

Request for Information (RFI)
For
Synthetic Training Environment Live Training System (STE-
LTS):

FoF/FoT Tier 2 Engagement Types (Placed, Thrown, and
Dropped Objects)
and Enabling Technologies

13 September 2021

Table of Contents

1. Purpose.....	3
2. Program Background	3
3. STE-LTS Program Description.....	4
4. Program Schedule	6
5. Responses.....	6
5.1 Plus Five Enabling Technologies.....	6
5.1.1 Plus Five Enabling Technologies: Geo-Pairing	6
5.1.2 Plus Five Enabling Technologies: Other.....	7
5.2 Engagement Types.....	7
5.2.1 Placed Objects.....	7
5.2.2 Thrown Objects.....	8
5.2.3 Dropped Objects	9
5.3 Integration	10
6. Responses Submission	10

1. Purpose

This request for information (RFI) is issued solely for information and planning purposes – it does not constitute a Request for Solution (RFS) or a promise to issue an RFS in the future. This RFI does not commit the Government to contract for any supply or service whatsoever.

The U.S. Army Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) and the PEO STRI Agile Acquisition Response (STAAR) Team publishes this RFI to solicit industry's capabilities as market research in identifying potential geo-pairing Force-on-Force (FoF) and Force-on-Target (FoT) training solutions. Terrain Augmented Geometric Pairing (geo-pairing) is defined as a combination of technologies that incorporates terrain data to include manmade and natural obstacles, sensors that measure engagement parameters (e.g., 3D position, weapon type and trajectory, point of impact, target type, cumulative damage), and computer algorithms that provide the result of a simulated engagement to training participants in near real-time (accounting for time of flight) leveraging battlefield effects (e.g., visual, audible, haptic). This RFI seeks to introduce Placed, Thrown, and Dropped Objects in support of FoF / FoT engagements for Live Training. Solutions must communicate with the Government-owned Live Training Transformation (LT2) infrastructure. This RFI is also inquiring about industry's capabilities to demonstrate, integrate, test, and produce geo-pairing solutions that address Direct Fire (small arms), Direct Fire (vehicles), Counter Defilade, and Indirect Fire – Mortars.

Solutions must increase the live training environment realism and evolve to interface with future/emerging architecture (e.g., STE-Information System (IS), Embedded Training), and move the U.S. Army closer to meet the future training strategic objectives (Multi-Domain Operations).

2. Program Background

The STE-LTS consists of FoF / FoT systems that enable live training from the individual Soldier up to the Brigade echelon level for both combat and support forces. The architecture that supports the Army's live training environment consists of a variety of soldier and weapon instrumentation systems with overlapping applications, unique hardware, and independent software suites, which forces network interface and interoperability challenges.

Much of this is a result of segmented development and fielding over time. This approach requires extensive resources (in dollars and personnel) to develop, modify, and sustain. The ability to simulate and stimulate all unit capabilities and warfighting functions, plus Opposing Forces (OPFOR) and other entities, in the training environment will require new solutions to support realistic FoF / FoT training. A wide variety of training systems needs incorporation to simulate and stimulate the capabilities, effects, and vulnerabilities for some capabilities in a FoF/ FoT exercise or event. The Army uses unified and singular Exercise Control (EXCON) (i.e., Common Training Instrumentation Architecture (CTIA)) approach for integration of all engagement types to adjudicate and communicate engagement outcomes. The live training functions include the following key elements in no order of priority:

- **Distributed Training** Live training events need to include live and synthetic players in multiple training locations, to enable geographically distributed collective training events and mission rehearsal.
- **Simulation Realism** Live training simulations need to be realistic enough to enable the "suspension of disbelief" necessary for Soldiers to immerse

themselves in their training. Live training systems need to provide an objective assessment of initial or cumulative equipment damage and personnel casualties or require appropriate actions to repair equipment or treat casualties.

- **Simulation Accuracy and Precision** Live training simulations need to be accurate and precise for Soldiers to have confidence in their training performance evaluations. Battle damage assessments need to be based on accurate and precise hit/kill probabilities, while remaining unclassified. These training functions, as well as warfighting functions need to occur from the individual level up to the Army Service Component Command level.

3. STE-LTS Program Description

STE-LTS is the Army’s next generation live training system. It will provide the Army a converged Live and Synthetic Training Family of Systems (FoS) enabling players in both live and synthetic training environments to see and interact with each other. It will enable live training to use STE capabilities for battlefield engagements and effects not currently available in the live training environment. STE-LTS seeks to overcome limitations of current live training systems that cannot replicate or simulate the twelve (12) engagement types. STE-LTS addresses key operational gaps to current Live Army training, including Basic Combat Training (BCT) weapons effects not currently exercised in the FoF or FoT live training environment.

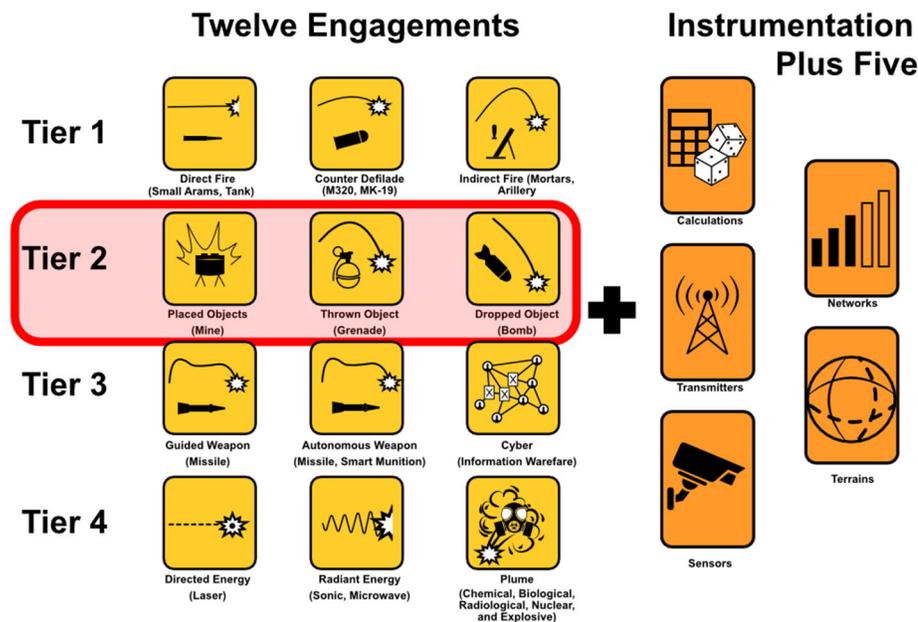


Figure: STE-LTS 12 Engagements Plus 5 Enabling Technologies

STE-LTS engagement solutions will be developed and acquired in multiple phases. Tier 1 addresses Direct Fire, Indirect Fire, and Counter-Defilade and is being addressed in the previous OTA contract (OTA 21). Tier 2 focuses on Placed, Thrown, and Dropped object engagements as highlighted in the above Figure. Future efforts will include Tiers 3 and 4.

With the challenges identified within the live training environment, the Army actively seeks

solutions to fill multiple training capability gaps. These gaps are identified in Tiers 1 through 4 of the Figure above as the "12 Engagements", as well as the "Plus 5 Enabling Technologies." The specific gaps the Army is currently focusing on within this RFI include the inability to perform Placed, Thrown, and Dropped Object engagements. Additionally, the Army seeks geospatial technologies that enable or enhance training mission capabilities within Tier 1; Direct Fire (small arms), Direct Fire (vehicles), Counter Defilade, and Indirect Fire – Mortars engagements. STE-LTS intends to award multiple OTA agreements in FY 22 to provide solutions for all engagement types in Tier 2, "Plus 5" Enabling Technologies.

Additional key attributes should be considered when developing solutions:

- Simulated battlefield effects for employed munition types should include associated visual, auditory, olfactory, and tactile or haptic feedback at the Point of Origin, Point in Space, and Point of Impact for all participants or observers of an engagement
- Solutions should be recoverable from the training area and reusable
- Solutions should be multi-capable, wherein one common baseline framework of a capability can be easily reconfigured to portray more than one type of device or munition

The Government seeks to integrate multiple technologies in a STE-LTS common modular system architecture to realize the 12+5 capabilities. STE LTS will leverage the established LT2 product line approach to developing a Family of Training Systems (FTS) that provide the ground maneuver training range functions supporting Army live and Joint training environments. The product line approach consists of an open architecture, common components, standards, processes, policies, governance documentation and other core assets. The success of the STE LTS program strategy is dependent on leveraging these defined standards and services derived to promote systematic reuse of software and interoperability solutions for the product line. STE LTS solutions must be interoperable and evolve with existing live training standards, to include CTIA and Live Training Engagement Composition (LTEC).

Each capability or solution must be at a Technology Readiness Level (TRL) 4 or higher. Solutions must support a clear path to demonstrate the prototype in a live training environment no later than FY26.

In the future, STE-LTS solutions will make full use of the STE-IS and other enabled systems through appropriate linkages and connectivity, to offer the full range of training capabilities to Soldiers and units. Linking live training with elements of Constructive, Virtual, and/or Gaming environments offers the ability to train at all levels using real or STE-generated visualizations to simulate battlefield entities, stimulate operational sensors, capabilities, battlefield effects, and vulnerabilities consistently at all levels.

4. Program Schedule

Listed below is the anticipated acquisition milestone timeline for the STE-LTS FoF Tier 2 Engagement Types (Placed, Thrown, and Dropped Objects) and Enabling Technologies effort. The milestones are "draft" only and are subject to change.

1. RFI Questions Due: 20 September 2021
2. RFI Responses Due: Noon 4 October 2021
3. RFS Released: October 2021
4. Project TALX/Industry Day: November 2021
5. RFS Responses Due: November 2021
6. OTA Award: 3rd QTR FY22

5. Responses

The Government specifically seeks capabilities that enable live training with Placed, Thrown and Dropped objects and geo-pairing solutions for any engagement type. The Government requests that vendors address the following topics and questions (in no order of priority) for any engagement type within the context of Tier 1 and Tier 2 engagements utilizing geo-pairing and/or other technologies.

Industry solutions should strive to make live training more realistic (i.e., train as you fight). Because of the evolution of new technologies and weapon systems, industry must maximize re-use of existing architecture/services from the LT2 product line such as Live, Virtual, Constructive Integrating Architecture (LVC-IA)) while ensuring Modular Open Systems Approach (MOSA) principles are followed to support future integration with STE-LTS and STE-IS components.

Vendors may respond to one or more engagement types to participate in this RFI. All responses must remain unclassified.

5.1 Plus Five Enabling Technologies

The following sections identify the "Instrumentation Plus Five" enabling technology types and questions that the Government is interested in. The Government will use this information to evaluate the vendor's capabilities and in turn inform the next step in this phase. These technologies will enhance or enable simulated FoF/FoT engagements.

5.1.1 Plus Five Enabling Technologies: Geo-Pairing

The Government seeks any Tier 1/Tier 2 FoF/FoT modular Enabling Technology solutions that can be individually integrated into a system of systems to enable geo-pairing. If you have a solution for this category, address the following questions:

- a. Describe your solution.
- b. Describe the solution's attributes and enabling technologies.
- c. Describe how your solution will track and record Live Training Participant's movement.
- d. Describe your solution's capabilities to track and record weapon position, orientation, and direction of fire (POD)

- e. Describe your solution's Synthetic Terrain capabilities.
- f. Describe solution's ability to integrate with Augmented Reality (AR).
- g. Identify the engagement type your technology solution supports.
- h. Describe any technology dependencies that your solution may have.
- i. Describe communication standards used. (Example: Zigbee, Bluetooth, etc.)
- j. Describe how your system will integrate with existing live training standards, to include CTIA and LTEC.
- k. Describe how your system will pair a successful engagement between a shooter and a FoT Target.
- l. Describe how your system will engage a FoT Target when the weapon platform cannot fire live ordnance.

5.1.2 Plus Five Enabling Technologies: Other

The Government seeks modular Enabling Technology solutions that can be individually integrated into a system of systems to enable or enhance the FoF engagement types. Any enabling technology solution will be of interest. If you have a potential solution(s) for this category, provide a brief synopsis of your capability(s):

- a. Describe the solution's attributes and enabling capabilities.
- b. Describe any key support system and technology dependencies required to sustain the operation and maintenance of the system that your solution may have.
- c. Identify the engagement type your technology solution supports.
- d. Describe communication standards used. (Example: Zigbee, Bluetooth, etc.)
- e. Describe how your system will integrate with existing live training standards, to include CTIA and LTEC.

5.2 Engagement Types

The following sections identify the engagement types and solutions that the Government is interested in.

5.2.1 Placed Objects

Placed objects such as Claymores are a key element of small unit defensive training and must be included in Live Training to ensure units can adequately employ them in combat. Placed objects such as Improvised Explosive Devices (IEDs) are still a significant OPFOR capability that needs to be replicated in Live Training.

The Government seeks the following near-peer OPFOR placed object solutions:

- Directional Fragmentation Mines
- Anti-Tank Mines
- Anti-Personnel Mines

The Government seeks the following BLUFOR placed object solutions:

- Directional Fragmentation Mines (e.g., M18 Claymore Mine)
- Anti-Tank Mines (e.g., M15, M19, M21)

However, any vendor solutions, which provide similar weapon engagement effects, are of interest. If you have a potential solution for this category, address the following questions:

- a. For Placed Object, describe system(s) for which you currently have a solution for consideration.
- b. Describe how your system models a realistic engagement that accurately and precisely represents tactical system performance.
- c. How does/could your system render battlefield effects for each live training participants and observer?
- d. Describe how your system identifies direction of blast/fragmentation to enable a realistic casualty assessment based on the blast location.
- e. Describe the emplacement process for this engagement type.
- f. Describe the recovery process of this engagement type.
- g. Describe the triggered capabilities for this engagement type such as location and casualties.
- h. Describe and address any safety issues related to this engagement type.
- i. Describe your system's capability to allow for remote detonation.
- j. Describe your system's reaction to detection and neutralizing operations.
- k. Describe the technology used to calculate the casualty assessment based on the blast location
- l. Describe any technology dependencies that your solution may have.

5.2.2 Thrown Objects

Grenades and other thrown objects are critical elements in small unit training. Previous solutions have had the following challenges:

- Real injuries sustained through hitting other Soldiers in Live Training with the grenade bodies
- Need to recover grenade training devices after explosion either for accountability, reuse, or environmental impacts
- Unrealistic Effects

The Government seeks the following near-peer OPFOR thrown object solutions:

- Fragmentary Grenades
- Stun / Flash Grenades

The Government seeks the following BLUFOR thrown object solutions:

- Fragmentary Grenades (e.g., M67)
- Stun / Flash Grenades (e.g., M84)

However, any vendor thrown object solution will be of interest. If you have a potential solution for this category, address the following questions:

- a. For Thrown Objects, describe which system(s) you currently have a solution for consideration.

- b. Describe how the solution determines weapon type and throw direction.
- c. Describe how your system identifies direction of blast/fragmentation to enable a realistic casualty assessment based on the blast location.
- d. Describe how your system models a realistic engagement that can penetrate concealment.
- e. Describe and address any safety issues related to this engagement type.
- f. Describe the form and fit of the engagement type.
- g. Describe the logistics for recovery process of this engagement type.
- h. Describe the "throw" process for your Thrown Object capability.
- i. Describe your solution's capability to render battlefield effects as a result of a thrown object detonating.
- j. Describe the data that your solution will send to the fielded live training network at either home station or CTC enabling both target awareness and assessment.
- k. Describe how your system utilizes geo-pairing technology to calculate the casualty assessment based on the blast location.
- l. Describe any technology dependencies that your solution may have.

5.2.3 Dropped Objects

The Government seeks the following OPFOR dropped object solutions:

- Fused-to-Detonate (e.g., Impact)
- Fused-to-Detonate (e.g., Proximity)

The Government seeks the following BLUFOR dropped object solutions:

- U.S. Mark 84 General Purpose Bomb

However, any vendor dropped object solution will be of interest. If you have a potential solution for this category, address the following questions:

- a. For Dropped Objects, describe which system(s) you currently have a solution for; include description of munition as well as delivery method.
- b. Describe how your system identifies direction of blast/fragmentation to enable a realistic casualty assessment based on the blast location.
- c. Describe your solution's capability to render battlefield effects as a result of a dropped object detonating.
- d. Describe how your system accurately tracks (altitude, velocity, and time) the dropped object from the falling point to the point of impact.
- e. Describe how your system can simulate dropped "dumb" bombs in the live training environment.
- f. Describe how your solution for a dropped object is dropped into the training environment.
- g. Describe how your system can simulate detonation at a specific altitude or upon impact.

- h. Describe how your system utilizes geo-pairing technology to calculate the casualty assessment based on the blast location.
- i. Describe any technology dependencies that your solution may have.
- j. Describe and address any safety issues related to this engagement type.

5.3 Integration

For all available solutions, please address the following topics:

- a. Describe the solution's key interfaces, interoperability protocols, and standards.
- b. Describe the solution's capability to calculate the trajectory/ballistics or blast effects in evaluating hit or miss against stationary, moving, and obscured targets.
- c. Describe your solution ability to leverage GFI ballistic models.
- d. Describe the solution's capability to place, track, and when applicable, recover objects/personnel into the training environment.
- e. Describe the data that your solution provides to a radio network.
- f. Describe the system's maturity (e.g., concept prototype is fielded and operated in live training range) and the technologies used by your system architecture.

6. Responses Submission

Companies electing to respond to this RFI shall be submitted electronically no later than noon 4 October 2021 to initiatives@nstxl.org, with "STE LTS FoF/FoT RFI Response" used in the subject line. The responses shall not exceed two (2) pages for introduction and administration and no more than 15 pages for all engagement types and enabling technologies. Font must be Arial no smaller than 11-font size on body or charts and graphs. The cover sheet shall include vendors Foreign Owned, Controlled or Influenced Mitigation (FOCI) status, along with how the vendor will meet the eligibility requirements of an OT. The cover sheet will not be counted towards total page count. Vendors must clearly outline how their company meets the eligibility requirements of an OT (as specified under 10 U.S. C. § 2371b) within their response. The burden for proof is on the submitting vendor.

- a. There is at least one nontraditional defense contractor or nonprofit research institution participating to a significant extent in the project.
- b. All significant participants in the transaction other than the Federal Government are small businesses or nontraditional defense contractors.
- c. At least one third of the total cost of the project is to be provided by sources other than the Federal Government.

The North American Industrial Classification System (NAICS) code is 541715 pertaining to this request for information.