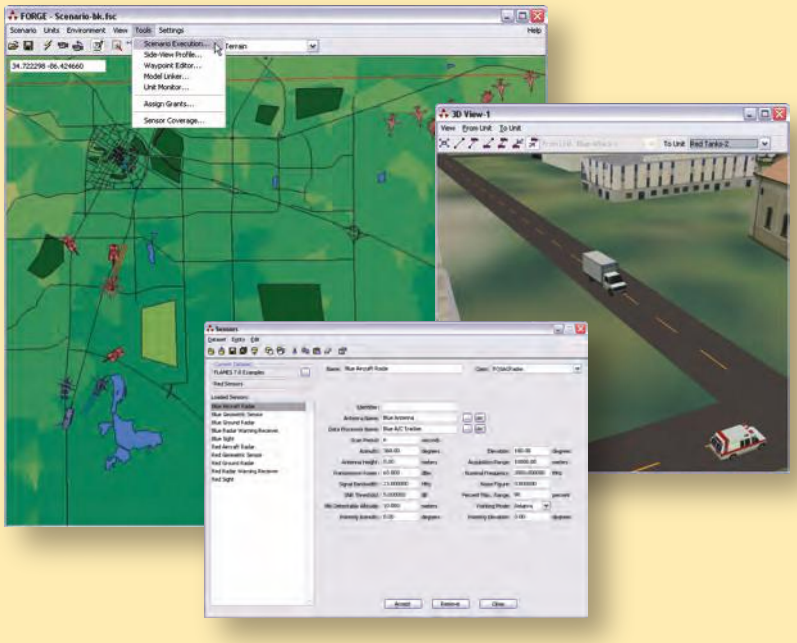
FLAMES®
Simulation Framework

Get the simulation you need



Try It for FREE!

when you need it!

Commercial Software Developed by

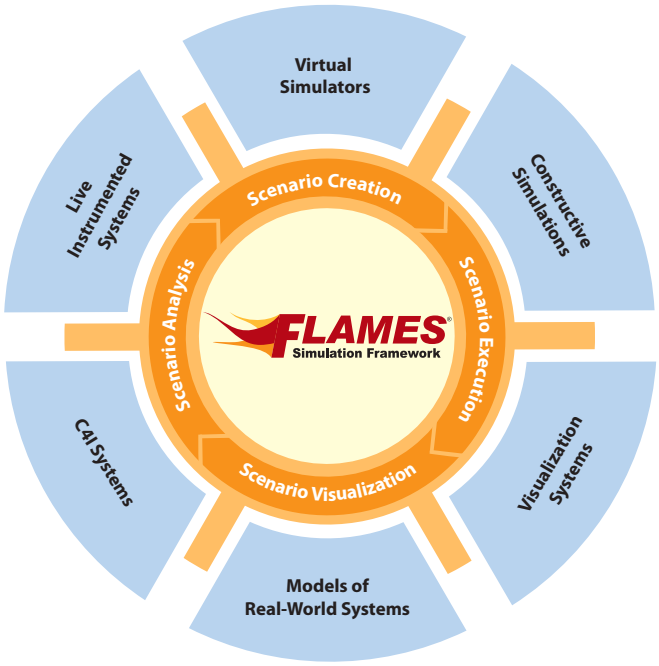
TERNION® CORPORATION
Simulations That Work℠

How FLAMES Is Different

The monolithic architecture of most simulations makes them very time-consuming and expensive to modify as technology and requirements change. Rather than modify an out-of-date simulation, it is often easier and cheaper to build a new one. This explains why there are so many different simulations in use today and why nearly every major new simulation currently under development is not based on a predecessor. Unfortunately, new simulations continue to be based on monolithic designs and will someday also need to be abandoned.

The limited architectures of both old and new simulations have resulted in the waste of literally billions of software development dollars. Even worse, many pressing requirements for more advanced simulations remain unsatisfied.

Unlike fixed, monolithic simulations, FLAMES® is a framework for composable simulations that can be reconfigured quickly to support almost any current or future modeling and simulation requirement imaginable. FLAMES is separate from and independent of application-specific software, such as models of real-world systems and custom interfaces to specific external systems. In a FLAMES-based simulation, the application-specific software resides in software components that plug into FLAMES using mature, well-defined interfaces.



FLAMES-Based Simulation System

FLAMES-compatible components, such as software models of real-world systems and interfaces to external systems, plug in to FLAMES and integrate automatically.

FLAMES: A True Framework

As a true framework, FLAMES provides two very important features:

Component Independence

Complete component independence is the primary feature that distinguishes true frameworks from fixed simulations. The acid test for component independence is whether the framework is fully executable without the presence of any components. Ternion® is not aware of any simulation system other than FLAMES that can pass this test.

Unlike other simulations, FLAMES is not hard-wired to support some fixed set of tightly-coupled components. As many organizations around the world have already learned, FLAMES can support almost any type of component you require, now and in the future. Just as important, you can now use a single framework to satisfy nearly all of your simulation requirements.

FLAMES® Simulation Framework

Quickly and easily simulate real-world systems with FLAMES.

Plug-in Component Architecture

In order for a framework to be useful, it must define mature interfaces that make it easy to develop and integrate new components. FLAMES clearly defines these interfaces. To develop a new component with the proper interfaces, use an automated FLAMES tool to define a new software class that inherits one of the FLAMES base classes. Then, compile the component software and place it in a standard object library. To integrate new components, simply copy a FLAMES-compatible object library into the proper directory on your computer hard drive.* The next time you execute FLAMES, your components will plug-in and integrate automatically.

One benefit of the FLAMES plug-in component architecture is truly composable, reconfigurable simulations—something many others have tried to develop without success. End-users (non-software developers) can quickly compose the simulations they need by merely placing the necessary component libraries on their hard drive.

Another benefit of the FLAMES plug-in component architecture is a tremendous, recurring savings in time and money. You save in software design because the structure and interfaces of FLAMES components have already been designed. You save in software development and testing because so much of the software you need to get a working simulation is already developed and tested for you. You save in software integration, which is often the most expensive part of modifying an existing simulation, because FLAMES components are self integrating.

*Available only with the FLAMES Enterprise Edition

Product Family

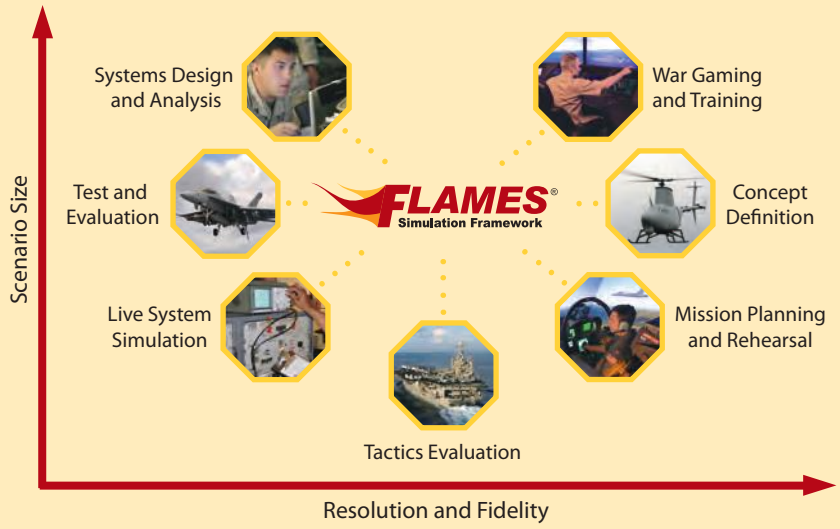
FLAMES is a powerful simulation framework that addresses all aspects of constructive simulation development and use, including customizable scenario creation, execution, visualization, and analysis, as well as interfaces to constructive, virtual, and live systems.

FLAMES Runtime Products Include

- Easy to use, ready to run applications for scenario creation, execution, visualization, and analysis
- Sample FLAMES components that include simple, example models of many types of military systems and human behavior
- An example FLAMES scenario database to help you build your first FLAMES scenarios
- Abundant online and printable user documentation

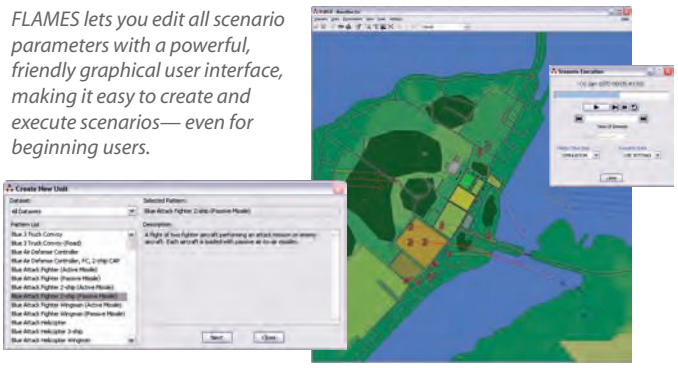
FLAMES Development Products Include

- Object libraries and include files for developing your own FLAMES-compatible components in either the C or C++ programming language
- Lots of example source code, including the source code to all the FLAMES example models
- Tools to generate custom model source code and define graphical user interfaces for your models
- Abundant online and printable developer documentation



With FLAMES, you can develop models of almost any type of system at the level of fidelity and resolution you require. Models can be "plugged" into FLAMES-based simulations in any quantity or combination, allowing you to compose simulations that can satisfy almost any modeling and simulation requirement.

FLAMES lets you edit all scenario parameters with a powerful, friendly graphical user interface, making it easy to create and execute scenarios— even for beginning users.



FLAMES Features

- Support for modeling almost any type of system (land, sea, air, space) at nearly any level of complexity
- Support for modeling human behavior and decision processes
- Support for scenarios with one player or thousands of players
- Ability to integrate models from legacy simulations
- Powerful, flexible database manager for storing, controlling, and sharing scenario data in a multi-user environment (no flat files)
- Friendly, intuitive graphical user interface for editing ALL scenario data (no configuration or parameter files that must be edited by hand)
- 2D, plan-view displays using terrain contour maps or a map from almost any 2D image file
- High-fidelity 3D visualization
- Detailed terrain and cultural feature databases that are perfectly correlated with 3D visualization databases
- Support for interacting with other simulations and simulators using both DIS and HLA; DIS and HLA interfaces are fully customizable
- Support for complex parametric trades studies and Monte Carlo analysis simulation
- Automatic checkpoint/restart capability to protect against hardware failure during long-running exercises
- Special facilities that support high-performance virtual simulators
- Support for direct interaction with real-world C4ISR systems and other live systems

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FLAMES®
Simulation Framework

Use a single framework to support your simulation requirements

- Integration of live, virtual, and constructive simulations
- Systems analysis and design
- Parametric trade studies and Monte-Carlo analysis
- Live system stimulation and testing
- Hardware in-the-loop simulation
- Semi-automated forces simulation
- Wargaming and large-scale training exercises
- Individual operator training
- In-garrision C4ISR system training
- Embedded, deployable training simulation
- Mission planning and mission rehearsal

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Analysis

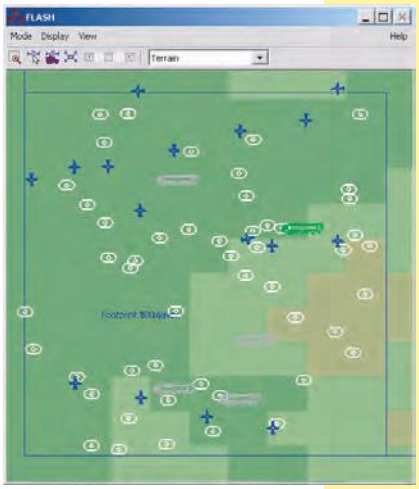
Customer Success

FLAMES® Simulation Framework

Air Force Research Lab Munitions Directorate Uses FLAMES

Concept Evaluation Tool

The Air Force Research Lab's Munitions Directorate (AFRL/RW) uses modeling and simulation to better study advanced, conceptual weapon systems. These weapon systems are actually a system-of-systems that use many technologies not yet developed. As budgets shrink, the efficient use of resources becomes critical. Applied Research Associates (ARA) is developing system-of-systems simulation models to represent these conceptual weapon systems and providing analysis that enables the AFRL/RW to make better investment decisions in both effort and funding.



An example of an advanced system-of-systems weapon system involves many vehicles loitering over a battlefield waiting to strike time-critical targets once they appear, such as this mobile missile launcher. Besides the analysis of equipment technologies, FLAMES also supports the analysis of CONOPS.

(Note: the white icons represent clutter that the sensors must deal with.)

Based on experience, warfighters identify abilities that would allow them to better accomplish their missions. Recent examples include the ability to attack deeply buried targets and the ability to detect and destroy mobile launchers that come out of hiding over an extended period of time. Engineers then devise conceptual weapon systems based on existing and/or future technologies to meet the warfighters' needs. Since developing and transitioning these conceptual weapon systems requires a tremendous amount of resources, these concepts must be evaluated in terms of viability, cost, and risk. Furthermore, as the concepts advance in maturity, analysis can determine sensitivities to technology development.

Using the FLAMES® architecture, ARA is supporting the AFRL/RW in developing weapon systems for the next decade. FLAMES enabled ARA to develop system-of-systems simulation models very quickly and efficiently. In particular, the FLAMES architecture supports independent equipment modeling, allowing ARA to build models for various communications equipment, sensors, and munitions being considered for the conceptual weapon system. These equipment models can then be "plugged" into the system-of-systems simulation for sensitivity analysis of their impact.

About AFRL/RW

The mission of the Air Force Research Lab's Munitions Directorate is to develop, integrate, and transition science and technology for air-launched munitions with the purpose of defeating ground-fixed, mobile/relocatable, air, and space targets, hereby assuring the preeminence of the U.S.

About ARA

Applied Research Associates is an employee research company that has grown steadily since 1979 and has offices throughout the United States and Canada. Its primary mission is to provide in-depth and diversified research, engineering, and technical support services. Its goal is to develop innovative, cost-effective solutions to important national problems in engineering and the physical sciences.

In addition to specific equipment models, ARA has learned the tremendous importance and impact of cognitive models for conceptual weapon systems. Cognitive models represent how the weapon system is employed, how the systems interact with each other within the system-of-systems, how the equipment interacts within a system, and how information is utilized. The FLAMES architecture fully supports the development of cognitive models, a key feature not found in other simulation architectures.

Since the weapon systems designed and considered by the AFRL/RW are conceptual, how the weapon systems are best employed is not known. The technologies these system-of-systems weapon systems bring to the warfighter represent a paradigm shift in capabilities and concept of operations. Applied Research Associates is able to support the development of not only the technologies used by advanced system-of-systems weapon systems, but also how the advanced weapon systems use the technology and how to employ such a weapon system.

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FLAMES® Simulation Framework

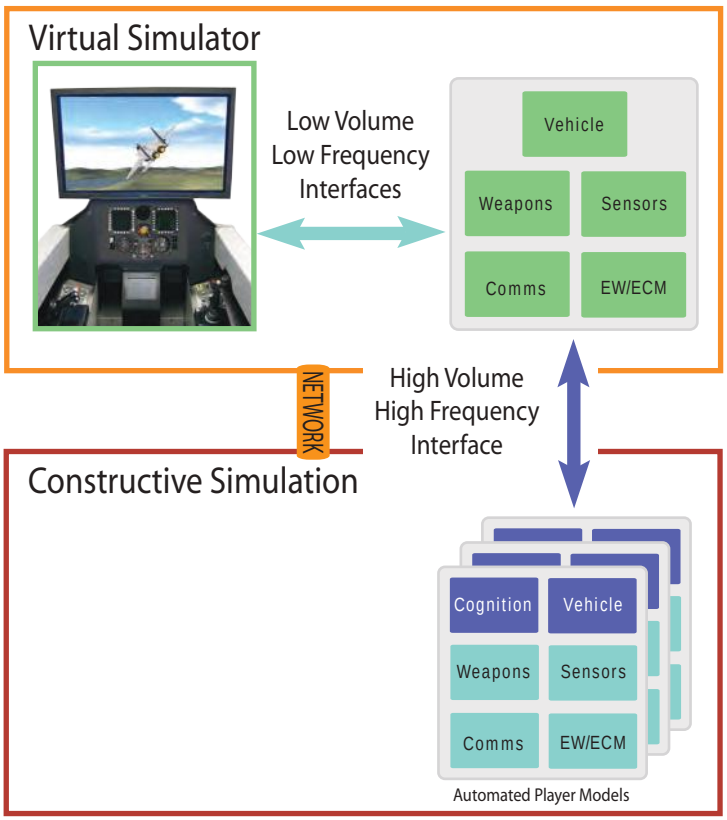
A BETTER WAY TO BUILD High-Fidelity Virtual Simulators

DIS and HLA often provide adequate performance when connecting multiple virtual simulators to each other and to a constructive "scenario generator" simulation. However, when it is necessary to model complex, high-fidelity, interactions between players, a computer network can become overloaded with all the high-volume, high-frequency data necessary to describe the interactions.

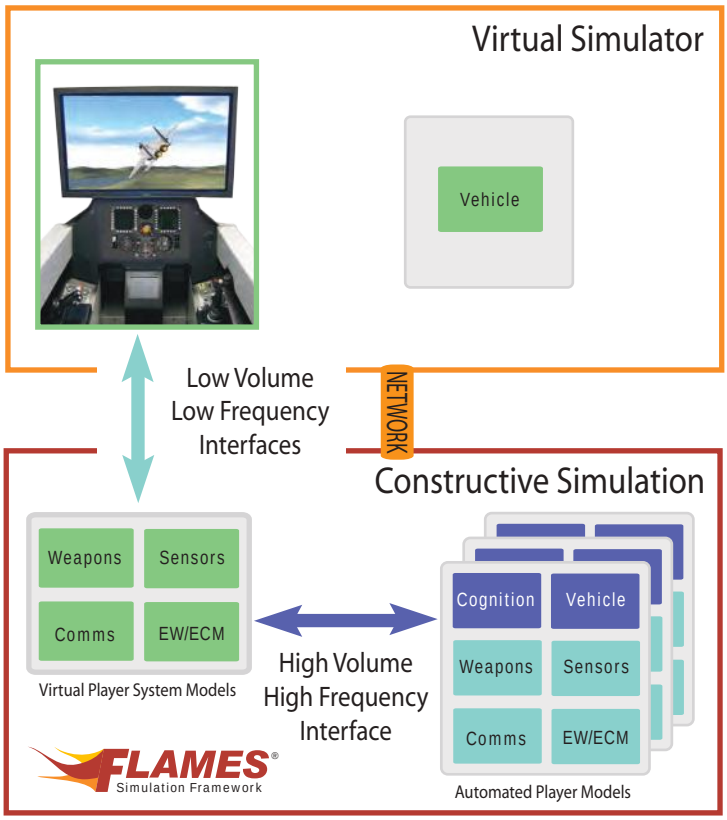
In such cases, it is often helpful to move some of the complex models involved in the interactions out of the individual virtual simulators and into the constructive simulation. This allows the high-volume, high-frequency data necessary to describe the interactions to stay within the constructive simulation where bandwidth and latency are not an issue.

FLAMES® supports both DIS and HLA (simultaneously if necessary), so virtual simulators that use DIS and HLA are supported. In addition, FLAMES supports a Client/Server architecture that allows selected models of a virtual simulator to be moved into a FLAMES-based constructive simulation. The FLAMES Client/Server architecture can also provide the benefits listed below.

DIS & HLA - *Typical Approach*



FLAMES Client/Server - *Better Approach*



Complex network protocols must be followed by all simulators	No network protocols are required
System models are different for each simulator	System models can be the same for each simulator and for all automated players
Differences in system models often make results unreliable	Common system models operate on a "level playing field" and help make results more reliable
System models are usually difficult to reconfigure	System models for any simulator are easy to reconfigure
Each simulator has its own input database and scenario editing tools	Inputs for system models for all players reside in a common database edited by one set of tools
Each simulator has its own post-processing tools	A single set of post-processing tools can be used

Training
Customer Success

FLAMES® Simulation Framework

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.

Simulated Predator UAV video feed from C2WSPTT

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.**

"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

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

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Significant FLAMES-based C2WSPTT Features

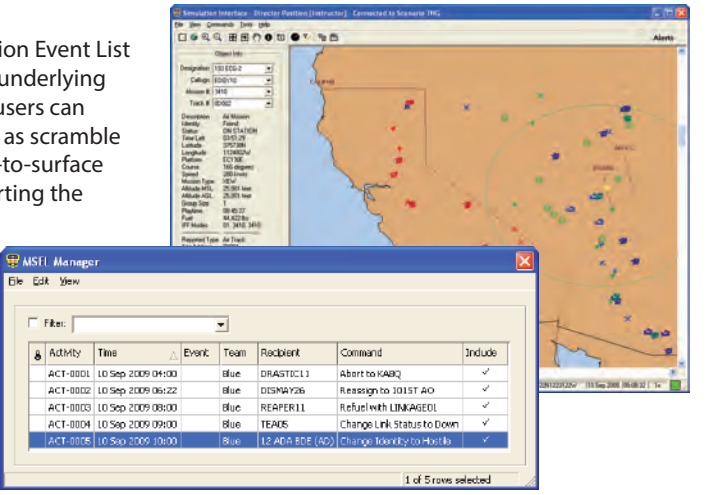
UAV Video
C2WSPTT can simulate 3D video feeds from several different types of UAVs using the inherent display capabilities of FLAMES.

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.



C2WSPTT simulation interface

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.

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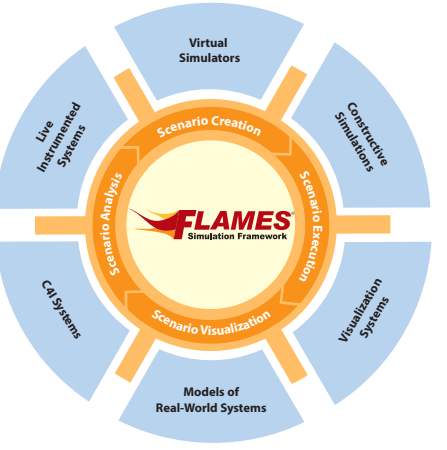

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FLAMES® Simulation Framework

Proven Solution for Live Virtual Constructive

FLAMES® is often the ideal framework for many types of simulations, including constructive simulations that are intended to interact with virtual simulators and live (real world) systems.

FLAMES has the ability to integrate models of almost any type of entity and to support interfaces to almost any live or virtual system. That's why so many organizations around the world have developed their testing, training, and mission rehearsal systems using FLAMES (see back for details).

How FLAMES Interfaces with LVC Systems

FLAMES supports DIS and HLA interfaces to legacy systems. In addition, FLAMES supports a unique, high-performance interface called the Interactive Server (ISV) that was specially designed to address the demanding requirements of integrating live, virtual, and constructive (LVC) systems.

The ISV supports many features not available in DIS and HLA, including the ability to communicate directly with command, control, communications, computer, and intelligence (C4I) systems using real-world tactical messages. Custom external system interfaces can be and have been integrated into FLAMES, as well.

Learn More

Contact Ternion to learn how FLAMES can integrate your live, virtual, and constructive systems.

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Benefits of using FLAMES for LVC

- Proven capability in numerous, existing testing and training systems
- DIS, HLA, and high-performance interfaces to live and virtual systems
- Specialized support for interfaces to C4I systems
- Deployed with operational systems for "in-garrison" training capability
- Fully customizable models and applications
- Used successfully by programs worldwide (see back for details)

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FLAMES is used in some of the most advanced testing, training, and mission rehearsal systems in the world. In addition, it appears that FLAMES-based simulations are the only simulations in the world to be deployed as integrated segments of real-world systems to provide in-garrison training capability. Here is a sample of Live Virtual Constructive (LVC) simulation programs that use FLAMES.

The Integrated Training Capability (ITC) for the NATO Combined Air Operations Centers (CAOCs)

NATO Live Virtual Constructive (NLVC) capability

U.S. Air Force Command, Control, and Weapon System Part Task Trainer (C2WSPTT) for the Theater Battle Management Core Systems (TBMCS)

U.S. Air Force Distributed Mission Operations (DMO)

U.S. Army Command, Control, and Communications Driver (C3 Driver) for the Army Battle Command System (ABCS)

U.S. Air Force Research Laboratory, Vehicles Directorate (AFRL/RB) aircraft virtual simulators

U.S. Marine Corps Common Aviation Command and Control System (CAC2S) integrated testing and training simulation

Republic of China (Taiwan) Air Force Distributed Wargaming System (DWS)

U.S. Marine Corps Predator anti-tank missile, hardware-in-the-loop avionics test simulation

Japan Ministry of Defense Type 90 tank simulator

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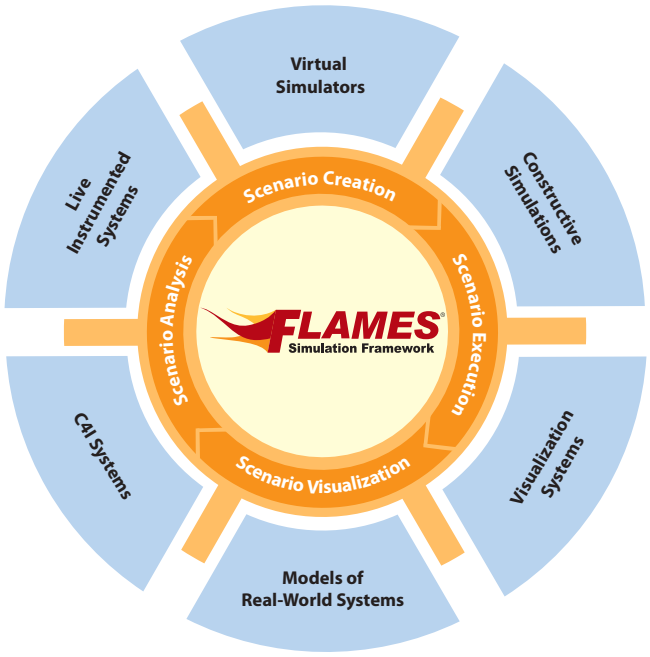

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FLAMES® Simulation Framework

FLAMES Makes It Simple to Perform Complex Systems Analysis

FLAMES® is the framework of choice for almost any constructive simulation, including constructive simulations used for complex system design and analysis.

Using the FLAMES Enhanced Analysis capability in your FLAMES-based simulation, you can easily perform Monte-Carlo analysis and parametric trade studies that vary and analyze almost any aspect of your scenario imaginable.

Perform complex systems analysis with FLAMES in three simple steps.

1 *Configure the Scenario*

System Concepts

Design Parameters

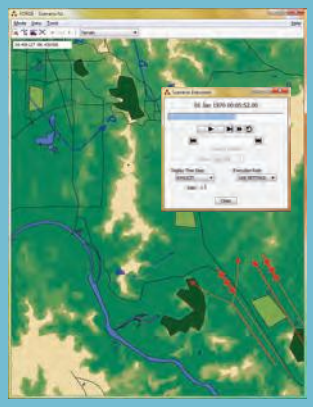
Rules of Engagement

Tactics and Plans

Specify the values of almost any set of input parameters as scenario variables.

Define multiple design cases, which assign different values to your scenario variables.

2 *Execute the Scenario*



Automatically execute your scenario repeatedly for all of your design cases.

3 *Analyze the Results*

Automated Parametric Trade Studies

Monte Carlo Analysis

Proof of Concept

System Demonstrations

Process and analyze the results to get the answers you need.

Use third-party "design of experiment" and analysis tools to automate and enhance the analysis process.

FLAMES Makes Complex Analysis Simple

- Study almost any aspect of any scenario
- Complete complex studies quickly and easily
- Perform studies you never thought possible
- Rely on a proven COTS simulation framework (see back for details)

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FLAMES is a proven COTS simulation framework for complex system design and analysis. Here is a sample of FLAMES-based simulations from around the world that are used for systems analysis.

U.S. Air Force National Air & Space Intelligence Center (NASIC) Integrated Air Defense Systems (IADS) analysis simulation (Helios)

U.S. Air Force Research Laboratory, Munitions Directorate (AFRL/RW) and Vehicles Directorate (AFRL/RB) analysis tools

Northrop Grumman Modeling, Simulation, and Analysis Facility (MSAF)

Raytheon Missile Systems weapons systems analysis simulation

Raytheon Cooperative Engagement Capability (CEC) analysis system and system demonstrator

Johns Hopkins University Applied Physics Lab (APL) net-centric operations analysis simulation

Boeing Advanced Combat Aircraft Division parametric aerospace system design analysis simulation

Indra for Spanish Navy air-to-ship and ship-to-ship systems analysis simulation

Israeli Air Force battlefield systems analysis simulation

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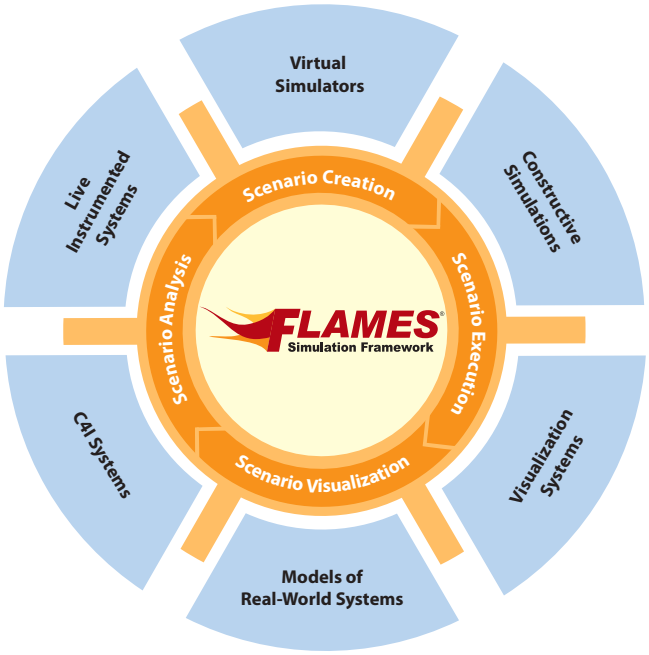
Since 1989, Ternion Corporation has provided quality commercial simulation products and custom software development and support services to government and commercial organizations worldwide. Ternion is a privately held, employee-owned company located in high-tech Huntsville, Alabama.



FLAMES-Based Simulation System

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Where to Buy
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FUEL

FLAMES® University/Education License

Ternion® Corporation provides free licenses to the Premier configuration of the FLAMES Development Suite to qualified educational institutions for the purpose of education, training and the pursuit of masters and doctoral degrees. Ternion developed the FUEL program to help prepare students for a career in modeling and simulation and to give Universities free tools to aid the classroom in career preparation.

Key Features

- Available to classrooms, undergraduates, Masters and PhD candidates
- Provides unlimited software licenses for classroom computers
- Offers student licenses for personal computers for $99
- Covers non-commercial work of all staff and students at degree-granting institutions
- Includes licenses to the Premier configuration of FLAMES Runtime and Development Suites
- Upgrades to software are available upon request and at no charge

Criteria

FLAMES may be used in the classroom or for research as long as it is for educational purposes only. Plug-ins, scenarios, and other items generated with an academic license cannot be provided to any third party without Ternion's advance consent. If your study is funded by a third party that requires the delivery of items developed using FLAMES, you will likely not qualify for an academic license. All license requests must be submitted through an application process and must meet criteria set by Ternion.

Pricing

Licenses are FREE to educational institutions. To qualify, FLAMES must be installed on a computer (1) owned by the educational institution and (2) residing within a facility owned by the educational institution.

Licenses are $99 per year for qualifying students' personal computers.

Support

Full on-line documentation, examples, videos, and tutorials come with every FLAMES license. Customer support will be limited to software installation only. Technical support can be purchased.

Training

FLAMES Training courses are available for a fee at Ternion's headquarters in Huntsville, AL. Training courses may also be taught on campus for an additional fee.

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FLAMES® Simulation Framework

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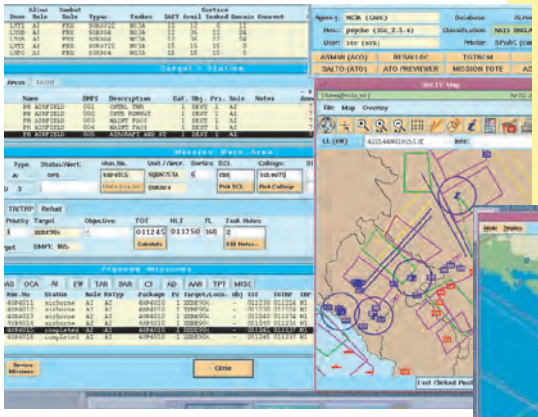
Training

Customer Success

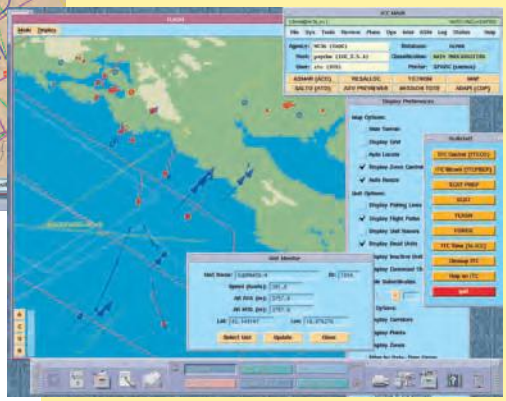
FLAMES® Simulation Framework

NATO C3 Agency Integrated Training Capability

Integrated Command and Control Software for Air Operations (ICC)



Exchanging data directly with ICC databases, ITC provides automated scenario definition, simulates ATOs, provides mission status and reports directly to the appropriate ICC application, and supports detailed after-action reviews.



To maximize the operational effectiveness of the ICC, the staffs of NATO and NATO member nations must have frequent training in using the ICC in the context of realistic military operations. The Integrated Training Capability (ITC) makes this training possible and affordable.

With the guidance and sponsorship of NC3A, Ternion® Corporation developed the ITC using FLAMES®. Operating on a single computer integrated into a site's ICC architecture, the ITC simulates the execution of one or more Air Task Orders (ATOs) to represent a modern combat environment. Interfaces between the ICC and the ITC support the bi-directional exchange of standard NATO messages to allow ICC operators to interact with subordinate and command echelons that are simulated within the ITC.

Air and ground vehicles, sensors, communication devices, computers, weapon systems, and jammers are simulated within the ITC, as are the operations of many different types of units, including air bases, wings, squadrons, individual aircraft, and surface-to-air missile sites for both friendly and opposing forces. Trainees can exercise all the major functions of the ICC during the execution of an operational scenario and directly participate in the conduct of a battle. Exchanging data directly with ICC databases, ITC provides automated scenario definition, simulates ATOs, provides mission status and reports directly to the appropriate ICC application, and supports detailed after-action reviews. ITC can also be used for operational course of action analysis and planned refinement. Through these seamless data exchange mechanisms, ICC is employed exactly as it is in real operations for any ITC-supported evolution.

The robust and open architecture of FLAMES enabled the development of system models that precisely matched the ICC training requirements. FLAMES' support for modeling human cognitive behavior enabled the ITC to execute on a single computer with little or no role-player support. The foundation for many essential ITC features, including direct ICC database import and direct messaging interfaces to ICC systems, was supplied by FLAMES' comprehensive library of support services. Perhaps most importantly, the mature, object-oriented framework provided by FLAMES allowed the ITC to be developed quickly and inexpensively.

About ICC

The "NATO-wide Integrated Command and Control software for Air Operations" (ICC) is an integrated C3I environment that provides information management and decision support to NATO Combined Air Operations Centers (CAOCs) during peacetime, exercise and wartime. ICC also provides related mission-essential functions to command echelons above and below the CAOC. The ICC provides functional support for the most critical functions of the air command and control cycle, such as Planning & Tasking, Airspace Control Order (ACO) / Air Task Order (ATO) / Air Task Message (ATM) production, and mission monitoring and reporting.

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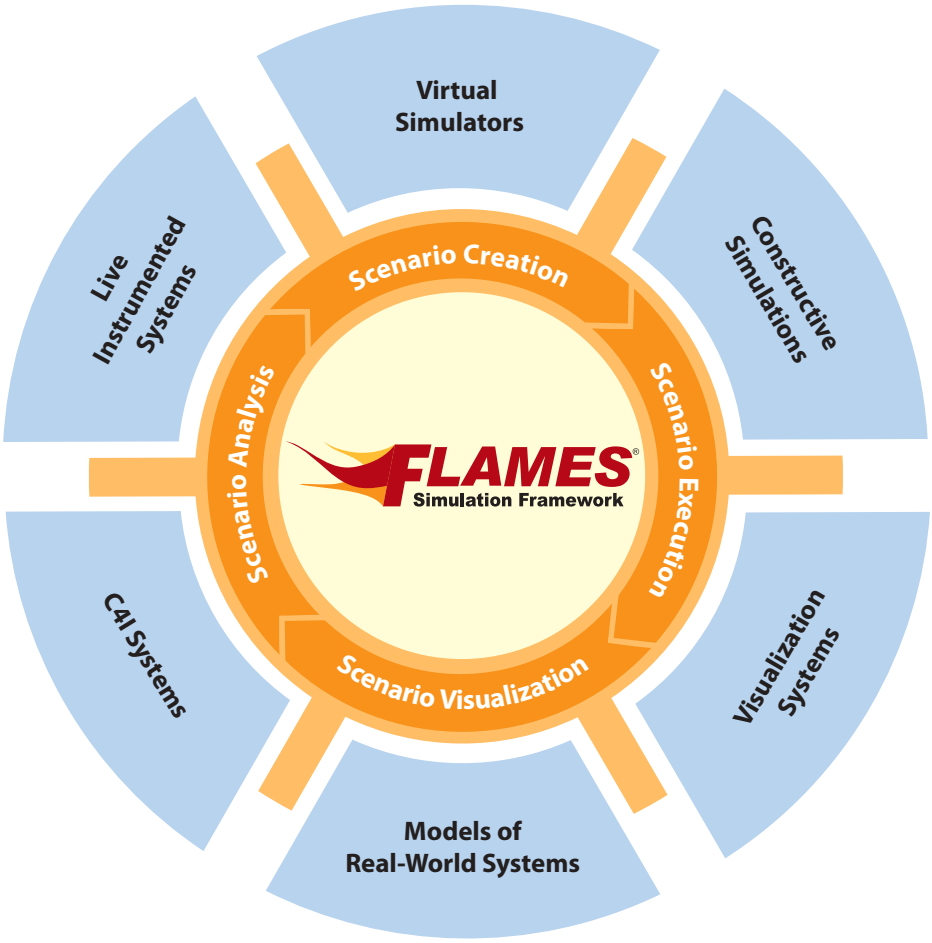

FLAMES-Based Simulation System

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FAST™

FLAMES® Automated Simulation Trainer

Field Deployable Training System

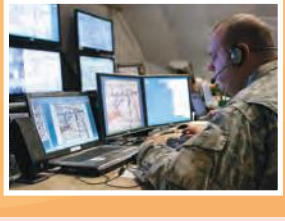
Ternion® Corporation's FLAMES Automated Simulation Trainer (FAST™) is a powerful, deployable training system that addresses the specialized needs of the training community.

FAST: FLAMES Automated Simulation Trainer

FAST is a turn-key, commercial off-the-shelf (COTS) simulation designed specifically to serve as the central constructive simulation in a live-virtual-constructive (LVC) training exercise. Based on Ternion Corporation's flagship product, the FLexible Analysis, Modeling, and Exercise System (FLAMES®), FAST provides a powerful yet friendly graphical user interface for controlling simulated entities during scenario execution and tools for automatically creating scenarios from standard military data sources. Flexible, versatile, and configurable, FAST can be embedded in operational command and control systems to provide deployable, individual unit training, and it can also support large, multi-unit distributed training exercises.

FAST's Primary Features

- Physics-based simulation of air, ground, and surface sea entities, including vehicles, sensors, communication systems and networks, weapon systems, munitions, and human behavior
- Ability to simulate thousands of entities in "real time" on a single computer
- Support for all of the terrain modeling capabilities of FLAMES
- Automated scenario creation by importing Air Tasking Orders (ATO) and Airspace Control Orders (ACO) in US Message Text Format (USMTF)
- Support for a single "Director" station and any number of "Controller" stations, each of which can visualize an ongoing scenario in 2D, dynamically control entities, and create new entities
- Ability to interact with other simulations and virtual simulators using the Distributed Interactive Simulation (DIS) protocol and the High Level Architecture (HLA)
- Support for checkpoint and restart in the event of hardware or power failure
- 3D visualization of a scenario (in real time or playback) using FLASH



The following features require an export license when delivered internationally:

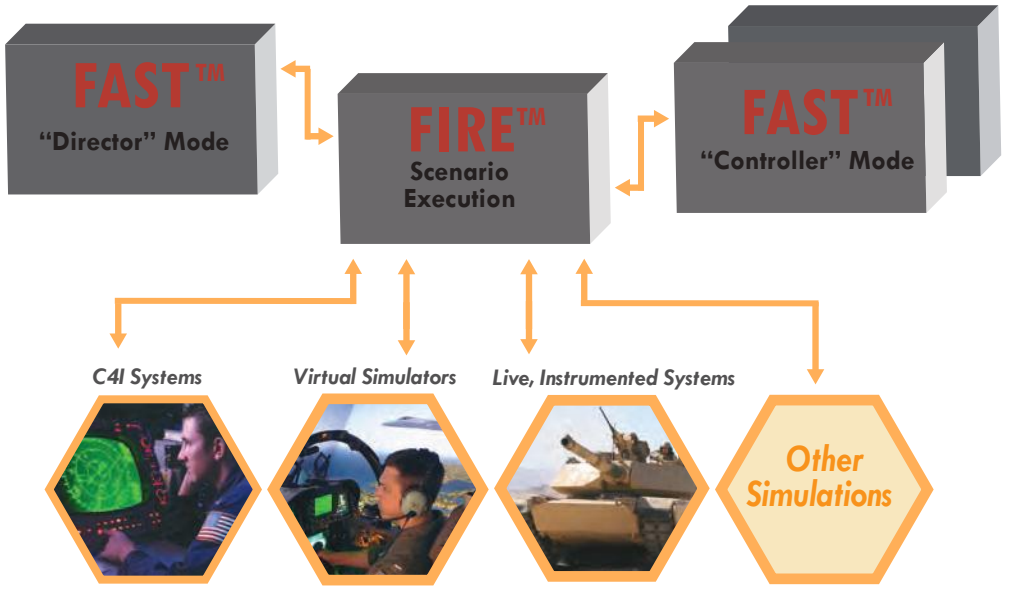
- Bi-directional communication with tactical systems using the JREAP C (MIL-STD 3011-C) interface
- Support for J-series tactical messages, including J2.2, 2.3, 2.5, 2.6, 3.0, 3.2, 3.3, 3.5, 3.6, 7.0 (partial), 7.5, 12.1, 12.4
- Support for Precise Participant Location and Identification (PPLI) message generation
- Support for AN/TPS-59 radar simulation and sending AN/TPS-59 radar plot data to tactical systems

Creating, Visualizing, and Controlling Scenarios

FAST supports a single "Director" station and any number of "Controller" stations. A Director can create new scenarios manually or by automatically importing ATO and ACO data. Directors can also edit existing scenarios and start, stop, pause, and fast-forward the execution of a scenario. During scenario execution, both Directors and Controllers can visualize the scenario and create and control scenario entities through a powerful and friendly graphical user interface.

FAST includes a license to each of the standard Runtime Suite applications (FORGE™, FIRE™, and FLASH™) and a license to several Runtime Suite optional products (3D, Analysis, Interactive Simulation, DIS, HLA, Multi-threaded Execution, and Checkpoint/Restart). FORGE can be used to edit and expand the low-level scenario parameter database that is supplied with FAST. Scenarios are executed in the background using FIRE during a training exercise. FLASH can be used to visualize a scenario in 2D and 3D both during scenario execution and in after-action-review mode after scenario execution.

Scenario Execution in FAST



Customizing FAST

Ternion can develop custom extensions to FAST to address specific training requirement requirements. The capabilities of FAST can also be extended by a customer using the FLAMES Development Suite.

Contact Ternion Corporation today to learn more about how you can drastically reduce your training costs while dramatically increasing the effectiveness of your training programs.

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