CA²X² Forum 2026

What NATO’s Future Means for Nations Today

See the future

ST Engineering

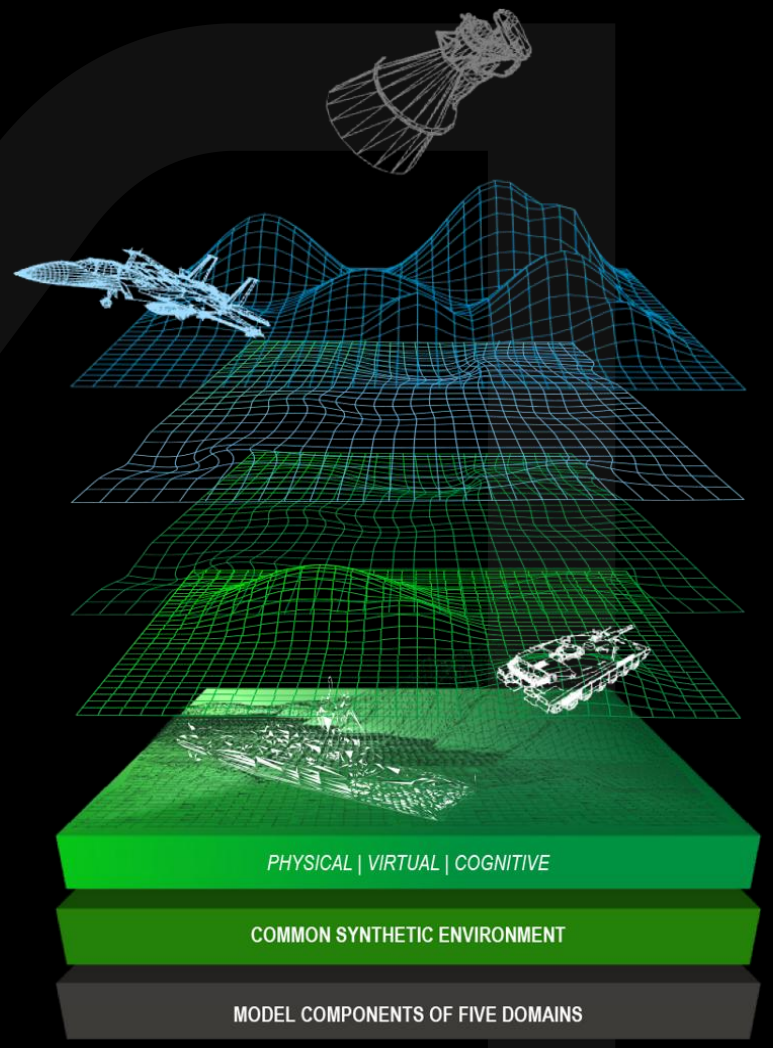
ECOSYSTEM

Simulation Ecosystems and NATO's NexGen M&S

Multi-Domain Operations demand training across land, air, maritime, cyber, space *and* the cognitive/information dimensions

Nations hold capable simulation systems that were procured independently and don't easily connect

NATO's proposed answer: shift focus from standalone systems to integrated *simulation ecosystems*

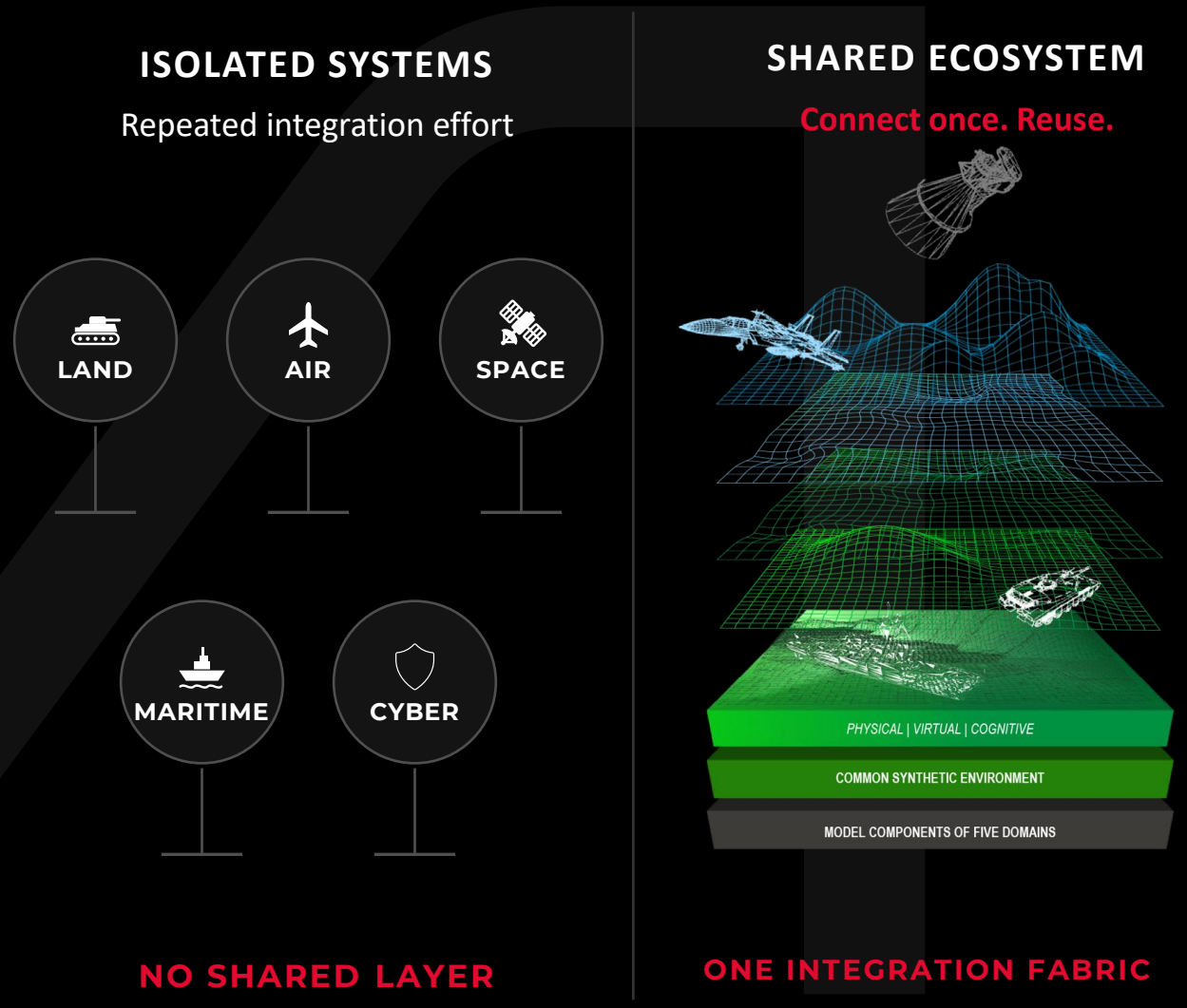


Why the Old Model is Struggling

Legacy standards (DIS, HLA, FMN) were built for narrower, largely single-domain federation problems

Today's requirement: multi-domain fidelity, AI-enabled behaviours, information/cognitive effects, distributed multinational play

Practitioners report most effort now goes into preparing and connecting systems, not delivering training itself

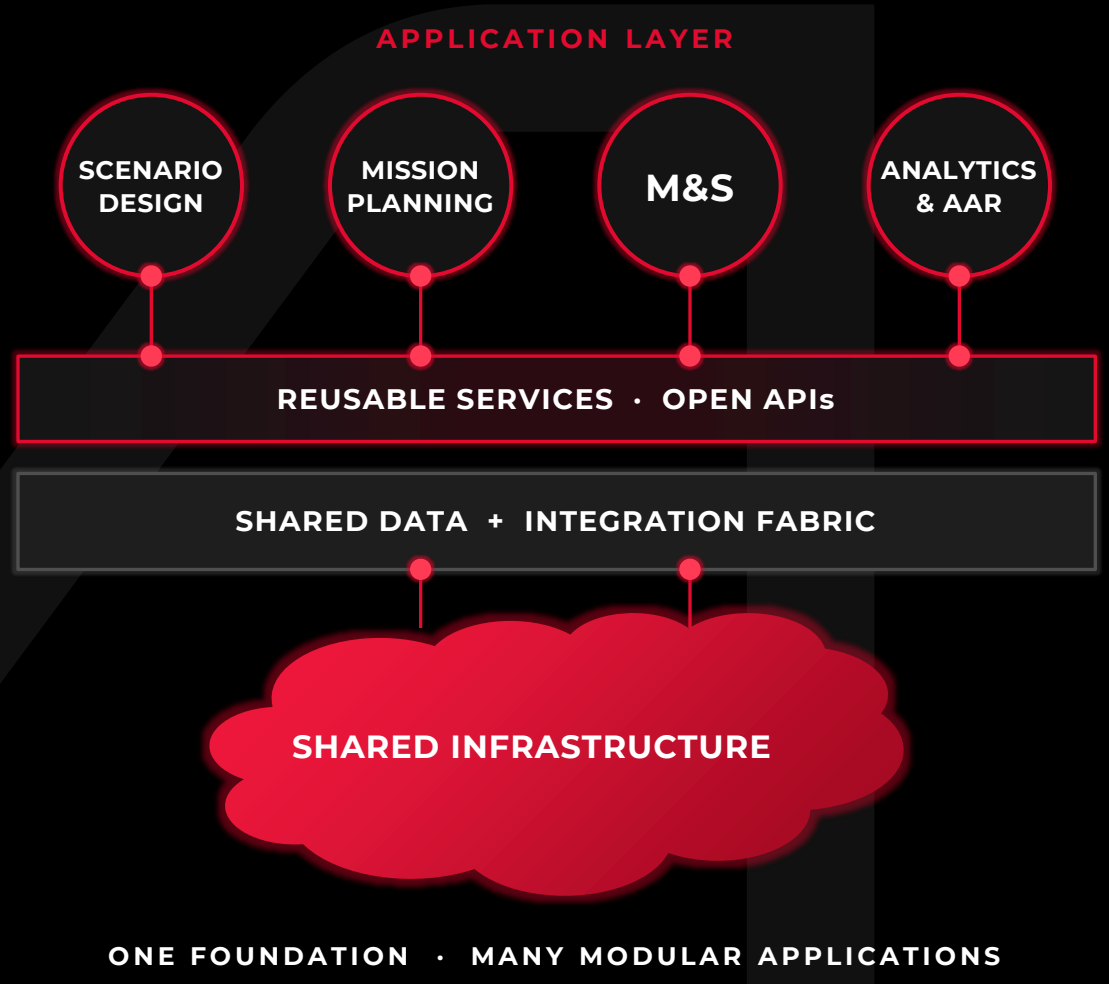


From Systems to Ecosystems: A Definitional Shift

An ecosystem is open architecture + reusable services + shared data + modular insertion, not a product

Spans the full readiness continuum: scenario generation, planning, simulation, decision support, analytics, AAR

Cloud-computing analogy: shared infrastructure, many applications, one foundation



NATO NEXGEN M&S

NATO's Journey Towards NexGen M&S

EVOLUTION TOWARDS A COMMON SYNTHETIC ENVIRONMENT

2000s
DIS / HLA
FOUNDATIONAL STANDARDS

FEDERATED INTEROPERABILITY

2014 - 2017
MSG-136 / 145 / 176
PROGRAMME STUDIES

2022
MSG-195
NEXGEN M&S VISION

2024
NIAG SG286
INDUSTRY STUDY

2026
NexGen M&S Bidders Conference
NEXT MILESTONE

NEXGEN M&S

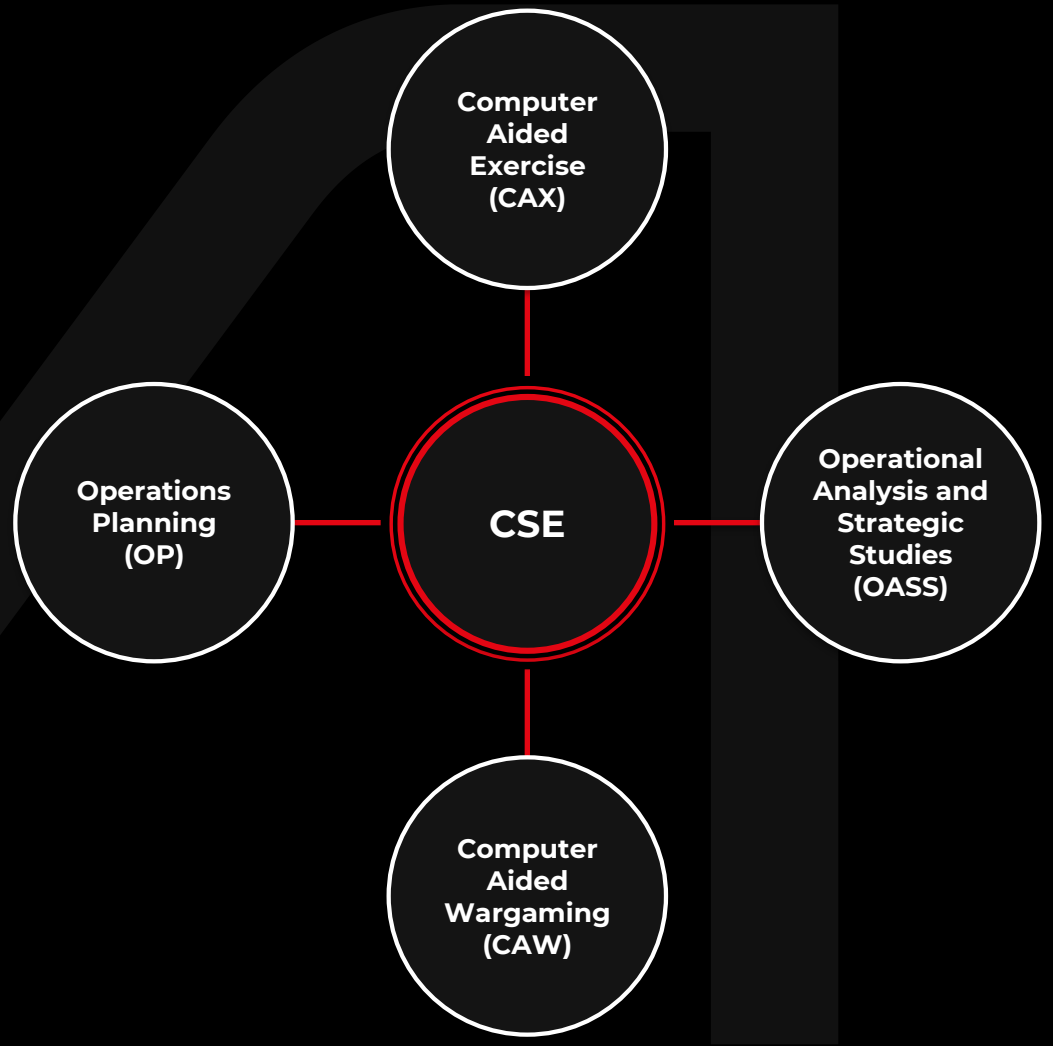
Foundations: DIS, HLA (IEEE 1516-2020) and Federated Mission Networking over two decades

NATO MSG studies (MSG – 136, 145, 176, 195) piloted service-oriented architectures and Modelling & Simulation as a service

NexGen M&S (2026 Bidders Conference) consolidates this into a single Common Synthetic Environment vision

What NATO Means by a Common Synthetic Environment

- A shared foundation of terrain, ORBAT, behavioural models and data exchange — not a single software product
- Enables reuse: one force structure can support analysis, wargaming, training and planning alike
- Must accommodate tiered sensitivity, open source reference data through to nationally validated sovereign datasets



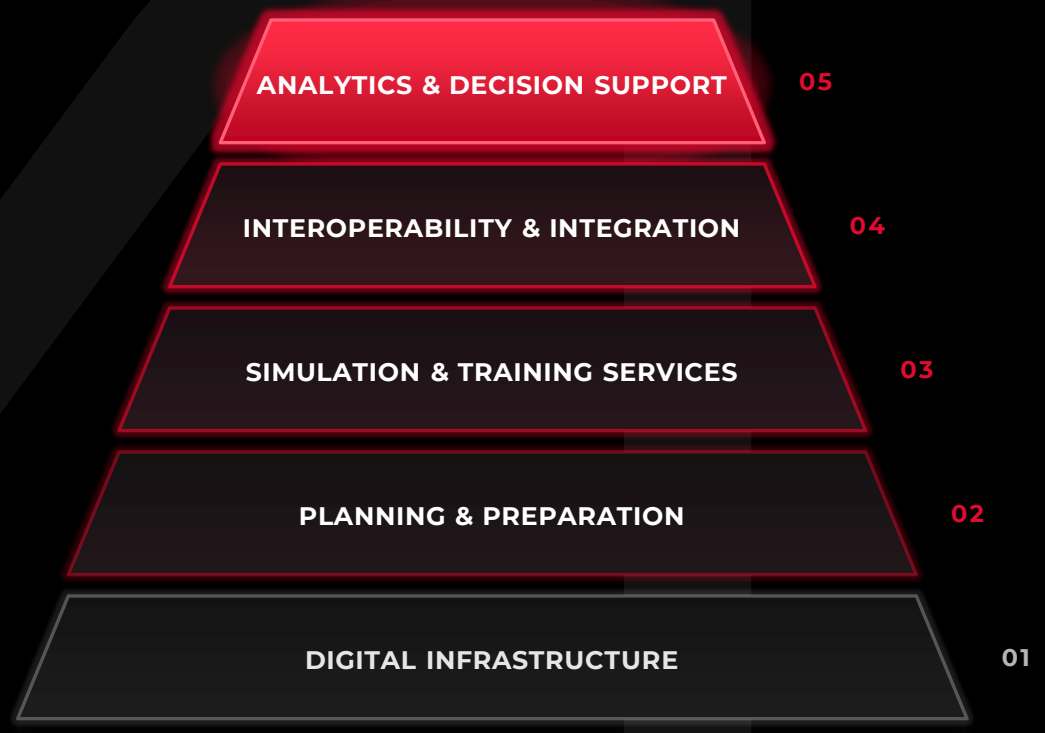
ECOSYSTEM ARCHITECTURE

A Practical Ecosystem Architecture Example

Five layers: Digital Infrastructure; Planning & Preparation; simulation & training services; interoperability & integration; analytics & decision support

AI-assisted services are targeted at scenario generation and analytics, to reduce manpower and specialist-time burden

Interoperability depends as much on API openness and data quality as on standards compliance



FOUNDATION • SERVICES • INSIGHT

ANTYCIP

Sovereignty and the Federation Model

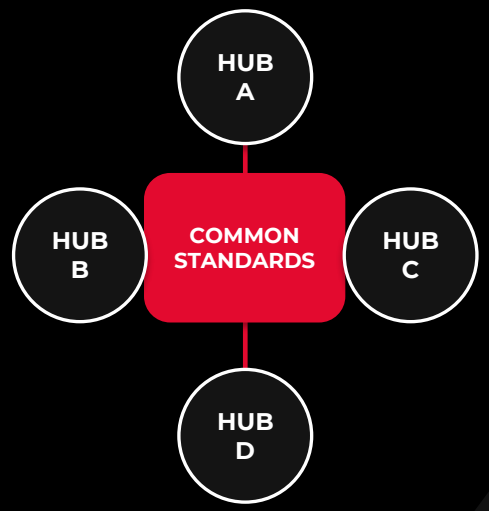
CENTRALISED SYSTEM

ONE
CENTRALISED
NATO SYSTEM

One architecture for every nation

VS

FEDERATION MODEL



Sovereign national hubs linked by common standards

Nations will not converge on identical systems, nor should they be expected to

Real challenge is interoperability while preserving sovereign capability, industrial policy and procurement diversity

A federation of national ecosystems, bound by common standards, may be more realistic than one centralised NATO system

Case study 1: National Ecosystems and AI Services

NATIONAL PROGRAMMES ALREADY MOVING THIS WAY

LS Core 2.0 (Australia)

Constructive, virtual and Command a Post Exercise (CPX) systems federated via shared terrain and scenario repositories

US Synthetic Training Environment

Pursuing AI-assisted scenario generation and information-environment simulation

Ambition, Not Yet Evidence

Both are illustrative of ambition and direction, not independently verified evidence of outcomes

Sources: Australian Army Simulation Wing, SimTecT 2021; Australian National Audit Office, Major Projects Report 2015–16 (JP 2072 Phase 3A); PEO STRI, Synthetic Training Environment Operational Overview, 2022. Programme descriptions, not independently audited outcome data.

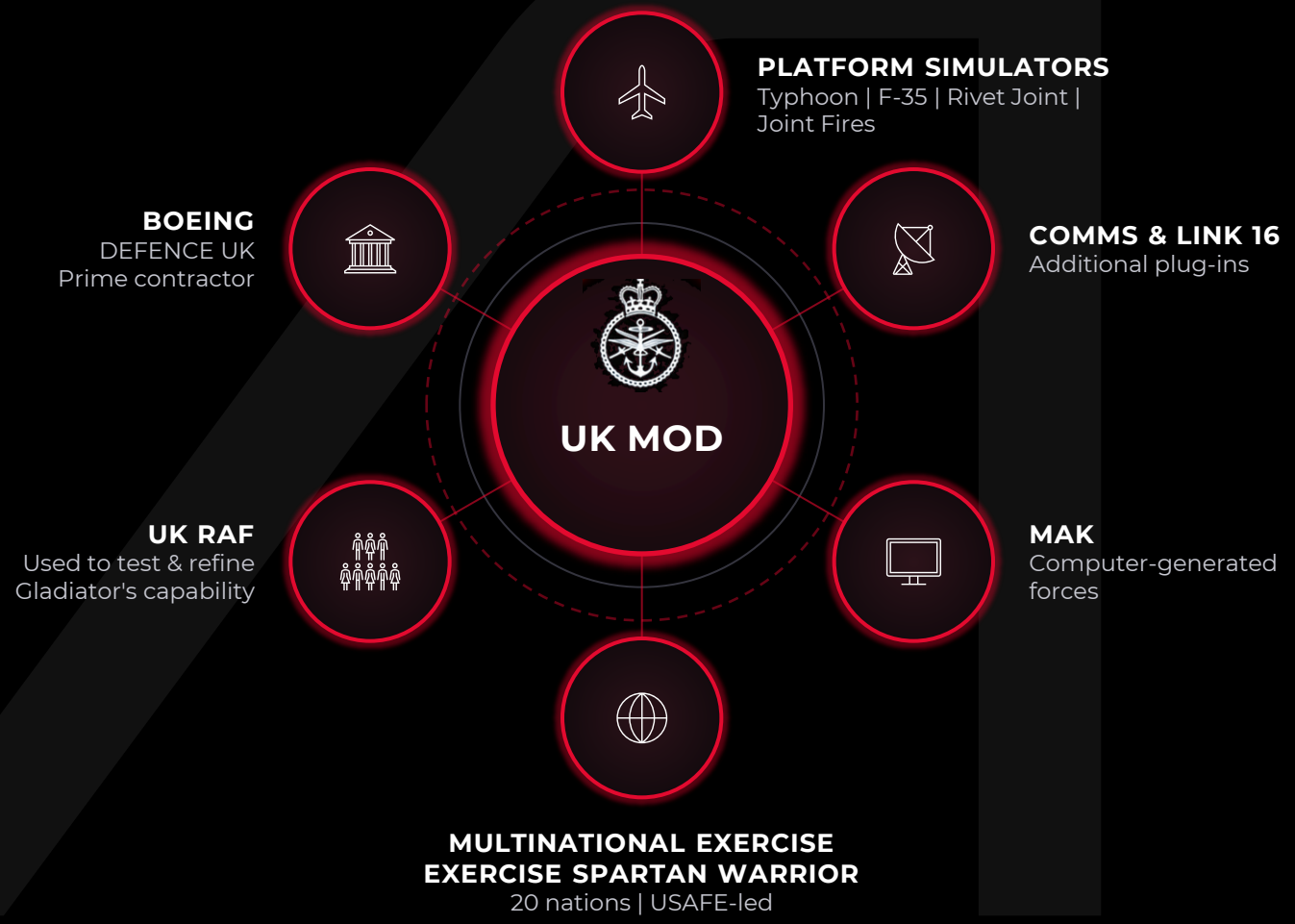
Case Studies II: Interoperability as an Operational Enabler

- RAF Gladiator: MOD-owned system (DE&S-operated) federating training devices from multiple suppliers — Boeing Defence UK as prime, MAK's VR Forces for computer-generated forces, additional plug-ins for comms and Link 16 — into one hub-and-spoke synthetic environment
- Demonstrates integration of existing platform simulators (Typhoon, F-35, Rivet Joint, Joint Fires) into a shared environment, rather than replacing them
- Used as a UK contributing node in the 20-nation, USAFE-led Exercise Spartan Warrior — genuine evidence of the federation model operating in a live multinational exercise, and used by the RAF itself to test and refine Gladiator's capability

Sources: DE&S, “Boeing Defence UK awarded £16.9m contract for Gladiator,” 19 Dec 2025; RAF, “Gladiator completes its first major international exercise,” n.d.; Jane’s, “RAF expands use of Gladiator training environment,” Mar 2026. Core system confirmed MOD-owned and DE&S-operated.

RAF Gladiator: Federating Simulators, Strengthening Readiness

RAF Gladiator is a UK MOD-owned system (DE&S-operated) federating training devices from multiple suppliers.

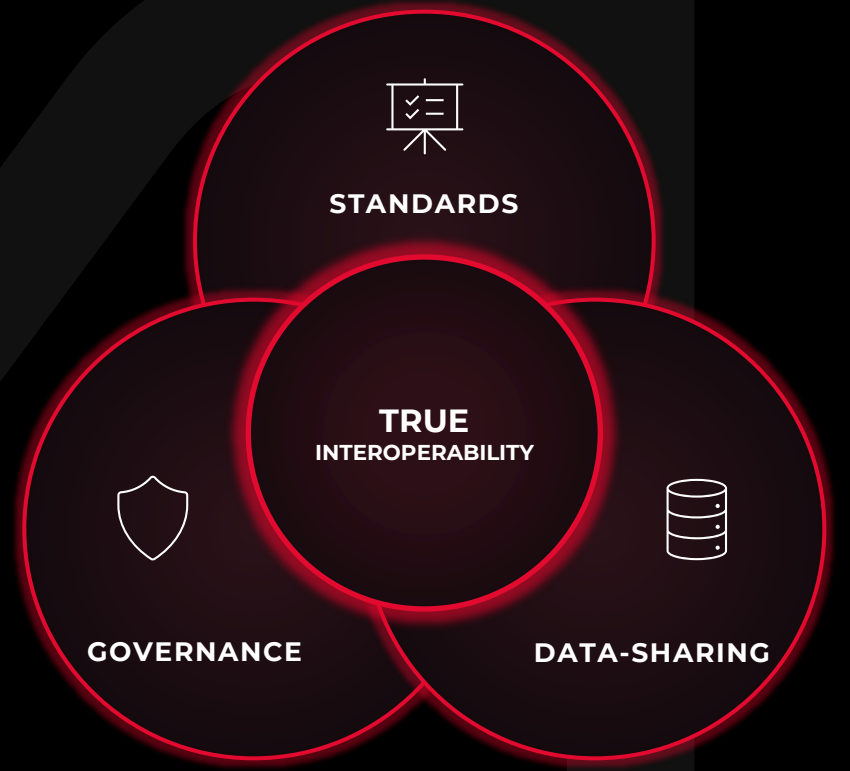


Interoperability: Beyond Standards

Standards compliance (HLA/DIS/FMN) is necessary but not sufficient, implementation and API openness vary widely

Interoperability is a governance, data-sharing and trust problem as much as a technical one

CWIX validates interoperability in practice, but cost and access barriers disadvantage SMEs and smaller nations



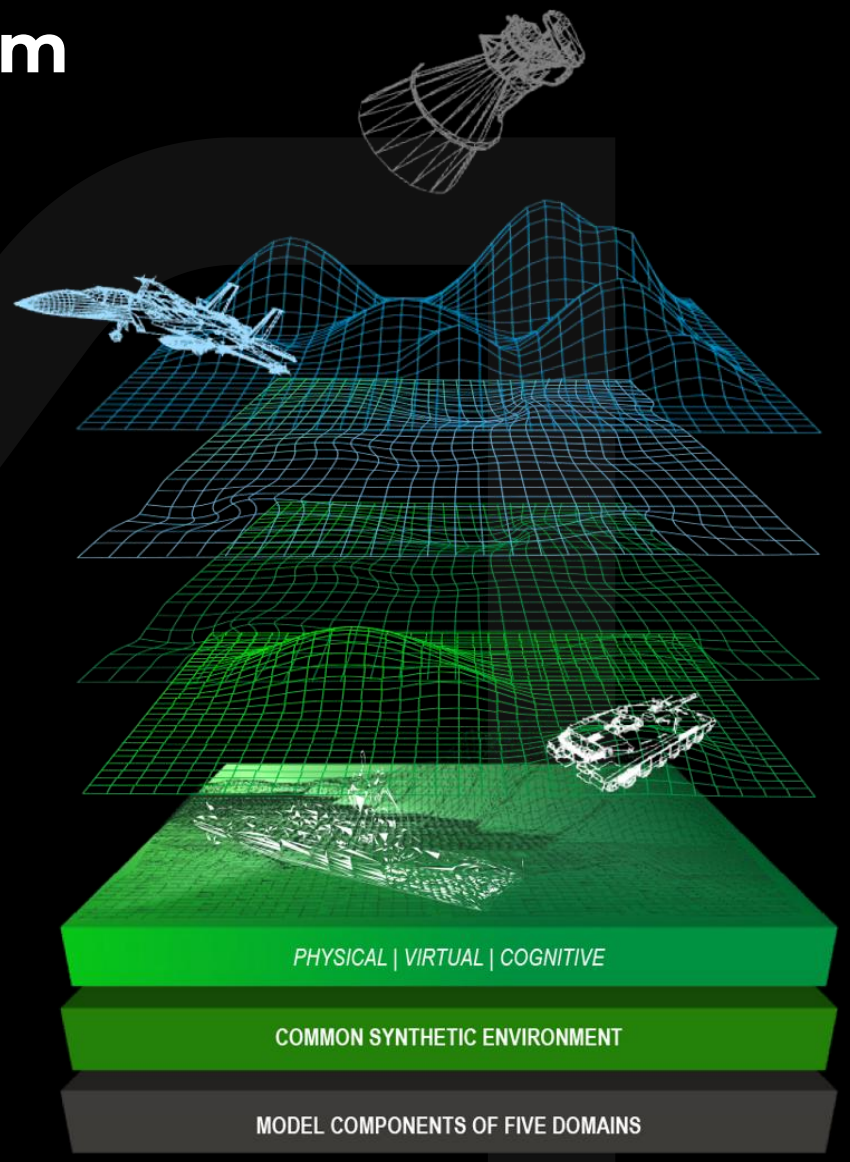
THREE CONDITIONS

ONE OPERATIONAL OUTCOME

Conclusions and Questions for the Forum

- future readiness depends on ecosystems, not standalone
- For nations the opportunity is to adopt ecosystem principles today

- ? How do we transform decades of successful experimentation into enduring operational capability?
- ? Who is responsible for maintaining ecosystem coherence at a national level?



Thank you