

# TRAINING AS A SERVICE

PEO STRI is working to make the Common Operating Environment truly common for training

*by Dr. Jeremy T. Lanman and Mr. Amit Kapadia*

Industry is spearheading the advance of consumer applications and services that are available anytime, anywhere and on any device. This transformation features streamlined real-time collaboration, universal data access, intuitive user interfaces and seamless, round-the-clock availability on desktops, tablets and mobile devices. The immense popularity and growing adoption of these data and services are being leveraged within the Army's larger Common Operating Environment (COE). This technology provides the key to migrating the Army's simulation and training systems to the training as a service (TaaS) paradigm whereby any user, at any time, anywhere can access an ecosystem of training services, data and applications.

Current systems and capabilities provided by the Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) fall into the live, virtual or constructive (LVC) simulation domain. Live training systems focus on real players for force-on-force and force-on-target exercises. Simulators, such as the Aviation Combined Arms Tactical Trainer, embed real crew members with Army ground or aviation platform mock-ups for human-in-the-loop training. Constructive simulations feature complex models of simulated Army units and entities and their associated behaviors, manipulated with operator input (a keyboard, for example) to support collective command staff training.

Each of these domains has independent standards, components and architectures that facilitate delivery of training systems.

Current PEO STRI LVC systems employ a unique, system-specific and complex configuration of hardware, software, network, facilities and associated personnel expertly skilled to operate and sustain training activities across various Army installations. The heavy overhead and footprint to conduct live force-on-force, force-on-target and command-post training exercises must be streamlined to meet the Army's Force 2025 vision.

To mitigate the complexity, PEO STRI is systematically infusing its live training and constructive simulation product lines with commercial and COE-proven technology to achieve TaaS. These modernization efforts aim to reduce overall acquisition system life-cycle costs, reduce technical complexity, streamline the user experience and enable on-demand access to simulation services, at any time and anywhere.

## COMMON OPERATING ENVIRONMENT

Central to the live-constructive transformation is the Army's establishment of the COE, an approved set of computing technologies and standards that enable the development and rapid deployment of secure and interoperable applications across six



#### VIRTUAL ASSIST

Soldiers from the Tennessee National Guard's 278th Armored Cavalry Regiment train Jan. 24 in a virtual environment, performing day and night reconnaissance missions. While one platoon barreled through actual rough terrain and battled the cold, another platoon worked with them while immersed in a simulated environment in trailers. "Embedding" Soldiers virtually in live training expands the number of Soldiers who can train, and can save money. (Photo by SGT Nicole Smart, 118th Mobile Public Affairs Detachment)

defined computing environments: data center or cloud; command post; mounted; real-time, safety critical; mobile or hand-held; and sensor. Each computing environment has a minimum standard configuration that supports the Army's ability to produce and deploy high-quality Army applications quickly while reducing the configuration, support and training burdens associated with the computing environment.

The COE marks a wholesale shift from the Army's traditional procurement of systems with dedicated software and hardware. As the COE evolves, these six computing environments

provide standardized processes to insert simulation-based training applications.

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TaaS is an on-demand training-delivery model in which simulation and training software and its associated data are hosted centrally (typically in the cloud) and are accessed by users using a so-called thin client, normally a Web browser over the Internet. (See Figure 1 on Page 64.)

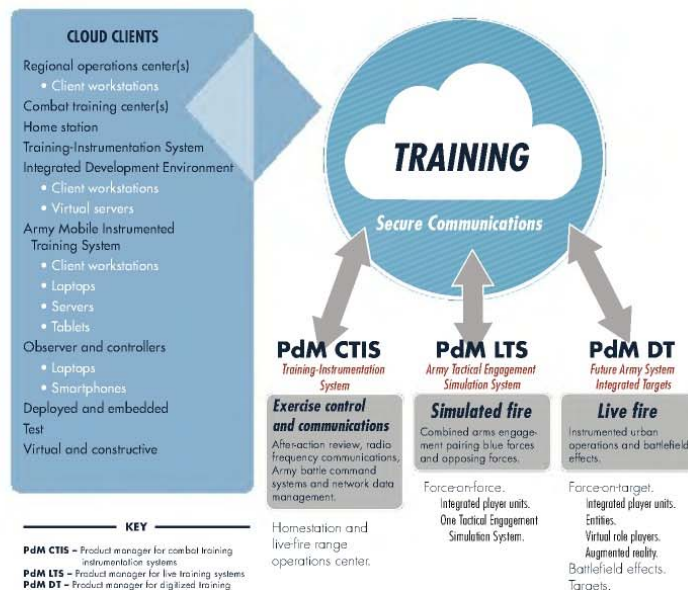
The TaaS strategy is to build simulation and training services (i.e., Web services) and the supporting infrastructure (i.e., networks, communications, sensors and

computing hardware) according to COE principles and practices.

TaaS will evolve to enable product development teams to build common Army training apps and software services for Web browsers, desktop computers and mobile devices (e.g., smartphones, tablets, laptops, etc.) in the cloud environment. Army units and individual Soldiers can access software applications such as a GPS tracking app for land navigation and exercise-control monitoring, tactical engagement simulation apps for laser and simulated fire engagements, and instrumented range apps for fixed live-fire targets. TaaS will support up to

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FIGURE 1



### A FAR-REACHING CLOUD

In the TaaS on-demand training delivery model, simulation and training software and its associated data are hosted centrally, typically in the cloud. Users gain access via a so-called thin client, normally a Web browser over the Internet. (SOURCE: PEO STRI)

**HISTORICALLY, EMBEDDING SIMULATIONS WITHIN MC SYSTEMS HAS BEEN PLAGUED WITH SIGNIFICANT TECHNICAL AND OPERATIONAL HURDLES THAT ARE GRADUALLY BEING CLEARED THROUGH THE COE COMMAND POST COMPUTING ENVIRONMENT.**

brigade- and battalion-level force-on-force instrumentation and home-station training with constructive (i.e., One Semi-Automated Forces (OneSAF)) data feeds and battle damage assessment. TaaS will integrate with mission command systems and include the fully immersive LVC simulation and training environment. Software services will include training equipment asset tracking and training exercise replay. TaaS will be cloud-based with a deployable software service infrastructure to support the full live training domain.

### CONSTRUCTIVE SIMULATION

Constructive simulation environments such as OneSAF have long been used to simulate a full spectrum of Army military operations, systems and control processes for training (e.g., command post exercises), testing (e.g., Army mission command (MC) systems), research and analysis (e.g., prototyping), and experimentation activities (e.g., future Army force structures) at fixed simulation data centers. While providing an immersive operational environment, current constructive simulations are becoming complex and expensive to maintain, as they must interoperate within larger LVC environments. In addition, it takes unique sets of computing resources and a skilled set of technicians and operators to conduct simulation-based training events.

To combat this complexity and expense, PEO STRI's OneSAF program has spearheaded a multipronged modernization effort to streamline simulation delivery. OneSAF is the U.S. Army's entity-level constructive simulation environment that models military operations from brigade down to the individual platform and combatant level. From its inception, OneSAF has supported several Army, DOD and international simulation communities supporting LVC applications.



The modernization effort focuses on adopting a Web-based service-oriented architecture (SOA), aligning to larger Army initiatives, and leveraging industry-proven technologies that promote open architectures. In the same way, for example, that Google's ecosystem delivers collaboration, file storage and office productivity applications seamlessly across computing platforms to the user, the OneSAF program is adopting a road map to realize a future, on-demand cloud simulation solution accessible through simple, intuitive Web browsers to support test, training and experimentation.

OneSAF in 2012 marked the introduction of Web browser-based user interfaces along with virtualization and cloud prototyping concurrently. The migration to a Web-enabled capability accessible at any time, anywhere significantly reduced the OneSAF hardware footprint and greatly improved the user experience.

As the next step, OneSAF builds on these Web-based capabilities and folds in virtualization and cloud technologies to deliver a centrally managed, on-demand and persistent simulation service. This centralized approach will minimize the need to replicate simulation infrastructure, technical staff and unique hardware and software across all simulation centers. The result will be significant cost savings by virtue of significantly reducing the number of simulation centers. Users will be able to access the OneSAF cloud portal via Web browsers and conduct a variety of simulation activities, including scenario-generation, execution and after-action review—similar to how users at home can access services for collaboration, streaming video, document management, music and a variety of other services. While still in their early days, these efforts align with larger Army and

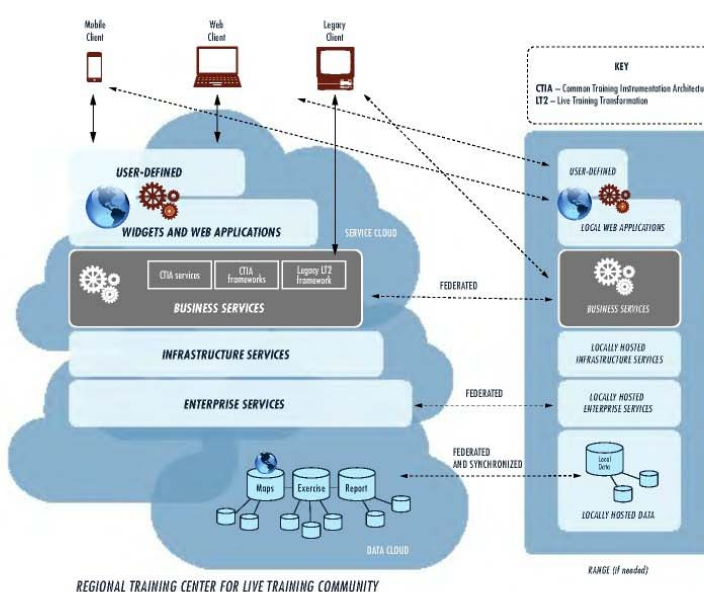
DOD standards and processes with the Joint Information Environment, COE and Intelligence Community-Information Technology Initiative.

Over the long term, employing OneSAF as an operational service embedded within Army MC systems will address key operational requirements for mission planning, rehearsal and course-of-action analysis. Historically, embedding simulations within MC systems has been plagued with significant technical and operational hurdles that are gradually being cleared through the COE Command Post Computing Environment.

## LIVE TRAINING

PEO STRI provides force-on-force and force-on-target capabilities with products composed of reusable and interoperable software components standardized by the Common Training Instrumentation Architecture (CTIA), the software architecture defined by the Army's Live Training Transformation product line. For more than a decade, CTIA has achieved more than \$500 million in return on investment as a product line architectural framework. However, the technology in use today (developed more than 10 years ago) is unable to meet the growing needs of the live

FIGURE 2



## SUPPORTING ARCHITECTURE

This illustration shows the projected end state of the architecture deployed to a conceptual regional training center supporting exercises at home stations and combat training centers. (SOURCE: PEO STRI)

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### HUNTING THE ENEMY

SSG Matthew Sullivan, operational law NCO for 3rd Sustainment Command (Expeditionary) (ESC), scans for virtual enemies within the Dismounted Soldier Training System at the Training Support Center on Fort Knox, KY, Jan. 22. Blending LVC training environments through TaaS can vastly increase the scope of training, enabling more Soldiers to train at lower cost. (Photo by SFC Gary Cooper, 3rd ESC)

training community. Therefore, as with the constructive modeling solution outlined above, an SOA approach is the preferred software development strategy to enable TaaS. Using SOA, the live training domain can more easily migrate to the TaaS philosophy where software training apps and services can be accessed on demand in a cloud-based computing environment, such as Amazon's GovCloud. Several key technologies support this solution, including virtualization and wireless connectivity at the training sites, and the training software infrastructure (i.e., enterprise service bus) and services to support the applications, including tracking Soldiers and participants on the exercise battlefield, recording and monitoring services for after-action reviews, and exercise manipulation for observer/controller trainers.

The live training domain encompasses individual shoot houses (small arms training ranges) and weapons proficiency examination, up to battalion engagements that train battle staff. The objective architecture enables all levels of training to coexist during large exercises without sacrificing the quality of training at any level. Figure 2, on Page 65, illustrates the end state of the architecture deployed to a conceptual regional training center to support exercises at home stations and as well as combat training centers. As with global call centers that service a variety of commercial help desks, trainers and analysts who may be physically distributed at various Army posts can provide domain expertise for training exercises.

Today, each CTIA configuration has dedicated infrastructure ranging from server racks full of equipment to installation on

a laptop. In the future, the Army plans to embrace cloud computing by developing a regionalized, distributed training capability that provides the hardware and software on demand. This would relieve the units being trained from having to operate and maintain their own hardware and software. By moving to the cloud, CTIA also can support the emerging COE mobile computing environment through the use of smartphones and tablets; and Soldiers can use mobile devices to capture training observations and events, just as one might use a mobile app to post a picture to a social networking site.

### CONCLUSION

The Army is changing the way it delivers services by leveraging open standards that achieve agility, and reduce the overall operation and sustainment costs and technical complexity of capabilities.

PEO STRI has developed several successful efforts to modernize its simulation and training legacy software for the live and constructive domains. Its TaaS strategy addresses the need to reduce costs in concert with DOD's Better Buying Power 2.0 initiative and to leverage technology developments to better support our Soldiers' training needs.

However, there exist some challenges. For example, SOA and cloud adoption typically centers on network bandwidth, latency, software scalability and other technical issues. Furthermore, any changes to architectures and software components must consider the security and accreditation impacts that might affect information assurance. We must also consider that as the Army evolves to implement the COE and its computing environments, security and information assurance requirements also are likely to evolve and introduce new challenges.





#### GAME DAY

Soldiers of the 3-2 Stryker Brigade Combat Team, 7th Infantry Division (ID) from Joint Base Lewis-McChord, WA, use Virtual Battlespace for training. (U.S. Army photo by SSG Mark Miranda, 7th ID Public Affairs)

In support of the Army Enterprise Network, COE and the U.S. Army Training and Doctrine Command's vision for a future, holistic training environment, PEO STRI will continue to leverage SOA and cloud computing as the enablers to realize TaaS across many common platforms. This effort will include deploying simulation and training services as mobile applications in a cloud-based network and enabling continuous on-demand training in a distributed, Web-based environment.

For more information, go to the Live Training Web portal at [www.LT2Portal.org](http://www.LT2Portal.org). To learn more about the COE, go to: [http://www.army.mil/article/71710/Army\\_Releases\\_Common\\_Operating\\_Environment\\_Implementation\\_Plan/](http://www.army.mil/article/71710/Army_Releases_Common_Operating_Environment_Implementation_Plan/).

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