



BATTLESPACE SIMULATIONS

Don't settle for only part of the battlespace

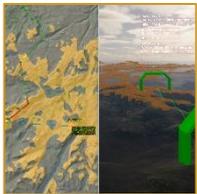


Conflict is often determined by what is not seen, such as: Beams and Waves (Lasers, Radars, RF and IR), Countermeasures (Decoys & Jamming), Communications (Radios & Datalinks). BSI specializes in multi-domain combat simulation & analysis in near-peer threat environments, simulating the entire battlespace, seen and unseen using our flagship products: **MACE**, **ARMOR**, and **Merlin**.

Together these applications provide:

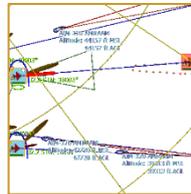
Pulse-level fidelity – Physics-based movement – Worldwide geo-specific terrain – Integrated AI capability

WHAT PEOPLE USE OUR PRODUCTS FOR



Mission Planning Analysis & Rehearsal (MPAR)

- Uses worldwide GIS data and Mil data to create battlespaces
- Import/Export to mission planning systems formats
- Simulate, iterate, visualize & analyze with diverse toolset



Computer Generated Forces

- Multi-domain simulation of tactical platforms & pattern of life
- Driving full mission simulators & distributed simulation
- DMON and CAF-DMO certified



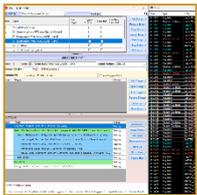
Joint Fires Training

- Accredited as part of national JTAC training
- Train with accurate weapon, flight, and threat models in contested battlespace
- Out-of-the-box integration with DACAS systems



sUAS / ISTAR Training

- Offensive and defensive UAS missions
- Simulate all critical aspects – EM effects, accurate sensor views
- Train, analyze, plan and rehearse in contested EM battlespaces



Operational Analysis

- High detail user-definable content and model parameters
- Constructive scripting engine and code scripting interfaces
- Control multiple scenario iterations & logging



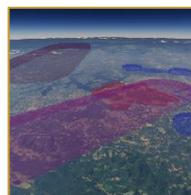
Live Virtual Constructive Simulation

- Live connection with military systems
- Drive synthetic tracks in real-world systems
- Drive software defined emitters stimulate real protection systems



EW Training & Testing

- Complex IADS creation, interaction and editing at pulse-level
- Physics-based countermeasure evaluation
- Multiple visualization and analysis tools



Battlespace Management

- Create battlespace management products for real operations
- Import/Export battlespace data military formats
- Edit, assess, create new, and export.



Targeted Fidelity Aircrew Training

- User-configurable flight modes
- Avionics and combat displays
- Dynamic cockpits in a high detail 3D multi-spectrum virtual environment



Specific Device Training

- High detail functional equipment emulation
- Integrated into battlespace simulation attached to any entity
- Train device specifics in realistic contested environments

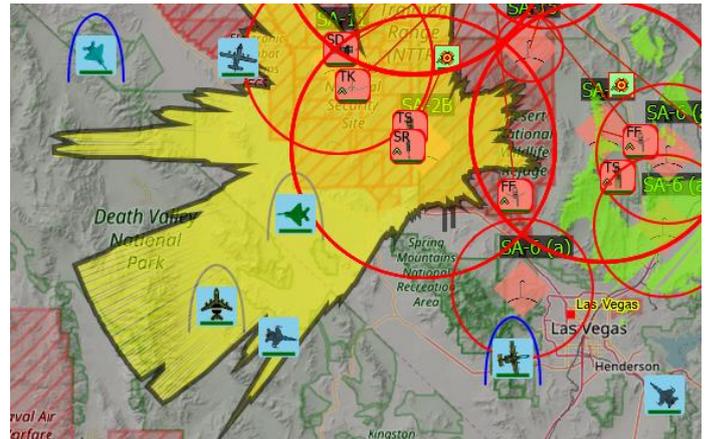
MACE

MACE is a Windows application and framework capable of performing multi-domain simulation and analysis within operational scenarios, in contested, near-peer adversary environments. It performs physics-based many-on-many simulations, using pulse-level modeling of the electromagnetic spectrum. Detailed simulation of threat environments and precise modelling of sensors enables users to create highly relevant, accurate battlespaces with high fidelity engagements and behaviors.

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WORKFLOW: Build and execute scenarios by selecting, dragging, dropping onto a mission area, configuring: platforms, equipment, and autonomous or semi-autonomous behaviors. MACE is built upon a mature Geographic Information System (GIS) core, it has a 2D mission area view of the 3D environment, supporting multiple standard GIS map, elevation & imagery formats.

PHYSICS-BASED SIMULATION: MACE is a real-time physics-based simulation; modeling platform motion such as aircraft, ground vehicles, surface vessels, satellites, and weapons. It models all the C3 networks and sensors required to make a fully realistic scenario.



The simulation can be fully constructive (hands-off), semi-autonomous, or full human in the loop.



SIGNAL GENERATOR ENGINE: MACE simulates the electromagnetic spectrum (such as electronically scanned radar systems typical of 'double-digit' threat systems, multimode seekers, datalinks and jammers) at the pulse-level. It models all RF (radio and radar) transmitters and receivers for all entities in the MACE mission, and infra-red signal generation and detection. Users can define all types of emitters with multiple parameters (e.g. beam properties, scan and pulse patterns). This is all managed by the Signal Generation Engine (SGE).

USER EDITABLE & EXTENSIBLE DATABASE: Out-of-the-box, MACE comes with an unclassified database; any user (even without developer experience) can extend the MACE order of battle, including new platforms and weapons, movement and emitter models. Edit and adjust the database with accurate data using the same tool as BSI use internally; the Mission Object Configuration Tool (MOCT). For US DOD customers, there is a classified MACE database available for download.

INTEROPERABLE: MACE is ideally suited for both stand-alone scenario creation/mission rehearsal and distributed mission simulation; interoperable with other simulations via the Distributed Interactive Simulation (DIS) and Common Image Generator Interface (CIGI) standard protocols. HLA interoperability is in the planned development roadmap.

SIMULATION FRAMEWORK: MACE is a Simulation Framework that includes a plug-in architecture (C#/ .NET) allowing any software developer to add or modify features and capabilities. Users can also write their own semi-autonomous functions from within MACE itself either using a simple UI or using snippets of C# code. Users have access to all the object models in the MACE mission. This means that your software engineers can add new functionality (e.g. visual displays, custom plugins), change default behaviors and mine data for analysis.

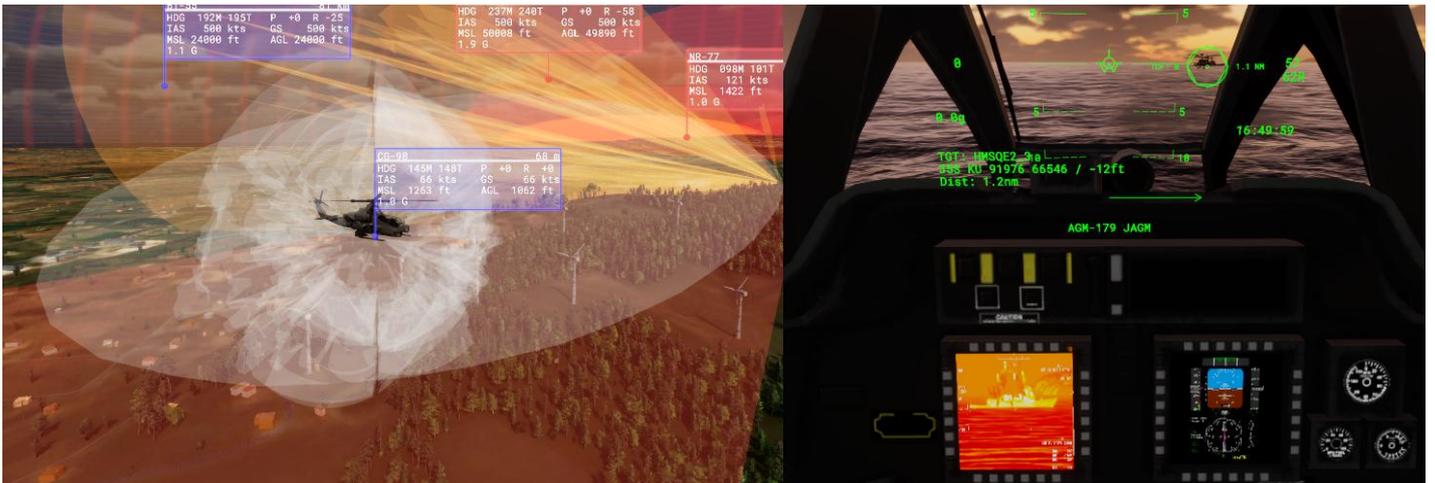
ARMOR

ARMOR is a full-planet, round earth, Unity-based 3D visual image generator (IG). It enables interaction with the simulation from multiple perspectives: from first-person control to table-top planning and sensor viewpoints. It supports multiple visual systems from screens and multichannel systems, virtual and mixed reality. Users can generate ARMOR terrain anywhere in the world without any prior GIS expertise.



INTEROPERABLE IMAGE GENERATOR: ARMOR is a CIGI based image generator and can be used with or without MACE by any application that supports the CIGI 4.0 protocol. ARMOR can run on the same PC as MACE (every full MACE ships with a local copy of ARMOR at no extra charge) or as a standalone image generator on networked PCs.

MULTI SPECTRUM VIZUALISATION: With MACE and ARMOR, you can visualize things you normally can't see e.g. radar beam and scan patterns, jamming corridors, 3D radar cross-sections, route vulnerability analysis, line of sight coverage, sensor frusta etc. – all of which are critical to planning against a sophisticated adversary. Emulated sensor views provide visual and material-based (per pixel modelling) IR spectrums, and Night Vision.



RAPID CAPABILITY DEVELOPMENT: With ARMOR it is possible to develop new capabilities at a very rapid pace by leveraging the huge Unity developer community and vast content catalogue. This results in significantly lower engineering costs than when developing with proprietary engines.

ARMOR is built with COTS procurement in mind; it runs on normal game specification PCs, and you can plug and play with a multitude commercially available XR equipment.

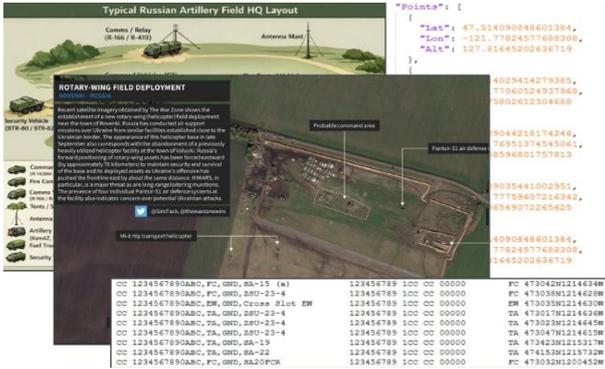
ACCREDITABLE: MACE and ARMOR have already been accredited for the Joint Fires training simulations, replacing live events as part of national JTAC training programs.



BATTLESPACE SIMULATIONS



Merlin is a companion AI agent application designed for MACE. It serves as an intelligent interface that allows users to interact with MACE events and functionality through a natural language chat interface. Merlin is integrated directly into MACE EW. It vastly reduces the technical knowledge required to make scenarios in MACE and allows a multitude of source data to be parsed into MACE scenarios without any programming or reformatting.



TECHNICAL SKILL NOT A BARRIER: Why does this AI-driven technology matter for the Warfighter? Because technical knowledge shouldn't be a barrier to mission readiness. Merlin takes user instructions and makes mission content.

MULTIPLE DATA FORMATS NOT A BARRIER: There is a 'Tower of Babel' problem, where there is so much data that a human cannot easily parse and understand all the different formats. Merlin makes sense of it all and brings it into your MACE missions the way you need.

RAPIDLY BUILD MISSIONS AND CONTENT: You can use the Merlin AI plugin for real world mission planning and rehearsal; reducing time-to-plan. Create complex scenarios by entering text or voice prompts, providing images, maps (and other relevant data in multiple formats). Merlin does the hard work of collating relevant data and getting it into MACE scenarios or creating MACE entities such as complex emitters or large drone swarms, low-risk routing etc. All can be handled by Merlin while you work on other parts of the scenario. Merlin really is your indispensable AI mission planning partner.

User Prompt to MERLIN

File: RUS Helo Base.jpg
Using the diagram of a typical laydown of a Russian of deployed helicopter base place units within the Helicopter base location shape including 4 Hind attack helicopters in the LZ area, on the ground using each of the landing zones points described in the mission context L1 L2 L3. Make sure the helicopters are placed at least 10m from each other but not more than 40m. Make the helicopters all face into wind. Place trucks and command vehicles in the base. Place parameter security vehicles with some at the nodes of the helicopter base shape. Make sure the security forces reasonably evenly spread, facing outward, and are within 100m of the perimeter inside the shape. Ignore the air defence items in the image. Place up to 2 fuel trucks near the Helicopters.

Internet Sourced Recon Photo



MERLIN Final Response

Placed a ****Red deployed helicopter base**** inside the ****Red Forces Helicopter Base**** shape and populated it per your instructions (ignoring any air-defense items from the reference image).

4x Hind attack helicopters (grounded) in the LZ area using L1/L2/L3
Created ****4 grounded Mi-24**** and positioned them using the ****L1/L2/L3**** points as references while ensuring ****all helicopter-to-helicopter spacing is between ~12m and ~34m**** (meets your ****10-40m**** requirement):

- ****RED-HIND-01**** at ****L1****
- ****RED-HIND-02**** near ****L2**** (slightly offset to meet spacing)
- ****RED-HIND-03**** near ****L3**** (slightly offset to meet spacing)
- ****RED-HIND-04**** near ****L2**** (extra pad position inside the LZ area)

****All 4 helos are facing into the wind:**** heading set to ****060**** (wind from 060° per mission weather).

Fuel trucks near the helicopters (up to 2)
****RED-HB-FUEL-01**** (Ural-4320, Green) near the helos
****RED-HB-FUEL-02**** (Ural-4320, Green) near the helos

Trucks + command vehicles inside the base
****RED-HB-CP-01**** (ZIL-131CP) placed in the base support/command area
****RED-HB-TRK-01**** (Ural-4320, Green)
****RED-HB-TRK-02**** (Ural-4320, Green)
****RED-HB-CMD-02**** (GAZ-66)

Perimeter security vehicles (inside shape, within 100m of perimeter, outward-facing)
Placed ****8x BTR-80**** security vehicles ****inside the helicopter base polygon****, distributed around the perimeter with ****some positioned near the polygon's corner nodes****. All were set ****facing outward**** (heading away from base center) and placed ****~30m inside the perimeter**** (well within your ****100m**** requirement):

- ****RED-HB-SEC-01**** .. ****RED-HB-SEC-08****

Posture/settings

- All new units set to ****Red****
- Security and helos set ****Weapons Free**** and ****Passive engagement posture**** (consistent with how you've been configuring Red forces so far)

Results in MACE and ARMOR

