Training
Customer Success

C2WSPTT Trains AOC Warfighters as They Would Actually Fight

FLAMES Serves as C2WSPTT’s Modeling & Simulation Development Platform

The U.S. Air Force 505th Communications Squadron (505 CS) under the 505th Command and Control Wing (505 CCW) needed a low-cost, high-fidelity modeling and simulation (M&S) capability with a small footprint that would allow Air and Space Operations Center (AOC) units to conduct in-garrison training without the need for outside agency support. It developed the Command and Control Weapon System Part Task Trainer (C2WSPTT) with support from Ternion Corporation to provide an on-demand, single-server, resident modeling and simulation capability to stimulate an AOC environment. A key component to C2WSPTT’s success was the 505 CS's strategy to use Ternion Corporation's FLAMES as its M&S development framework.

Due to its innovative design, small footprint, and reduced manpower requirements, C2WSPTT has proven to be an extremely cost-effective M&S solution to meet a variety of requirements, including training, testing, experimentation, and analysis. C2WSPTT is used by AOC crews, the 505th Formal Training Unit (FTU), the 46th Test Squadron (TS), and Air Force Research Laboratories (AFRLs). For this reason, C2WSPTT received the prestigious U.S. Air Force Modeling and Simulation Award in the cross-functional category in 2002, 2005, and 2007.

Interfacing with Other Systems Using Less Manpower and Hardware Resources

FLAMES provides a single architecture for constructing air, space, land, sea, human, and environmental models in C2WSPTT. FLAMES’ ability to construct models in all operational domains makes it possible to reduce the hardware and manpower requirements to a single system operated by a single controller. Since all models reside on the same platform, only one database is required, and interactive control of the scenario is accomplished through one interface. There is no need for a distributed protocol to share data among disparate systems that require expensive bandwidth. This allows C2WSPTT to be a stand-alone system that can be scheduled on demand. Additionally, FLAMES supports DIS and HLA protocols, so C2WSPTT can interface with other virtual and constructive models in a distributed environment.

C2WSPTT is integrated with the Theater Battle Management Core Systems (TBMCs) and other AOC Weapon System components. C2WSPTT provides a simple and intuitive interface that allows the operator to programmatically extract data from existing TBMCs databases to define the asset and mission data for both the friendly and enemy forces. This gives C2WSPTT a tremendous advantage over other M&S systems that must employ time-consuming manual processes to generate the databases and scenarios. The output from C2WSPTT is interfaced with C4I systems to provide simulated real-world inputs to AOC systems based on a fly-out of the Air Tasking Order (ATO). These real-world inputs include Link-16 message feeds and United States Message Text Formatting (USMTF) message traffic.

C2WSPTT provides for real-time interactive control of the scenario to inject a variety of simulation events, such as vectoring or scrambling aircraft, controlling missions, launching missiles, killing units, simulating equipment failures, and closing bases. These events can be pre-planned or added dynamically as the simulation is running. C2WSPTT also allows controllers to create or modify USMTF messages to be sent to the AOC. The end result is an M&S capability that mirrors real C2 data streams and enables warfighters to train as they would actually fight.

Applications of C2WSPTT

Air & Space Operations Center (AOC)
Supports mission qualification and continuation training (MQT/CT) at most of the 24 locations supporting the AOC Weapon System

505th Formal Training Unit (FTU)
Provides the synthetic environment for initial qualification training with simulated labs and end-of-course exercises to approximately 1,300 warfighters annually in operational processes and critical mission applications

46th Test Squadron (TS)
Stimulates testing for AOC systems and services; the 46th TS is at the forefront of the command and control (C2) developmental test community in the Air Force, as well as a key participant in the evolving joint test and evaluation (T&E) community

Air Force Research Laboratory (AFRL)
Facilitates experimentation and analysis, allowing AFRLs to research, demonstrate, and transition leading-edge human performance methods and technologies that provide warfighters the necessary knowledge and skills to dominate the decision environment

“FLAMES provides a wide scope of important and valuable tools, which have helped C2WSPTT become a leader in M&S. It’s more than a match for its competitors.”

— BK Stover
C2WSPTT Project Manager

Simulated Predator UAV video feed from C2WSPTT
Significant FLAMES-based C2WSPTT Features

UAV Video
C2WSPTT can simulate 3D video feeds from several different types of UAVs using the inherent display capabilities of FLAMES.

DMO Capable
FLAMES' support for DIS allows C2WSPTT to interface with other simulations for interagency training via Air Force Distributed Mission Operations (DMO).

Mission Control
The C2WSPTT operator can control mission behavior by sending a variety of commands into the simulation through the FLAMES client/server functionality.

Custom Functionality Implemented Using the FLAMES API

MSEL Manager
Using the Master Simulation Event List (MSEL) Manager and the underlying custom FLAMES service, users can preplan commands, such as scramble aircraft or launch surface-to-surface missiles (SSM), before starting the simulation. These commands will occur automatically for each future run of the simulation at the scheduled times. This facilitates running a dynamic training exercise without any operator intervention.

JTIDS Network
C2WSPTT simulates a Joint Tactical Information Distribution System (JTIDS) network through the use of a variety of FLAMES models, including sensors to detect tracks and data processors to store track data. Each participating unit in the modeled JTIDS network has a unique address and track block, which is used to report tactical information to the simulated AOC. These simulated messages are then translated into JTIDS format and transmitted to the live AOC through serial or socket connections.

USMTF Support
C2WSPTT reads a USMTF Airspace Control Order (ACO) and creates a FLAMES airspace model to represent each airspace. C2WSPTT also reads a USMTF Air Tasking Order (ATO) and creates a FLAMES mission model to represent each mission. During simulation runtime, this information is used to move aircraft through their specified series of activities. Upon completion of a mission, a mission report (MISREP) message is converted to USMTF format and output to the live AOC for distribution.

FLAMES is a powerful simulation framework that addresses all aspects of constructive simulation development and use, including customizable scenario creation, execution, visualization, and analysis, as well as interfaces to live, virtual, and constructive systems. FLAMES minimizes the amount of software development needed to get a full-featured, working simulation. At the same time, the open, object-oriented architecture of FLAMES gives you the flexibility to modify or enhance your simulation as necessary to meet your specific requirements. Get the simulation you need, when you need it, with FLAMES.

Since 1989, Ternion® Corporation has provided quality commercial simulation products and custom software development and support services to government and commercial organizations worldwide. Ternion is a privately held, employee-owned company located in high-tech Huntsville, Alabama.