in Table 2 below by source area.

Table 2. Training Programs By Source Area

SOURCE AREA	NUMBER OF CITATIONS
All Services	3
U.S Army	29
U.S Air Force	12
U.S. Navy/Marine	3
NATO	5
Civilian	20

Also, during Phase II, research was conducted to identify training courses and their respective skills and knowledge requirements and were further decomposed into tasks and learning domains which included:

- Cognitive (intellectual skill, cognitive strategy and verbal information)
- Psychomotor skills
- Affective (attitude)

All of the research data points noted above were collated into an extensive Research Traceability Matrix using Microsoft Excel for ease of reference, sorting and use during the conduct of the project. The matrix served as a working database document to which material was added as new research was identified/published during the project timeline.

Reference ANNEX C: POINTS RESEARCH TRACEABILITY MATRIX

Further research was conducted during Phase II to identify the various military medical personnel and summarize their respective job duties, prerequisites, training requirements, helpful skills and equipment used (where available). Table 3 below summarizes the results of this research.

Table 3. Military Medical Providers

SOURCE AREA	NUMBER OF PROVIDERS
All Services	1
U.S Army	4
U.S Air Force	2
U.S. Navy/Marine	2
Special Operations Forces (SOF)	5
Nursing	8

Reference ANNEX D: MILITARY MEDICAL PROVIDERS

"A simulation inventory of LVCG technologies currently used that would support a joint patient evacuation transport system of system for training and assessment will be generated. Each technologies' data elements and formats will be investigated for interoperability and incorporation into a standardized data transfer definition".

The intent of this research was to generate a simulation inventory of live, virtual, constructive, and gaming simulation technologies and affective measurement and part task trainer (PTT) technologies currently used that would support a JETS and POINTS System of Systems (SoS) for initial and sustainment training with a focus of identifying their respective data elements and formats for interoperability and incorporation into a standardized data transfer definition. The research also focused on technologies that could capture data for cognitive, psychomotor, decision-making and command and control skill sets for the purposes of interoperability considerations and assessment capabilities of the JETS and POINTS SoS architecture. A SoS for joint evacuation and transport training and POI training should map the integration of Service component specific, cross-cutting operational sub-system components, including, but not limited to, the functions of inter-component qualifications, communication, mission planning, mission rehearsal, ERC, patient movement, command and control, logistics and their associated operational supporting sub-systems for training and assessment. The architecture design must account for the data and capabilities in simulation devices currently being used for training, as well as future advancements, to ensure compatibility and ease of integration into the training of POI care, patient evacuation and transport, and eventually the full continuum of care.

Research was completed on current live/virtual simulation, command and control, affective measurement and PTT technologies for initial and sustainment training across the continuum of care. Emphasis was placed on their capability to be integrated into a JETS and POINTS SoS focusing on POI care and patient transitions (evacuation, transport, handoffs and transfers). Thus, the focus was on identifying the requirements for data standards and interoperability. The sampling of 214 identified technologies in the simulation inventory are either commercially available, Government-owned equipment, or are currently in development. Given that focus, the JETS and POINTS SoS architecture should strive to accommodate all identified data types and formats to allow for the integration of the technologies identified with additional effort.

An LVCG Simulation Traceability Matrix was developed to identify the attributes of each respective technology in order to establish their possible incorporation into a JETS and POINTS SoS architecture. An analysis was conducted which included identifying, describing, and documenting capabilities and variances between each technology's ability to be incorporated into a JETS and POINTS SoS

architecture. Although the technologies identified in the research are capable of integration into a system of systems framework, they will require a varying degree of additional effort to complete integration and to minimize their intrusive effects.

An LVCG Simulation Inventory Summary document was developed to describe the research conducted for each simulation technology investigated along with noted observations and conclusions for possible integration into the JETS and POINTS SoS architecture.

Reference ANNEX E: LVCG SIMULATION TRACEABIITY MATRIX

Reference ANNEX F: LVCG SIMULATION INVENTORY SUMMARY

3.1.2 OBJECTIVE #2: Conduct Site Visits

"Site Visits: The goal is to gather information regarding existing training systems. In addition, the verification portion of this Objective will be accomplished by creating and executing a Verification Matrix to ensure that all line items in the requirements documents are reflected to DoDAF views and documents the link".

Due to research and interviews conducted in Phase I, the Government Technical Representative approved changing the Verification and Review Conference to on-site meetings at military locations and extensive interviews pertaining to POI training specifically. Phase II effort focused on the POI aspect specifically which was included with previously obtained information. Upon conduct and analysis of the front-end domain research, elements were reviewed and discussed with Subject Matter Experts (SMEs), military clinicians, and stakeholders to assess the accuracy, usefulness and appropriateness of the information gathered in meeting current and future requirements and desired system capabilities.

The JETs team visited sites where views, ideas, and advice were gathered from SMEs with previous experience from relevant units and levels of organization which focused on POINTS and JETS elements. This information was gathered in person, individually and in groups. This allowed the research team to clearly understand all training and operational needs, their constituent parts and interrelationships necessary to complete the required deliverables.

Information collected has been disseminated within the Capabilities Traceability Matrix and the SME Interview Matrix which were submitted in Phase I.

Phase II Site Visits Conducted:

- Department of Combat Medic Training (DCMT)
  - Combat Medic Training: The U.S. Army Medical Department Center & School (AMEDD C&S) for discussions on initial training needs
- Randolph Airforce Base
  - Air Force Modeling and Simulation Training (AFMMAST) and Navy Medical Modeling and Simulation Training (NMMAST) Groups for discussions on POINTS specific needs
- Fort Polk: U.S. Army Joint Readiness Training Center (JRTC)
  - Command Surgeon for JRTC
  - Operations Center
  - Trainees: 1-75 RGR, 142 CSSB, Tunisians

Full reports for each of the above visits were submitted previously within their respective Monthly and Quarterly Technical Reports.

3.1.3 OBJECTIVE #3: Develop JETS Architectural Plan and Requirements Definition

"Create a system of systems framework that will utilize a High Level Architecture (HLA) as a foundation to create an integrated simulation system for joint evacuation and transport to support training, analysis, test and evaluation, and concept development".

"Establish standards for data transmission for medical simulation training. A standardized Federation Object Model (FOM) will be the main focus of the effort. Standards for communication among medical simulations using multiple modalities will be designed and demonstrated (Phase II)".

IVIR Inc. expanded the Medical Modeling and Simulation (MMS) Federation Object Model (FOM) created during the JETS architecture effort (Phase I) to include support for demonstrating POINTS architecture. The FOM, which will work within a Hight Level Architecture (HLA) instantiation, is meant to demonstrate the feasibility of a standard communication protocol among medical simulations using multiple modalities. It does not imply that HLA is the only possible framework that can be used within the JETS or POINTS architecture.

The use of HLA and a custom MMS FOM can demonstrate the proof of concept of a JETS architecture. HLA uses a publish-subscribe methodology, where each connected system (called a federate) publishes the information it offers to other federates and subscribes to only information it needs from other federates. An HLA network allows for systems to come online and go offline as necessary and is designed to be extensible to adapt to new requirements.

An HLA-based SoS operates according to a predefined FOM, which is a data dictionary that defines the data elements that can be used within the SoS. As part of this program, a custom MMS FOM has been drafted to begin identifying the necessary standards for a global medical modeling and simulation architecture. To date, the primary data modules are: base, communications, facility, instructional, medical logistics, patient, simulation control, and patient transfer. Each module contains specific data variables that are required in a medical simulation, though not all simulations will use all available variables.

In order to efficiently use the FOM in a SoS, several Federation Agreements must be documented. The Federation Agreements are captured in 2 volumes: *MMS Federation Agreements – Execution* and *MMS Federation Agreements – Data* (Both volumes are included within this report as **ANNEXES I** and **J**, respectively). While the FOM supports interoperability at the data level, the Federation Agreements support interoperability at the semantic level. Federation Agreements serve several purposes:

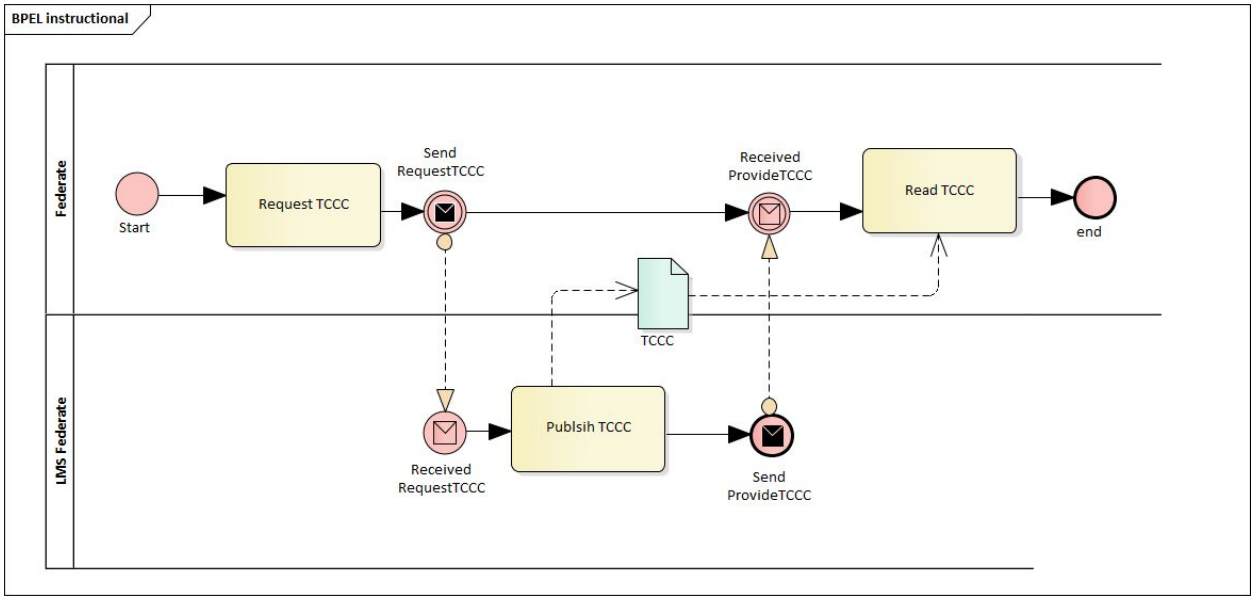
- Participating simulations must agree to them in order to interoperate.
- New simulations wanting to join JETS/POINTS understand what they need to achieve data interoperability.
- If JETS/POINTS is used as part of a larger exercise, the Federation Agreement document helps them understand how to interoperate with JETS/POINTS.

One example of a Federation Agreement is how to request a TCCC card which is described below.

TCCC Card Request/Response

In training events in which documents such as the TCCC Card already exist prior to Role 2 training, it may be necessary to request them from a Learning Management System (LMS) or similar repository. A federate may use the interaction RequestTCCC to get the document from the repository. Figure 1 below illustrates the expected execution steps for the interaction and the response interaction, ProvideTCCC.

Figure 1: Expected Execution Steps



The custom MMS FOM ensures that all data transferred to and from the architecture is in a standardized format and is readable by all federates that join the architecture. Variables for the FOM have been identified from the front-end analysis, research of Service component protocols and curriculum, and from SME input. Each module will have an extensive list of variables to allow for standardized communication between medical simulations.

The MMS FOM was updated to support demonstrating multiple modalities. In the Phase II demonstration, for example, the federation supported both a serious game and a physical manikin. Each simulator was connected to the same federation and used the same FOM objects. In this case, the same patient was represented in both a purely virtual world and a physical trainer that included haptic feedback. Both were driven by the same physiological engine and managed by the same instructional components. All systems complied with the single standard defined by the MMS FOM and the Federation Agreements. Videos from the demonstration were captured and are available from the Government (See **ANNEX H** for details).

In addition to demonstrating that a single standard can be used to enable multiple training devices to interoperate, Phase II demonstrated the feasibility of interoperability between different frameworks and standards. In this case, the MMS Federation connected to the JETS Core Manikin (JCM) network using an HLA-JCM Gateway developed as part of Phase II. The manikin on the JCM network, which uses the Data Distribution Service (DDS) standard, was able to interact with the instructional and physiological components using the MMS FOM standard in order to exchange such data as:

- Physiological data including blood pressure and lung volume
- Treatments applied to the manikin
- Bookmarks which indicated events that were of interested to the instructor
- Forms such as the TCCC Card and DA 4700

Phase II FOM development focused on expanding the foundation defined in Phase I to include data exchange standards for basic medical logistics modeling, improved modeling of physiology, instructional system integration, and support for multiple modalities. Future FOM development work is expected to focus on increased fidelity of patient physiology, detailed models for representing medical facilities, standards for integrating with combat simulations and support for the entire instructional and assessment lifecycle. Future demonstrations are expected to provide proof of concepts for such development in addition to demonstrating the MMS FOMs ability to support multiple sites and causality training throughout all roles of care.

Reference ANNEX G: POINTS FOM DEMONSTRATION DESIGN

Reference ANNEX H: POINTS FOM DEMONSTRATION MINUTES

Reference ANNEX I: MMS FEDERATION AGREEMENTS – EXECUTION

Reference ANNEX J: MMS FEDERATION AGREEMENTS – DATA

Reference ANNEX K: MMS FOM

3.1.4 OBJECTIVE #4: Develop JETS Capability Models and **Objective #5:** Develop JETS Operational and Systems Models

#4: *"Architectural viewpoints will be composed of all data gathered and organized to facilitate understanding. The developed capability models will articulate the system of systems capability requirements, the delivery timing, and the deployed capability".*

#5: *"The operational viewpoints (OVs) and system viewpoints (SVs) will be generated which will tie together and identify the flow of data and resources among the subsystems. The architecture will account for functions such as interoperability, expandability, data transmission, usability and assessment".*

3.1.4.1 DoDAF SUMMARY

The Architectural Description uses the DoD Architectural Framework (DoDAF) to convey the decisions made in developing the POINTS system. The purpose is to inform the Defense Health Agency (DHA), acquisition organizations, contracting companies, Schoolhouses/Cadre, and other stakeholders about a recommended approach to address identified needs in training Joint Patient Movement/Global Patient Movement/Joint Theater Patient Evacuation (JPM/GPM/JTPE). The contained information is intended to assist in evaluating architectural scope and design trade-offs, dividing the full operating capability into highly-focused increments, tracing requirements to capabilities to operational activities to services to systems, defining subsystems and their connectivity, and developing testing metrics (e.g., testing system attributes or metrics for user performance). This architectural description will accompany the draft Capabilities Development Document (CDD) to be submitted to the DHA, for an expected Joint Capabilities Integration and Development System (JCIDS) Milestone A regarding POINTS.

The architecture is designed from the viewpoints of multiple anticipated users, including instructors, technicians, learners, and Command and Control (C2) organizations involved in patient movement training. The POINTS architecture is advocated by the DHA, supports capabilities defined in the Joint Force Health Protection (JFHP) Concept of Operations (CONOPS) and addresses identified gaps in the JFHP Initial Capability Document (ICD). The POINTS system supports the Force Support Joint Capability Area (JCA) 1.4.1.4: Provide GPM.

The purpose of the JETS System is to link the operational needs of the Component and Geographic Combatant Commanders (GCC) to optimize POI training within the Military Health System (MHS) continuum of care while ensuring clinical standards of patient management. The end-state is to ensure patients receive the most effective care throughout the POI role in the DoD chain of evacuation, while decreasing overall DoD training costs and technology fielding timelines, without effecting the Component's training capabilities already in place. POINTS provides the Components with a standardized DoD training platform to support "train like we fight". POINTS does not replace a Component's unique training requirements, but rather it provides a modular, integrated, sustained, maintained, and modernized training platform on which to execute that training for individuals, teams, and units.

Several versions of DoDAF views were created for this phase:

- JETS Architectural Description from JETS Draft CDD
- JETS Architectural Description with Recommendations (as of Phase I)
- JETS Architectural Description with Recommendations (as of Phase II)
- POINTS Architectural Description from POINTS Draft CDD
- POINTS Architectural Description with Recommendations

While the JETS and POINTS architectures are similar, the POINTS architecture with recommendations now incorporates capability requirements following the format described in the 2018 JCIDS manual. Each capability requirement identifies one or more operational tasks, or Unified Joint Tasks (UJTs) that are supported or enabled by the identified capability.

The following DoDAF-described views were developed for each of the "with recommendations" views:

- AV-1: Overview and Summary Information
- AV-2: Integrated Dictionary
- CV-1: Capabilities Vision
- CV-2: Capabilities Taxonomy
- CV-3: Capability Phasing
- CV-4: Capability Dependencies
- CV-6: Capability to Operational Activities Mapping
- CV-7: Capability to Services Mapping
- DIV-1: Conceptual Data Model
- DIV-2: Logical Data Model
- DIV-3: Physical Data Model
- OV-1: High-Level Operational Concept Graphic
- OV-2: Operational Resource Flow Description
- OV-4: Organizational Relationships Chart
- OV-5a: Operational Activity Decomposition Tree
- OV-5b: Operational Activity Model
- SvcV-1: Services Context Description
- SvcV-3: Systems-Services Matrix
- SV-1: Systems Interface Description
- SV-2: Systems Resource Flow Description
- SV-3: Systems-Systems Matrix
- SV-7: Systems Measures Matrix
- SV-8: Systems Evolution Description

Note that for the JETS and POINTS DoDAF, views are based directly on the Draft CDD and without added recommendations. Only the following views are included:

- AV-1: Overview and Summary Information
- AV-2: Integrated Dictionary
- OV-1: High-Level Operational Concept Graphic
- CV-1: Capabilities Vision
- CV-2: Capabilities Taxonomy
- CV-3: Capability Phasing
- SV-1: Systems Interface Description
- SV-3: Systems-Systems Matrix
- SV-7: Systems Measures Matrix
- SV-8: Systems Evolution Description

3.1.4.2 DoDAF REVIEW

Throughout the development of the DoDAF views, IVIR Inc. reviewed each of the DoDAF views and provided feedback. The reason for the DoDAF review is to ensure that the architectural artifacts and views serve the purpose they are developed for. IVIR Inc.'s review process is explained below.

Architecture artifacts are assessed for the following qualities:

- Clarity
  - Views comply with the DoDAF specification
  - Accurate and unambiguous use of terminology
  - Correct use of diagram symbology
  - The content conveys the desired information to stakeholders
- Consistency
  - Content is consistent between views
  - Content is consistent with source materials
- Validity
  - Views meet the purpose identified in the DoDAF specification
  - Views describe solutions relevant to the "Capabilities Development Document (CDD) for Point of Injury and Trauma Simulation (POINTS) System"

Each artifact developed for the POINTS architecture follows the same process as described below.

Define/Revise Key Review Points: For each DoDAF view, key review points are defined based on the DoDAF specification, project requirements, and known risks. These are created prior to reviewing the relevant artifacts to independently identify acceptance criteria.

Assess Artifacts Against Key Points: For each key review point, the architecture is reviewed to determine if it meets the criteria, fails to meet the criteria, or if the defined review point is not applicable. Each revision of the architecture is assessed against all review points to ensure changes to the artifacts did not cause previously passed items to fail.

Assess Each View Against Its Defined Purpose: Each artifact is viewed as a single entity with a specific purpose. Regardless of any issues found, if any, it must communicate the desired information, message, or guidance to the relevant stakeholders.

Cross-Reference Related Views: For each artifact in a review, the data flow is traced from any views that contribute data to the artifact and to any views in which the artifact provides data.

Cross-Reference Source Material: For each artifact in a review, all content is traced to source material such as the "CDD for POINTS System". The goal is not to ensure that there is a one-to-one relationship between the contents of source material and the architecture. Instead, the goal is to identify any content in the artifacts that contradict such material.

Capture And Report Findings: Any findings are captured and reported back to the artifact developer. Findings may be in the form of recommendation, questions or general observations. In some cases, example diagrams are included as well, but only for elaboration.

3.1.6 OBJECTIVE #6: Conduct Technical Feasibility Studies

"A series of assessments to determine the practicality of the proposed system or system requirements will be conducted. These studies will aim to objectively uncover the strengths and weaknesses of the proposed requirements and evaluate their potential for success. The intent is that they will provide information to the research team upon which decisions can be based from in the final proposed system architecture designs and associated capabilities documentation".

A series of assessments were conducted to determine the practicality of the proposed system and system requirements. These studies aimed to objectively uncover the strengths and weaknesses of the proposed requirements and evaluate their potential for success. The study consisted of reviewing use case scenarios, and a review of network suitability to provide information to the research team upon which decisions can be based for the final proposed system architecture designs and associated capabilities documentation.

The scenarios generated during these assessments represent the POINTS architecture design. The POINTS feasibility study is based on the previous JETS feasibility study, modified to match the different capabilities of the POINTS architecture. They are meant to showcase a sample of events that will be possible to perform in the eventual POINTS system.

Reference ANNEX L: POINTS FEASIBILITY STUDY

3.1.7 OBJECTIVE #7: Provide Recommendations to JETS and POINTS Draft CDDs
"The CDD will specify the operational requirements for the JETS/POINTS that will deliver the capability that meets operational performance criteria specified in the draft CDD which the Offeror anticipates will be provided by the Government. The generated documentation will outline the capability each with its own set of attributes and performance values, defining measurable and testable capabilities".

The POINTS draft CDD was reviewed for completeness based upon the research conducted through literature review, site visits to specific locations related to POI, Government provided documents and extensive subject matter expert interviews.

The references noted from the draft CDD were reviewed for currency from the twenty-six (26) references that the Government provided and any items that had been restricted to Government/DoD access where provided. It is recommended that the Government consider revising the POINTS CDD to include additional detail identified in the sixteen (16) items noted in the POINTS CDD Recommendations Summary.

Reference ANNEX M: POINTS CDD RECOMMENDATONS SUMMARY

4. PROGRAM SUMMARY

4.1 Program Organization

Table 4 below lists the *Prototype of Joint Evacuation and Transport Simulation Program Phase II* organization:

Table 4. Program Organization

RESPONSIBILITY	INDIVIDUAL	ORGANIZATION
Key Personnel		
Principle Investigator	Ms. Catherine M. Strayhorn, BS	IVIR Inc.
Program Manager	Ms. Dee Kuenzig, MS	IVIR Inc.
Educational Engineer	Mr. William Lewandowski, MS	IVIR Inc.
Team Personnel		
Sr. System Engineer	Ms. Erin Honold, BS	IVIR Inc.
Sr. Researcher	Mr. Ray Shuford, BS	IVIR Inc.
Software Architectures	Mr. William Lewandowski, II, MS	IVIR Inc.
Contract Administration	Ms. Mary O'Hara	IVIR Inc.
Subject Matter Experts		
Military Medicine/TCCC	CSM (Ret) David Litteral, MS	
Physiological Modeling	Mr. Robert Hester, PhD	
Network and Cyber Security, DICAP	Mr. Robert Madden, BS, CISSP	
Government Personnel		
SOTR – Phase I	Mr. Dave Thompson	MSIS Research Program JPC-1

SOTR – Phase II	Ms. Mei Sun, PhD	MSIS Research Program JPC-1
Contractual Representative	Ms. Rebecca Harmon	ATI

4.2 Program Deliverables

Table 5 below lists the program deliverables for the *Prototype of Joint Evacuation and Transport Simulation Program Phase II*

Table 5. Program Deliverables

DUE DATE	MILESTONE NUMBER AND BRIEF DESCRIPTION
* 9/7/18	19 – Project Plan ● Project Plan Document (Microsoft Project) ● Work Break Down Structure (WBS) ● Traceability Matrix Templates (TMT) ● Quality Control Plan (QCP) ● Data Paths
* 9/7/18	20 – Sprint Monthly Planning Report – Month 1 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 10/5/18	21 – Sprint Monthly Planning Report – Month 2 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 10/25/18	24 – Quarterly Report 3 ● Technical Status Report ● Business Status Report
* 11/7/18	23 – Sprint Monthly Planning Report – Month 3 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 12/7/18	25 – Sprint Monthly Planning Report – Month 4 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 1/7/19	27 – Sprint Monthly Planning Report – Month 5 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 1/25/19	29 – Quarterly Report 4 ● Technical Status Report ● Business Status Report
* 1/25/19	30 – Annual Report Technical Status Report ● Business Status Report
* 2/7/19	28 – Sprint Monthly Planning Report – Month 6 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 3/7/19	31 – Sprint Monthly Planning Report – Month 7 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 4/5/19	32 – Sprint Monthly Planning Report – Month 8 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 4/25/19	37 – Quarterly Report 5 ● Technical Status Report ● Business Status Report
* 4/29/19	39 – Conduct Site Visits and CDR POINTS

	● Trip Reports from Site Visits ● Meeting Minutes from CDR
* 5/7/19	36 – Sprint Monthly Planning Report – Month 9 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 6/7/19	38 – Sprint Monthly Planning Report – Month 10 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 6/27/19	45 – Demonstration Preliminary MMS FOM
* 7/8/19	41 – Sprint Monthly Planning Report – Month 11 ● Minutes from Weekly Meetings ● Minutes from Monthly Meeting
* 7/22/19	42 – Final Deliverables Phase II ● 42.1 POINTS DoDAF Artifacts and Supporting Documents ● 42.2 QCP ● 42.3 WBS Gantt Chart (Final MS Project Plan update) ● 42.4 Traceability Matrices ● 42.5 Reports and Meeting Minutes ● 42.6 MMS FOM ● 42.7 Project tasks and plan for use in continuing JCIDS acquisition strategy and progress towards Milestone B and beyond (Phase III – VI)
* 7/22/19	43 - Phase II Final Technical Report

* Delivered

4.3 Work Performed Summary – Phase II: POINTS

4.3.1 Month 1: August 1 – August 31, 2018

- Created Draft Phase II Project Plan in MS Project
  - Created the WBS for the POINTS effort
  - Drafted the QCP for POINTS
  - Drafted the TMTs for POINTS
- Began daily SCRUM meetings
- Conducted weekly program meetings
- Held Monthly Agile Review meeting on 30 August 2018 for August
- Held internal kickoff with SimQuest on 09 August 2018
  - Meeting minutes included as attachment
- Compiled questions from internal kickoff sent to Mr. Dave Thompson
  - Forwarded questions via email to Mr. Dave Thompson
- Held POINTS program kickoff with JPC-1 on 23 August 2018
  - Generated kickoff presentation slide deck
  - Submitted meeting minutes
- Submitted First Monthly Phase II Sprint Report 07 September 2018

4.3.2 Month 2: September 1 – September 30, 2018

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, now held twice per week on Wednesday and Friday
- Conducted weekly program meetings
- Scheduled monthly Agile review for 01 October 2018, minutes to be included with the next monthly report

- Submitted contract modification to MTEC and JPC-1 on 19 September 2018
  - Final approval was pending
  - Modifications to Milestone Payment Schedule to reflect Agile approach approved at Government kickoff meeting

Milestone Detail:

- 020: Sprint Monthly Planning Report, Phase II Month 1 – Completed
- 021: Sprint Monthly Planning Report, Phase II Month 2 – Completed
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
  - Began conducting literature review, analyze curriculums, and update LVCG technologies
    - Began research for the annotated bibliography
    - Created draft document defining health care provides associated with POINTS
  - Refined the research and requirements traceability from Phase I for POINTS specific information
  - Created data collection plan
  - Began POINTS updates for *Healthcare Providers, Military Medical Doctrine and Bibliography* documents generated in Phase I
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
  - Began scheduling site visits
    - Working to schedule visits to view Ft. Sam Houston training
    - Working to schedule visits to view Ft. Bragg training (Note: Coordination not completed)
  - Attended the 2018 National Modeling & Simulation Coalition (NM&SC) National Meeting at the University of Nebraska Medical Center.
    - Discussion held with Mr. Ruben Garza, DHA Education and Training and Commander Selvester, HQ AETS/SGR
      - The role of disease and non-combat injuries as they relate to POINTS/JETS
      - Issues related to treatment of female casualties by enlisted first responders
      - Issues related to treating injuries under biological, chemical and nuclear condition
- 045: Demonstration Preliminary MMS FOM – Was in Progress
  - Completed draft of medical scenario to define patient conditions, treatments, and timeline of scenario
  - Updated draft outline of overall scenario design
    - Draft outline of general flow of scenario and basic hardware configuration
    - Draft outline of how the first training event will be conducted to show the FOM

4.3.3 Month 3: October 1 – October 31, 2018

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week on Wednesday and Friday
- Conducted weekly program meetings
  - Weekly meeting on 22 October included additional discussion on processes moving forward in the program
- Held monthly Agile review on 01 October 2018 – Submitted minutes

- Scheduled monthly Agile review for 05 November 2018, minutes were included with the next monthly report
- Submitted Quarterly Report on 25 October 2018
- Scheduled Phase I Deliverable review meeting for 13 November 2018 at Ft. Detrick
    - Received initial feedback from Government on 31 October 2018
- Submitted contract modification to MTEC and JPC-1 on 19 September 2018
    - Approval was granted 12 October 2018
    - Modifications to Milestone Payment Schedule to reflect Agile approach approved at Government kickoff meeting

Milestone Detail:

- 021: Sprint Monthly Planning Report, Phase II Month 2 – Completed
- 023: Sprint Monthly Planning Report, Phase II Month 3 – Completed
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
    - Continued conducting literature review, analyzed curriculums, and updated LVCG technologies
        - Continued work on the annotated bibliography
        - Updated draft document defining health care providers associated with POINTS
        - Updated LVCG technology matrix
        - Compiled research from SimQuest into the research documents
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Was in Progress
    - Began gathering data from POINTS Draft CDD to identify architecture design requirements
    - Compared the JETS Draft CDD with the POINTS Draft CDD to identify primary differences
        - POINTS Draft CDD explicitly mentions POI care, which will be the focus of the AV, OV, and CV views
        - Emphasize using JETS to tie into the transition to Role 2 through 4
        - Heavy emphasis on a 4-phase approach, which does not completely line up with the JETS increments – will need to determine how these are represented.
        - The POINTS Draft CDD has an increase in specific technologies mentioned throughout the document
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
    - Continued scheduling site visits
        - Working to schedule visits for Ft. Bragg training, working with JPC-1 to assist with scheduling
    - Conducted site visit at Ft. Sam Houston and Randolph Air Force Base (AFB) in San Antonio, TX
        - Visit conducted on 18 October 2018
        - Met with cadre at the Department of Combat Medic Training (DCMT) at Ft. Sam Houston and the AFMMAST and NMMAST training groups at Randolph AFB
        - Full meeting notes submitted

- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
    - Obtained copy of POINTS draft CDD from Government on 15 October 2018
    - Began initial review of POINTS Draft CDD
    - Began reviewing the references and resources listed in the CDD
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
    - Received feedback from the Joint Program Committee-1 (JPC-1) regarding the Phase I JETS deliverables
    - Began addressing feedback for the Phase I deliverables, for both the research products and the Department of Defense Architecture Framework (DoDAF) views. Final results will be transferred into POINTS effort upon acceptance
- 045: Demonstration Preliminary MMS FOM – Was in Progress
    - Continue work on the medical scenario to add a related prolonged field care version of the scenario
    - Updated FOM demonstration design document
        - Added detail to each training event within the scenario
        - Added detail regarding data variables that will be transferred over the network
    - Completed a storyboard of the FOM demonstration
        - Outlined the overall actions for the full demonstration with information on what will be expected to be shown at each point during the demonstration
    - Updated the FOM
        - Added more patient forms including DA Form 4700
        - Consideration and planning about incorporating additional data about Patients, such as ID info and other metadata as currently used on DoD forms
        - Consideration and planning to allow POINTS to simultaneously support multiple independent training activities, involving multiple Patients, multiple distinct scenarios, etc.
    - Coordinated demonstration system design with subcontractors
        - Verified that design accounted for existing capabilities
        - Provided HLA FOM information to prepare for upcoming integration

4.3.4 Month 4: November 1 – November 30, 2018

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 05 November 2018 and submitted minutes
- Scheduled monthly Agile review for 03 December 2018, minutes will be included with the next monthly report
- Held Phase I Deliverable meeting at Ft. Detrick on 13 November 2018 and submitted minutes
- Scheduled site visit to Ft. Polk, LA for 05-06 December 2018
    - As of 03 December 2018, this meeting has been cancelled and rescheduled to March 2019

Milestone Detail:

- 023: Sprint Monthly Planning Report, Phase II Month 3 – Completed
- 025: Sprint Monthly Planning Report, Phase II Month 4 – Completed
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
    - Continued conducting literature review, analyzed curriculums, and updated LVCG technologies
        - Continued work on the annotated bibliography
        - Updated draft document defining health care providers associated with POINTS
        - Updated LVCG technology matrix
    - Received and began review of updated Navy doctrine documents provided by JPC-1
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Was in Progress
    - Continued gathering data from POINTS Draft CDD to identify architecture design requirements
    - Received and reviewed additional reference documents from the POINTS Draft CDD
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
    - Continued scheduling site visits
        - Working to schedule visits for Ft. Bragg training, working with JPC-1 to assist with scheduling (Note: Coordination not completed)
        - Schedule with Ft. Hood as a secondary site visit if Ft. Bragg is unavailable
    - Scheduled site visit for the Joint Readiness Training Center (JRTC) at Ft. Polk, LA for 05-06 December 2018
        - As of 03 December 2018, this meeting was cancelled and rescheduled to March 2019
    - Continued scheduling the CDR for January 2019
    - Received notice of In Process Review (IPR) to be held 12 February 2019 in Orlando
- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
    - Continued review of POINTS Draft CDD
    - Began reviewing the references and resources listed in the CDD
    - Received and reviewed definition updates from JPC-1
        - Included definitions for levels of automatic and autonomous technology and types of joint/global patient movement
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
    - Attended meeting at Ft. Detrick on 13 November 2018 to discuss Phase I deliverable questions and feedback
    - Began addressing feedback for the Phase I deliverables, for both the research products and the DoDAF views
        - Research documents will be updated based on the feedback
        - DoDAF views will be presented in five total versions between JETS and POINTS
            - JETS DoDAF views based on the draft CDD
            - JETS DoDAF views based on recommendations from Phase I
            - JETS DoDAF views based on recommendations from Phase II
            - POINTS DoDAF views based on the draft CDD
            - POINTS DoDAF views based on recommendations

        - Additional definitions and suggestions will be included as part of the CDD recommendation document for both JETS and POINTS
- 045: Demonstration Preliminary MMS FOM – Was in Progress
    - Obtained approval from JPC-1 regarding the design concept of the demonstration system on 26 November 2018
    - Scheduled meeting with JPC-1 for 03 December 2018 regarding the expectations of the demonstration.
        - Additional notes and updates to be provided with the next monthly report
    - Provided a description of HLA and why HLA was chosen for the demonstration system
    - Updated the FOM
        - Added more patient forms including DA Form 4700
        - Added variables to support logistics, particularly in regards to supplies of perishable and non-perishable equipment
        - Separated anatomical location information from injury parameters
            - The description of injury and location will now be handled by two separate variables
    - Coordinated demonstration system design with subcontractors
        - Verified that design accounted for existing capabilities, and adjusted roles of each subcontractor to best fit existing capabilities
        - Provided HLA FOM information to prepare for upcoming integration
        - Began regular meetings with subcontractors as integration of systems begins
    - Updated FOM demonstration design document
        - Added detail to each training event within the scenario
        - Added detail regarding data variables that will be transferred over the network
        - Added detail for patient form data

4.3.5 Month 5: December 1 – December 31, 2018

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 03 December 2018 and submitted minutes
- Scheduled monthly Agile review for 14 January 2019, minutes will be included with the next monthly report
- Tentatively scheduled site visit to JRTC at Ft. Polk, LA for 11-15 April 2019

Milestone Detail:

- 025: Sprint Monthly Planning Report, Phase II Month 4 – Completed
- 027: Sprint Monthly Planning Report, Phase II Month 5 – Completed
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
    - Continued conducting literature review, analyzed curriculums, and updated LVCG technologies
        - Continued work on the annotated bibliography

        - Updated draft document defining health care providers associated with POINTS
        - Updated LVCG technology matrix
    - Continued review of updated Navy doctrine documents provided by JPC-1
    - Began researching Seaware LMS from the US Navy
        - The system is being investigated to potentially leverage existing technology and design elements for the POINTS architecture, particularly the POD piece for the Navy
        - The LMS is focused on providing POD and training to submarines and schoolhouses for maintenance training
        - Seaware LMS is an existing product owned by the Navy and is compliant with major education standards such as SCORM and xAPI
        - Offers online and offline training, can add new modules as needed, and tracks student performance.
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Was in Progress
    - Continued gathering data from POINTS Draft CDD to identify architecture design requirements
    - Continued reviewing additional reference documents from the POINTS Draft CDD
        - Began putting together summaries and key points for each reference document
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
    - Continued scheduling site visits
    - Tentatively scheduled site visit for the JRTC at Ft. Polk, LA for 11-15 April 2019
    - Scheduled the CDR for 08 February 2019 in Orlando, FL
        - The CDR was originally scheduled for January 2019 in San Antonio, TX
    - IPR to be held 12 February 2019 in Orlando
- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
    - Continued review of POINTS Draft CDD
    - Continued reviewing the references and resources listed in the CDD
    - Continued documenting suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
        - All suggestions were documented in the CDD recommendations document for the POINTS Draft CDD
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
    - Updated the meeting minutes and notes from the JPC-1 meeting on 13 November 2018 to include additional definitions and information provided by JPC-1
        - Included definitions for automatic and autonomous technology and definitions for patient movement
    - Completed and delivered updated Phase I deliverables on 17 December 2018
        - Final report was updated based on feedback from JPC-1
        - Research documents were updated based on the feedback from JPC-1
        - DoDAF views for JETS were updated and delivered as two versions:
            - JETS DoDAF views based on the draft CDD

- JETS DoDAF views based on recommendations from Phase I

- Updated the CDD recommendations document to include additional definitions and additional notes based on JPC-1 feedback

- Continued updating the JETS DoDAF views based on Phase II research
  - DoDAF views will be presented in five total versions between JETS and POINTS
    - JETS DoDAF views based on the draft CDD (delivered)
    - JETS DoDAF views based on recommendations from Phase I (delivered)
    - JETS DoDAF views based on recommendations from Phase II
    - POINTS DoDAF views based on the draft CDD
    - POINTS DoDAF views based on recommendations

- 045: Demonstration Preliminary MMS FOM – Was in Progress
  - Held meeting with JPC-1 on 03 December 2018 regarding the expectations of the demonstration.
    - The audience for the demonstration was expected to consist of medical professionals with limited engineering knowledge
    - IVIR was asked to clarify and identify what capabilities of JETS will be demonstrated and what it offers that is not currently available
      - The demonstration itself was to be focused on demonstrated the HLA FOM
      - The presentation was to include additional detail on the larger picture JETS architecture
    - JPC-1 recommended changes to the design document include adding high level block diagrams, focus on system capabilities over medical procedure, break down system interconnectivity and show clearly in diagrams, and focus on educating the audience
      - IVIR was currently reviewing all recommendations and said that it would update the design document as necessary in future drafts
  - Updated the FOM
    - Continued modifying variables to better handle patient form data
    - Added variables to support logistics, particularly in regards to supplies of perishable and non-perishable equipment and inclusion of supplies within kits
    - Updated and added definitions to variables related to the Patient, Injury, and Treatment categories, further clarified the relationship between these variables
  - Coordinated demonstration system design with subcontractors
    - Verified that the design accounted for existing capabilities, and adjusted roles of each subcontractor to best fit existing capabilities
    - Provided HLA FOM information to prepare for upcoming integration
    - Began preparing the code to be used by the demonstration system
    - Continued regular meetings with subcontractors as integration of systems begins
    - Set up document sharing portal on Zoho for demonstration system team to ensure coordination and to manage version control for code and design documents

4.3.6 Month 6: January 1 – January 31, 2019

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week on Wednesday and Friday
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 14 January 2019 and submitted minutes
- Scheduled monthly Agile review for 04 February 2019, minutes were to be included with the next monthly report
- Submitted Quarterly Report on 25 January 2019 (Milestone 29)
- Submitted Annual Report on 25 January 2019 (Milestone 30)
- Scheduled CDR for 08 February 2019
- Scheduled IPR for 12 February 2019

Milestone Detail:

- 027: Sprint Monthly Planning Report, Phase II Month 5 – Completed
- 028: Sprint Monthly Planning Report, Phase II Month 6 – Completed
    - Note: this is the current report. It is completed at the time of submission, but was in progress as of 31 January 2019
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Was in Progress
    - Continued gathering data from POINTS Draft CDD to identify architecture design requirements
    - Continued reviewing additional reference documents from the POINTS Draft CDD
        - Continued putting together summaries and key points for each reference document
    - Began researching information on tactical and command/control simulations that utilize HLA and other standard architectures
        - The research was to identify possible non-medical architectures that may need to be accounted for in the design of POINTS and JETS
- 029: Quarterly Report Number 4 – Completed – Submitted 25 January 2019
- 030: Annual Report Number 1 – Completed – Submitted 25 January 2019
- 033: Develop POINTS Capability Models – Was in Progress
    - Reviewed the draft CDD to identify capabilities
    - Began developing capability models for POINTS
- 034: Conduct Feasibility Study POINTS – Was in Progress
    - Began initial plans for feasibility studies for the POINTS architecture
- 035: Develop POINTS Operational System Models – Was in Progress
    - Reviewed the draft CDD to identify capabilities and related operations
    - Began developing operational system models for POINTS
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
    - Continued scheduling site visits
    - Tentatively scheduled site visit for the JRTC at Ft. Polk, LA for 11-15 April 2019
    - Scheduled the CDR for 08 February 2019, in Orlando, FL
        - Began preparing the presentations for the CDR, including an updated storyboard for the demo system
        - Slides were provided with the next monthly report
    - IPR to be held 12 February 2019 in Orlando

- Prepared and submitted the IPR slides on 22 January 2019
    - Attended the Military Operational Medicine Symposium in San Diego, CA on 23-24 January 2019 – Prepared trip report summarizing the conference

- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
    - Continued review of POINTS Draft CDD
    - Continued reviewing the references and resources listed in the CDD
    - Continued documenting suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
        - All suggestions were being documented in the CDD recommendations document for the POINTS Draft CDD
    - Created document to organize the review and research of the draft CDD, and to summarize the references/resources from the CDD
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
    - Received additional feedback from JPC-1 on the Phase I deliverables on 15 January 2019
        - Expansion of dictionary in Architecture Description
        - Document editing
        - CDD compliance
    - Updated the Phase I deliverables per feedback, and will be providing all updated versions on 15 February 2019
- 045: Demonstration Preliminary MMS FOM – In Progress
    - Updated the FOM
        - Continued modifying variables to better handle patient form data
        - Continued adding variables to support medical logistics
        - Updated patient injury and treatment variables
        - Began designing bookmark variables for After Action Review (AAR) systems
        - Worked on federation agreements for the system, including the relationship between patients, injuries, and treatments, and on how to handle time within the system
    - Coordinated demonstration system design with subcontractors
        - Held weekly calls with each subcontractor for status updates
        - Finalized the first draft of the publication/subscribe list for each federate (system)
            - The list was updated throughout the course of development, however the first draft will allow for initial integration testing
            - The list identified which objects and interactions each federate publishes (sends) and subscribes to (receives)
            - The list is used to generate the code to allow each federate to integrate with HLA and communicate through the run time interface (RTI)
        - Created a Virtual Private Network (VPN) tunnel to allow remote testing between the subcontractors and the demo system server
        - Continued use of document sharing portal on Zoho for demonstration system team to ensure coordination and to manage version control for code and design documents

- Began developing the POI and ERC simulation systems/federates
  - Virtual patient models are being developed to accurately reflect patient type and injuries
- Updated the primary demonstration design document
  - Added detail to describe each individual interaction between the federates
  - Added detail to denote the major events within each simulation

4.3.7 Month 7: February 1 – February 28, 2019

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week on Wednesday and Friday
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 04 February 2019, minutes submitted
- Scheduled monthly Agile review for 04 March 2019, minutes will be included with the next monthly report
- Held CDR on 08 February 2019 in Orlando, FL
- Held IPR on 12 February 2019 in Orlando, FL

Milestone Detail:

- 028: Sprint Monthly Planning Report, Phase II Month 6 – Completed
- 031: Sprint Monthly Planning Report, Phase II Month 7 – Completed
  - Note: this was the current report. It is completed at the time of submission, but was in progress as of 28 February, 2019
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
  - Continued conducting literature review, analyzed curriculums, and updated LVCG technologies
    - Updated the LVCG technology matrix, the document on military doctrine, and the document on healthcare providers
  - Conducted interviews with relevant military medical personnel
    - Sent out (seven) introductions and requests for interviews from recommendations given at IPR
    - Had one interview scheduled on March 12 with Naval Aerospace Medical Institute (NAMI)
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Was in Progress
  - Continued gathering data from POINTS Draft CDD to identify architecture design requirements
  - Continued reviewing additional reference documents from the POINTS Draft CDD
    - Continued putting together summaries and key points for each reference Document
  - Continued researching information on tactical and command/control simulations that utilize HLA and other standard architectures
    - The research was to identify possible non-medical architectures that may need to be accounted for in the design of POINTS and JETS
    - Met with Cole Engineering on 07 February 2019
      - Discussed potential interoperability with the OneSAF architecture in the future

- Received request to share information with the Naval Air Warfare Center Training Systems Division (NAWCTSD) on the Total Learning Architecture project

- 033: Develop POINTS Capability Models – Was in Progress
  - Reviewed the draft CDD to identify capabilities
  - Continued developing capability models for POINTS
- 034: Conduct Feasibility Study POINTS – Was in Progress
  - Began initial plans for feasibility studies for the POINTS architecture
- 035: Develop POINTS Operational System Models – Was in Progress
  - Reviewed the draft CDD to identify capabilities and related operations
  - Continued developing operational system models for POINTS
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
  - Continued scheduling site visits
  - Tentatively scheduled site visit for the JRTC at Ft. Polk, LA for 12-15 April 2019
  - Held CDR on 08 February 2019 in Orlando, FL
    - Meeting was attended by members from JPC-1 and SimQuest
    - Reviewed the status of the front-end research, discussed tying tactical architecture into JETS/POINTS, reviewed the DoDAF designs, reviewed the FOM development and demonstration, and discussed future risks and mitigations
  - Held IPR on 12 February 2019 in Orlando, FL
- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
  - Continued review of POINTS Draft CDD
  - Continued reviewing the references and resources listed in the CDD
  - Continued documenting suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
    - All suggestions were being documented in the CDD recommendations document for the POINTS Draft CDD
  - Began reviewing the information assurance (IA) and cybersecurity requirements referenced in the POINTS Draft CDD and associated reference documents
  - Continued reviewing and summarizing the Draft CDD reference documents
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
  - Updated the Phase I deliverables per feedback received on 15 January 2019
  - Held meeting on 20 February 2019 with SimQuest and JPC-1 to conduct live edits for the Phase I deliverables
  - Submitted final Phase I deliverables on 25 February 2019
    - Final submission included the Phase I final report, Phase I Annexes, and Phase I Supporting Documentation
    - Request for additional change on 26 February 2019, re-submitted those documents the same day
    - Updates included separating support documentation from main report and main annexes; updating the wording in each annex to better match the draft CDD; added product links to the LVCG matrix

- 045: Demonstration Preliminary MMS FOM – Was in Progress
  - Updated the FOM
    - Continued modifying variables to better handle patient form data
    - Continued adding variables to support medical logistics
    - Updated patient injury, treatment, and medication variables

        - Continued designing bookmark variables for AAR systems
        - Finalized the federation agreements for the system, including how the system will handle time
        - Began the configuration management of two FOM versions: one that will be used for the demonstration system, and one that will be expanded to cover additional JETS and POINTS capabilities
    - Coordinated demonstration system design with subcontractors
    - Continued developing the POI and ERC simulation systems/federates
        - Virtual patient models were being developed to accurately reflect the female patient type and injuries
        - Patient models received an initial review from the medical
    - Updated the primary demonstration design document
        - Held table-top review of final presentation/demonstration
        - Added detail to describe each individual interaction between the federates
        - Added detail to denote the major events within each simulation
        - Added detail regarding the overall flow of the demonstration

4.3.8 Month 8: March 1 – March 31, 2019

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week on Wednesday and Friday
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 04 March 2019 minutes submitted
- Scheduled monthly Agile review for April 2019, minutes will be included with the next monthly report

Milestone Detail:

- 031: Sprint Monthly Planning Report, Phase II Month 7 – Completed
- 032: Sprint Monthly Planning Report, Phase II Month 8 – Completed
    - Note: this was the current report. It is completed at the time of submission, but was in progress as of 31 March 2019
- 022: Conduct Front-End Domain Analysis POINTS – Was in Progress
    - Continued conducting literature review, analyzed curriculums, and updated LVCG technologies
        - Updated the LVCG technology matrix, the document on military doctrine, and the document on healthcare providers
        - Created the LVCG summary report for POINTS
    - Conducted interviews with relevant military medical personnel
        - HM1 Michael Chernenko, CNO HELSEACOMBATRON, San Diego, CA: Chief of Naval Operations Office Search and Rescue Office
        - HM2 Nicholes Davis, CNO, Flight Medic Course, NAMI, Pensacola, FL
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Was in Progress
    - Continued gathering data from POINTS Draft CDD to identify architecture design requirements
    - Continued reviewing additional reference documents from the POINTS Draft CDD

        - Continued putting together summaries and key points for each reference document
- 033: Develop POINTS Capability Models – Was in Progress
    - Reviewed the draft CDD to identify capabilities
    - Continued developing capability models for POINTS
- 034: Conduct Feasibility Study POINTS – Was in Progress
    - Continued initial plans for feasibility studies for the POINTS architecture
- 035: Develop POINTS Operational System Models – Was in Progress
    - Reviewed the draft CDD to identify capabilities and related operations
    - Continued developing operational system models for POINTS
- 039: Conduct Site Visits and CDR POINTS – Was in Progress
    - Finalized schedule of site visit for the JRTC at Ft. Polk, LA for 11-15 April 2019
        - Trip report was be included with the next monthly report
        - Trip report included observations on how training is conducted and how it relates to POINTS/JETS
- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
    - Continued review of POINTS Draft CDD
    - Continued reviewing the references and resources listed in the CDD
    - Continued documenting suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
        - All suggestions were being documented in the CDD recommendations document for the POINTS Draft CDD
    - Reviewed the information assurance (IA) and cybersecurity requirements referenced in the POINTS Draft CDD and associated reference documents
        - Identified newer reference documents for section 5.1.3 “Net-Ready”
            - Suggested change was reflected in the CDD recommendations document and is noted below:
                - *Rationale:* As defined in CJCSI 6510.01F (09 February 2011), the system is subject to the applicable Information Assurance and Cybersecurity policies, controls, and processes referenced within DoDI 8500.01E “Cybersecurity” (14 March 2014), and DoDI 8510.01Chg-2 “Risk Management Framework (RMF) for DoD Information Technology (IT)” (28 July 2017).
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
    - Continued refinement of JETS architecture based on POINTS research
- 045: Demonstration Preliminary MMS FOM – Was in Progress
    - Received feedback from JPC-1 on 22 March 2019
        - The demonstration design is approved based on what was presented at the CDR in February
        - Additional notes for key points to include in the presentation that preceded the demonstration:
            - What specific capabilities are we demonstrating?
            - What does JETS offer that is not currently available?
            - How are we defining JETS?

- How flexible is the concept to future advances/changes?
- Why is it better compared to current systems?
- Why is it needed?
- Why are we doing the demo?

- Updated the FOM
  - Finalized how the FOM will handle the transfer of patient for data for the demonstration system
  - Continued designing bookmark variables for AAR systems
  - Finalized the federation agreements for the system, including how the system will handle time
  - Continued the configuration management of two FOM versions: one that will be used for the demonstration system, and one that will be expanded to cover additional JETS and POINTS capabilities
  - Continued work on the expanded version of the FOM
    - Began requirements traceability between the FOM and the POINTS and JETS draft CDDs
- Coordinated demonstration system design with subcontractors
  - Held weekly calls with each subcontractor for status updates
  - Finalized the publication/subscribe list for each federate (system)
    - The list identified which objects and interactions each federate publishes (sends) and subscribes to (receives)
    - The list is used to generate the code to allow each federate to integrate with HLA and communicate through the RTI
  - Updated the feature list for each federate to track features and completion dates of each feature
    - The feature list will form the basis of the testing checklists for each of the system tests prior to the final demonstration
  - Provided updated code for each federate to connect to the RTI, and to identify how to interact with their variables from the publication/subscribe list
  - Conducted initial connection tests on 15 March 2019
    - All systems have successfully connected to the RTI
    - Future tests were focused on further integration between the systems
  - Scheduled hardware integration test for 04 April 2019 in Orlando
    - All systems were installed on the demonstration hardware
      - Systems included:
        - HumMod for patient physiology
        - SCM Globe for logistics
        - RESITE for the POI simulation
        - Training in Motion for AAR

- Advanced Female Trauma Training System (AFTTS) for the ERC simulation
    - Test was to focus on initial integration tests between systems based on the capabilities developed as of 01 April 2019
    - Results of the test were reported in the next monthly report
- Continued use of document sharing portal on Zoho for demonstration system team to ensure coordination and to manage version control for code and design documents

o Continued developing the POI and ERC simulation systems/federates
- Virtual patient models were being developed to accurately reflect the female patient type and injuries
    - One patient model was to be used for POI, and one will be used for the ERC simulation
- Patient models were reviewed by a medical SME and were in the process of being updated to reflect the feedback provided

o Updated the primary demonstration design document
- Added detail regarding the patient form transfer

4.3.9 Month 9: April 1 – April 30, 2019

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week on Wednesday and Friday
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 01 April 2019, minutes submitted
- Scheduled monthly Agile review for 06 May 2019, minutes will be included with the next monthly report
- Submitted the Quarterly Report on 25 April 2019

Milestone Detail:

- 032: Sprint Monthly Planning Report, Phase II Month 8 – Completed
- 036: Sprint Monthly Planning Report, Phase II Month 9 – Completed
    - Note: this was the current report. It was completed at the time of submission, but was in progress as of 30 April 2019
- 022: Conduct Front-End Domain Analysis POINTS – Completed
    - Completed literature review, analyzed curricula, and updated LVCG technologies
        - Updated the LVCG technology matrix, the document on military doctrine, and the document on healthcare providers
        - Created the LVCG summary report for POINTS
    - JPC-1 provided feedback on the Navy Supplemental interviews that were submitted with the previous monthly report on 12 April 2019
        - Responses to their questions were submitted by IVIR on 12 April 2019
    - Updated and finalized the traceability matrix for the literature research
    - Updated and finalized the military medical doctrine document
- 026: Develop POINTS Architecture Data Plan and Requirements Definition – Completed
    - Finalized gathering data from POINTS Draft CDD to identify architecture design requirements

  - Finalized review of additional reference documents from the POINTS Draft CDD
- 033: Develop POINTS Capability Models – Was in Progress
  - Reviewed the draft CDD to identify capabilities
  - Began review of the documents related to the Universal Joint Task Lists and architecture requirements uploaded by SimQuest to the LT2 Portal
  - Continued developing capability models for POINTS
- 034: Conduct Feasibility Study POINTS – Was in Progress
  - Continued plans for feasibility studies for the POINTS architecture
  - Study to be finalized once DoDAF's are completed
- 035: Develop POINTS Operational System Models – Was in Progress
  - Reviewed the draft CDD to identify capabilities and related operations
  - Continued developing operational system models for POINTS
- 037: Submitted POINTS Quarterly Report on 25 April 2019 – Completed
- 039: Conduct Site Visits and CDR POINTS – Completed
  - Conducted site visit to the JRTC at Ft. Polk, LA on 11-15 April 2019 and submitted trip report
- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
  - Continued review of POINTS Draft CDD
  - Continued reviewing the references and resources listed in the CDD
  - Continued documenting suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
    - All suggestions were being documented in the CDD recommendations document for the POINTS Draft CDD
- 044: Iteratively Refine and Refactor JETS Architecture – Was in Progress
  - Continued refinement of JETS architecture based on POINTS research
    - Require receipt of created DoDAF's to ensure information is included under the version with recommendations
- 045: Demonstration Preliminary MMS FOM – Was in Progress
  - Updated the FOM
    - Continued designing bookmark variables for AAR systems
    - Continued the configuration management of two FOM versions: one that was used for the demonstration system, and one that was expanded to cover additional JETS and POINTS capabilities
      - The version for the demonstration system was finalized, all future work on the FOM will be done on the expanded version
    - Continued work on the expanded version of the FOM
      - Continued requirements traceability between the FOM and the POINTS and JETS draft CDDs
      - Expanded the DA Form 4700 and DD Form 1380 capabilities in the FOM
  - Coordinated demonstration system design with subcontractors
    - Held weekly calls with each subcontractor for status updates
    - Updated the feature list for each federate to track features and completion dates of each feature

- Updated the feature list based on changes that resulted from the 04 April integration test
- Provided finalized code for each federate to connect to the RTI, and to identify how to interact with their variables from the publication/subscribe list
- Continued use of document sharing portal on Zoho for demonstration system team to ensure coordination and to manage version control for code and design documents

- Continued developing the POI and ERC simulation systems/federates
  - Virtual patient model for the POI system was updated based on SME feedback
  - The POI system user interface (UI) was updated to correct some display issues and correct the vital sign values being shown on the screen
  - Virtual patient model for the ERC system was removed
    - The ERC system was to focus on the physical female manikin
- Conducted the initial system integration test on 04 April 2019
  - Consolidated results of the test and provided feedback to subcontractors regarding feature updates and bug fixes
  - Test notes were attached as a separate document to this report
- Conducted the system Alpha test on 29 April 2019
  - Consolidated results of the test and provided feedback to subcontractors regarding feature updates and bug fixes
  - Test notes were attached as a separate document to this report
- Began tracking bug fixes and feature updates using the Zoho task tracking tool
- Updated the primary demonstration design document
  - Updated the design document based on changes made as the result of testing this month

4.3.10 Month 10: May 1 – May 31, 2019

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held twice per week on Wednesday and Friday
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 06 May 2019, minutes submitted
- Scheduled monthly Agile review for 03 June 2019, minutes were included with the next monthly report
- Held deliverable outline review on 29 May 2019
- Attended ITEC Conference in Stockholm, Sweden on 14-16 May 2019
  - Notes from the conference were submitted

Milestone Detail:

- 036: Sprint Monthly Planning Report, Phase II Month 9 – Completed
- 038: Sprint Monthly Planning Report, Phase II Month 10 – Completed
  - Note: this was the current report. It was completed at the time of submission, but was in progress as of 30 April 2019
- 022: Conduct Front-End Domain Analysis POINTS – Completed

- All completed research files were uploaded to the LT2 Portal, POINTS collaboration area, Research Documents folder
- Finalizing the milestone and putting information into the final report will be tracked in MS 42
  - Tracking of future requests for review were in MS 42

- 033: Develop POINTS Capability Models – Completed
  - Began review of the capability DoDAF views uploaded by SimQuest to the LT2 Portal
  - Finalizing the milestone and putting information into the final report will be tracked in MS 42
- 034: Conduct Feasibility Study POINTS – Completed
  - Completed review of the documents related to the Universal Joint Task Lists and architecture requirements uploaded by SimQuest to the LT2 Portal
    - Review documents with comments have been uploaded to the LT2 Portal, Architecture description folder
  - Continued plans for feasibility studies for the POINTS architecture
  - Study to be finalized once DoDAF's are completed
  - Finalized the milestone and put information into the final report that was tracked in MS 42
- 035: Develop POINTS Operational System Models – Was in Progress
  - Completed initial review of the operations and systems DoDAF views uploaded by SimQuest to the LT2 Portal
    - Reviewed documents and comments uploaded to the LT2 Portal, Architecture description folder
- 040: Provide Suggested Edits to POINTS Draft CDD – Was in Progress
  - Continued review of POINTS Draft CDD
  - Continued reviewing the references and resources listed in the Draft CDD
  - Began review of CDD recommendations provided by SimQuest
  - Continued documenting suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
    - All suggestions documented in the CDD recommendations document for the POINTS Draft CDD
- 044: Iteratively Refine and Refactor JETS Architecture – Completed
  - Began review of updated JETS DoDAF views uploaded by SimQuest to the LT2 Portal
  - Finalized the milestone and put information into the final report will be tracked in MS 42
- 045: Demonstration Preliminary MMS FOM – Was in Progress
  - Updated the FOM
    - The FOM used for the demo has been completed and uploaded to the LT2 Portal for review, under the demo folder
    - Continued the configuration management of two FOM versions: one that will be used for the demonstration system, and one that will be expanded to cover additional JETS and POINTS capabilities
    - Continued work on the expanded version of the FOM
      - Continued requirements traceability between the FOM and the POINTS and JETS Draft CDDs

- Expanded the DA Form 4700 and DD Form 1380 capabilities in the FOM
- Began biweekly meetings to discuss development effort of the extended FOM

- Coordinated demonstration system design with subcontractors
  - Held weekly calls with demonstration team to track status updates of each system
  - Continued use of document sharing portal on Zoho for demonstration system team to ensure coordination and to manage version control for code and design documents
- Continued developing the AAR and physiology federates
  - Expanded the DD Form 1380 capabilities for the AAR federate
  - Finalized the physiology model to show realistic reactions to interventions
- Conducted interim, internal system tests on 08 May and 15 May 2019
  - Provide notes and test results to subcontractors regarding bug fixes
- Conducted the system Beta test on 20 May 2019 in Orlando, FL
  - Consolidated results of the test and provided feedback to subcontractors regarding feature updates and bug fixes
  - Test notes were attached as a separate document to this report
- Continued tracking bug fixes and feature updates using the Zoho task tracking tool
- Scheduled a demonstration system dry run for 04 June 2019 in Orlando, FL
  - Began creating the presentation and demonstration script
  - Dry run was to focus on the entire presentation and demonstration organization, and will act as a full system test prior to the final demonstration

- 042: POINTS Deliverables – Was in Progress
  - Began finalizing all research documents for inclusion in final report
  - Created final deliverables coordination document to coordinate review dates between IVIR and SimQuest for final products
- 043: Final Report – In Progress
  - Began outlining the final report
    - Submitted the final report outline to JPC-1 for review
    - Initial review was discussed during the deliverable outline review on 29 May 2019. Government verbally approved the outline as submitted.

4.3.11 Month 11: June 1 – June 30, 2019

Programmatics:

- Updated Phase II Project Plan in MS Project
- Continued SCRUM meetings, held once per week on Wednesday
  - Discontinued SCRUM meetings during the last week of June through the end of the program
- Conducted weekly program meetings and submitted minutes
- Held monthly Agile review on 03 June 2019, minutes submitted
- Scheduled monthly Agile review for 01 July 2019, minutes will be included with the final report

Milestone Detail:

- 038: Sprint Monthly Planning Report, Phase II Month 10 – Completed
- 041: Sprint Monthly Planning Report, Phase II Month 11 – Completed
  - Note: Was in progress as of 30 June 2019
- 040: Provide Suggested Edits to POINTS Draft CDD – Completed
  - Finalized review of POINTS Draft CDD
  - Finalized the references and resources listed in the Draft CDD
  - Completed review of CDD recommendations provided by SimQuest
  - Completed documentation suggested definitions to include in the POINTS Draft CDD, based on the research and based on the review of the JETS Draft CDD
    - All suggestions were documented in the CDD recommendations document for the POINTS Draft CDD
- 045: Demonstration Preliminary MMS FOM – Completed
  - Updated the FOM
    - Continued the configuration management of two FOM versions: one that was used for the demonstration system, and one that has been expanded to cover additional JETS and POINTS capabilities
    - Continued work on the expanded version of the FOM
      - Continued requirements traceability between the FOM and the POINTS and JETS Draft CDDs
      - Expanded the DA Form 4700 and DD Form 1380 capabilities in the FOM
      - Continued biweekly meetings to discuss development effort of the extended FOM
      - Received feedback on the FOM from SimQuest and began incorporating the comments
      - Reviewed the FOM naming conventions and began updating for consistency
  - Completed demonstration presentation and script
    - The presentation was uploaded to the LT2 portal, with updated diagrams
  - Conducted system dry run on 04 June 2019 in Orlando, FL
    - Dry run focused on the entire presentation and demonstration organization
    - Provided notes and test results to subcontractors regarding bug fixes
  - Conducted final system test and rehearsal on 12 June 2019 in Gainesville, FL
  - Traveled to Ft. Detrick, MD to conduct final demonstration for JPC-1
    - Arrived on 17 June, set up and tested the system
    - Conducted the demo on 19 June 2019
    - Began organizing and rendering the videos recorded at the demo
  - Continued tracking bug fixes and feature updates using the Zoho task tracking tool
  - Continued finalizing the FOM demo design document.
    - The final document was included with the Final Report.
  - Final work on the FOM was tracked under Milestone 42
- 042: POINTS Deliverables – Was in Progress
  - Finalized all research documents for inclusion in final report

- Research documents were uploaded to the LT2 portal, POINTS collaboration area, Phase II Final Documents for Review folder
  - Purpose of files:
    - The files outline and describe the research efforts that have been conducted for the POINTS program
- Completed review of DoDAF artifacts provided by SimQuest
- Continued plans for feasibility studies for the POINTS architecture
  - Study to be finalized once DoDAF's are completed

- 043: Final Report – Was in Progress
  - Continued drafting the final report
  - Began filling in sections of the final report
    - Drafting objective summaries
  - Began preparing appendices for the final report

4.3.12 Month 12: July 1 – July 22, 2019

- Completed all Phase II Tasks
  - Completed Phase III – VI Recommended Tasks **(Reference ANNEX N: PHASE III – VI RECOMMENDED TASKING)**
  - Updated final POINTS Quality Control Plan (**Reference ANNEX O: POINTS QUALITY CONTROL PLAN)**
  - Updated final POINTS Master Program Plan **(Reference ANNEX P: POINTS MASTER PROGRAM PLAN)**
  - Sprint Monthly Planning Report, Phase II Month 12 – Submitted
  - Phase II Final Technical Report – Submitted

5. PRODUCTS

5.1 PUBLICATIONS/PRESENTATIONS/POSTERS/PANEL PARTICIPATION

- Oral Presentation: Curry, Damon; Lofstrand, Bjorn; Cutts, Dannie; Honold, Erin, *A Standardized and Modular Object Model for Medical Modeling and Simulation for Distributed Training,* Presented at ITEC, 14 – 16 May, 2019, Stockholm, Sweden

  Reference APPENDIX A: ITEC 2019 ABSTRACT

  Reference ANNEX Q: ITEC 2019 POWERPOINT PRESENTATION

- Oral Presentation: Honold, Erin; Curry, Damon, *Enabling Joint Medical Modeling and Simulation Training with a Standard Data Object Model (Abstract # MHSRS-19-01087),* To be presented at MHSRS 2019, 19 – 22 August, Kissimmee, FL

  Reference APPENDIX B: ABSTRACT # MHSRS-19-01087

5.2 OTHER REPORTABLE OUTCOMES/PRODUCTS

The following are the products generated during the course of the Phase II program:

- Programmatic:
  - POINTS Project Plan in MS Project
  - POINTS Quality Plan
  - POINTS Work Breakdown Structure (WBS)
  - Weekly Program Meeting Minutes
  - Monthly Program Meeting Minutes
  - Monthly Program Status Reports

  - Quarterly Program Status Reports
  - Annual Program Status Report
  - Phase III – VI Recommendations
  - Final Technical Report
- Research Reports:
  - Military Medical Providers Summary
  - POINTS Bibliography
  - Military Medical Doctrine Bibliography
  - LVCG Simulation Inventory Summary
  - POINTS Site Visit Reports
  - POINTS Interview Summaries
- Traceability Matrices:
  - POINTS Research Traceability Matrix
  - LVCG Simulation Traceability Matrix
- System Design and Architecture:
  - POINTS FOM Demonstration Design
  - POINTS FOM Demonstration Minutes
  - MMS Federation Agreements – Execution
  - MMS Federation Agreements – Data
  - MMS FOM
  - POINTS Feasibility Study
  - POINTS CDD Recommendations Summary

6. ACRONYMS

Reference APPENDIX C: ACRONYMS for a listing of acronyms contained in this Phase II Final Technical Report and associated Annexes.

7. EXTERNAL DOCUMENTS

ANNEX A: POINTS BIBLIOGRAPHY

ANNEX B: MILITARY MEDICAL DOCTRINE BIBLIOGRAPHY

ANNEX C: POINTS RESEARCH TRACEABILITY MATRIX

ANNEX D: MILITARY MEDICAL PROVIDERS

ANNEX E: LVCG SIMULATION TRACEABIITY MATRIX

ANNEX F: LVCG SIMULATION INVENTORY SUMMARY

ANNEX G: POINTS FOM DEMONSTRATION DESIGN

ANNEX H: POINTS FOM DEMONSTRATION MINUTES

ANNEX I: MMS FEDERATION AGREEMENTS – EXECUTION

ANNEX J: MMS FEDERATION AGREEMENTS – DATA

ANNEX K: MMS FOM

ANNEX L: POINTS FEASIBILITY STUDY

ANNEX M: POINTS CDD RECOMMENDATIONS

ANNEX N: PHASE III – VI RECOMMENDED TASKING

ANNEX O: POINTS QUALITY CONTROL PLAN

ANNEX P: POINTS MASTER PROGRAM PLAN

ANNEX Q: ITEC 2019 POWERPOINT PRESENTATION

APPENDIX A: ITEC 2019 ABSTRACT

A standardized and modular data object model for medical modeling and simulation for distributed training

Purpose:

This paper describes work done to-date in developing a standardized, modular, data object model to support simulation-based training of medical personnel.

Benefits:

A standardized data model is highly useful as a foundation on which diverse real and simulated systems can interact. A standardized data model can reduce costs and risks in developing and maintaining related programs. In addition, a standardized data model can be a valuable part of specifications to procure training systems that are interoperable by design.

Key Take-aways:

The reader will understand progress made to-date towards development of a standardized data object model being built under contract to a US Government agency, enabling standalone and distributed training. This model has been implemented in a Federation Object Model (FOM) for use in training systems based on the IEEE-standard High Level Architecture (HLA). The result is a Medical Modeling and Simulation Federation Object Model (MMS FOM) which will be delivered to the US Defense Health Agency in the summer of 2019.

Background:

To date, simulation as a technology applied to medical training has largely meant standalone systems, such as mannequins to simulate human bodies (patients), virtual reality to simulate surgery, and scenario-driven training activities. However, simulation-based medical training based on distributed training involving many different systems is emerging. The history of distributed simulation-based training in other domains, e.g. training pilots in flight simulators, clearly shows that the use of international standards and a standardized data object model is a good way to go forward.

The project is part of a contract issued by the Medical Technology Enterprise Consortium (MTEC) and sponsored by the Medical Simulation and Information Sciences Research Program (JPC-1). Development of the MMS FOM is a requirement of that contract. IVIR Inc. (USA) is the prime contractor for the FOM portion of the contract. Subcontractors are: Pitch Technologies (Sweden and USA), Education Management Solutions (USA), and SCM Globe (USA). The contract, issued in 2017, has the objective to provide a training environment that simulates patient care, evacuation, and hand-offs to replicate the continuum of care to improve patient outcomes. The continuum of care spans care for combat-injured soldiers at the Point of Injury through higher tiered medical facilities.

Since the MMS FOM is a modern electronic data transfer mechanism, it must encapsulate data, procedures and practices currently in use by military medical, transport, and logistics personnel. The trail of documents currently used by combat medics, field and regional hospitals, and major medical facilities, including MEDEVAC transport personnel, must be supported in a training system involving handoffs of patients through those tiers of medical care. For example, at the Point of Injury, a US Army combat medic uses a Tactical Combat Casualty Care (TCCC) card to document patient injuries. Information on the TCCC card is communicated to the next tier medical caregiver, usually in advance but always as part of the patient handoff. As a result, the MMS FOM includes information first documented on a TCCC card.

Approach:

Many years of experience in other simulation domains show that a Publish-Subscribe system architecture along with a standardized data object model would satisfy current and projected future needs for simulation-based medical training, whether standalone or distributed. The prime contractor for the referenced contract chose High Level Architecture (HLA), an IEEE-controlled international simulation standard, as the data interchange architecture because HLA fits this medical training application very well. Benefits of HLA for Medical Simulation-based Training include:

- Proven through 20+ years of development and use
- IEEE standard … non-proprietary, readily available and internationally used
- Suitable for small, large, and very large scale applications
- Publish/Subscribe architecture
- Modular and Expandable
- Efficient data management
- Short time to develop/adapt new applications
- Commercial off-the-shelf tools readily available from multiple suppliers
- Future proof, to avoid "stove-piped" implementations
- Time management features for operation in real-time plus slower or faster than real-time
- Synchronization of subsystems (HLA federates) throughout the larger system (HLA federation)
- Assured data delivery
- Causality and Deterministic, needed for operational integrity & repeatability

Building a standardized Medical Modeling & Simulation Federation Object Model (MMS FOM) requires inclusion of many different categories of information. The MMS FOM defines the overall data infrastructure through which various medical-related simulators interchange data. Any standalone or distributed medical training system may include these types of information in full or in part. The MMS FOM in its current and still evolving form consists of nine modules:

- Type of Medical Facility
- Physiological
- Pharmacological
- Transfer of Patient
- Control of Simulation
- Medical Logistics
- Other Logistics

- Communications
- Instructional

Additional details are included here about two of those modules.

The "Facilities" module has data elements that describe the characteristics of a medical facility, including:

- The immediate area surrounding a combat medic treating a field casualty at the point of injury, which is not generally thought of as a classical medical facility but is, in fact, the first medical treatment environment encountered by a combat casualty.
- CASEVAC/MEDEVAC transportation vehicles
- Fixed facilities, such as field (tents) and regional hospitals
- Mobile hospitals, e.g. US Navy "Mercy" ship

The "Physiological" module contains data definitions about:

- Patients
- Identification, vital signs, oxygen level in blood, and other physiological data
- Injuries
- Injury types (standard medical codes)
- Treatments
- Medicines given, topical treatments, tourniquets, etc.

Results:

A demo Point of Injury related training system of systems is being constructed to verify the approach and first implementation of the MMS FOM. Key components are:

- Interactive 3D visualization ("serious game")
- Highly advanced physiology engine
- Simulated CASEVAC/MEDEVAC operations
- Capture of patient and treatment data
- Capture of voice communications and related written documentation, in the forms mandated by US DOD policies
- Automated interaction with a Logistics system to track medical supplies
- Integration with a formal Learning Management System (LMS)

Lessons Learned:

In the course of our work, we recognized five major lessons learned: (1) Most medical training devices today were not designed to be interoperable. However, commercial off-the-shelf HLA tools provide a straightforward path to add HLA compatibility to devices and training systems. The MMS FOM will provide a standardized data interchange model for interoperability in future medical training systems. (2) It takes time "up front" to determine the data Input and Output capabilities and requirements of each component system, but having a standardized MMS FOM will enable previously isolated systems to interoperate with minimal stress on systems or personnel. (3) There is often a tendency to approach interoperability initially from a perspective of "My system as center of the universe". However, systems architects and developers generally and quickly realize that implementing interoperability using a modern, robust simulation framework (HLA) with a standardized data model and modern software tools is relatively easy to do and produces excellent results. (4) Building a modern interoperable system on the basis of old standard paper documents that have been in field use for years, sometimes decades, is definitely challenging. HLA's modularity and flexible data types have enabled adaptation of paper forms to electronic data. (5) Having a Subject Matter Expert (SME) available to consult is critical.

Conclusions:

HLA proved itself as a viable architecture to enable interoperability of previously standalone products for simulation-based training of medical personnel. A standardized object model took time to coordinate but the result was worth the effort. Future training systems can benefit from our recent work, building on the current baseline and adding modules when needed.

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Biographies:

DAMON CURRY: Pitch Technologies' manager for business development in North America, Damon has 30+ years in the simulation industry specializing in distributed training systems, 3D visualization, and 3D terrain. He presently has 3 patents pending related to wireless video for virtual reality. BS Electrical Engineering, The Ohio State University.

BJORN LÖFSTRAND: Services and Training Manager at Pitch Technologies, and senior systems architect in modelling and distributed simulation design. Mr. Löfstrand has been engaged in national, international (SISO) and NATO M&S standardization activities since mid-90's. M.Sc. Computer Science, University of Linköping.

DANNIE CUTTS: Senior Computer Scientist supporting Pitch Technologies. Involved with the High Level Architecture since 1995, supporting HLA federation development for NASA and the US DoD. A Certified Modeling & Simulation Professional, serving on the IEEE Drafting Group for the HLA 1516 standard.

ERIN HONOLD: Biomedical Engineer with IVIR Inc. with experience developing medical simulation technologies and architectures for the US Department of Defense. Previous work includes utilizing HLA to design standard architectures for joint medical training focusing on en route care and patient handoffs.

APPENDIX B: ABSTRACT # MHSRS-19-01087

Enabling Joint Medical Modeling and Simulation Training with a Standard Data Object Model

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Purpose:

This abstract describes the work done to date, including both methods and results, in developing a standardized and modular data object model to support joint medical modeling and simulation training. This model has been implemented in a Federation Object Model (FOM) for use in training systems based on the IEEE-standard High Level Architecture (HLA).

Background:

The model, which will be referred to as the Medical Modeling and Simulation FOM (MMS FOM), has been developed as part of a contract issued by the Medical Technology Enterprise Consortium (MTEC) and sponsored by the Joint Program Committee-1/Medical Simulation and Information Sciences (JPC-1/MSIS) Research Program. The program focus was to begin designs for the Joint Evacuation Transport System (JETS) and Point of Injury Training System (POINTS) architectures. The MMS FOM was delivered in the summer of 2019, and a proof of concept system was demonstrated in the same time frame.

Problem:

Training of military medical providers frequently occurs in silos. The simulation technology used to augment training is typically focused on standalone systems such as manikins and virtual patient platforms. These technologies are not always interoperable, sometimes due to varying fidelity levels and sometimes because of the use of proprietary software and control systems.

However, the future of medical simulation is shifting toward a more distributed joint training environment involving many different systems. This shift will eventually allow for joint training events across the US Military Services, NATO, and other allied forces. The history of distributed simulation-based training in other domains, such as tactical and battlefield simulations, shows that the use of international standards and a standardized data object model is a valid path forward toward the goal of interoperable medical simulation.

Approach:

Being a modern electronic data transfer mechanism, the MMS FOM must encapsulate data, procedures, and practices currently in use by military medical, transport, and logistics personnel. The MMS FOM must also remain compatible with the JETS and POINTS architecture designs. The design requirements for the MMS FOM include:

- Integration of live, virtual, constructive, and gaming (LVCG) simulation technologies
- Synchronous training events
- Integration with tactical and combat simulations
- Modular and expandable

HLA utilizes a publish and subscribe architecture, using a FOM to define the set of data that is published and subscribed throughout the system. Building a standardized MMS FOM requires the inclusion of many different categories of information. The MMS FOM defines the overall data infrastructure through which various medical training related simulators interchange data. Any

Any standalone or distributed medical training system may include these types of information in full, or in part.

Within the MMS FOM, several primary modules have been identified, a selection of which are listed and described below:

- Communications
- Physiological
- Instructional
- Simulation Control
- Facility
- Patient Transfer
- Logistics

The communications module focuses on communication data and patient documentation, including patient forms and command and control messages related to evacuation. The physiological module contains data about a patient's physiological state, injuries, and treatments. The instructional module contains data about instructor actions, student assessment, and learning management system capabilities. The simulation control module contains data and commands monitoring the real-time status of a simulation, and commands to control simulations. The facility module contains data to describe the medical facilities involved in patient care and patient transport, including transport vehicles and fixed facilities. The patient transfer module contains data on intratheater and intertheater patient movement. The logistics module contains data on medical supplies and equipment that are used during training.

Results:

A proof of concept system has been developed to demonstrate the use of HLA and the MMS FOM in an abbreviated medical training event. This demonstration has verified the initial implementation of the MMS FOM, and verified the ability to create an interoperable medical training system that consists of:

- A virtual patient
- A standalone physiology engine
- Simulated MEDEVAC operations
- Capture of patient, injury, and treatment data
- Interaction with a logistics system
- Interaction with a commercial learning management system
- After action review capabilities

Conclusions:

Over the course of the program, several lessons learned were noted: most medical training devices today were not designed to be interoperable, however the MMS FOM will provide a standardized data interchange model for interoperability in future medical training systems; while it takes initial development time to determine the data input and output capabilities, having a standardized MMS FOM will enable previously isolated systems to interoperate with reduced stress on systems or personnel; the MMS FOM provides a common point of interoperability, allowing systems to focus on one standard data model rather than needing to integrate with other systems individually.

The MMS FOM has proven itself as beneficial in allowing a variety of medical training systems to interoperate within one overall system of systems. Future training systems can benefit from this work, building on the current baseline and adding modules as needed.

APPENDIX C: ACRONYMS

ACRONYMS	MEANING
18D	Army Special Forces Medical Sergeant
66B	Army Public Health Nurse
66P	Army Nurse Practitioner
66S	Army Critical Care Nurse
68W	Combat Medic Health Care Specialist
68WF2	Critical Care Flight Paramedic
AAPA	American Academy of Physician Assistants
AAR	After Action Review
ABCA	American, British, Canadian and Australian
ACEN	Accreditation Commission for Education in Nursing
ACLS	Advanced Cardiac Life Support
ACOM	Army Command
AE	Aeromedical Evacuation
AECM	Aeromedical Evacuation Crewmember
AEF	Aerospace Expeditionary Force
AETC	Air Force Education and Training Command
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFMC	Air Force Material Command
AFMMAST	Air Force Medical Modeling and Simulation Training
AFMS	Air Force Medical Service
AFPD	Air Force Policy Directive
AFSOC	Air Force Special Operations Command
AFSOCPAM	Air Force Special Operations Command Pamphlet
AFSOF	Air Force Special Operation Forces
AFTH	Air Force Theater Hospital
AFTTP	Air Force Tactics, Techniques and Procedures
AFTTS	Advanced Female Trauma Training System
AHA	American Heart Association
AHLTA-T	Armed Forces Health Longitudinal Technology Application – Theater
AHRQ	Agency for Healthcare Research and Quality
AHS	Army Health System
AJMedP	Allied Joint Medical Publication
AJP	Allied Joint Publication
AMD	Air Mobility Division
AME	Aerospace Medicine Enterprise
AMEDD	Army Medical Department

AMEDD C&S	Army Medical Department Center and School
AMedP	Allied Medical Publication
AO	Area of Operations
AOR	Area of Responsibility
API	Application Program Interface
AR	Army regulation
ARSOF	Army Special Operations Forces
ASA	Advanced Situational Awareness
ATP	Advanced Tactical Practitioner
ATP	Army Technical Publication
AV	Audio/Visual
AV	All Viewpoint
AVPU	Alert, Verbal, Pain, Unresponsive
BAS	Battalion Aid station
BCT	Brigade Combat Team
BLS	Basic Life Support
BRAC	Brachial
BVM	Bag-Valve-Mask
C2	Command and Control
C3	Command, Control and Communications
CAR	Carotid
CASEVAC	Casualty Evacuation
CBA	Capabilities Based Assessment
CCAST	Critical Care Air Support Team
CCATT	Critical Care Air Transport Team
CCFP	Critical Care Flight Paramedics
CCNE	Commission on Collegiate Nursing Education
CDD	Capabilities Development Document
CDR	Critical Design Review
CE	Continuing Education
CENTCOM	Central Command
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CLS	Combat Lifesaver
CO	Contracting Officer
CO2	Carbon Dioxide
CONOPS	Concept of Operations
CONUS	Continental United States
COPD	Chronic Obstructive Pulmonary Disease
COT	Commissioned Officer Training

CoTCCC	Committee on Tactical Combat Casualty Care
CPG	Clinical Practice Guideline
CPR	Cardiopulmonary Resuscitation
CRIC	Cricothyroidotomy
CRM	Crisis Resource Management
CTR	Combat Trauma Registry
CV-1	Capability Viewpoint
DA	Department of the Army
DCMT	Department of Combat Medic Training
DCR	DoTmLPF-P Change Recommendations
DCR	Damage Control Resuscitation
DCS	Damage Control Surgery
DD	Department of Defense
DDM	Data Distribution Management
DDS	Data Distribution Service
DHA	Defense Health Agency
DHMSM	DoD Healthcare Management System Modernization
DISA	Defense Information System Agency
DMLSS	Defense Medical Logistics Standard Support
DNBI	Disease and Non-Battle Injuries
DoD	Department of Defense
DoDAF	Department of Defense Architecture Framework
DoDI	Department of Defense Instruction
DOTmLPF-P	Doctrine, Organization, Training, material, Leadership, Personnel, Facilities and Policy
DRU	Direct Reporting Unit
ECG	Electrocardiogram
ECM	Expeditionary Combat Medic
EDA	Electrodermal Activity
ETCO2	End-Tidal Carbon Dioxide
EEG	Electroencephalogram
EHR	Electronic Health Record
EMEDS	Expeditionary Medical Support
EMT-B	Emergency Medical Technician – Basic
EMT-P	Emergency Medical Technician – Paramedic
ENT	Ear, Nose and Throat
EPC	Electronic Patient Card
ER	Emergency Room
ERC	En Route Care
ERCCS	En Route Casualty Care System

ERPSS	En Route Patient Staging System
EST	Expeditionary Skills Training
ET	Endotracheal
FACS	Facial Action Coding System
FARRP	Forward Area Rearming and Refueling Point
FAST	Focused Assessment with Sonography for Trauma
FEM	Femoral
FHP	Force Health Protection
FIO2	Fraction of Inspired Oxygen
FM	Field Manual
FMC	Field Medical Card
FOB	Forward Operating Base
FOM	Federation Object Model
FRC	Forward Resuscitative Care
FRSS	Forward Resuscitative Surgery System
GCC	Geographic Combatant Commander
GED	General Education Diploma
GPM	Global Patient Movement
GSR	Galvanic Skin Response
HCA	Health Care Activity
HD	High Definition
HD	Human Dimension
HDQA	Headquarters, Department of the Army
HG	Mercury
HLA	High Level Architecture
HM	Corpsman
HMMWV	High Mobility Multi-Wheeled Vehicle
HQ	Headquarters
HPS	Human Patient Simulator
HR	Heart Rate
HRT	Health Response Team
HRV	Heart Rate Variability
HSS	Health Service Support
IAW	In Accordance With
ICD	Initial Capabilities Document
IDMT	Independent Duty Medical Technician
IEEE	Institute of Electrical and Electronic Engineers
IFAK	Individual First Aid Kit
IO	Interosseous

IP	Internet Protocol
IPR	In Process Review
ISS	Instruction Support System
IT	Information Technology
ITEC	International Forum for the Military and Civil Simulation, Training and Education Community
IV	Intravenous
IVIR	Information Visualization and Innovative Research, Inc.
JCA	Joint Capability Area
JCIDS	Joint Capabilities Integration and Development System
JCRAS	Joint Concept for Robotic and Autonomous Systems
JDEIS	Joint Doctrine, Education, and Training Electronic Information System
JDTA	Job Duty Task Analysis
JETS	Joint Evacuation and Transport Simulation
JFHP	Joint Force Health Protection
JMC	JETS Manikin Core
JPC-1	Joint Program Committee-1
JPM	Joint Patient Movement
JROC	Joint Requirements Oversight Council
JROCM	Joint Requirements Oversight Council Memorandum
JRTC	Joint Readiness Training Center
JSOMTC	Joint Special Operations Medical Training Center
JTFC	Joint Training Functional Concept
JTPE	Joint Theater Patient Evacuation
JTTR	Joint Theater Trauma Registry
JTTS	Joint Theater Trauma System
KSA	Key System Attributes
KSA	Knowledge, Skills and Abilities
LiDAR	Light Detection and Ranging
LMS	Learning Management System
LOC	Level of Consciousness
LTT	Live Tissue Training
LVCG	Live, Virtual, Constructive and Gaming
MARCHPAWS	Massive Bleeds, Airway, Respiration, Circulation, Hypothermia/Head Injury, Pain Management, Antibiotics, Wounds and Splinting
MASCAL	Mass Casualty
MCWP	Marine Corps Warfighting Publication
MedCIS	Medical Communications and Information Systems
MEDEVAC	Medical Evacuation
MEDINFO	Medical Information
MEDINTEL	Medical Intelligence

MEDLOG	Medical Logistics
MERT	Medical Emergency Response Team
METC	Medical Education and Training Campus
MeTER	Medical Training Evaluation and Review
MHS	Military Health System
MIH	Medical Interoperability Handbook
MIST	Mechanism of Injury, Injuries, Symptoms and Treatment
MM	Millimeter
MMLT	Mobile Medical Lane Training
MMS	Medical Modeling and Simulation
MOS	Military Occupational Specialty
MPT	Medical Proficiency Training
MRMC	Medical Research and Materiel Command
MRT	Medical Readiness Training
MS	Microsoft
MSE	Medical Simulation Enterprise
MSIS	Medical Simulation and Information Science
MT-C2	Medical Training Command and Control
MTEC	Medical Technology Enterprise Consortium
MTF	Medical Treatment Facility
MTM	Medical Team Management
NAMI	Naval Aerospace Medical Institute
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NAWCTSD	Naval Air Warfare Center Training Systems Division
NCD	Needle Chest Decompression
NIST	National Institute of Standards and Technology
NM&SC	National Modeling and Simulation Coalition
NMETC	Navy Medicine Education and Training Command
NMMAST	Navy Medical Modeling and Simulation Training
NPA	Nasopharyngeal
NREMT	National Registry of Emergency Medical Technicians
NRP	National Registry Paramedic
NSOMI	Navy Special Operations Medical Institute
OA	Operational Area
OCONUS	Outside Continental United States
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OTC	Over the Counter

OV	Operations View
PA	Physician Assistant
PAD	Patient Administration Divisi
PALS	Pediatric Advanced Life Support
PCR	Patient Care Record
PCS	Patient Communication Simulator
PECC	Patient Evacuation Coordination Cell
PED	Pedal
PEEP	Positive End Expiratory Pressure
PEO	Program Executive Office
PEO STRI	Program Executive Office, Simulation, Training and Instrumentation
PEP	Pre-Hospital Emergency Pediatric Care
PEPP	Pediatric Education for Prehospital Providers
PERLLA	Pupils, Equal, Round, Reactive, Light, Accommodation
PFC	Prolonged Field Care
PHRG	Permissive Hypotensive Resuscitation Guidelines
PII	Personally Identifiable Information
PJ	Pararescue Jumper
POD	Point of Demand
POI	Point of Injury
POI	Program of Instruction
POINTS	Point of Injury Training System
POV	Point of View
PPS	Ports, Protocols and Services
PPSM	Ports, Protocols and Services Management
PTT	Part Task Trainer
QCP	Quality Control Plan
QM	Quality Manager
RAS	Robotic and Autonomous Systems
RMF	Risk Management Framework
RTI	Run Time Interface
RWDT	Real-World Date-Time
SAAM	School of Army Aviation Medicine
SABC	Self-Aid and Buddy Care
SAR	Search and Rescue
SCORM	Sharable Content Object Reference Model
SDK	Software Development Kit
SET	Simulation Elapsed Time
SGA	Supraglottic

SME	Subject Matter Expert
SOAP	Subjective, Objective, Assessment and Plan
SOCM	Special Operation Combat Medic
SOCOM	Special Operations Command
SOF	Special Operations Forces
SOIDC	Special Operations Independent Duty Corpsman
SoS	System of Systems
SOTR	Sponsor Office Technical Representative
SSN	Social Security Number
SSW	South-southwest
STANAG	Standardization Agreement
STIG	Security Technical Implementation Guide
STP	Soldier Training Publication
SV	Systems Viewpoint
TACEVAC	Tactical Evacuation
TAMMIS	Theater Army Medical Management Information System
TC	Training Circular
TC3	Tactical Combat Casualty Care
TCCC	Tactical Combat Casualty Care
TCCC-C	Tactical Combat Casualty Care Card
TEMP	Temporal
THOR	Theater Hospital Operations Replication
TIM	Training In Motion
TLC	Total Lung Capacity
TMDS	Theater Medical Data Store
TMIP-J	Theater Medical Information Program – Joint
TMT	Traceability Matrix Template
TRADOC	United States Army Training and Doctrine Command
TRG	Training Group
TV	Tidal Volume
UI	User Interface
UJT	Unified Joint Task
UK	United Kingdom
UN	United Nations
U.S.	United States
USA	United States Army
USAF	United States Air Force
USAFSAM	United States Air Force School of Aerospace Medicine
USAMEDDC&S	United States Army Medical Department Center and School

USASAM	United States Army School of Aviation Medicine
USMC	United States Marine Corps
USN	United States Navy
USSOCOM	United States Special Operations Command
UTC	Universal Time Coordinated
VPS	Virtual Patient System
VTOL	Vertical Take-Off and Landing
WBS	Work Breakdown Structure
WHO	World Health Organization
xAPI	Experience Application Program Interface