TACSIM

AI-Enabled Wargaming for Multi-Domain Operations Readiness

Constructive tactical wargaming and simulation platform

OUTLINE

- constructive wargaming
- product capability
- current AI-enabled CGF
- MDO orientation
- AAR
- interoperability
- VV&A
- conclusion

TACSIM — SCENARIO EXECUTION

TACSIM — TACTICAL SIMULATION ROOM

- **Training without operational risk**
- **Repeatable scenario-based exercises**
- **A pathway to a NATO simulation ecosystem**

CA2X2 = Computer Assisted Analysis, Exercise and Experimentation • CGF = Computer-Generated Forces • • MDO = Multi-Domain Operations • AAR = After-Action Review • VV&A = Verification, Validation and Accreditation

DEFINITION

What TACSIM is

Constructive computer-assisted wargaming platform

Human-in-the-loop scenario control and adjudication

AI-supported simulated-force CGF behaviour

Current AI-supported CGF

> ***"TACSIM contributes to selected MDO readiness functions through repeatable, instrumented and bounded constructive wargaming."***

- Not an autonomous operational decision system
- Not a full all-domain operational-level simulation
- Not a predictive estimate outside a declared VV&A boundary

AI = Artificial Intelligence • CGF = Computer-Generated Forces • VV&A = Verification, Validation and Accreditation

ARCHITECTURE

TACSIM capability architecture

From scenario design to assessment in a closed learning loop

Scenario design
missions, forces, ROE, routes

›

Synthetic battlespace
terrain, weather, sensors, communications

›

Multi-resolution CGF
entities + aggregate formations

›

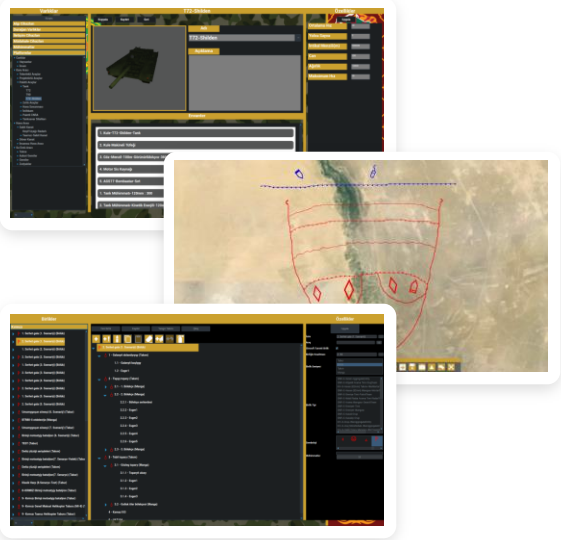
Runtime adjudication
injects, changes, adversary reaction

›

AAR + assessment
replay, metrics, learning closure

Simulation Engine	Scenario Editor	GIS & Map Module
Model Editor	Military Symbology Editor	Unit Identification
Formation & Movement	After Action Review	Communication Layer

Exercise data and recurring deficiencies feed the next scenario design cycle.



SCENARIO & GEOSPATIAL SETUP

ROE = Rules of Engagement • AAR = After-Action Review

CAPABILITIES

TACSIM product capability and model coverage

Operational scale, training environment and interacting model families

Operational capacity

Up to 100 users	100+ platforms	Unlimited scenarios

Training environment

- 2D map-based command view and 3D simulation view
- Touch-enabled tactical control, including large tactical-table configurations
- Expandable architecture with adjustable model fidelity

CONSTRUCTIVE SIMULATION RUNTIME

Model & training coverage

Vehicles | sensors | weapons | communications | human / neutral entities

Risk-free rehearsal | tactical-plan testing | repeatable scenario experience

2D = two-dimensional • 3D = three-dimensional

WORKFLOW

Scenario lifecycle and mission scope

From scenario design to after-action review across reusable tactical missions

Design
missions • routes
ROE • forces

Execute
blue/red teams
instructor control

Inject
events • friction
new tasks

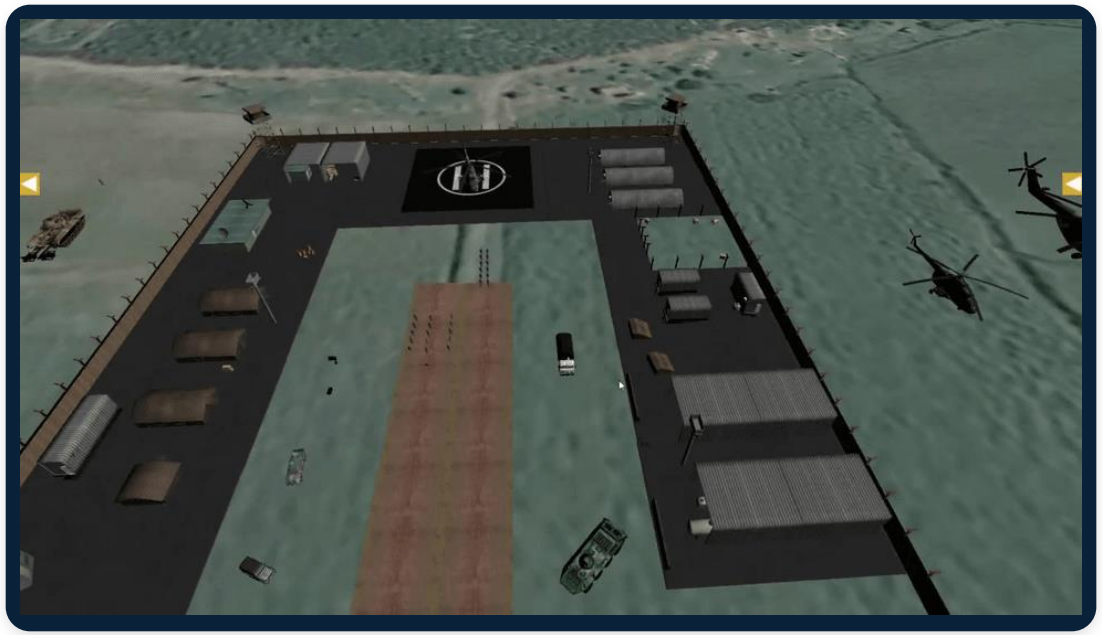
Record
logs • state
histories

Assess
AAR • replay
reports

Instructor as white cell

The instructor can shape the exercise during runtime, introduce uncertainty, modify plans and follow all feedback through the instructor console.

TACSIM SCENARIO LIFECYCLE



Representative missions

- border security
- river / sea border
- combined arms
- fire support
- air defence
- engineering / mines

Current AI-supported capabilities in TACSIM

Current AI-supported entity control

- behaviour functions and command capabilities
- intelligent path-finding and script-based control
- instructor-governed scenario behaviour

Controller workload reduction

- reduces controller workload while preserving white-cell control
- supports larger blue/red/neutral force scenarios

current AI supports simulated-force control; doctrine-informed and explainable AI are planned roadmap items.

CGF RUNTIME ENVIRONMENT

Behaviour functions

Command capabilities

Intelligent path-finding

Script-based control

SME = Subject Matter Expert

Illustrative MDO vignette

A bounded tactical vignette mapped to measurable MDO readiness dimensions

TACSIM RIVER-CROSSING SCENARIO

Readiness dimensions

cognitive | procedural | effects | interoperability | data | assessment

ISR delayed	Delayed observation / uncertainty
Comms degraded	Reduced C2 tempo / alternate reporting
Air-defence threat	Constrained aviation and ISR windows
Engineer bottleneck	Crossing timing and exposure
Branch decision	Activate sequel before tempo is lost

Assessment questions

- Did the staff identify dependencies?
- Were fires, movement and airspace synchronized?
- Were branches activated before tempo was lost?

The scenario can be replayed under alternative Courses of Action (COAs), adversary reactions and degraded-environment assumptions.

ISR = Intelligence, Surveillance and Reconnaissance • C2 = Command and Control

DECISION SUPPORT

COA analysis and AAR

Training value comes from disciplined replay, comparison and assessment

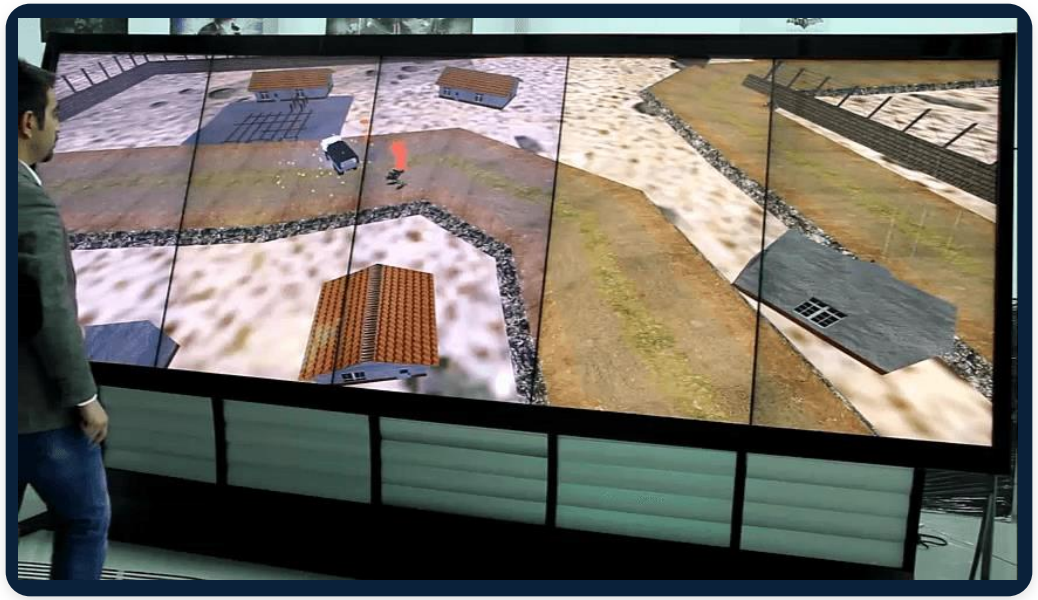
Plan COA A/B → Run scenario → Replay events → Extract metrics → Improve next design

Example indicators

- Decision tempo
- Cross-domain synchronisation
- Information quality
- C2 resilience
- Operational risk
- Learning closure

AAR should explain not only what happened, but which decisions, assumptions and coordination failures produced the outcome.

SCENARIO REPLAY & ASSESSMENT



NATO simulation ecosystem integration

The decisive property is credible federation, data exchange and reuse

Runtime federation	HLA / IEEE 1516 • STANAG 4603
Semantic alignment	AMSP-04 • NETN-FOM v4
Service composition	DIS / RPR FOM where required
Engineering process	DSEEP / IEEE 1730
Scenario + C2 exchange	C2SIM

Maturity evidence required

- Implemented interface version
- Run-Time Infrastructure / gateway details
- FOM / SOM mapping evidence
- Federation test results
- Accreditation boundary

Position TACSIM as a constructive node that can mature through tested, standards-based federation evidence.

HLA = High Level Architecture • DIS = Distributed Interactive Simulation • RPR FOM = Real-time Platform Reference FOM • NETN-FOM = NATO Education and Training Network Federation Object Model
DSEEP = Distributed Simulation Engineering and Execution Process • C2SIM = Command and Control Systems–Simulation Systems Interoperation • AMSP = Allied Modelling and Simulation Publication
IEEE = Institute of Electrical and Electronics Engineers • STANAG = Standardization Agreement • SOM = Simulation Object Model

Proposed AI capability roadmap

Planned AI extensions that Simsoft can propose while protecting credibility and VV&A discipline

Near-term AI productisation

- AI-assisted scenario drafting
- Automatic scenario variants
- Behaviour parameter templates

Operational AI extensions

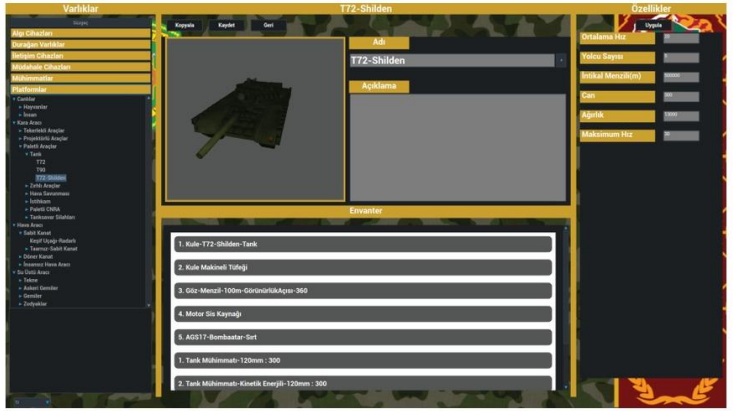
- Adaptive OPFOR behaviour
- Intelligent inject recommendations
- EW / cyber / ISR-latency effects

AI-assisted AAR analytics

- Decision-tempo analytics
- Recurring deficiency detection
- Role/team performance summaries

AI credibility controls

- Explainability logs
- SME validation workflow
- VV&A evidence pack



Current capability: behaviour functions, command capabilities, path-finding and script-based control.

Planned AI: doctrine-informed libraries, explainability logs, adaptive OPFOR and AI-assisted AAR.

OPFOR = Opposing Force • EW = Electronic Warfare

VV&A discipline and limitations

Constructive outputs are useful only inside a declared model boundary and validation envelope

Verify

built correctly against specifications

Validate

sufficiently accurate for intended use

Accredit

accepted by authority for defined purpose

Interoperability maturation

HLA / NETN / C2SIM mapping, federation testing and explicit maturity evidence

Non-kinetic effects

EW, cyber degradation, ISR latency, information-related injects

Explainable CGF improvement

doctrinal rules, traceability, controlled data-driven models

Assessment science

MDO metrics, AAR data models, learning analytics

Credibility requires explicit capability claims, interoperability maturity and VV&A boundaries.

VALUE PROPOSITION

Closing position

From tactical training product to ecosystem-ready constructive simulation capability

TACSIM is a practical constructive wargaming capability today, with current AI-supported CGF behaviour and a credible maturation path toward interoperable, AI-assisted MDO readiness analytics.

Product value

risk-free, repeatable tactical training

Training value

COA comparison and instrumented AAR

AI value

current AI-supported CGF + planned explainability roadmap

NATO value

HLA/NETN-FOM/C2SIM/DSEEP maturity path

DESIGN. EXECUTE. ASSESS. IMPROVE.

Design → Execute → Assess → Improve

We are ready to cooperate to fully meet NATO's needs with TACSIM

Thank You

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