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MACE 2021 R1 – What's New

Hello everyone! Today we are happy to announce that MACE 2021R1 is now available for download as an official release. Before we get into our summary of the new features, we would once again like to express our sincere appreciation to all of our customers and especially those who engage with us to help us continuously improve MACE. It is extremely fulfilling for us to see people using our software. If you are a MACE user and find yourself saying "if only these guys would add such and such a feature, it would make my life so much easier/help meet additional training objectives" – then please tell us! Many of the best ideas for MACE improvements come from you, our existing customers.

We'd also like to extend our thanks to everyone who attended our fourth annual MACE User's Group (MUG) a few weeks ago in Ft Walton Beach. We had a record turnout (just under 80 people!) with attendees from the Air Force, Navy, Army, Guard/Reserve and of course our industry partners. We are looking forward to next year!

There are many improvements in this version of MACE; this document contains a summary of those improvements, but if you encounter any changes to the MACE user interface not mentioned in this document, please reference the MACE 2021R1 User's Manual (which installs with MACE).

BSI Worldwide Imagery

BSI has added support for Sentinel 2 cloudless 10-meter worldwide imagery, a highly performant Spherical Mercator imagery set that covers the entire world. This imagery set is not distributed w/ MACE, but it is available on our BSI Worldwide GIS Data drive along with our other worldwide GIS data sets, like ALOS 30-meter CDB elevation, worldwide land use data, and, of course, our Open Street Maps (OSM) database. With these tools, MACE gives you the ability to also generate highly detailed terrain for anywhere in the world for use in BSI's 3D visualization framework, ARMOR.





BSI Worldwide imagery also blends beautifully w/ BSI's Open Street Map tiles.



To find out more about BSI's worldwide GIS dataset, please contact support@bssim.com.

UI Enhancements

Touchscreen Map Controls Plugin

This plugin permits touch screen users to zoom their MACE map or center on an entity using the touch screen. Note: This plugin does not install with MACE, but it available upon request.





Layer Manager

We've extended the layer manager to give the user more control over what information is drawn on the MACE map. These enhancements include

- Added option to always show selected information on platforms or weapons, as well as engagement rings (solid for air, dashed for ground).
- Extended the layer manager with additional options for filtering by team, and for displaying specific information for things like datalink tracks.



MACE MAP

The sun position is now displayed on the MACE map. It displays the real-world position of the sun as the mission progresses. Since MACE models the sun, and the sun can affect the ability of IR weapons to lock onto targets, knowing where the sun is during an engagement can be quite useful. Additionally, the sun icon displays the transition to both civil and nautical twilight as the sun rises and sets, transition times that can be essential during mission planning.





The text size used for drawing entity text on the map (i.e. callsigns, labels, etc.) is now user scalable:



UI programmable weapons

A significant enhancement in MACE 2021 are weapon specific designated points of impact, impact parameters, and laser designator PRF codes that are programmable via the weapons property dialog.





EZ Buttons and Favorite Platforms

MACE EZ IADS, EZ Traffic and EZ Lifeforms now have a "Use Favorites Only" checkbox. With this checked, MACE will only use entities marked as a 'favorite' in the mission builder during EZ entity generation.



Behavior Improvements

MACE 2021R1 adds support for trains that stay linked while following their route. Can be attached to OSM railroads for excellent correlation with image generators.



We've also added the ability to specify "control indices" so weapons can operate with or independently from one another. You can now also specify "tracking Indices" so weapons can be associated to specific tracking RADARs. This expands and enhances MACE's ability to more accurately model very complex weapon systems with complicated engagement rules and hierarchies.



Object Configuration		Platforms		-	Port RIM-116 Launcher (Control #1 / Tracking #6)	Ŧ
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ATO-to-MACE Equipment Mappings		Aircraft Carr	ner (George Bush / CVN //) ents		Misc	
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EM Aeros		RIM-1	I62D ESSM:Port RIM-162 Launcher		Vbs Barrel I D (min=0, max=255, inc=1) 0	
FFM Aeros		RIM-1	162D ESSM:Starboard RIM-162 Launcher		Boresight Azimuth_deg (min=-360, max=360, inc=t 270 Boresight Elevation_deg (min=-90, max=90, inc=1) 45	_
Heads-Up Display		RIM-1	16 RAM:Port RIM-116 Launcher 16 RAM:Starboard RIM-116 Launcher		Azimuth Limit_deg (min=0, max=360, inc=1) 180	
Helicopter Aeros		AN/SI	PS-48E:SPS-48 Radar		Control Index (min=0, max=25, inc=1) 1	
Hydrodynamics		- AN/SI	PQ-9B:SPQ-9 Radar		Tracking System Index (min=0, max=10, inc=1) 6	
Known Places		- Sparr	ow Illuminator:Port Mk 91/95 Radar			
Missile Aeros		Sparr	ow Illuminator:Starboard 2 Mk 91/95 Radar			
Platforms		Sparr	ow Illuminator:Port 2 Mk 91/95 Radar			
Weapon Engagement Zones		🕀 - Hard Poi	nts			0
Emitter Editor		···· Port F	RIM-116 Launcher (Control #1 / Tracking #6) RIM-162 Launcher (Control #2 / Tracking #4)			đ
Threat Libraries		4 Starb	oard RIM-162 Launcher (Control #3 / Tracking #3)	4		NOC
		SPQ- Starb SPS-4 SPN-1	9 Radar 9 Radar bard Mk 91/95 Radar (Tracking #3) 48 Radar 43 Radar			
Tools 🔦	:	SPS-4	49 Radar			
Ballistic Aero Visualization		Starb	oard CIWS (Control #5 / Tracking #1) CIWS (Control #6 / Tracking #2)			
Missile Aero Visualization		Port M	/lk 91/95 Radar (Tracking #4)			
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Weapon Damage Effects		E Hirerait Can	ter (Ceraia T Ford/ CVIV70)			

Mission Rehearsal and Route Analysis Tool

This new mission planning and rehearsal plug-in for MACE-EW provides an abundance of easy-to-use features:

- Line Of Sight (LOS) tab generates 'splat maps' for target AGL and MSL values. Also displays the inverse with a Height Required for LOS feature and an elevation profile window.
- RADAR detection splat map for targets at various elevations as well as a selected target. Target RCS is determined by user or by aspect of the selected target. This is an improved version of the mask analysis tool (which remains a core feature of MACE) in that it uses a double knife-edge diffraction algorithm (Deygout).
- Radio / ESM splat map generation displays RF reception at all points determined by AGL/MSL and includes multiple peak terrain diffraction determined by the Deygout Principle Edge Method. Receiver sensitivity is user definable.
- Route evaluation this tool color codes areas along the route where weapons may hit, tracking is
 reduced by MTI Doppler notch, or tracking is impossible due to direct and indirect terrain
 masking (for a demonstration of this feature, please see <u>this video</u> and also <u>this video</u>.
- Weapon Flyout Evaluation runs a weapon launch against a use defined maneuver at any point along the route. Flyout may occur in both real time and accelerated time. Results from multiple runs are visible in a history window. For a demonstration, <u>click here</u>.
- Range Plot displays a graph of time vs. distance from threat of the chosen route.





Mask Analysis

MACE's mask analysis tool now has options to color by radar type, draw all Search radars, and draw all Acquisition/Height Finding radars.



Tactical Datalink Enhancements

MACE 2021R1 brings with it native control of Network Enabled Weapons (NEWs) from within MACE. Third party software is no longer required to send and receive J11 messages.



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Environ	CE Mission Se	ttings ink Beh	eviors Agg	egates	Database						-	0	

MACE can now encode, decode, and draw shape geometry encoded in J3.0 messages, both MACE originated or those received externally from real world systems.



MQ-9 Overlay

This plugin mimics real-world MQ-9 overlays so users can create Pilot / Sensor operator stations. Intended for use with MetaVR's (now MVRSimulations) Virtual Reality Scene Generator (VRSG). Note: This plugin does not install with MACE, but it available upon request (for US customers).

Mission Management

Role Player Manager



The role player manager plugin gives centralized control over multiple client training stations, permitting a single instructor operator station to initiate MACE-to-MACE transfers or instruct remote client stations to load specified shapes files.

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	Eagle12					Blue 1					-
	Eagle13					Blue 1					-
	Su-27_2					Red 1					-
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	Su-27_8				Red 1					-	
•	E-3AWACS_	1				AWAC	s				-

LVC Enhancements

Link16 Entity Creator Plugin

The Link16 Entity Creator plugin enables MACE to create user specified entity instances from received J2 or J3 datalink tracks. This permits MACE to engage those entities using constructive or virtual weapon systems within the scenario. This allows for very tight integration of MACE with a live training scenario.

🖳 Link	16 Entity Creator						2	_		×
File	J2									
Entities	s Settings									
E	nable									
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J2 PF	LI Entity Mapping:									
	Domain (Sublabel)		Platform	Track Block Start	Track Block End	Default Callsign	MACE Type	•		^
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	Air (2.2)	-	Any/No Statement	• 01001	01001	JEDI01	FA-18F		•	
	Air (2.2)	-	Any/No Statement	01002	01002	JEDI02	FA-18F		•	
	Air (2.2)	-	Any/No Statement	 01003 	01003	TIGER03	Typhoon		•	
	Air (2.2)	-	Any/No Statement	• 01004	01004	TIGER04	Typhoon		•	
	Air (2.2)	-	Any/No Statement	01005	01005	SABRE05	Typhoon		•	
	Air (2.2)	-	Any/No Statement	01006	01006	SABRE06	Typhoon		•	
	Air (2.2)	-	Any/No Statement	• 01011	01011	VEGAS11	F-16CJ		-	
	Air (2.2)	-	Any/No Statement	01012	01012	VEGAS12	F-16CJ		-	



VMF Gateway Plugin

Send and receive raw VMF messages (meaning, without the DIS header) to communicate with real world VMF capable systems. Note: This plugin does not install with MACE, but it available upon request.

💀 VMF Gateway	_	×
Network Finabled Transmit Port: 1581 Address: 127.255.255.255 Receive Port: 1581		
Status		^
		 ~

Air-to-Air Improvements

BSI has developed several new plugins that expand the air-to-air capabilities of MACE. These include:

Spider Card Plugin

The Spider Card plugin enables a global depiction of cursor bullseye position, the drawing of a customizable range and bearing overlay around the bullseye location, the ability to quickly drag a temporary range and bearing cursor, and the global drawing of all entity icons using just the platform outline and its associated team color. This can be useful to customers seeking to use MACE for runtime management of air-to-air scenarios or for traditional weapons school style debriefs.

Note: This plugin does not install with MACE, but it available upon request.





C2 Manager Plugin

The C2 Manager plugin turns the MACE map into a very capable analog of an AWACS C2 control console. Note: This plugin does not install with MACE, but it available upon request (for MACE-EW licensees).

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Þ	BC00		Su-27	Pending -	Mountain 113/52.2	12250	952									
	BC00	2	Su-27	Pending -	Mountain 101/60.5	12328	935									Eagle11
	BC00		Su-27	Pending 💌	Mountain 114/59.8	12279	935									24.0k/520 kts 30-1603
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	2000	Eagle 12	F-15C	Friendly <a>	Mountain 114/22.0	24000	520			1602						
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Tactical Display Stores Management System (SMS) Plugin

The MACE tactical display now has a stores management system that gives full control over the management of on-board stores, to include release quantity and interval (MACE-EW only).





Improved RADAR Cross Sections (RCS's)

MACE has undergone a series of 3D RADAR Cross section improvements. These enhancements include:

- An RCS Editor has been added to the SGE emitter editor. Our first graphical RCS editor is now available for use at the top of the Emitter Editor in MACE. From the editor, loading, adding, and editing RCS values during runtime is possible.
- RCS XML Data MACE now stores all RCS data for a platform in a single XML file that contain multiple frequency and polarization aspects.
- User RCS data folder added that is searched by MACE before using the default data from BSI.
- Generated RCS Data BSI has expanded the default repository of RCS data by using CAD RCS to generate high quality values for air and sea platforms as well as weapons.
- RCS Server MACE can now function as an RCS data server that broadcasts DIS RCS Data PDUs based on RADAR requirements of azimuth, frequency, and polarization in order that the minimum number of PDUs is sent.





API Extended

The MACE application programming interface continues to expand in capability and scope, permitting MACE users to further extend MACE's built-in capabilities to better meet their needs. To find out more, access the MACE API documentation via the MACE Quick ribbon's "Help" option.



In addition, we've extended the MACE plugin template and default code script templates to make it even easier to get started making your own tools using the MACE API. You can download the MACE Plugin Template installer for Visual Studio 2019 (.vsix installer) as well as an API developer's guide from https://downloads.bssim.com/.

Performance Improvements

You'll notice several performance improvements in MACE 2021R1, including

• MACE startup time has been cut in half!



- MACE's draw ordering has been improved from an $O(n^2)$ to an O(n) operation
- MACE's internal collision tests have been improved from an $O(n^2)$ to an O(n * log(n)) operation
- Improved Traffic AI

Resources

As a reminder, we have a series of MACE Tutorial Videos posted on our YouTube page. They are the first nine videos posted here: <u>https://www.bssim.com/videos/</u>

There are many other videos posted on our YouTube page as well, designed to demonstrate specific capabilities or new features: <u>https://www.youtube.com/user/BattlespaceSims/videos</u>

If you have any questions please e-mail us @ <u>support@bssim.com</u> and we will do our best to reply within one business day.

Get Your MACE!

You can download MACE from this folder: <u>https://downloads.bssim.com/</u>

Note: The login process has changed; you will need to request an account (click on the 'Request Account' button as shown in the screenshot below:

Client Login									
Username									
Password									
Forgot your password?	Sign in								
Request an Account									

Thanks again everyone, and please let us know if you have any suggestions or encounter any issues with this new MACE.

Best Regards, The BSI Team