

Bridging the Domains

Elevating NATO Collective Training with RIACE Distributed Mission Training

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NATO CA2X2 Forum - Rome – 29th September 2026

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Elevating NATO Collective Training with RIACE Distributed Mission Training

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Physical and operational constraints of live-only exercises.	
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1. The MDO Training Challenge

Physical and operational constraints of live-only exercises



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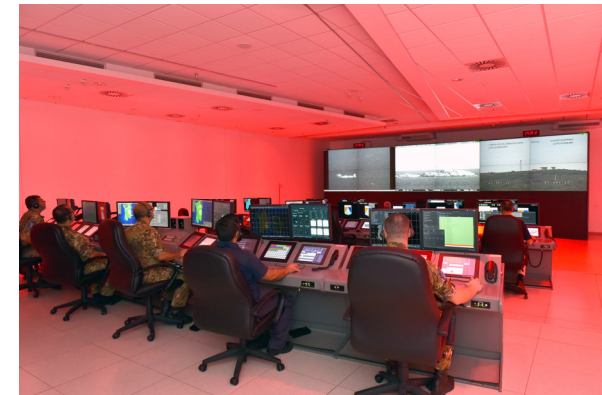
The Multi-Domain Operations (MDO) Friction

The Goal:

Synchronization across Land, Maritime, Air, Cyber, and Space.

The Barrier:

Live exercises face soaring logistics, airspace limitations, and security restrictions for advanced threats.





2. The RIACE & DMT Solution

Core hardware-software architecture and security framework

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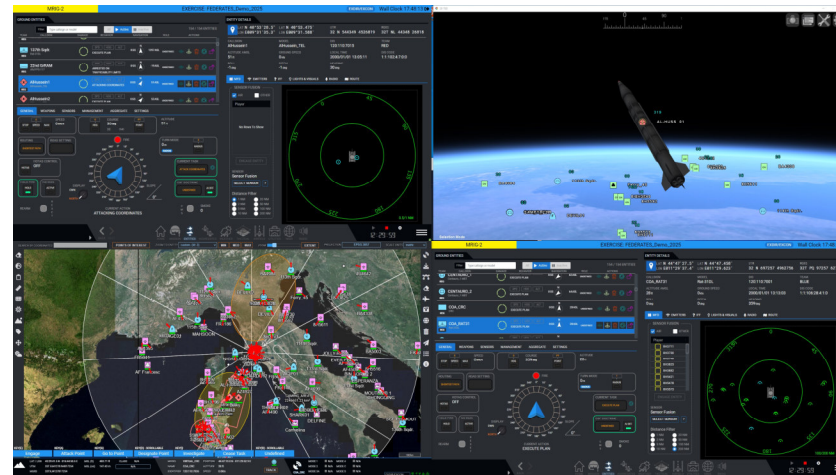
The Solution: DMT Infrastructure & RIACE

DMT Architecture:

Modular hardware-software framework for complex tactical scenarios.

RIACE:

Next-generation distributed synthetic environment serving as the digital backbone.



Enabling Robust LVC Federation

Unified Tactical Space:

Seamless Live, Virtual, and Constructive federation.

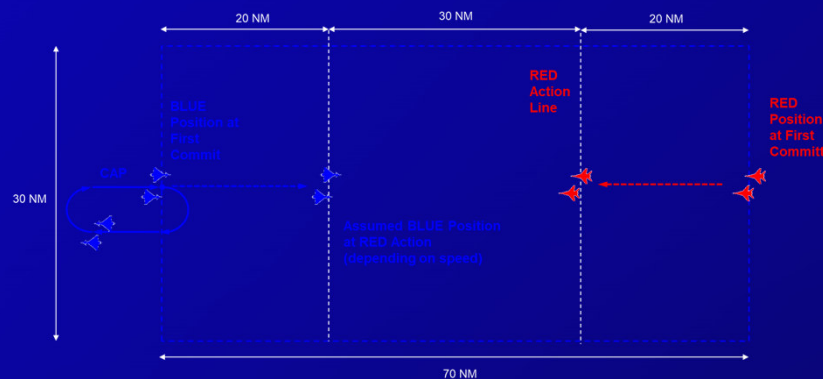
Distributed C2 Nodes:

Interconnects geographically dispersed physical platforms and command centers simultaneously.



3. High-Fidelity AI Tactics

Generating non-scripted Constructive forces and the Doctrine Editor



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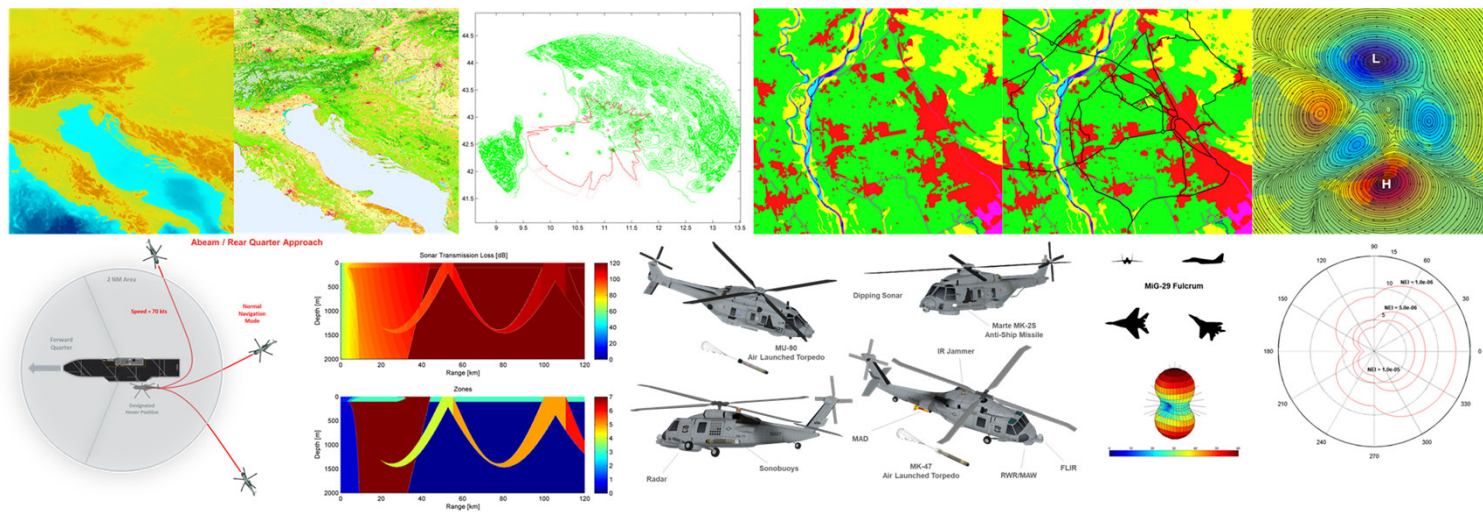
Inside RIACE: AI & High-Fidelity Constructive Forces

Dense Synthetic Spaces:

Generates highly realistic, non-scripted Constructive forces.

Core Engine:

Predictive behavior models, autonomous sensor management, and physical systems friction simulation.



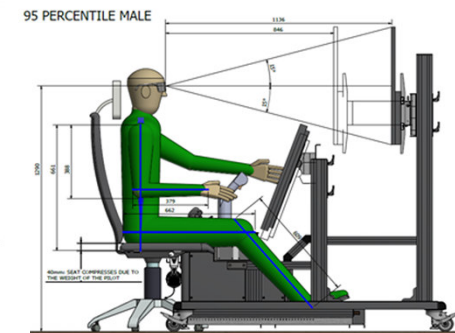
The Tactical Edge: Typhoon Mission Trainer (TMT)

Deployable Capability:

Containerized part-task trainer for mission-oriented training.

System Fidelity:

Replicates complete fighter subsystems (Radar, IRST, DASS, MIDS) for trainees or manned adversaries.



Beyond Visual Range (BVR) Tactics Validation

Autonomous Threats:

Controlled by the RIACE Doctrine Editor.

Tactical Simulation:

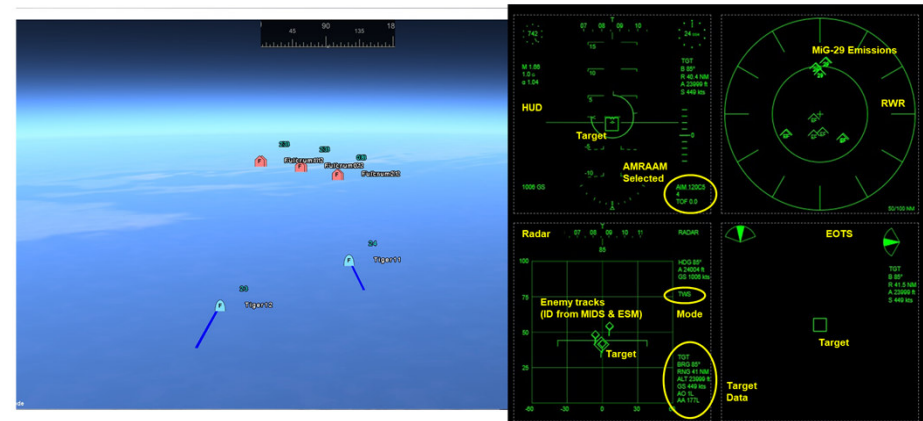
Realistic AI active radar homing management, BVR weapons mechanics, and countermeasures.



- Radar: Captor-M (ON)
- IRST: Pirate (ON)
- FLIR: Pirate EOTS (ON)
- RWR/ESM: Praetorian DASS (ON)
- ECM: Praetorian DASS (OFF)
- MAW: Praetorian DASS (ON)
- Chaff/Flares: C320 / F32
- Towed Decoy: Ariel MkII
- IFF: NATO IFF (ON - Mode 4 VALID)
- Datalink: Link16 MIDS (ON)
- Gun: Mauser BK-27 (150 rounds)
- SCL: 2 x 1000 lt Fuel Tanks
4 x AIM-120C5 AMRAAM (INS/Datalink/ARH)
4 x IRIS-T



- Radar: N-019 Rubin (ON)
- IRST: S-31E2 Kols (ON)
- FLIR: N/A
- RWR/ESM: SPO-15 Beryozha (ON)
- ECM: N/A
- MAW: N/A
- Chaff/Flares: C30 / F30
- Towed Decoy: N/A
- IFF: Soviet IFF (ON)
- Datalink: TKS-2 (OFF)
- Gun: GSh-30-1 (150 rounds)
- SCL: 2 x AA-10C (SARH)
4 x AA-11



4. LVC Operational Milestones

Key lessons from Exercises SW 24-2 and CW-25.



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Operational Milestones:

2018 – Spartan Alliance 18-8 Exercise

- “First time” for Italian Air Force (ITAF)
- Large number of sites/simulators involved
- Italian playground

2019 – Spartan Warrior 19-2 Exercise

- Classical WPC Warrior scenario
- OCA/DCA constructive missions
- Central Europe playground

2020 – Spartan Warrior 20-9 Exercise

- **NATO Exercise with Coalition Training Objectives**
- **OCA/DCA, COMAO, CAS, SCAR constructive missions**
- **Eastern Europe and Baltic playground**

2024 – Spartan Warrior 24-2 Exercise

- DCA, BMD, SBAD constructive missions
- Eastern Europe and Black-Sea playground

2025 – Centurion Warrior 25 Exercise – ITAF ONLY

- Live-Virtual-Constructive Exercise for Live EF2000 & F-35
- OCA/DCA, SBAD, COMAO, C2 coord. Missions (IADS)

2026 – Centurion Warrior 26 Exercise – ITAF ONLY

- Constructive training for C2 & SBAD (IADS)
- Multiple threats (air, space, drones)



Spartan Warrior 20-9



<https://www.usaf.af.mil/News/Article-Display/Article/2367496/spartan-warrior-20-9-nato-strengthens-air-power-through-distributed-training/>

Operational Milestones: Exercise Spartan Warrior 24-2



Coalition Training:

Connected many NATO nations over the CFBL Net.

Italian Contribution:

Virtual TMTs (Grosseto) and constructive forces (Poggio Renatico) with live operational CRCs.



<https://www.aeronautica.difesa.it/news/esercitazioni-conclusa-la-spartan-warrior-24-02/>

Pushing LVC Boundaries: Centurion Warrior 25

True LVC Integration:

4th & 5th Gen live assets (EF2000/F-35) flying against synthetic threats.

Technical Enablers:

Multi-Datalink Processor (M-DLP) and VODIS tactical Radio-Bridges.



<https://www.aeronautica.difesa.it/news/esercitazioni-conclusa-la-centurion-warrior-2025/>

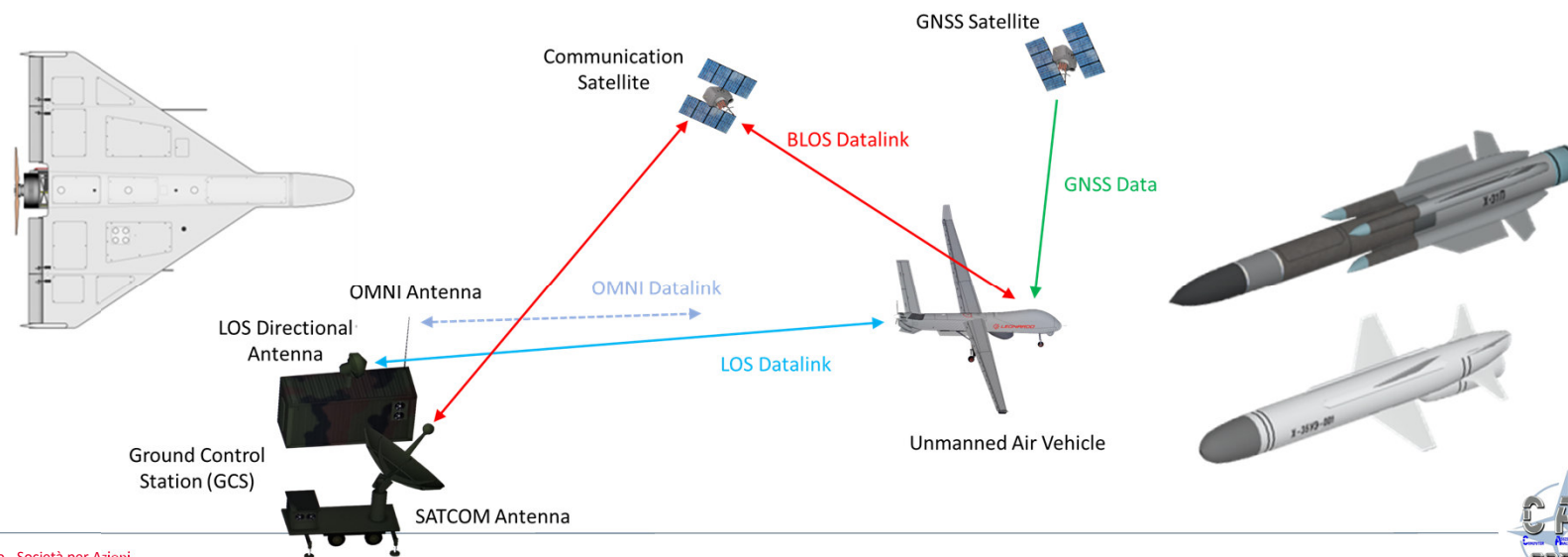
Future Roadmap: Training IADS for Current & Next-Gen Threats

IADS Adaptation:

Scaling the synthetic environment to stress complex Command & Control architectures.

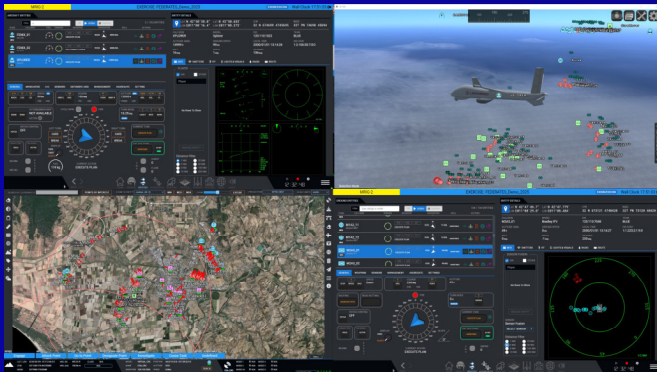
Multi-Threat Injection:

Integrating dense constructive scenarios featuring asymmetric drones and space-layered inputs.



5. Strategic Frameworks

Project FEDERATES and alignment with NATO MSaaS vision.



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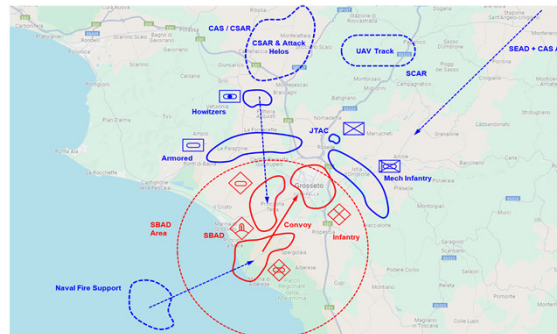
Multi-Domain EU Framework: Project FEDERATES

EDF Initiative:

European Modelling and Simulation as a Service (MSaaS) implementation.

Cross-Domain Vignettes:

Simultaneous Air (BVR), Ground, Naval (ASW), and Space/Ballistic Missile Defence (BMD) simulation.

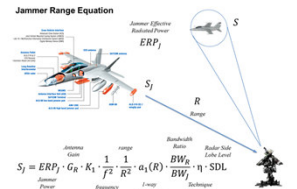


[https://defence-industry-space.ec.europa.eu/document/download/2323e186-afd1-43e8-860a-4c910563a680_en?filename=FEDERATES%20-%20Factsheet EDF22.pdf](https://defence-industry-space.ec.europa.eu/document/download/2323e186-afd1-43e8-860a-4c910563a680_en?filename=FEDERATES%20-%20Factsheet_EDF22.pdf)

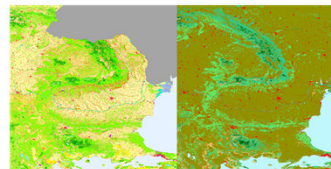
NATO MSaaS Alignment:

The Future:

Physics-based math models



Worldwide operations



A collection of colorful toy ships, including cargo ships, tankers, and a large cruise ship, arranged on a white background.

SA-12A GLADIATOR
SA-12B GIANT

The figure shows a screenshot of the 'True Threats' interface. On the left, a list of parameters is shown with red arrows pointing to their corresponding values on the radar display. The parameters and their values are:

- Altitude (ft AGL): 1000
- Speed: 100
- Load Factor: 1.0
- Angle of Attack: 1.0
- SHOOT icon: (indicated by a red arrow pointing to a green circle on the radar)
- Radar at current TAA: (indicated by a red arrow pointing to a green circle on the radar)
- Radar at current TAA: (indicated by a red arrow pointing to a green circle on the radar)
- Groundspeed (KTS): 100
- Radar Reference Symbol (pitch): (indicated by a red arrow pointing to a green circle on the radar)
- Bank Angle: (indicated by a red arrow pointing to a green circle on the radar)

The radar display itself shows a green circle with a crosshair in the center, and a green circle with a crosshair on the right side. The radar display also shows a list of threats on the right side, including:

- Target: 1000
- Alt: 1000
- Speed: 100
- Angle of Attack: 1.0
- SHOOT icon: (indicated by a red arrow pointing to a green circle on the radar)
- Radar at current TAA: (indicated by a red arrow pointing to a green circle on the radar)
- Radar at current TAA: (indicated by a red arrow pointing to a green circle on the radar)
- Groundspeed (KTS): 100
- Radar Reference Symbol (pitch): (indicated by a red arrow pointing to a green circle on the radar)
- Bank Angle: (indicated by a red arrow pointing to a green circle on the radar)



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Thank you
for your attention



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