



2006 CCRTS

The State of the Art and the State of the Practice

**Situational Awareness Object (SAO),
A Simple, Yet Powerful Tool for Operational C2 Systems**

***Cognitive Domain Issues
C2 Experimentation
C2 Modeling and Simulation***

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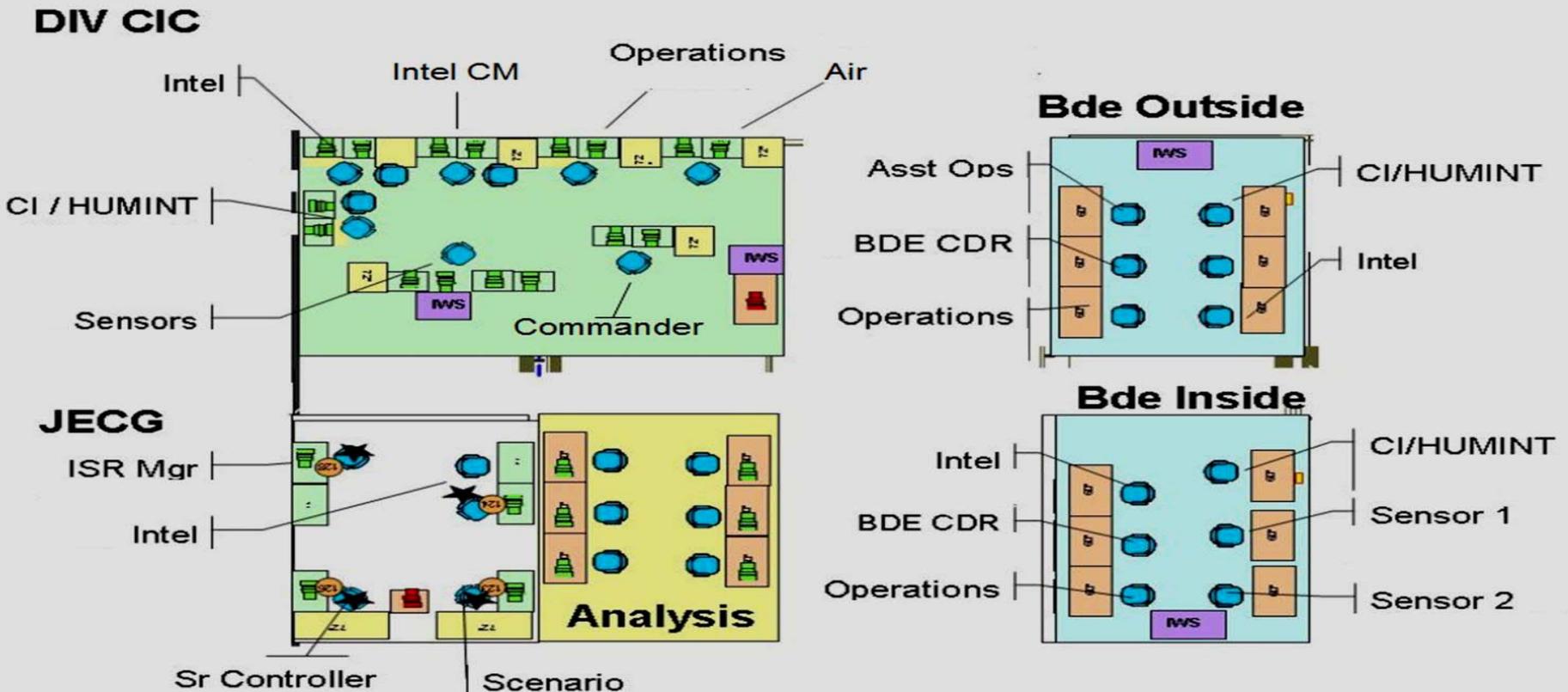
Introduction



- USJFCOM, J9 Modeling and Simulation (M&S) Support Team advanced the capability of distributed simulation in support of Urban Resolve series of experiments.
 - UR Phase 1
 - UR Current Ops
 - UR 1015
- Investigated potential improvements related to C4ISR, organizational, and process improvements for integrating and employing forces, sensors, and systems.
- Human-In-The-Loop (HITL) real-time collaborative experiments
- Situational Awareness Objects (SAOs) used to better understand the impact of new technology and development of command cells, tactics, techniques & procedures (TTPs).

The Environment

- SAO tools developed in Joint Semi-Automated Forces (JSAF) simulation.
- JSAF is an entity-level simulation designed for HITL interactions.
- Runs in real-time
- Entity maneuvers and behaviors are cued, or directed, by the sim controllers and experiment participants.



The SAO

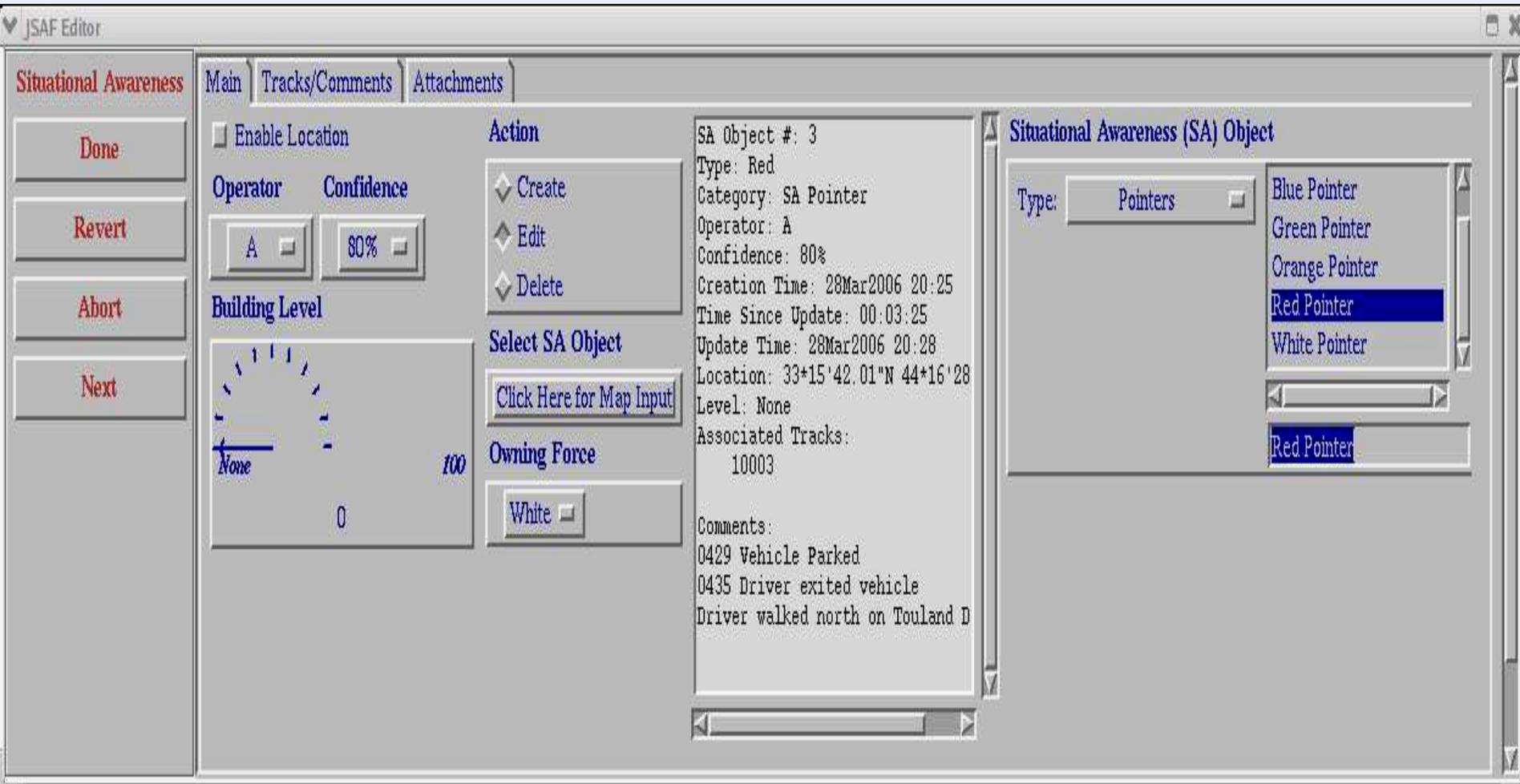
- Compact packages of information symbolically displayed on the terrain map.



- Players to share awareness and understanding of the battlespace regarding activities of the adversaries, blue forces and civilian population.
- Players created SAOs whenever they chose to during event run-time.
- SAOs were entered before run-time to share and display
 - Intelligence Preparation of the Battlespace (IPB)
 - Named Area of Interest (NAIs) and Targeted Areas of Interest (TAIs).

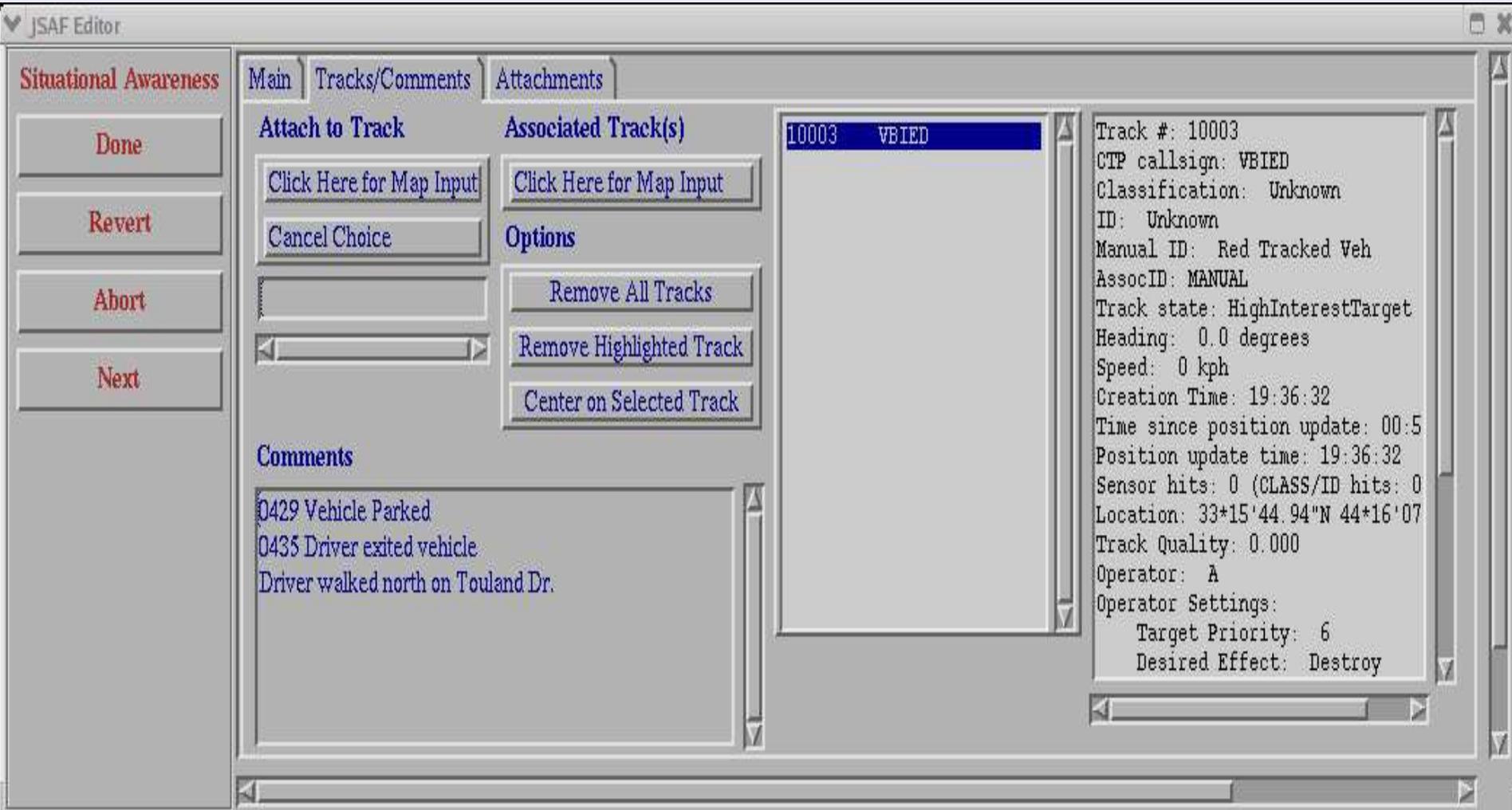
The SAO Editor (Main Tab)

- Players create SAOs using an editor with selectable options.
- Options designed to support tactical and operational objectives.
- SAO formats evolved to include options based on player needs.



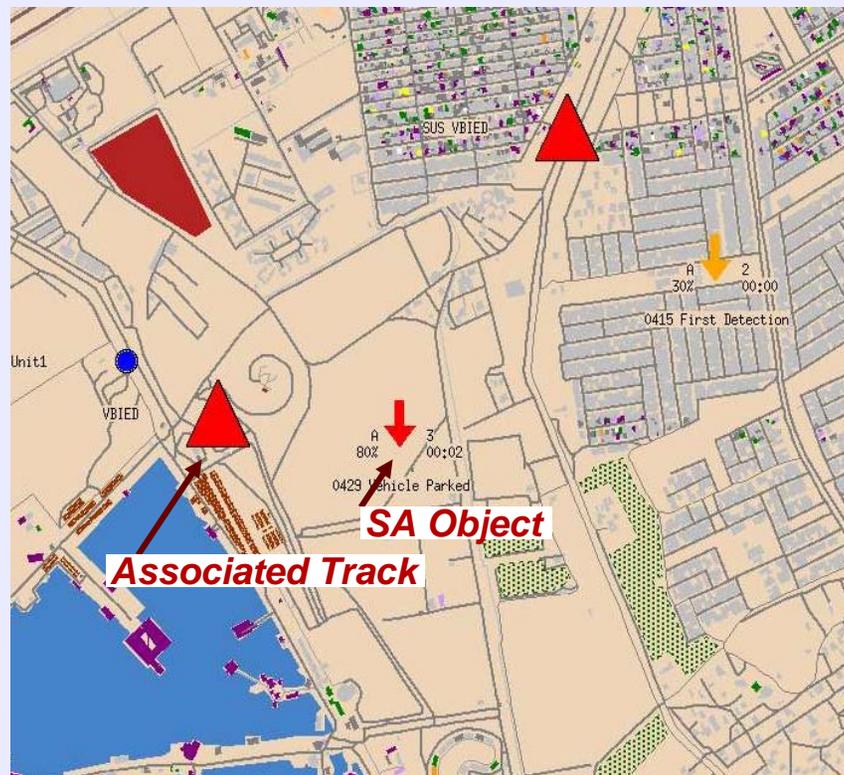
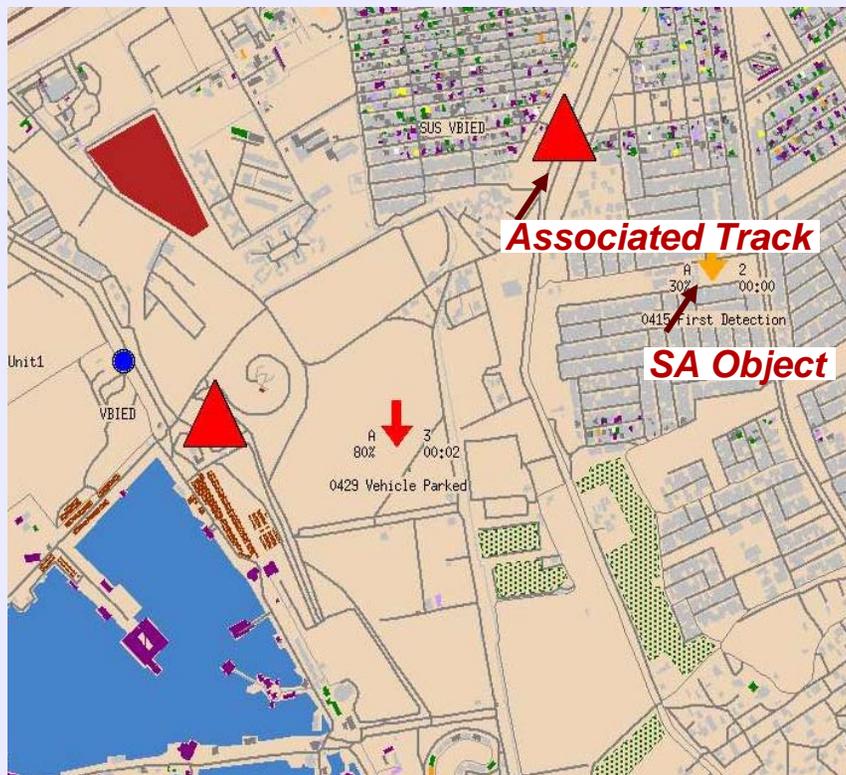
SAO Editor Tracks/Comments

- Players associate sensed tracks and other SAOs.
- Players attached SAOs to track objects, so that they moved with tracks.



SAO Attach Feature

- When players select an SAO, the SAO Editor opens and arrows on the map point to all the associated tracks, which helped to support collaboration and review.
- Upon return to an SAO after lapsed time, arrows indicate where the associated tracks had moved.



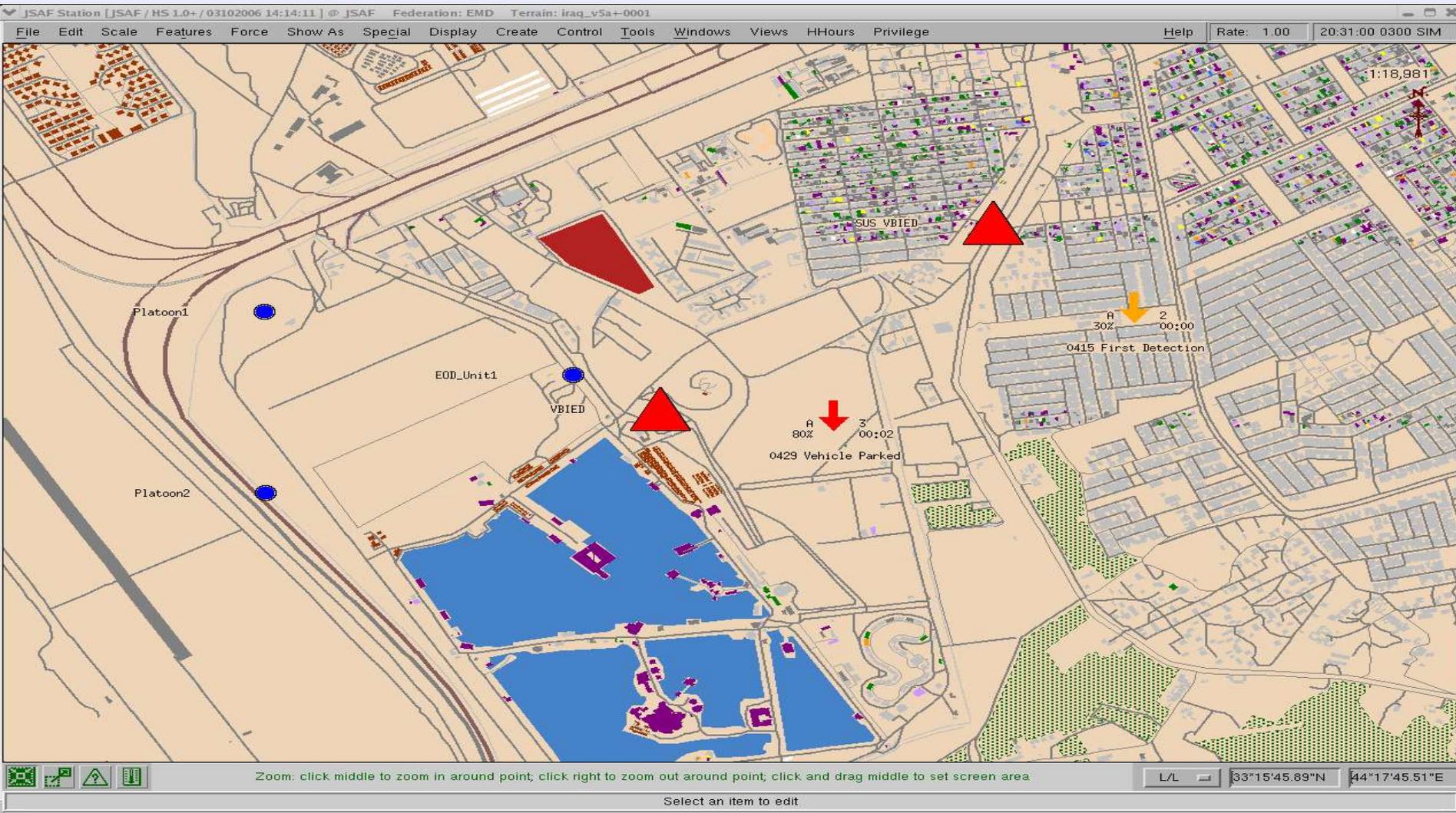
Logging SAOs

- SAOs were logged during each experiment event to supported both real-time experiment assessments and post-event comprehensive after-action reviews.
- SAO comments were evaluated by analysts to determine the SA level achieved by the players

SA Level 1 Where is the enemy?	SA Level 2 What is the enemy doing?	SA Level 3 What is the enemy going to do?
Appears to be a mortar site	Appears to be a group of insurgents placing a mortar pad	Expect a launch at sunset
Enemy Recon team on roof	Recon team is waiting until street clears	Recon Team will radio mortar team when all clear
Vehicles and Explosives in bldg	Explosives are being loaded into vehicles	Vehicles likely to move to FOB 3 during the night

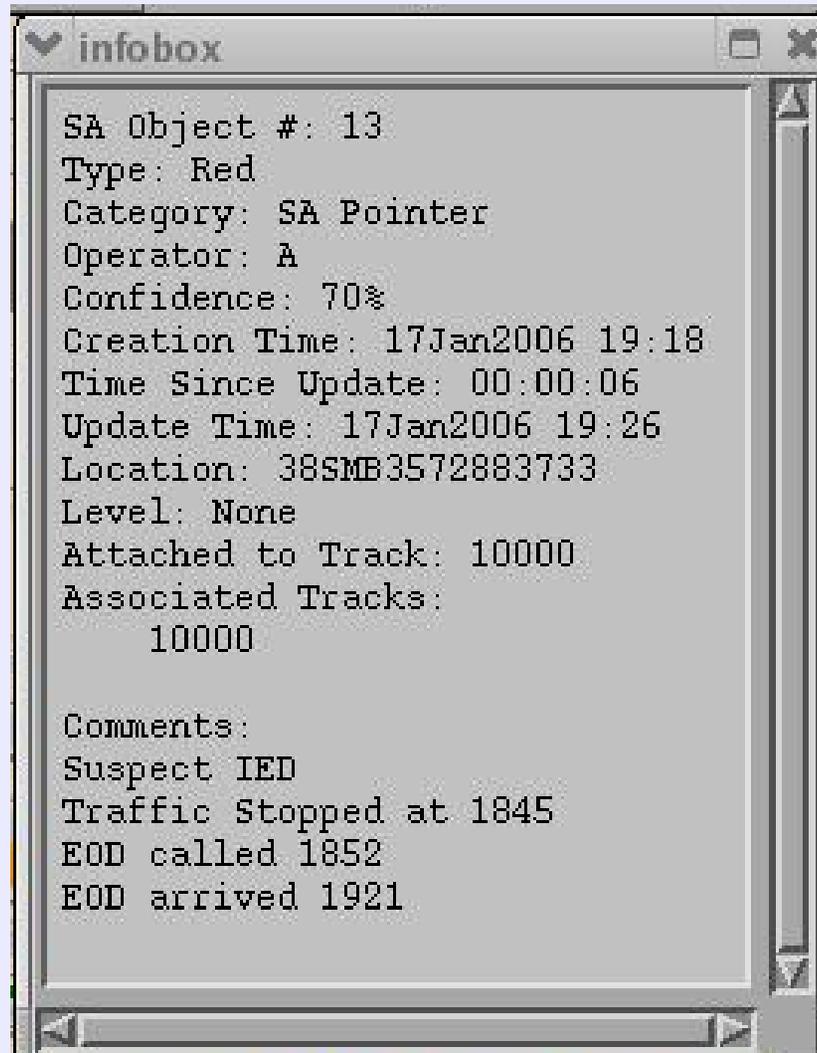
SAOs Displayed on the Map

- SAO objects are displayed on the JSAF map display.
- Players controlled the display of the attribute flags next to the SAO.



The Info Box

- Shows a summary of the SAOs when players clicks on the SAO.



The SAO Summary

- Summary shows the tracks and related attributes in a table format.

Situational Awareness Summary

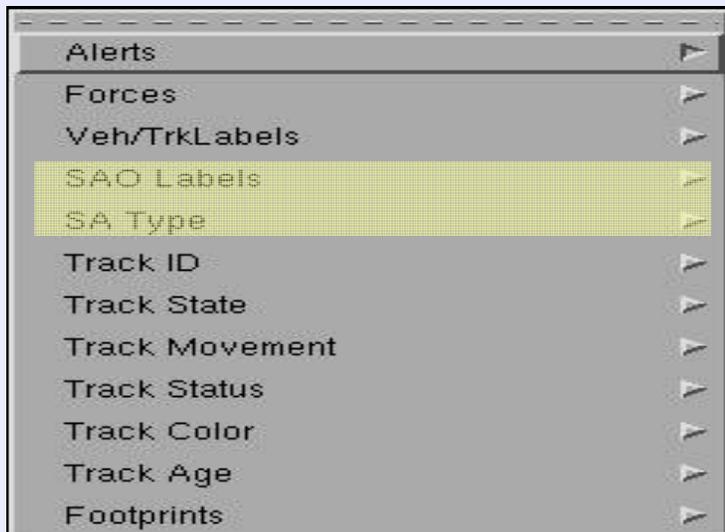
	SA #	Type	Category	Oper	Confidence	Creation Time	Time Late	Level	Assoc.Tracks	Comments
Center	12	Snow Drift Radar	SA Air Defense	A	80%	17Jan2006 08:1	00:05:13	0	No	Emission 1423
Center	7	White	SA Pointer	A	70%	17Jan2006 08:1	00:01:50	0	No	NAI Assembly Plant for IE
Center	5	Mortar	SA NAI/TAI	A	100%	17Jan2006 08:1	00:00:02	0	No	NAI Mortar Baseplate
Center	8	Safehouse	SA NAI/TAI	A	40%	17Jan2006 08:1	00:02:31	0	No	NAI Possible Hide Site
Center	11	UG Armed Pickup single	SA Urban Guard	A	90%	17Jan2006 08:1	00:07:14	0	No	Observed 1623 Lost in Traff
Center	10	Unimog single	SA Urban Guard	A	100%	17Jan2006 08:1	00:06:01	0	No	Stopped and cleared at che
Center	13	Red	SA Pointer	A	70%	17Jan2006 08:1	01:38:28	0	Yes	Suspect IED Traffic Stoppe
Center	6	Safehouse	SA NAI/TAI	A	50%	17Jan2006 08:1	00:00:55	0	No	TAI Leader Safehouse

Total = 8

Delete Selection Refresh Close

Filters

- Players use filters to select types of SAOs and labels they wanted to see.



**Display
Filter Menu**



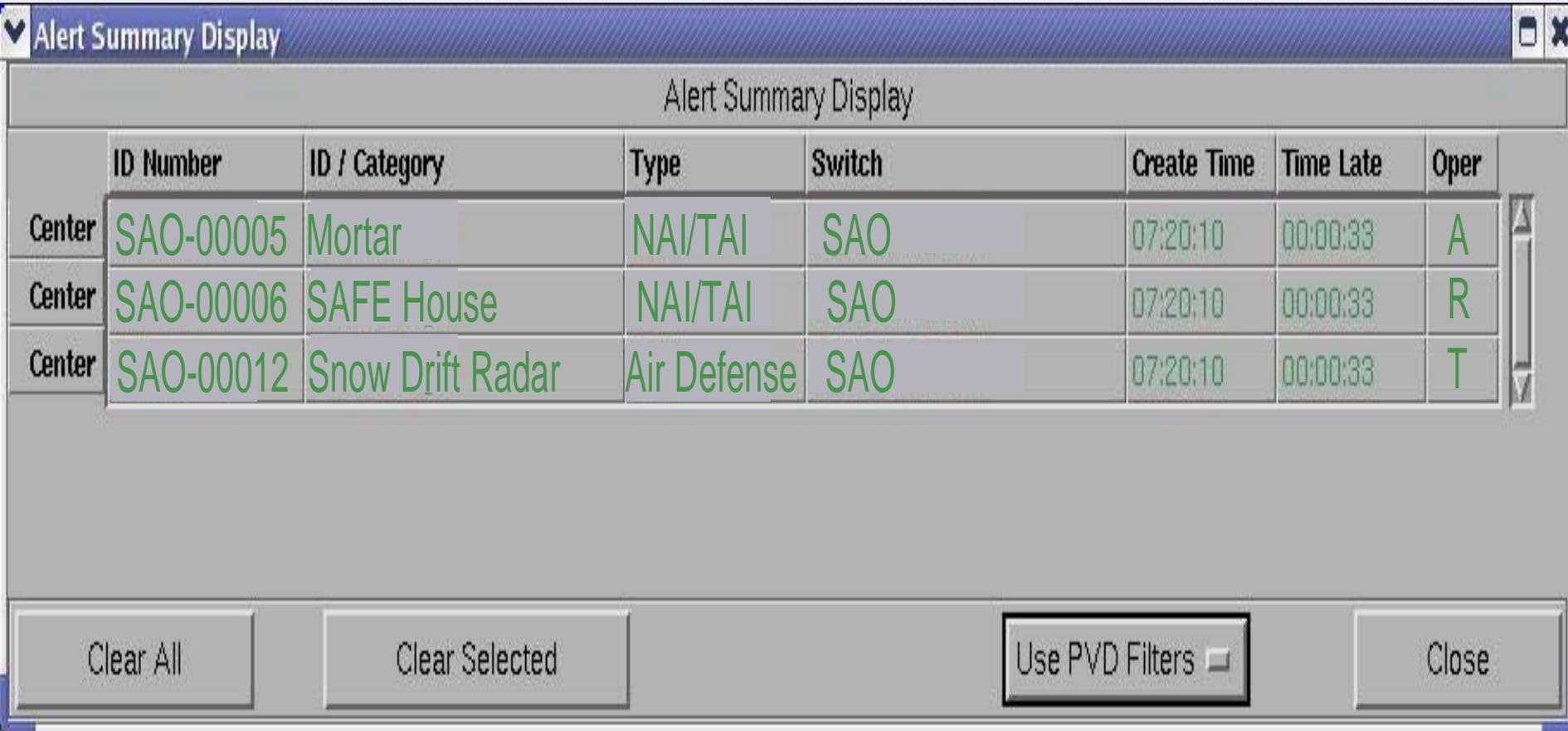
**SAO
Labels**



SA Types

Alerts

- SAO Alerts were created to let the players choose the SAO categories for which they wanted to be alerted as they were created, or modified, by other players.

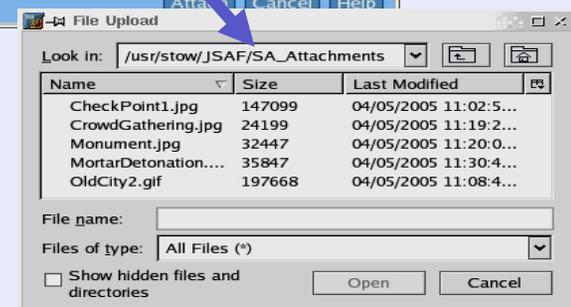
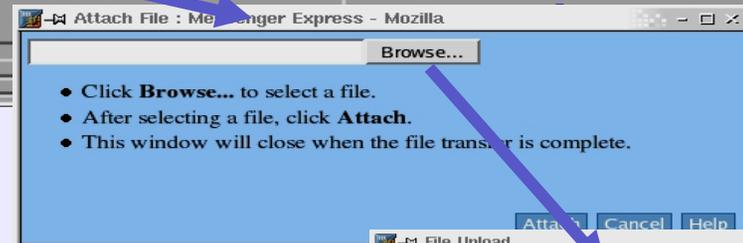
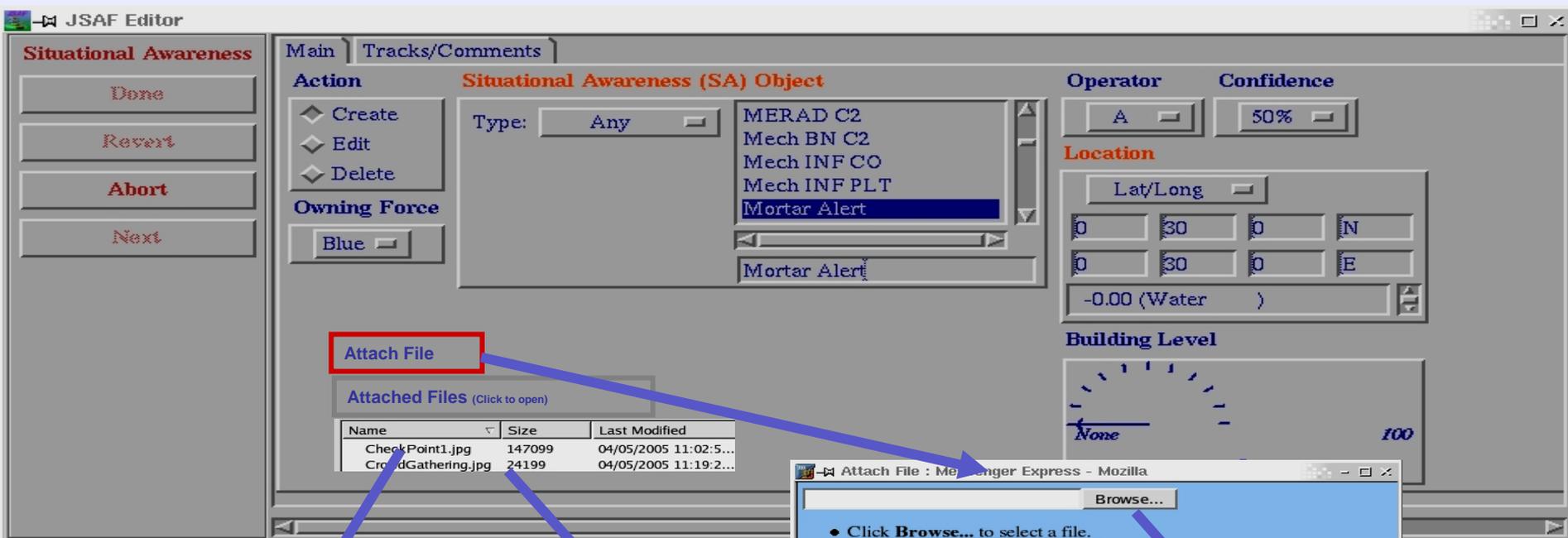


The screenshot shows a software window titled "Alert Summary Display". The window contains a table with the following columns: ID Number, ID / Category, Type, Switch, Create Time, Time Late, and Oper. There are three rows of data, all with a "Center" label in the first column. The table is styled with a light gray background and green text for the data cells. Below the table are four buttons: "Clear All", "Clear Selected", "Use PVD Filters" (with a checkbox), and "Close".

	ID Number	ID / Category	Type	Switch	Create Time	Time Late	Oper
Center	SAO-00005	Mortar	NAI/TAI	SAO	07:20:10	00:00:33	A
Center	SAO-00006	SAFE House	NAI/TAI	SAO	07:20:10	00:00:33	R
Center	SAO-00012	Snow Drift Radar	Air Defense	SAO	07:20:10	00:00:33	T

The Attach Feature

- SAOs attach feature allows operators to match information to a specific location in time.



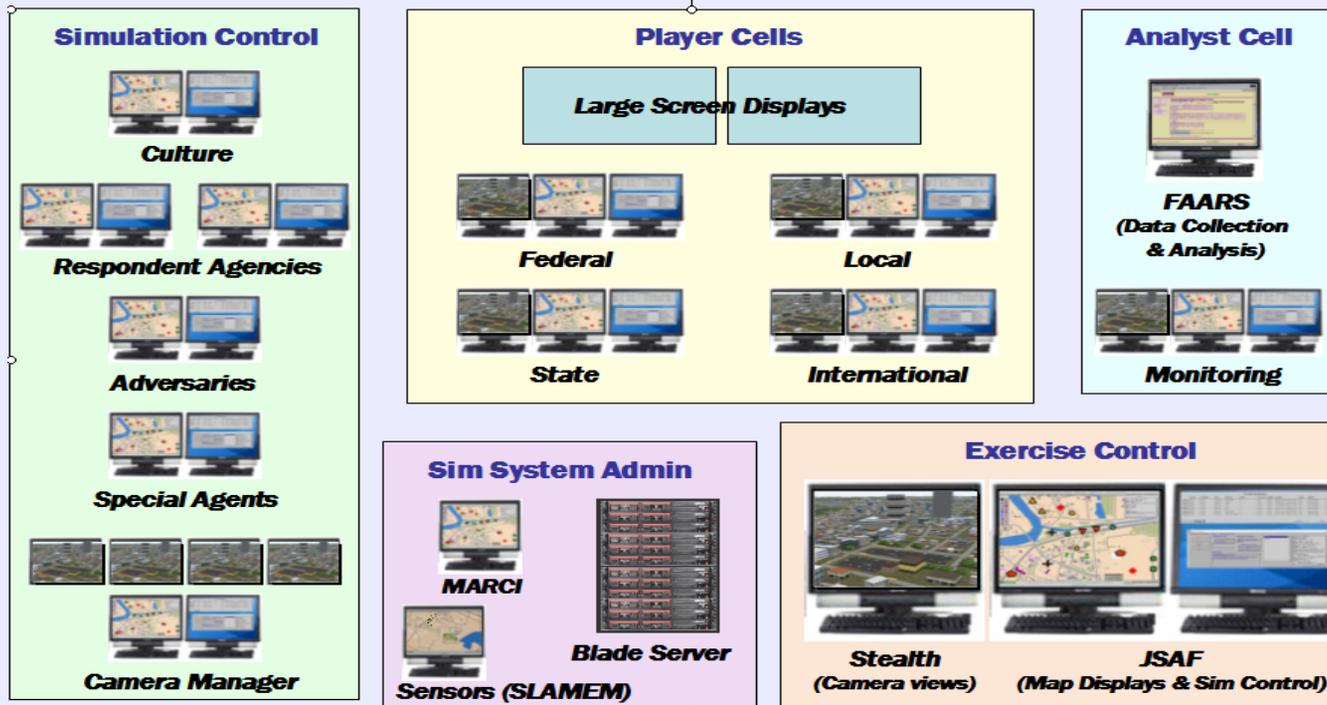
SAO Spreadsheets

- SAOs can be saved to spreadsheet at any time by anyone on a JSAF system.

SAO NUMBER	SAO TYPE	CTP NAME	OPERATOR	OWNING FORCE	LOCATION	CONFIDENCE	ATTACHED FILES	COMMENTS	ASSOCIATED TRACKS	ATTACHED TO TRACK
5	SA NAI/TAI	Mortar	A	Blue	10GEV1843528583	100	Pic1.jpg	NAI Mortar Baseplate		
6	SA NAI/TAI	Safehouse	R	Blue	10GEU4186480416	50		TAI Leader Safehouse		
7	SA Pointer	White	B	Blue	10GET6766391668	70		NAI Assembly Plant for IEDs		
8	SA NAI/TAI	Safehouse	A	Blue	10GET4014680864	40	Pic8.jpg	NAI Possible Hide Site		
9	SA Green	Crowd forming	A	Blue	10GET5450871966	70		Crowd picketing factory		
10	SA Urban Guard	Unimog single	N	Blue	10GEV3933203048	100		Stopped and cleared at checkpoint charlie		
11	SA Urban Guard	UG Armed Pickup single	A	Blue	10GET7005778730	90		Observed 1623 Lost in Traffic		
12	SA Air Defense	Snow Drift Radar	T	Blue	10GET4965074078	80		Emission 1423		
13	SA Pointer	Red	M	Blue	38SMB3572883733	70		Suspect IED Traffic Stopped at 1845 EOD called 1852 EOD arrived 1921	10021	10021

Processing SAOs

- SAOs are automatically transmitted over the network to the shared JSAF Track Database, where they are assigned unique and sequential SAO numbers.
- SAOs in the track database are made available to all the JSAF machines, depending on the player filter settings.
- System administrators can clear, save and reloaded the SAO database.
- SAOs are logged by the Future After Action Review System (FAARS).



The SAO Evolution

- Prior to the implementation of SAOs, during each of the HITL experiments, analysts gathered around the players to listen to and observe actions and communications
- Because of the broad scope of these experiments, this analysis process was in some cases subjective and vulnerable to missed cues and actions.
- It was clear that the accurate evaluation of SA was going to be crucial in distinguishing subtle changes in player abilities under varied trial conditions.
- M&S team decided to create a tool that would let players record their own impressions during the trial.
- The tool had to:
 - Be easy to use,
 - Benefit the players as well as the analysts
 - Produce loggable data.



Adjusting SAOs to New Venues

- Following Urban Resolve (Phase I), USJFCOM shifted to UR05 Current Operations and then to UR2015.
- SAO menu options were modified to support the new environment and operator's needs.
- The types of SAO menu items influenced how readily the players assembled data and shared SA.

Response Facilities		Public Transportation	
	Hospital		Train Station
	Trauma Center		Ferry Landing
	Police Station		Airport Terminal
	Fire Station		Bus Terminal
	Morgue		Ship Terminal
	Emergency Helo Pad		
	Towing Vehicle		
Crime In Progress		Traffic	
	Robbery		Accident
	Assault		Stopped
	Murder		Slow
	Hostage Situation		Diverted
	Officer Down		
	Crime Scene	Flooding	
	Domestic Violence		Rising Water
	Crowd Control		Receding Water

SAOs for the Analysts

- In Urban Resolve exercises, analysts no longer needed to hover over the player's shoulders and take copious notes, since player observations were captured in SAOs and logged.
- Instead, they monitored SAOs and relied on the Future After-action Review System (FAARS) to provide real-time indication of player situational awareness.
- SAOs allowed analyst team to focus on observations that would compliment the SAO data.

Relevance to Operational C2 Systems

- SAO capabilities can be implemented using existing C2 system conventions in any computer system and operational environment.
- Tools need to be simple to use.
- Include relevant map symbols, with selectable attribute flags
- Give the operator the ability to filter out SAOs they do not want to see
- Provide an SAO summary table that allows operators to center on selected SAOs.
- Create a function in the SAO Editor that will allow the operators to create their own new SAO menu items.
- Consider and plan for SAO management. Just as GCCS tracks are managed, there needs to be procedures in place to allow the deletion of SAOs

Conclusion

- USJFCOM's success in using SAOs to enable the Urban Resolve series of experiments and the enthusiasm and innovation that operators show in using them, indicates this simple tool would be useful if implemented in other simulation systems and various operational C2 systems, including GCCS.
- SAOs allow operators to work together; sharing their impressions and understanding about geo-spatial activities in a time-critical environment.
- Operators share their understanding of detections and tracks in a natural collaborative manner, and as a result, complex battlespace environments can be more accurately and readily understood.
- USJFCOM, J9 implementation of the SAO process serves as a pretty-good prototype that offers some suggestions and tools that have proven useful to operators and tactical decision-makers.

Thank you