

CAPABILITY BRIEF

# Modeling, Simulation and Training (MS&T)

ADVANCING OPEN ARCHITECTURE TECHNOLOGIES TO POWER TRANSFORMATIONAL MS&T SYSTEMS

## HIGHLIGHTS

Rapid simulation integration using open architecture technologies

Integrates HLA, DIS, CIGI and gaming simulation standards

Natural hardware-in-the-loop (HIL) integration with deployed systems

Maintainable multi-domain and multi-level security (MLS) architecture

Efficient technology insertion, maintainability and extensibility capabilities

Robust safety, security, interoperability and resiliency

## DEVELOPING NEXT GENERATION MS&T SYSTEMS

Today's Modeling, Simulation, and Training (MS&T) systems require a next-generation platform in order to prepare warfighters for future missions against near-peer adversaries. The systems must optimize the flow of multi-domain data in real-time with millisecond precision in order to support high-fidelity simulations. Above all, the systems require multi-domain access to authenticated, secured data in order to enable multi-national participation, with protection against cybersecurity threats.

Meeting these MS&T operational demands requires three capabilities:

1. To develop, acquire and consolidate unique MS&T functions from a diverse pool of assets, integrating both industry standards and proprietary solutions according to specific training mission requirements.
2. To continually improve simulation value by integrating and evolving simulation, gaming and actual deployed systems in order to increase fidelity and effectiveness.

Training for today's military threats requires secure, simulated environments that can be quickly integrated, assembled and reconfigured from a diverse set of proprietary solutions. RTI Connex<sup>®</sup> DDS is the platform that brings distributed simulation assets together in a secure, high-performance, scalable environment. Based on the DDS standard, it has the required security and interoperability capabilities for cross-vendor, cross-branch and cross-ally simulations.

3. To enable global participation in implementing sensitive assets with appropriate levels of communications security, which protect simulation intellectual property and mission confidentiality.

## SECURE, SCALABLE AND HIGHLY-RELIABLE MS&T PLATFORM

RTI Connex<sup>®</sup> DDS supports open architecture MS&T systems by providing fast, scalable, reliable and secure connectivity within and between all forms of real and simulated land, sea, air and space-based systems. Based on the Object Management Group<sup>®</sup> (OMG<sup>®</sup>) Data Distribution Standard (DDS<sup>™</sup>), Connex<sup>®</sup> DDS is the first solution to comply with the new DDS standard security specification. Its security plug-ins provide authentication, access control, encryption, data tagging and event logging without modifying the existing DDS network infrastructure. This ensures data confidentiality and integrity while protecting information from multiple security domains from unauthorized access and tampering.

In addition, RTI Connexx DDS integrates with MS&T and A&D industry standards, including:

- High-Level Architecture (HLA)
- Distributed Interactive Simulation (DIS)
- Open Group Future Airborne Capability Environment (FACE™)
- US DoD / SAE AS-4UCS Unmanned Systems (UxS) Control Segment (UCS) Architecture and data model

Connexx DDS includes a rich set of tools that accelerate module- and system-level development, debugging, testing, integration and optimization. These tools provide the ability to visualize system modules, view interconnectivity and monitor system health. They also allow developers to introspect and inject data into MS&T systems.

### MULTI-SUPPLIER MS&T INTEGRATION CHALLENGE

The optimal way to prove interoperability is through the actual integration of disparate MS&T systems built on multiple standards. At I/ITSEC 2018, a group of RTI technical engineers became the first to integrate multiple platforms from Harris, VT MAK, Microsoft, National Instruments and SimBlocks.io using RTI Connexx DDS. The demonstration created an integration of the HLA standard with DIS standard simulation platforms containing different data formats. These were then integrated with a FACE standard avionics platform using actual avionics hardware designed for hardware-in-the-loop (HIL) environments. Additional components were Microsoft Flight Simulator for hands-on interaction, the Harris FliteScene and the SimBlocks.io One World SDK for Unity gaming platform.

This demonstration proved that military training scenarios can be rapidly assembled and reconfigured in an agile, ad-hoc manner from ready-made, commercial-off-the-shelf (COTS) components. Systems based upon the Connexx DDS connectivity framework can integrate a wide range of real-time simulation environments to efficiently deliver Live, Virtual and Constructive (LVC) training. These integrated multi-vendor training and simulation systems reduce risk and drive down costs, using proven methodologies and components.

### ABOUT RTI

Real-Time Innovations (RTI) is the Industrial Internet of Things (IIoT) connectivity company. The RTI Connexx® Databus is a software framework that shares information in real time, making applications work together as one, integrated system. It connects across field, fog and cloud. Its reliability, security, performance and scalability are proven in the most demanding industrial systems. Deployed systems include medical devices and imaging; wind, hydro and solar power; autonomous planes, trains and cars; traffic control; Oil and Gas; robotics, ships, and defense.

RTI lives at the intersection of functional artificial intelligence and pervasive networking<sup>SM</sup>.

RTI is the largest vendor of products based on the Object Management Group (OMG) Data Distribution Service™ (DDS) standard. RTI is privately held and headquartered in Sunnyvale, Calif.

Download a free 30-day trial of the latest, fully-functional Connexx DDS software today: <https://www.rti.com/downloads>.

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### PROVEN IN MORE THAN 1,200 UNIQUE DESIGNS

RTI is the market leader in DDS technology, with systems deployed in simulation environments including:

#### National Advanced Driving Simulator

The U.S. Army and the University of Iowa jointly developed several high-fidelity simulators to demonstrate how military vehicles and components can be tested and evaluated using virtual proving ground (VPG) technology. Connexx DDS provided the software for real-time, low-latency data interchange to manage the many simulation components working concurrently.

#### FORCE Multi-Ship Simulation

Force Technology created the world's first system to provide a complete environment for training tugboat captains in maneuvering large vessels, such as oil and gas tankers, into restricted spaces using multiple boats. Connexx DDS delivered the connectivity framework that offered real-time data interchange between subsystems without requiring the developers to know specific code for each subsystem added to the application.

#### CAE Sim XXI Full Flight Simulator

Pilots around the world consider CAE's Sim XXI full-flight simulator as the closest simulation of the true experience of flight. It delivers breakthrough visual realism, precise cockpit replication, high-fidelity avionics simulation, and flight and ground-handling characteristics indistinguishable from the aircraft. Connexx DDS helps to achieve this level of full-flight simulation that involves a variety of complex subsystems sharing and processing data in real-time.

#### US Navy HiPer-D

The Naval Sea Systems Command (NAVSEA) Dahlgren Division needed to investigate how to apply advanced technologies and concepts to the Naval Surface Ship Anti-Air Warfare (AAW) problem domain. Connexx DDS was used by the US Navy High Performance Distributed Computing Project (HiPer-D) to create test bed demonstrations, based fully on COTS technology, that enabled NAVSEA to investigate technologies supporting real-time, distributed, scalable, fault-tolerant, heterogeneous computing systems to be used in combat systems.