

# MULTI-DOMAIN OPERATIONS AND THE FUTURE OF TRAINING AND SIMULATION:

A Look into What's Ahead and How  
STS is Positioned to Lead the Way

November 20, 2018

Written By:  
STS International, Inc.



**MISSION-DRIVEN INNOVATION**

1225 South Clark Street Suite 1300  
Arlington, VA 22202

STSint.com | 703 . 575. 5180

## Introduction

STS International, Inc. is an ISO 9001:2015, Veteran-Owned company and leader in the defense industry. In 2018, Inc. 5000 recognized STS International for the fifth consecutive year one of America's Fastest-Growing Private Companies. As Government's trusted partner for over 25 years, STS delivers Training and Simulation services to meet each customer's unique needs. We possess the infrastructure and expertise to provide our customers with end-to-end training solutions, enabling mission success across the spectrum of Multi-Domain Operations. We consistently focus on rapid, integrated solutions to ensure operational training and readiness, whether in the homeland or overseas in contested areas of operations. STS is launching its Center of Excellence for Thought Leadership that will fortify its strategic positioning as a customer-focused industry leader in Training and Simulation, C6ISR, Cyber Mission Assurance, Force Protection Systems, Artificial Intelligence and Machine Learning, and Robotics and Unmanned Systems.



*Figure 1: Synthetic Training Environment (STE)*

Successful training and simulation capabilities require integrated decision-making during tactical, operational, and strategic operations. The development of computer-based, interactive, and multi-media simulation training platforms must consider the impacts of decision-making at each echelon to achieve the desired training outcomes, ranging from the individual to large formations to joint staff.

## Where We've Been

Our roots in this domain began almost 20 years ago with STS' Virtual Interactive Training and Assessment System (VITAS).



*STS transformed fixed-site training capabilities into dynamic mobile training platforms, bringing realistic battlefield training right to the soldier.*

VITAS is a computer-based, interactive, and multimedia simulation platform training aid which grew into several critical training and simulation efforts at various operational and command locations. The training platform offers dynamic and challenging scenarios for users to test their knowledge and skills within multiple learning environments. The success of VITAS led STS to integrate similar training and simulation services at several virtual training centers throughout the United States.



Figure 2: VITAS Screenshot



Figure 3: Mobile Readiness Trainer (MRT)

While providing services to these fixed-site virtual training centers, STS recognized the need for mobile training capabilities. Since 2006, STS has worked with the United States Army Research, Development, and Engineering Command (RDECOM) - Simulation and Technology Training Center (STTC) to design, develop, test, deliver, and sustain a Mobile Readiness Trainer (MRT) and Combat Medical Basic and Advanced Tactical Trainer (CoMBATT) for medical-related training. STS' MRT has increased the effectiveness of combat simulation training by providing

critical lifesaving skills training. This mobile capability has provided Army medical components the option of 'bringing battlefield realistic training to the soldier' instead of sending soldiers to one of the eighteen (18) Medical Simulation Training Centers. STS has delivered training services to an assortment of customers to include:

- **US Army-** RDECOM STTC, Medical Department (AMEDD), Directorate of Combat Medic Training (DCMT), Medical Simulation Training Centers (MSTC), and Brigade Combat Trauma Training Team (BCT3);
- **US Navy-** Navy Medicine Operational Training Center (NMOTC), Naval Undersea Medical Institute (NUMI); US Marine Corps- Field Medical Training Battalion-East (FMTB-East) and FMTB-West; and the National Terrorism Preparedness Institute (NTPI).

Under this evolving program, STS designed and developed software upgrades for a 2<sup>nd</sup> Generation VITAS; developed a Serious Gaming 3-D Combat Medic Virtual World; installed a Medical Learning Resource Center at the USMC FMTB-East; and, upgraded and integrated software and hardware for three medical simulation centers. STS also worked with Simulaids, a medical simulation manikin trainer manufacturer, developing state-of-the-art software applications to integrate with Simulaids' medical education simulation products.



Figure 4: MSTC and Simulaids Manikin

## Current STS Contracts in Training and Simulation



Figure 5: MMAST Live Training Scenario

### Medical Modeling and Simulation Training (MMAST) Program

The MMAST Program identifies, evaluates, and uses advanced learning technologies to improve Air Force and Navy medical education and training for healthcare teams. STS executes MMAST's vision using multimodal modeling and simulation technologies and advanced blended learning. For 28 Air Force and 13 Navy medical facilities around the globe, delivered through a centralized Program Management Office at Randolph Air Force Base.

### Enterprise Training Services Contract (ETSC)

STS provides the U.S. Army with training assistance for military and civilian related subjects to include classroom and field instruction; exercise planning, management, and support; and training systems support services. STS supports individual, unit, crew, and collective training (platoon through Joint Task Force levels) to prepare key leaders, individual soldiers, units, and staff/headquarters elements to perform their full training mission.

### Medical Simulation Support Services (MS3) Contract

STS provides medical simulation support, procurement, kitting, and delivery services to the Joint Program Office for Medical Modeling and Simulation (JPO MMS) and the Veterans Health Administration (VHA) to support the Simulation Learning, Education and Research Network (SimLEARN) programs. Our extensive network of suppliers includes human patient simulators, task and partial-task trainers, medical training materiel, and software.

### Simulation Training and Environmental Services (STES)

STS supports the Army Research Laboratory Orlando Simulation and Training Technology Center (ARL-Orlando-STTC) with progressive applied research, advanced technology development, and test and evaluation in modeling, simulation, and training. Specifically, STS focuses on imaging systems, virtual patients, and innovative interaction capabilities; and severe trauma simulations, application, and game-based training; technologies to reduce/eliminate the use of live tissue and cadavers in the military; and training effectiveness.

### **Rapid Equipping Force/ISR**

STS trains REF ISR systems operators and maintainers at 14 sites CONUS and OCONUS. From August 2015 through July 2017, Team STS trained 2,386 personnel on non-aerostat systems in the United States alone.

### **Entry Control Point (ECP) Non-Intrusive Inspection Systems (NIIS)**

STS provides full lifecycle logistics for ECP/NIIS systems for CONUS and Forward Operating Bases (FOBs) and Combat Outposts (COPs) in Afghanistan and throughout the Middle East. For ECP/NIIS, provide the New Equipment Training (NET), cross-training, and encrypted wireless remote expert mentoring via live audio/video streaming technology. Specifically, STS developed a comprehensive operator radiation safety awareness and maintenance training program to train nearly 5,000 operators.

### **FISA II (Fixed Installation Satellite Antenna)**

This solution enhanced Global Response Force's (GRF) Common Operational Picture (COP) and situational awareness from home station to the destination. The solution integrated full-motion video feeds (FMV) and other imagery to enable command and control in transit, and to the ground force in theater. The system maintained full interoperability with legacy systems such as INMARSAT, Intelsat, and Boeing Broadband Satcom Network with no degradation of existing systems or services. This capability is transferable to supporting a Live, Virtual, and Constructive (LVC) Integrated Architecture for Synthetic Training Environments. Features of FISA II include: Tech Mission Systems, C-17 aircraft, training aides (CARTS), and mission readiness at airfields.

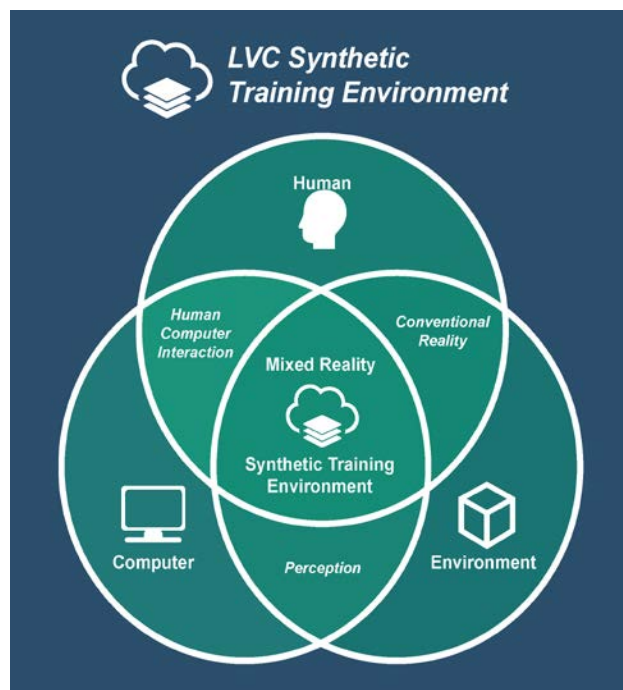
## Future of Multi Domain Operations (MDO) Demands New Approaches to Training & Simulation

*We are now standing at a precipice in training and simulation capabilities where the MDO requires a live, virtual, and constructive integrated architecture to support a synthetic training environment.*

As the operational environment grows more complex with new technology and meta-data, the Joint Force simultaneously moves into Multi Domain Operations (MDO). MDO describes how the U.S. Army, as part of the Joint Force, can counter and defeat a near-peer adversary capable of contesting the U.S. in all domains, in both competition and armed conflict. The concept describes how U.S. ground forces can deter and defeat near-peer enemies, whose technologies and capabilities are on par with those of the United States, in the 2025-2050 timeframe.

Because of this shift to MDO, Synthetic Training Environments (STE) must present mixed reality architecture that integrates the computer, warfighter, and operational environment to ensure the best training possible.

Future Live, Virtual, and Constructive (LVC) training must focus on solutions that maintain the capacity and capability to customize each client's requirements for mission success. In addition, the operational tempo and complexity that the warfighter faces today demands LVC simulation training to be available anywhere and anytime, whether at home station or in a combat zone.



*Figure 6: STS harnesses elements of human sensing and decision-making, computer technologies, and the surrounding environment to create synthetic training environments integrating multiple domains of land, sea, air, space, and cyber warfare.*





Figure 7: Photo by U.S. Army Training and Doctrine Command. "Multi-Domain Battle: Combined Arms for the 21st Century"

**Objectives:** STS adapts and integrates emerging technologies to enhance efficient and effective training, while maximizing best value, mitigating risks, and optimizing learning efficiency. Below are our objectives in LVC training and simulation as we move into the future and Multi-Domain Operations for the Joint Force:

- Integrate data analytics, human and technical sensors, intelligence, and effects from each domain to gain situational understanding in an increasingly complex, cluttered operational environment.
- Improve human performance and ethical decision-making processes in a STE with artificial intelligence and machine learning augmentation during high stake, time critical situations.
- Optimize LVC anytime, anywhere end-to-end solutions that are cost-effective and support tailorable individual, functional, unit collective or joint training outcomes from home / garrison installation thru forward-deployed units to the battlefield.
- Reduce long-term costs through the application of accumulating data, evolving performance measures, and built-in feedback loops relevant to voice of the customer and the changing operational environment.
- Provide cost-effective mixed reality STEs that remain portable in delivery, adaptable, and agile with tailored solutions to support the warfighter.

**Challenges:** The Joint Force will train, deploy, and fight simultaneously across multi-domains on the ground, in the air, at sea, in space, and in the cyber realm- against adversaries that may be human or, increasingly, machine. STS is applying technology advancements to mixed reality systems to prepare the warfighter with end-to-end solutions from home station to the battlefield. However, maintaining adaptable and agile LVC training and simulations in rapidly changing, complex, and cluttered operational environment poses challenges:

- **System complexity** – the many dynamic domains of an STE (land, sea, air, space, and cyber) which are complex within themselves, increases the intricacies of integrating and implementing an STE. The complexity of a multi-domain STE means that when one domain is not accurately defined and integrated into a mixed reality across all domains, it can negatively affect the desired training outcomes.
- **System portability, adaptability, and agility** – the ability to maintain current and future training scenarios and effective decision-making in a complex, cluttered, and dynamic STE demands data collection and analysis from training exercises, collaborative thought leadership with the warfighter and other experts, and forward presence in all types of deployed environments.
- **System supply chain management** – the current operational environment demands system expertise to address LVC sustainment across intra and inter service requirements as well as vast geographic locations to support the warfighters’ requirements. Moreover, system locations in active conflict zones pose a variety of challenges for supply chain management and forward deployed contractor personnel to sustain the systems.
- **System interoperability** – sustaining an STE system for an MDO training scenario requires a multi-layered capacity and capability to interface data across a joint distributed network. At the same time, any LVC system should be adaptable to operate independently from other systems for tailored customer needs, while remaining capable of enhancing multi-domain applications.

## STS’ Training and Simulation Solutions and Capabilities

STS possesses a wide range of multi-domain training and simulation expertise as well as sophisticated capabilities in systems engineering, software, product, and program integration. Our strong background coupled with our progressive movement toward the future of training and simulation positions STS as an industry leader. STS’ capabilities include: Synthetic Training Solutions, Instructional Design and Development, and Training Services.





## Summary

Simulation training is nothing new for the military. Due to emerging technologies like artificial intelligence, machine learning, and robotics, training simulations now more than ever, must be part of a long-term training strategy to ensure operational readiness of the Joint Force. Today's operational environment is increasingly complex and cluttered with data and both state and nonstate actors that require more data-based evaluation and leadership training. Simulation training can build confidence in the individual, leader, and unit; create situational awareness and understanding of the bigger picture within MDO; enable leaders to experiment with different tactics, techniques, and procedures; permit identification, testing, and experimentation of new technology and systems; and offer immediate feedback to the client. Although LVC simulation training may not create the conditions under which a warfighter is cold, tired, and under combat duress in the mountains of Afghanistan, heat of the Middle East, or possibly, the Korean Peninsula, LVC training is a cost-effective, hugely beneficial training opportunity that maximizes operational readiness in support of the U.S. national security. STS continues to adapt and innovate its capabilities in the following:

- Live, Virtual, and Constructive systems with software that supports modeling, cyber, gaming, and other task trainer simulation requirements.
- Instructional and design technologies that include the Instructional Systems Design (ISD) utilizing Analyze, Design, Develop, Implement, and Evaluate (ADDIE) models to improve the quality and effectiveness of enhanced learning.
- Full range of training services that include cross training and mentoring programs on site to include high risk areas of operations and staff augmentation as needed by units.

In the end, the future environment demands rapidly delivered, integrative technologies to the warfighter that ensure end-to-end solutions. STS remains committed in its pursuit of innovation, agility, and excellence for the customer in face of growing threats and complexity.

### About [STS International, Inc.](#)

Founded in 1992, [STS International](#) is a U.S. Veteran Owned business with over twenty-five years of experience providing integrated, secure solutions and services to the federal government in the areas of Engineering, Enterprise Asset and Logistics Management, Training and Simulation, and Professional Support Services. We have focused our efforts in the domains of Command, Control, Communications, Computers, Cyber-Defense, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C6ISR), Artificial Intelligence and Machine Learning, Force Protection Systems, Cyber Mission Assurance, Robotics and Unmanned Systems, and Medical Training and Simulation.

Our goal at STS is to achieve mission-success for our clients in Defense, Homeland, and National Security by dedicating ourselves to the principles of innovation, agility, and excellence. What makes STS unique is our ability to swiftly meet our client's needs while sustaining an organization with global operations and a mature infrastructure to support enterprise, end-to-end solutions. Our solutions maximize best value, mitigate risks, and optimize operational efficiency.