

Statement of Need
Persistent Cyber Training Environment (PCTE)
Cyber Innovation Challenge #3
Attachment 1
06 July 2018

Problem Statement:

The United States faces threats from cyber warfare. The Department of Defense (DoD) has created Cyber Mission Forces (CMF) under the United States Cyber Command which require a realistic, persistent training platform that enables personnel to develop the required skills to execute their missions. The Persistent Cyber Training Environment (PCTE) is required to enable individual through force level training and collective training for the CMF (which will extend to the broader DoD Cyber Workforce, globally). To maintain the operational readiness of a geographically dispersed CMF and the DoD Cyber Workforce, the training platform must be persistently available for the performance of individual and collective training of cyberspace operations.

The PCTE program is seeking the development, demonstration, and evaluation of the following capability solutions to allow PCTE to provide a training platform that leverages new, innovative learning and training models:

- Technical Management Dashboard
- White Cell (Exercise Control)
- Assessment (System and Training Performance)

The platform must enable individual and collective training events for CMF to operate, defend, and secure networks across a range of cyberspace operations.

Current PCTE Platform Baseline:

The PCTE platform is the material solution that provides the DoD cyberspace workforce the ability to conduct cyberspace training (including exercises and mission rehearsals), experimentation, certification, as well as the assessment and development of cyber capabilities and tactics, techniques, and procedures for missions that cross boundaries and networks.

PCTE aims to utilize a geographically dispersed and highly available distributed training platform within a hybrid cloud environment. This will enable CMF individual sustainment training, team certification, and scale to support collective and force training events (i.e. Cyber Flag, Cyber Guard). PCTE currently employs existing architectures, network transports, and commercial tools to provide emulated environments for virtual cyberspace operations training.

The PCTE platform is presently integrating hardware and software asset base within an agile scrum process lead by Government integration oversight to incrementally build out and expand towards an end-to-end cyberspace training ecosystem. The current platform features:

- Regional Compute and Storage (RCS) nodes that provide a converged datacenter leveraging Commercial-off-the-Shelf (COTS) hardware to instantiate a virtualized environment (64 compute nodes each with 22 core CPU, 680GB memory, hypervisor) accessed via out-of-band management network
- A remotely accessible Development Operations Environment (DevOps) environment leveraging RCS resources plan, build, integrate, test and deploy contributions across multiple vendors and Government in support of continuous integration and deployment
- A Defense Intelligence Information Environment (DI2E) PCTE team portal providing a integration development environment using Atlassian and other source development and collaboration tool sets to support agile development activities
- Vendor contributions from CIC-1 and CIC-2 to establish PCTE infrastructure, event design, event control, learning management system, gray/blue space simulation, order portal and content repository tools:
 - Circadence: Event Design
 - Simspace: Exercise Control, Order Portal, Content Repository
 - Metova: Grey and Blue Space Simulation
 - Mantech: Learning Management System and Infrastructure Services
- Software framework featuring ability to rapidly onboard and deploy technologies taking advantage of micro-services/containers, event bus integration, and component provided APIs

Technical Management Dashboard

The PCTE Technical Management Dashboard provides the material solution, tools, products, services and aids to assist PCTE operators allocate and deliver resources enabling cyber operations training-as-a-service (TaaS). The PCTE Management Dashboard provides capabilities responsible for provisioning, maintenance, configuration, collaboration, security, and operations of the PCTE platform and infrastructure. Specifically, the PCTE platform will include applications, services, and networks to enable a secure, accessible persistent cyberspace operations training environment. It is expected that across the PCTE platform, two levels of activities could occur using the Technical Management Dashboard: enterprise and event.

The vendor should provide technical solutions providing Technical Management Dashboard functions to facilitate enterprise and event management operations such as:

- Providing PCTE Help Desk, technical support and maintain quality assurance for PCTE Infrastructure/Platform resources and services
- Manage and execute IT Operations and Maintenance for PCTE Infrastructure/Platform resources and services
- Allocate and coordinate (internal and external) Infrastructure/Platform resources and services necessary for Cyber Training Stakeholders to plan, design, develop, integrate, deploy and execute Cyberspace Training Scenarios

- Facilitate and manage external technical resources for training events as required for PCTE managers with DoD Cyber Training Enterprise stakeholders as well as coordinate/manage necessary Interconnection Security Agreements
- Manage and execute a Common Operating Picture of PCTE Infrastructure/Platform resources and services
- Manage, populate and maintain PCTE Dashboard, Scenario, Data and Tool Repositories

At the event level, the Event Support Cell is required to:

- Provide Help Desk, technical support and maintain quality assurance for the specific supported training event
- Repair/restore infrastructure and platform resources provisioned for the event
- Conduct Event Security Operations including cybersecurity operations and access controls for the specific supported event.

White Cell (Exercise Control)

Event Management for PCTE integrates and orchestrates interdependent PCTE functions supporting the development, delivery, and reuse of training scenarios. Training scenarios is a compilation of the Event (task, condition, and standard) and environments transposed on a range over a series of connections. Event Managers oversee the preparation of multiple training scenarios lead by Event Design.

PCTE requires reusable data stores of on-demand customizable scenarios. The PCTE data stores will be containerized, interoperable, and compatible such that scenarios are available in any environment. The sharing of resources achieves coherence, economy of scale, and optimization of resource utilization. All of the materials and analysis produced for a given event/exercise may be stored in the Content Library (Repository) under appropriate access controls. Each user/team will be able to access the Repository to create and retrieve content for exercise planning, development, execution, support, and analysis depending on their assigned role. The Event Design will utilize this content to synchronize other relevant planning information. Lastly, this content will inform data modeling, statistics, and metrics of individual components and the overarching operational efficiency.

White Cell (Exercise Control) provides automated and manned functions directing the execution of training events (e.g. visualization, Master Scenario Event List (MSEL) launch, reaction analysis, grading rubric etc.). Observer controllers for a scenario guide a team to enhance the academic high points of an event and provide feedback to the team's leadership. Throughout the event, the White Cell dynamically interacts with all of the entities within Event Design (including Network Design, and the Event Manager. These interactions contribute to the overall analysis the White Cell provides at the conclusion of a scenario to include the performance and effectiveness of the training.

Assessments

Assessments is a mechanism designed to assess the (1) proficiency level of individual, crew/collective (group), and force level training (2) quality of the training content, and (3)

performance of the PCTE system. The first delivers training performance analyses for each event in accordance with the Joint Mission Essential Task List and/or training objectives. The second allows for continual improvement in the development of training scenarios. The third provides metrics to monitor and improve the effectiveness and efficiency of the system performance.