

Joint Analysis System

Analytic Rigor

User Requirements



Simulation-Supported Wargaming at the Campaign Level

**MORS Emerging Technologies Forum
Session 5: Organizational Analysis
September 2022**

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Unclassified



Analytical Wargame Technical Challenges

PRE-GAME

- ✓ Long preparation times for preparing Wargaming Scenarios and Staffing
- ✓ Often with only limited reuse of components

CONDUCTING THE GAME

- ✓ Heavy investment in manual support functions for conducting most games
 - ✓ Manually moving units realistically
 - ✓ Generating Intel and Status Report messages for players
 - ✓ Conducting Adjudication Events, and Recording Attrition results

POST GAME

- ✓ Detailed Wargame Analyses without Opportunities for Repetition or Operational, Situational, and Environmental modifications is a true Challenge



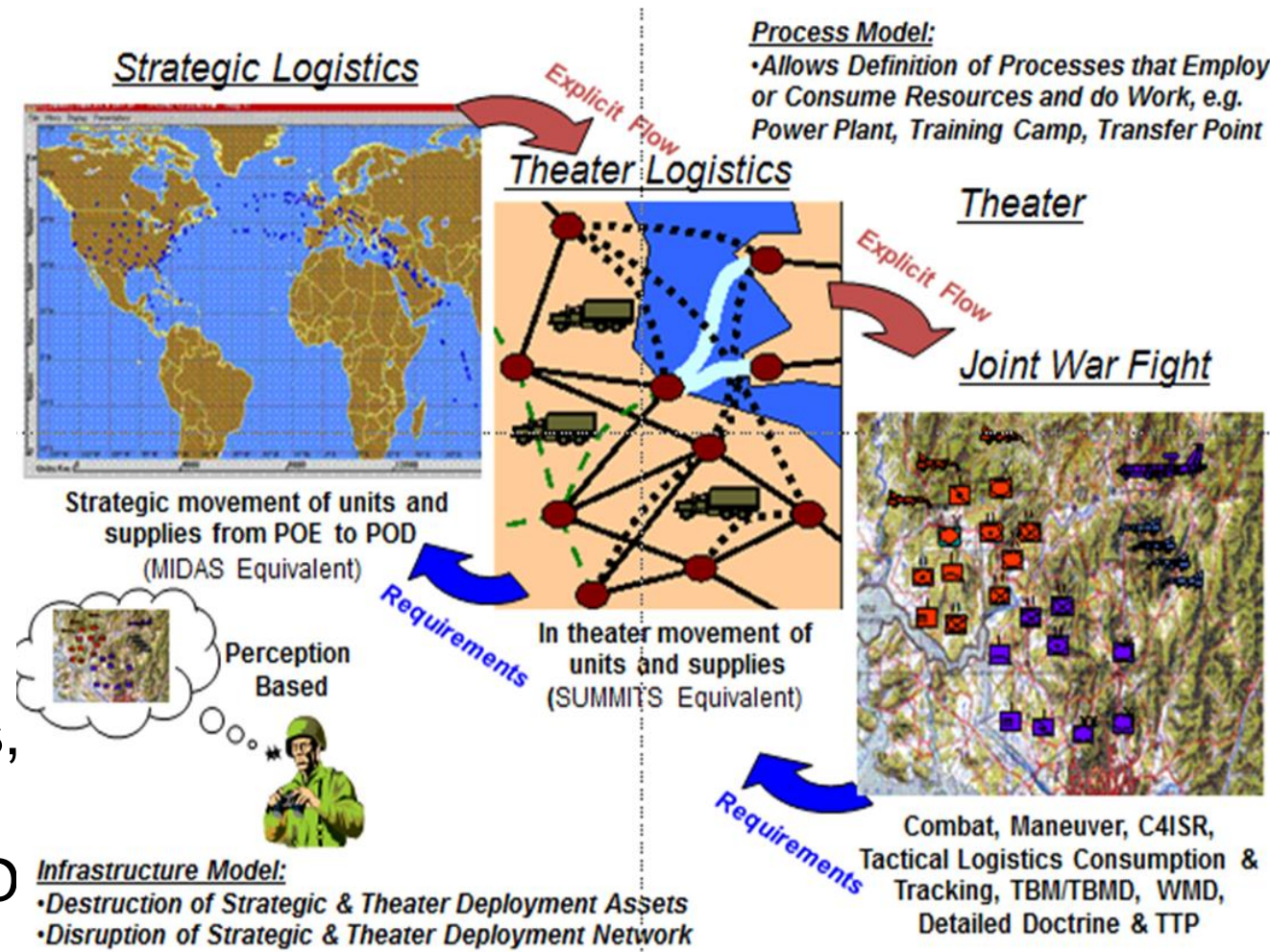
Joint Analysis System – Global Campaign Model

JAS is a global fully-integrated “single engine” simulation incorporating many internal sub-models from planning to adjudication.

It is agent-based, event-stepped, data-driven, and stochastic for most functions

It is a complete multi-domain model with balanced air, land, sea, space, & C4ISR including C², EW, deception, & cyber. Plus, fully integrated Logistics & Transportation, human soft factors, TBM/TBMD, and WMD

JAS decisions are based on perceptions!





OSD Strategic Analysis M&S Toolkit

Legend	
Campaign	C
Mission	M
Engagement	E

- The Joint Analysis System (JAS) was part of the OSD Strategic Analysis M&S Tool Kit up until early 2011.
- Then it was recalled from all users and archived at OSD/CAPE JDS.
- It was archived in operational status with several scenarios and could be brought back.

Strategic Analysis M&S Toolkit Tool Classification

Tool	Planning			Traditional Force-on-Force			C4ISR			Mobility and Logistics			WMD		Non-Traditional		
	Adaptive Planning	Effects Based	Force Allocation	Air Power	Ground	Maritime	C2	COMM	ISR	Logistics	Inter-Theater	Intra-Theater	Missile Defense	CBRN	Special Operations	Behavior	Consequence Mgmt
Core Analysis Tools																	
AB Tools																	
AMP/ELIST										C		C					
AMP/MIDAS										C	C						
COSMOS							M	M	M								
EADSIM				M			M	M	M				M				
HPAC														E			
ITEM				C	C	C			C		C	C	C	C			
JAS		C		C	C	C	C	C	C	C	C	C	C	C	C	C	
JCATS	M				M											M	
JICM				C	C	C			C	C	C	C	C	C			
PYTHAGORAS			E													E	
STORM	C		C	C	C	C			C	C							

Analytic Rigor

User Requirements



Despite Whatever You May Have Heard about JWARS/JAS

Extract from message, “Closure of the JAS Support Office,” January 2011

“Due to budgetary pressures, OSD/CAPE has decided to close the JAS Support Office and is currently in the process of moving JAS into archive status.

Over the past five years, the Simulation and Analysis Center has used JAS as one of its Strategic campaign tools in numerous key Departmental studies and has been very satisfied with the results it provides, its functional robustness, and the agility and usability of the model.

/Signed/

John Borsi

Managing Director, OSD/CAPE SAC

January 2011

JFCOM was disestablished in 2010



JAS as a Simulation-Supported Wargame

- In its wargame mode, JAS supports: “Pause, Modify, Resume,” which allows players to:
 - Review simulation-generated status reports including Blue casualties and perceived Red casualties
 - Review Blue/Red/Green/Gray units on a perception-based Common Operational Picture (COP)
 - Input new orders, priorities, rules, etc. either directly or through a White Force Controller and have them implemented by JAS computer agents.



Explicit messages and COPs are also used to inform the perceptions of agents, which fill all unmanned command and support roles. Swapping roles is straight-forward and Joint Forces Command, used JWARS to support its Unified Vision Experimentation Wargames



Simulation-Supported Wargaming in JAS (1)

“No one form of wargame can meet all our needs. [And each is] not without limitations:”

1. It is difficult to play such [analytical] games* in other than real time, actual decision making cannot take place in anything other than real time ... for the simple reason that humans can live and act only in real time.**

- Time in JAS can be fully paused during human decision-making or allowed to progress at wall clock time**
- Between pauses, JAS ran faster than 500 to 1 on 2010 desktops.**

*Talking about Analytical Wargames

**Perla, Peter P. and McGrady, ED (2011) "Why Wargaming Works," *NWC Review*: Vol. 64 : No. 3 , Article 8.



Simulation-Supported Wargaming in JAS (2)

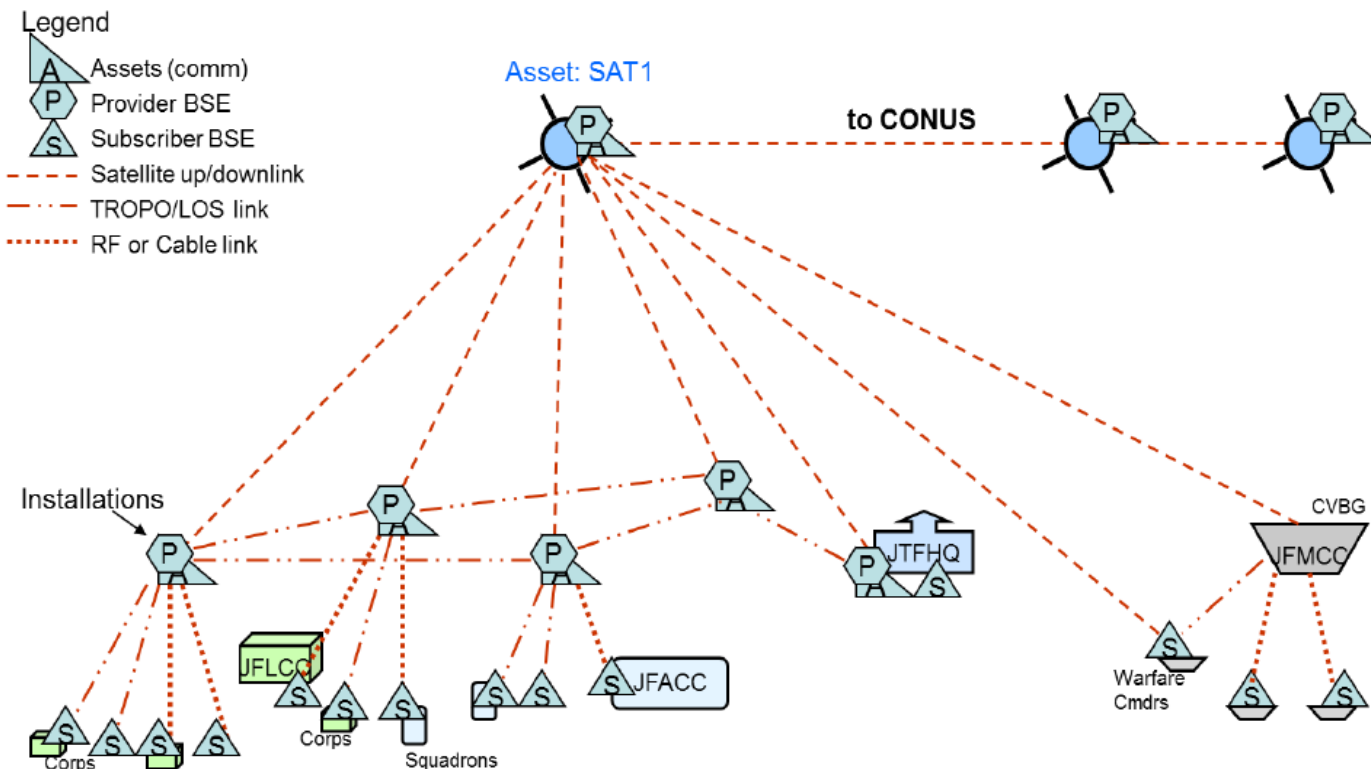
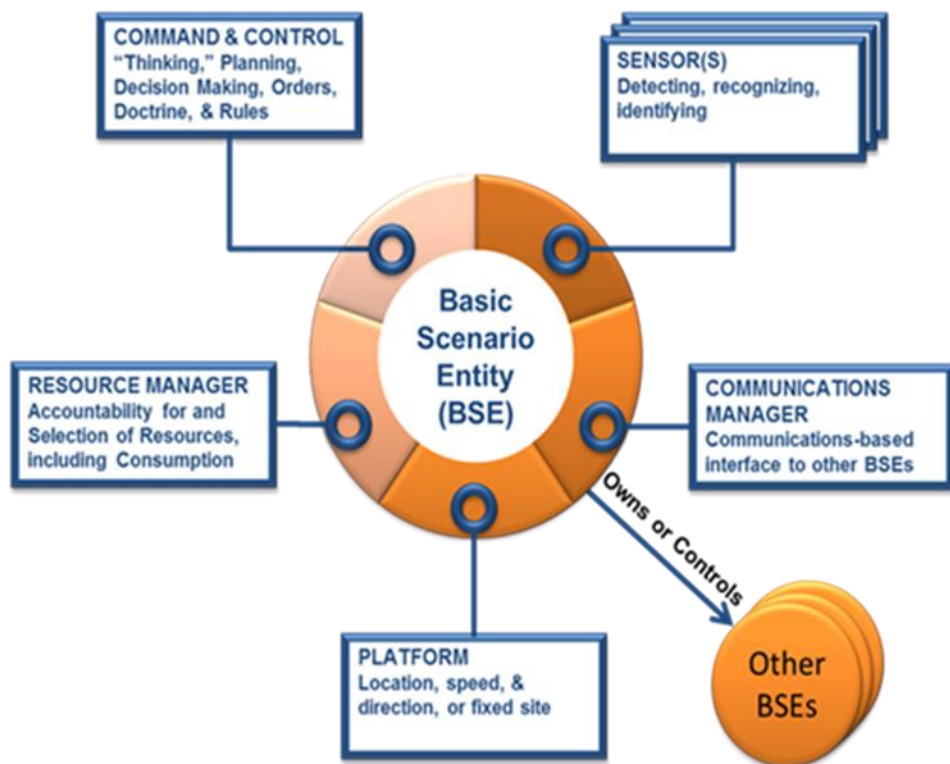
2. It is difficult to record what happens and why with enough fidelity and completeness to make it profitable and instructive to review and reflect upon events and decisions.*

- JAS is an “Event Driven” model. Every event is recorded.
- JAS Human Decisions are recorded and interpreted by JAS in exactly the same manner as Decisions from the computer agents (the meta-data is identical).
- Events and decisions can be reviewed in data, reports, and video replay.

*Perla, Peter P. and McGrady, ED (2011) "Why Wargaming Works," *NWC Review*: Vol. 64 : No. 3 , Article 8.



JAS is Run by Agents Who Communicate



If communications are disrupted: orders do not flow, sensor reports are late or never delivered, calls for fire go unanswered, resupply is late or nonexistent, etc.



Plug-ins and Knowledge Bases

JAS Command & Control (C2) Plug-ins

Static C2 (Only do programmed Functions)

1. AADCC2	27. JwInstallationSupportUnitC2
2. ACAC2	28. JwTIStrategicAircraft
3. AdvancedBrigadeC2	29. JwTIStrategicShip
4. AirDefenseWarfareCommanderBSE	30. JwTIStrategicTransporter
5. AirUnitC2	31. JwTransLogC2
6. AmphibiousWarfareCommanderBSE	32. JwTransportationOperatorC2
7. BaseBrigadeC2	33. JwTransporterC2
8. BaseCorpsC2	34. LandC2
9. BaseDivisionC2	35. LogisticsCoordinatorWarfareCommanderBSE
10. BaseVirtualC2	36. MaritimeAirCommanderBSE
11. BridgeC2	37. MaritimeComponentCommanderBSE
12. CombatantC2	38. MaritimeSubComponentCommanderBSE
13. DSPC2	39. MaritimeTaskOrientedGroupBSE
14. FireSupportC2	40. MineWarfareCommanderBSE
15. IndependentWithMultipleFCPC2	41. MissileLauncherC2
16. IOCC2	42. NavalLogisticsShip
17. J2	43. PopulatedArea
18. JFACCC2	44. RpC2
19. JflccC2	45. SatelliteC2
20. JTCBc2	46. StrikeWarfareCommanderBSE
21. Jtfc2	47. SurfaceWarfareCommanderBSE
22. JwAccountHolder	48. TestCombatantC2
23. JwFacility	49. TBMLauncherC2
24. JwInstallationC2	50. TranscomC2
25. JwInstallationFacilityC2	51. UnderSeaWarfareCommanderBSE
26. JwInstallationSupportUnitC2	

Dynamic C2 (Can perform "on the fly" Functions)

1	ABNAA	35	Jw Localization Sonobuoy Acoustic C2
2	Air Defense Area Controller	36	Jw Naval Asw C2
3	Air Defense Warfare Commander	37	Jw Order Plug In
4	Amphibious Warfare Commander	38	Jw Road Transport Common Carrier Manager
5	Asw Command Center	39	Jw Sonobuoy Acoustic C2
6	Ballistic Missile Defense C2	40	Jw Sustainment Activity Accumulator
7	Boat Logistics C2	41	Jw Trans Log Air Scheduler C2
8	CBMCommander	42	Jw Trans Log Road Scheduler C2
9	Chemical Warfare C2	43	Jw Waterway Dock Operation C2
10	Combatant Logistics C2	44	Knowledge Base
11	FARP	45	Land Cas Support
12	Fire Direction Center	46	Logistics Coordinator Warfare Commander
13	Fire Support Coordinator	47	Log Ship Log C2
14	Fire Support Planner	48	Maneuver Planner
15	Fuzzy Knowledge Base	49	Mine Warfare Commander
16	Gps Jamming Support PlugIn	50	Missile Engagement Zone
17	JTAGS	51	Naval Land Fire Support Center
18	Jtcb PlugIn	52	Pol Pipeline Control
19	Jw Abstract Acoustic C2	53	Resupply Manager
20	Jw Abstract Installation Contributor	54	Sead Wcu PlugIn
21	Jw Air Field Operation C2	55	Senior Naval Command
22	Jw Air Ops C2	56	SOF
23	Jw CASWC	57	Strike Warfare Commander
24	Jw Gateway Ops	58	Subordinate Commander
25	Jw Installation Cargo Ops	59	Supply Planner
26	Jw Installation Communication Ops	60	Supply Shuttle
27	Jw Installation Gateway C2	61	Surface Search Intercept Controller
28	Jw Installation Maintenance Ops	62	Surface Warfare Commander
29	Jw Installation Personnel Ops	63	Tbmd Midcourse Land
30	Jw Installation Pol Ops	64	Tbmd Midcourse Sea
31	Jw Installation Support Ops	65	Tbmd Terminal Land
32	Jw Installation Sustainment Accumulator	66	Tbmd Terminal Sea
33	Jw Installation Weapons Ops	67	Undersea Warfare Commander
34	Jw Jaoc Combat Ops	68	Unit Mez

- Plug-ins tell a BSE what to do.
- Knowledge Bases tell them how to do it.
- Both can be reviewed and modified by a User



Simulation-Supported Wargaming in JAS (3)

3. It is difficult to explore variations in the decisions made and what the outcomes of those decisions might have been, especially to explore all the mistakes that we make.*

- **By using the same initial random seed, any JAS simulation can be repeated identically up to a given point and paused. This allows:**
 - **Rehashing the specific decisions to explore the cause of the “mistake”, e.g., bad intel, disrupted comms, lack of timely planning, misperceptions by the decision-maker, enemy deception, etc.**
 - **Making changes in allocations and orders to determine if other decisions provide better outcomes.**

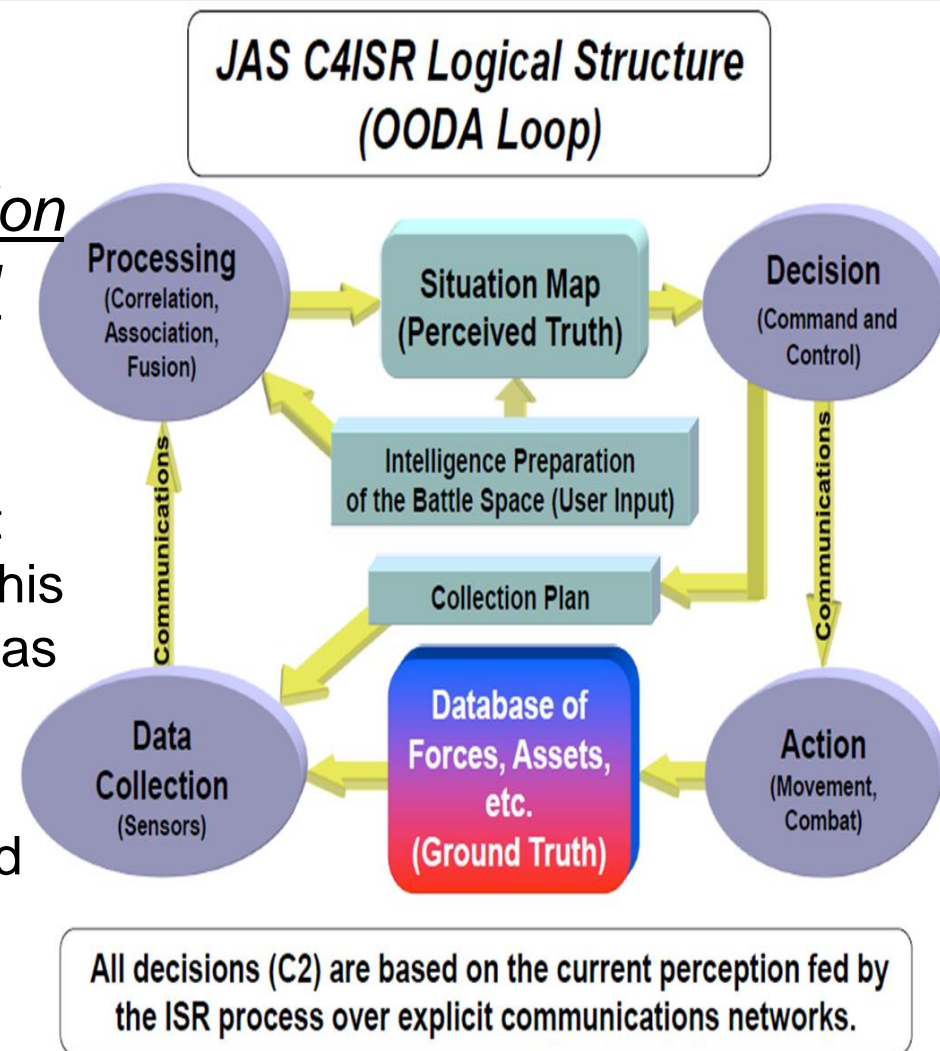
*Perla, Peter P. and McGrady, ED (2011) "Why Wargaming Works," *NWC Review*: Vol. 64 : No. 3 , Article 8.



Quoting Former DepSecDef Bob Work in 2015

DepSecDef Work stated that “The best wargames seek to create an environment for applying critical reasoning techniques and diagnosing the characteristics of competition under the “fog” and “friction” of war where incomplete and imperfect knowledge prevails.”

- JAS automatically produces delayable/disruptable English-readable status messages and probabilistic sensor reports that create a viewable, map-based Common Operational Picture. This supports Indications & Warning (I&W) and Maneuver Planning as well as Targeting.
- JAS Communications Networks and the flow of information on them generate a realistic environment for EW/cyber attacks and for an understanding of the response times needed to restore C4ISR without suffering a major operational impact.





The Role of the Campaign Model

JAS fulfills the gray areas on the left of AFSIM and has the potential for interfacing with it provided by the DoD HLA or High Level Architecture protocol. JWARS HLA capability was demonstrated as early as 2004 by federating with the Joint Semi-Automated Forces (JSAF) mission-level model.

Broad Trade-space Exploration	Concept Development and Refinement	Early Systems Eng. and Experimentation	Realization
Future Force Design Force Structure mix	Mission Engineering Ideation and Conceptual Design	Flight Test Risk Reduction Laboratory Integration	Operational Training Dev/Operational Testing
Military Utility Analysis (Campaign Level)	Effectiveness Analysis (Mission and Engagement Level)	Performance Analysis (Engineering Level)	
Comparative measure of the effectiveness of a system to achieve large-scale objectives	Comparative measure of performance of a system in an operational environment	Comparative measure of the level of operation or function of a material, sub-system, system, or architecture	
Capability trade-space	Design/mission concept trade-space	System-level trade-space	
Force structure design Technology investment Capability development War gaming	CONOPS exploration Technology investment Requirements development War gaming / Experimentation	System design/performance trades Technology investment Requirements development Integration and Testing	

THE AIR FORCE RESEARCH LABORATORY

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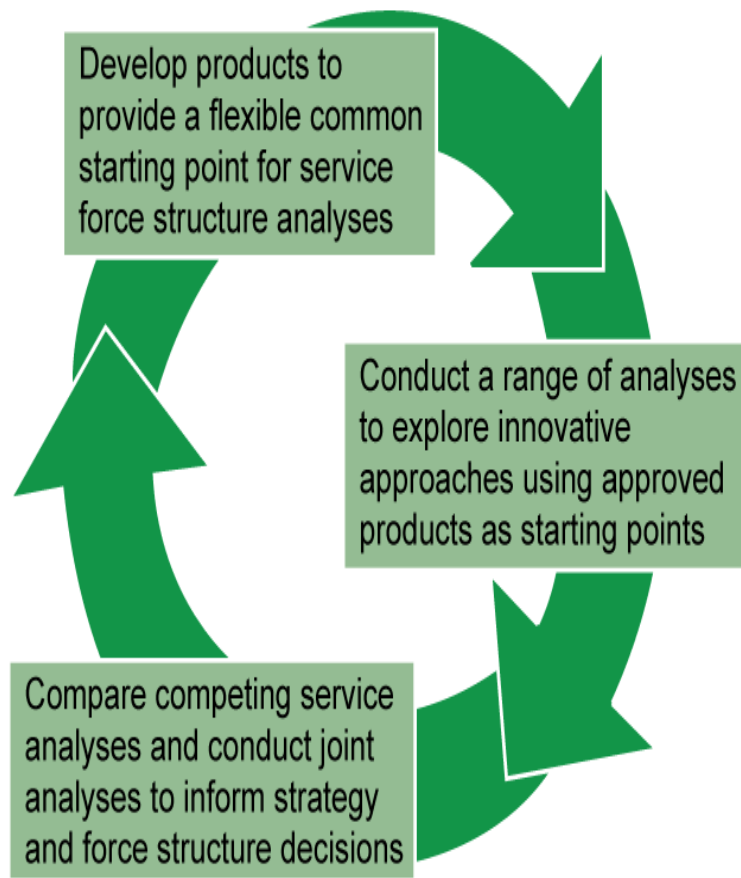


So, Let's Look at Campaign Simulation

In its 2019 Report, GAO found that [models] have been hindered by three interrelated challenges:

- **[Campaign] Products are cumbersome and inflexible.**
- **Force Analysis does not significantly deviate from Services' programmed force structures or test key assumptions.**
- **DOD lacks joint analytic capabilities to assess [joint force structure.**

Support for Strategic Analysis (SSA) as designed



SSA as implemented

Cumbersome and inflexible products

SSA products were highly detailed and complex, making them cumbersome to develop and analyze

Analysis does not significantly deviate from services' programmed force structures

DOD guidance did not require services to explore innovative approaches and provide a range of force structure options

Lack of joint analytic capability

DOD lacks a body or process to conduct joint analysis or compare competing force structure analyses

Source: GAO analysis of the Department of Defense (DOD) documents and interviews with officials. | GAO 19-385)



Simulation-Supported Wargaming in JAS (4)

4. It is difficult to repeat an in-person, multiplayer game like a high engagement game and impossible to “replicate” it in the sense of a Monte Carlo simulation experiment.*

- Every event in a scenario is recorded in JAS and can be replayed. Given the same initial master seed for the random number generators, JAS will exactly recreate both simulations and simulation-supported wargames.
- JAS wargames can also be replayed with different initial random number master seeds and act as Monte Carlo simulations to test the robustness of both human and agent decisions or the value of a new sensor under either the same conditions or consider a wide range of different conditions with minimal additional cost to run a major study.

*Perla, Peter P. and McGrady, ED (2011) "Why Wargaming Works," *NWC Review*: Vol. 64 : No. 3 , Article 8.



Quoting Former DepSecDef Work Again

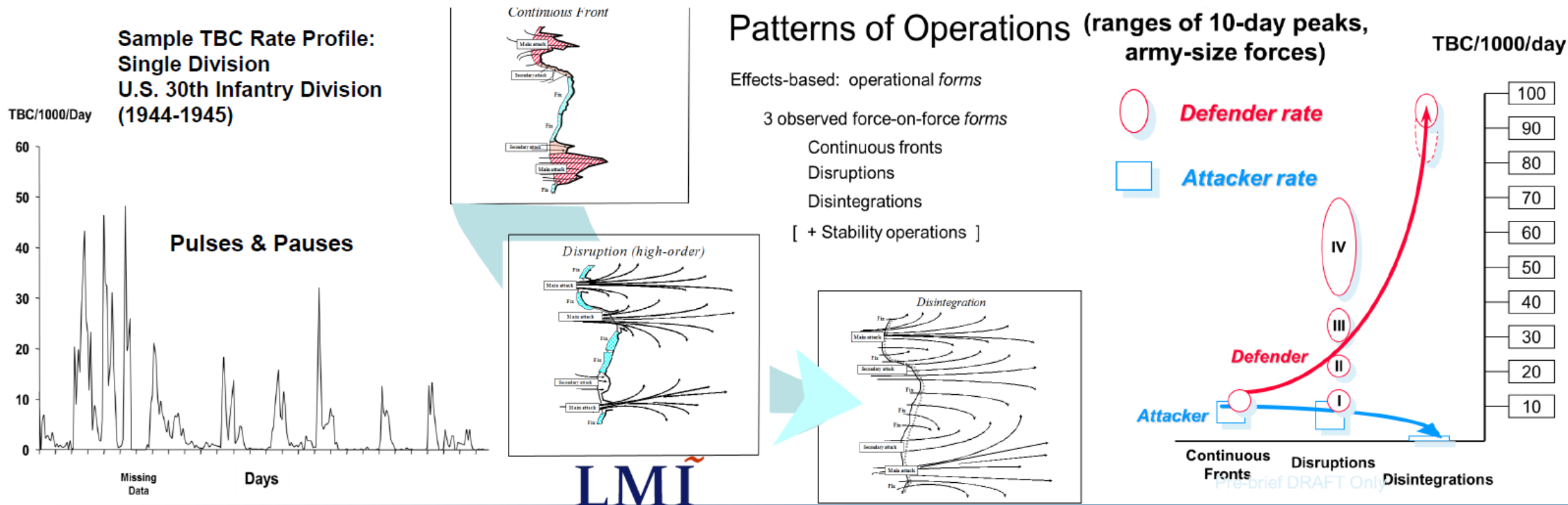
“...players should be able to observe and live with the consequences of their actions in the face of a thinking and reacting competitor, and so come to understand dynamic military competition from the perspective of opposing sides. Actions taken by the players on both sides must have tangible consequences that are determined by the actual performance of weapons and sensors in the real world, backed by a rigorous adjudication process....” January 2015

- JAS weapon systems and clusters of unit systems, e.g. gun batteries, produce coherent Attrition in line with available data. All engagements are recorded in a Killer-Victim Scoreboards (KVS)
- Users can modify attrition data as needed including range, lethal areas, kill rates...
- User's plans direct general Movement and Maneuver, but agents can plan routes and make modifications to address obstacles, enemy forces, supply shortages, etc.



Land Forces Patterns of Operations

JWARS worked closely with George Kuhn, then of LMI, to replace the “piston” model of land unit engagements with the concepts of Operational Forms and Peaks & Pauses. Generally, the Attacker recognizes when an attack has failed and pauses to regroup and continue or withdraw. The Defender holds until unit breakpoints are reached and attempts to withdraw,



LMI



User Oriented

Two GUI Views:
(Campaign Planning & Data Input)

Model assists the analyst or wargamer

- Pull Down menus
- Drop & Drag icons
- Point & Click input
- Automated route selection.

GUI has error detection & English language summary of orders

Analytic Rigor

BSE : 1st INFANTRY BRIGADE; ID: CLDSV04IN101
Order Number : CLDSV04IN101@11.33333
Initiate | Missions | Objective | Planned Participants |

Route
 All Routes
 Land Routes
 Unit Selected

Objective Selection
 Point
 NAI Area
 Unit/Installation

Refresh (Shift-Click)

Decimal Location
Lat: -2.7674
Long: 102.6604

DMS Location
Lat: - 2 46 3
Long: 102 39 37

Direct
ABNAARoute
Route Scud

Attack in a ATTACK WITHOUT RESERVE formation. The unit initial area of responsibility has a frontage of 4.9 km and a depth of 14.0 km. The orientation is 180 degree(s). The desired unit speed is 15 km/hr (if circumstances permit). Use Route [name] to destination at latitude -2.767 and longitude 102.66 decimal degrees. The participants for this order are 1st INFANTRY BRIGADE, 5/1 AMMUNITION SUPPLY BATTALION, 4/1 MORTAR BATTALION, 1/1 INFANTRY BATTALION, 2/1 INFANTRY BATTALION, 3/1 INFANTRY BATTALION.

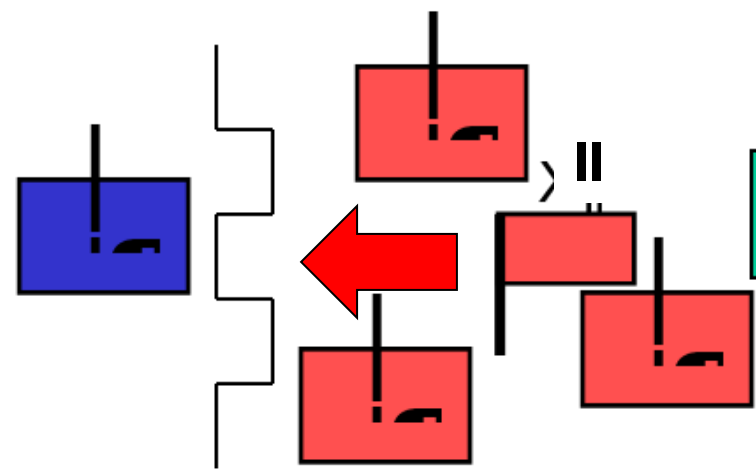
User Requirements



Land Direct Fire (DF) Adjudication

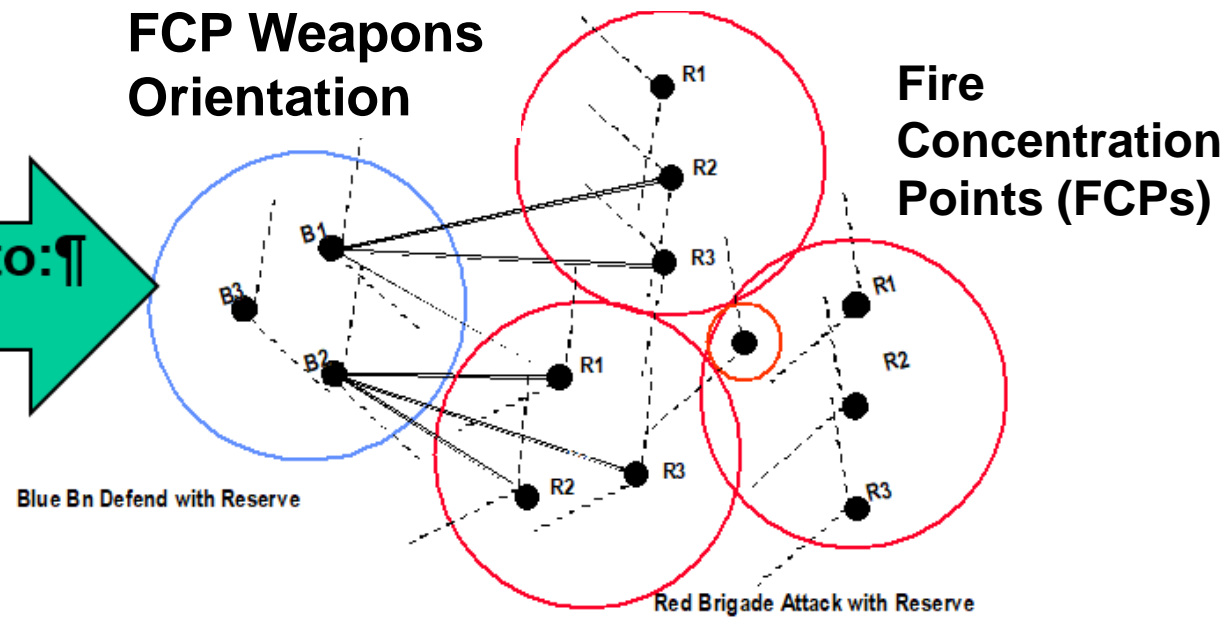
JAS DF is minimally aggregated (all weapons are explicit and countable). DF has interruptible Time-Steps, is Deterministic, but impacted by internal & external events. Only Lanchestrian when units are forced to stay in contact.

Unit Locations



Translates to:

FCP Weapons Orientation



Attrition reflects the current conditions for the engagement and is affected by local weather and terrain conditions.

JWARS Direct & Indirect Kill Rate algorithms approved by AMSAA

Analytic Rigor

User Requirements



Maritime Ops & Video Replay

- Maritime Ops
- Video Replay with auto search and control of view, participants, and speed of replay
- Global with WGS-84 globe)
- Ability to cross the international date line and the equator without confusion

The screenshot displays the Scenario Explorer software interface for JAS R2.0 SR2.00 SEA VIKING 2007 Sea Basing 9 Third Side. The interface includes a menu bar (File, Tools, Options, Help), a toolbar, and a status bar (UNCLASSIFIED). The main view is set to Campaign Planning View, Side: US-JTF.

The left sidebar shows a tree view of the scenario structure:

- Overview
 - Annex A: Task Organization
 - Joint Task Organization
 - Maritime Task Organization
 - Force Structures
 - Annex B: Intelligence
 - Annex C: Operations
 - General Phases and States
 - Operational Graphics
 - Air Operations
 - Land Operations
 - Maritime Operations

The right sidebar shows a list of command and control elements:

- Senior Maritime Commander
 - 1st Amphib Commander
 - 1st Carrier Strike Force
 - 1st Strike Commander
 - 1st Strike Warfare Commander
 - Aircraft Carrier CV02
 - 1st Surface Warfare Command
 - New Air Warfare Commander
 - 2nd Strike Commander
 - Logistic Commander Force

The main map area shows a globe with various maritime units and their attributes. The map is titled "Map | BSE Attributes | Unassigned Ships". The units are:

- BM_AVNTOYER_1
- BM_SUB_1
- CC_M_CRUISER_1
- BM_SURFSTKFOR_1_1_2
- BM_SURFSTKFOR_1_1_1

The map includes a coordinate grid and a scale bar. The status bar at the bottom shows the current position and speed of the selected unit:

Units: Km 0
03 04 17 @ 104 53 19
3.0715 @ 104.8887

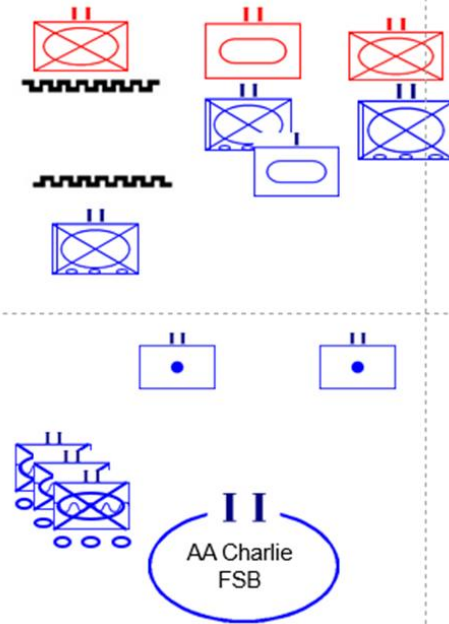


And not to Forget the Marine Corps

- Joint assault from a video of the simulation of a Sea Viking Exercise from 2004.
- Note “spawning” of amphibious vehicles with troops and supplies going ashore. Attack and transport helicopters went in earlier.



Stryker/MEF Actions

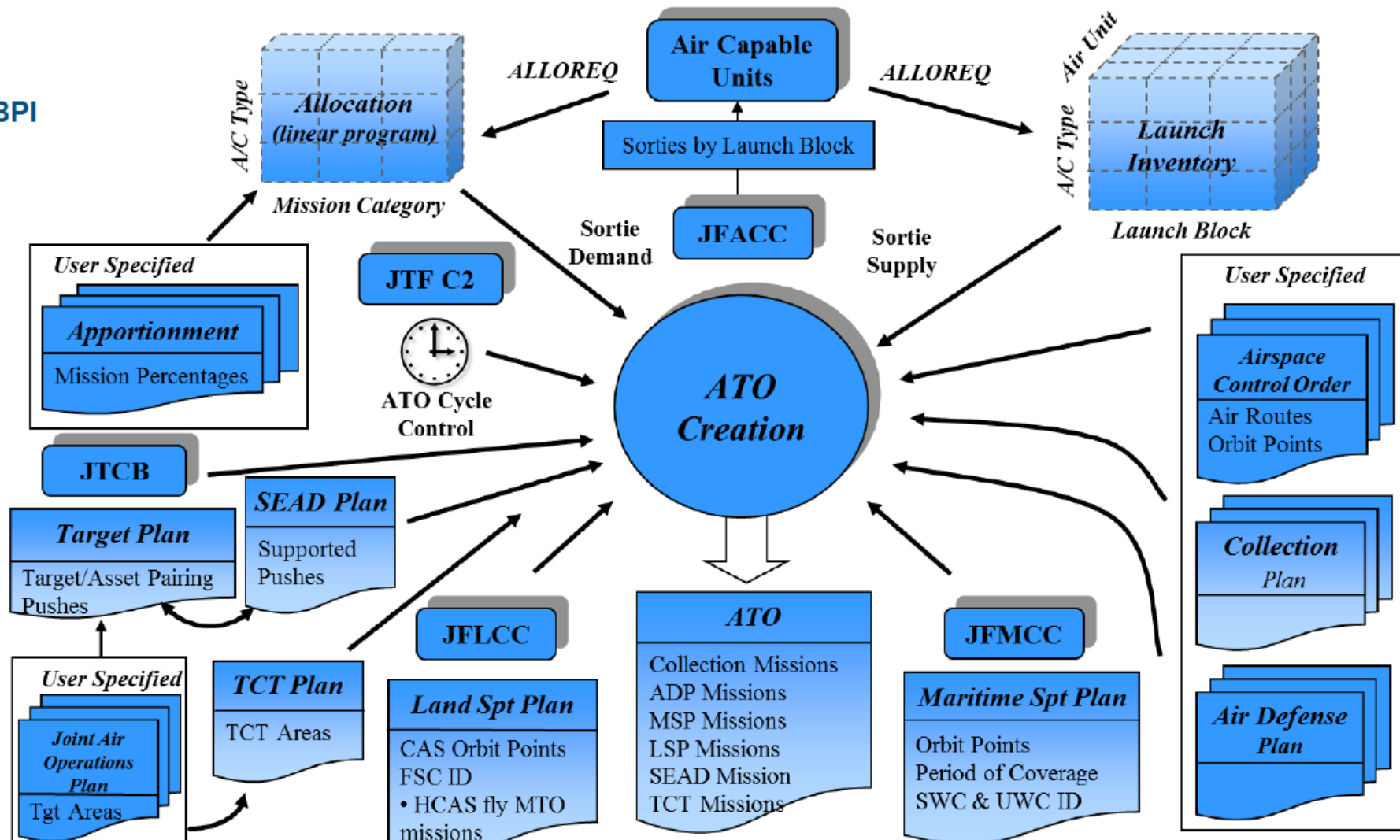




JAS Air Operations – Auto-Coordinated ATO Generation

Air Missions

- Air Defense - DCA/AAWC/BPI
- Combat Support- CAS/CASWC HCAS/HCASWC
- Joint Targeting PreplannedStrike/StratAttack OCASStrike/JamSEADStandoff LSEADStandoff/LSEADStrike OnCallStrike
- ISR Collection- ISR
- Maritime Air - FleetDCA SW/UWSurv
- Airlift - IntraTheater Air



Analytic Rigor

User Requirements



Air & Space Operations

- Aircraft events during a mission are recorded allowing updating the extrapolation of flights with minimum data generated
- Missions are not dependent of a 24-hour cycle. SCLs are selected based on targets.
- Space sensors are tasked as part of collection

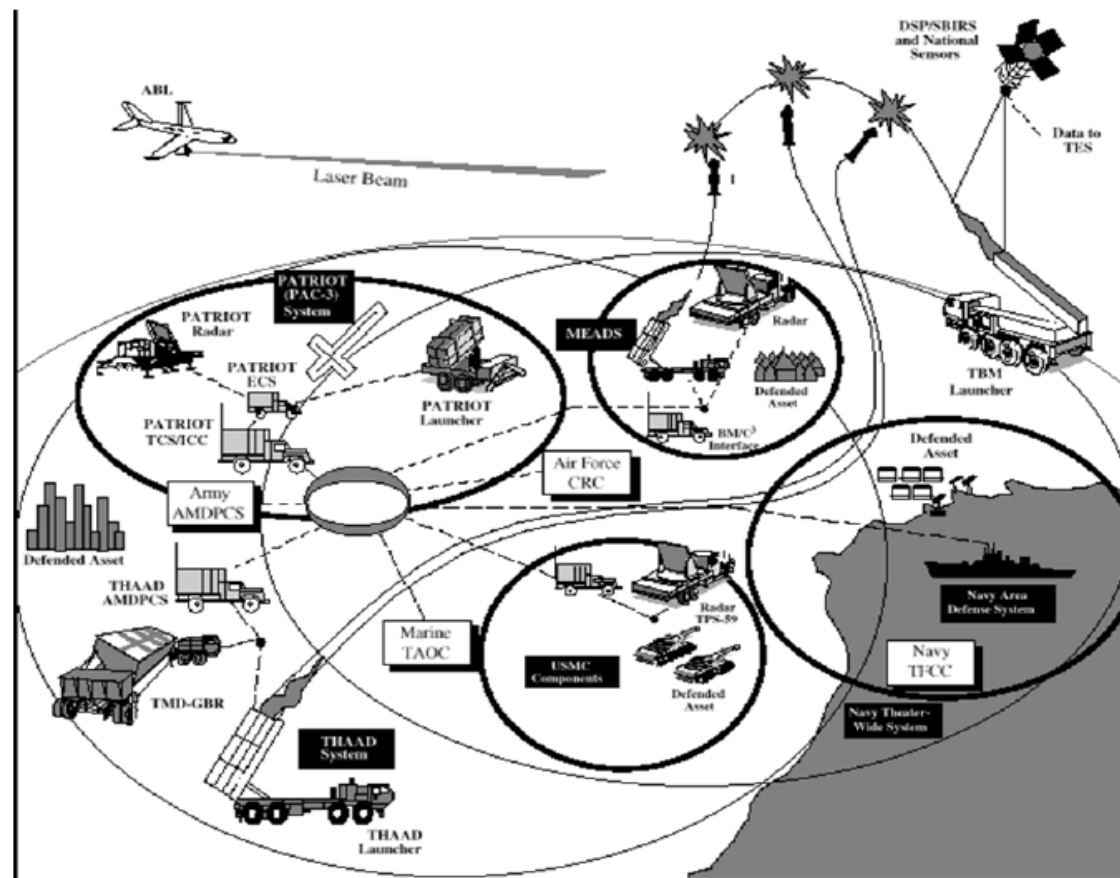




JAS TBM/TBMD Layered Defense

- Early Warning
 - DSP and later systems
- Boost System Defense
 - Airborne Laser
- Mid-Course Systems
 - THAAD
 - Navy Theater Wide (NTW)
 - GBI
- Terminal Systems
 - Patriot
 - Navy Area Systems
 - Foreign Systems

TBMS mounted on individual platforms, can “Shoot & Scoot” (reload elsewhere)





Chemical Defense

Chemical Agent Representation

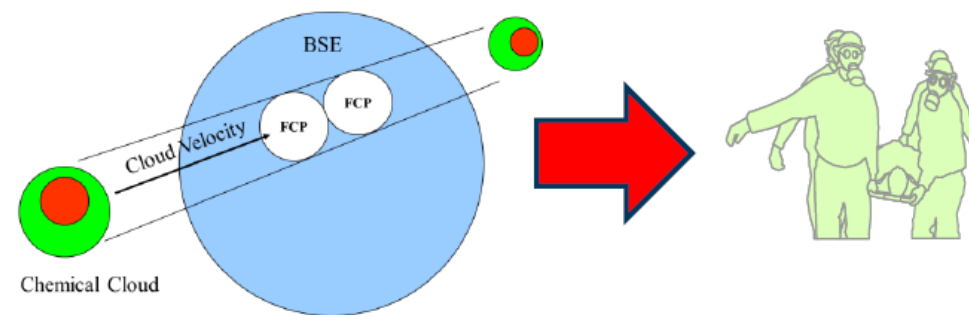
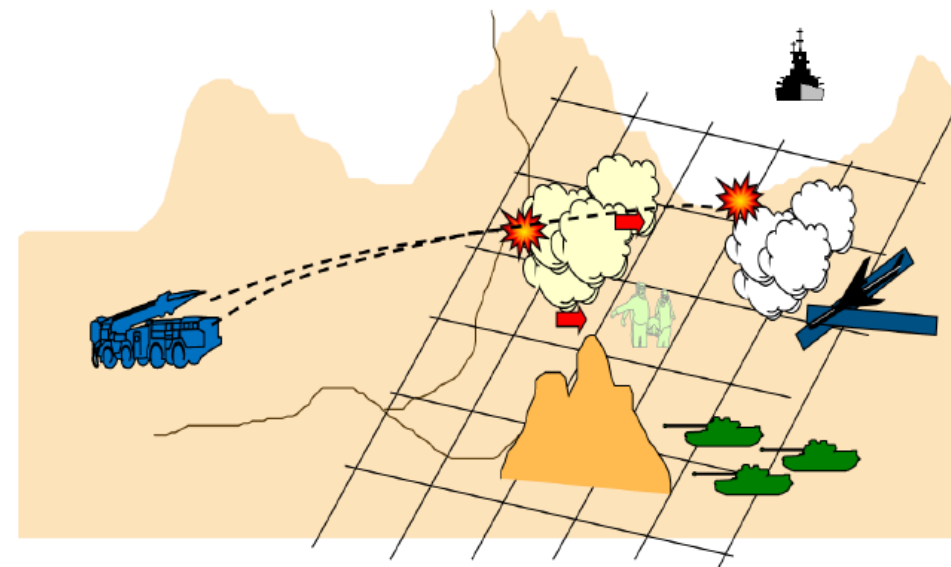
- Delivered Explicitly via Ballistic Missiles, Rockets, Artillery, and Air
- Type & Quantity of Agent
- Moves Dynamically as a Function of Environment
- Dissipated Explicitly based on DTRA sponsored inputs

Chemical Sensors

- Activation Based on Concentration of Chemical Agent
- Downwind messages sent to alert units in cloud's path

Casualty Adjudication

- All casualties treated as combat ineffective (for now)
- Unit Effectiveness when under chemical attack is dependent upon MOPP Status, Temperature, and Work Load



Biological weapons and EMP were funded by DTRA after this slide was produced

JAS can play civilian non-combatants who will be affected by CBRNE.



Simulation and Wargame Cooperation

Automated Attrition and Movement from simulation to support of wargaming



Wargame SME review of Decision-Making and provide validated effects of Soft Factors (training, leadership, experience, etc.) on unit breakpoints, marksmanship, suppression, speed, etc.



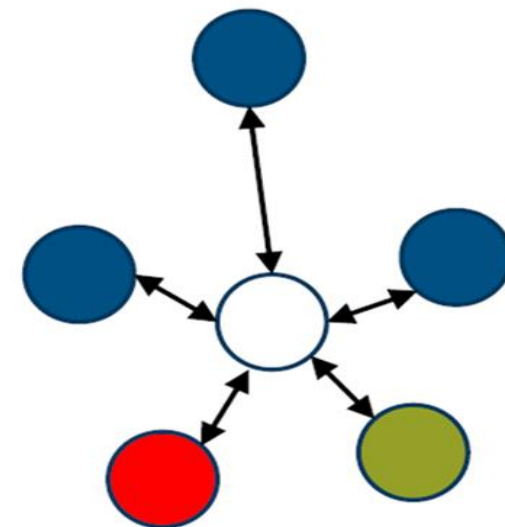
Since JAS scenarios can be run either as a simulation-supported Wargame or as a pure Simulation, It offers the opportunity to conduct Wargame-Simulation-Wargame-Simulation Cycles to advance the ability of both communities to conduct more extensive analysis.



Other Potential JAS Wargame Options

“Take-Home” Package: Since a saved sim-supported wargame scenario can be replayed as either a simulation or wargame, human players could replay the wargame and revisit their decisions in a “take-home” package without requiring a wargaming staff to support them.

Distributed Wargame: Since with the same inputs, the JAS wargame mode provides identical outputs, a low-cost distributed wargame can be conducted without requiring massive connectivity. This could also be done through a secure cloud.





Advantages of Using the JAS Wargame Mode (1)

- Both Agent and Human Decisions are based on “perception” not ground truth. But ground truth is also recorded for later comparison.
- Enemy action both kinetic and non-kinetic can cause loss, degradation, or delay of Comm & Sensor information, affecting decision-making in both speed & accuracy
- Cyber effects (denial of networks, destruction or corruption of data, destruction of physical equipment, etc. can be applied to simulated networks, their data flows, and supporting equipment.
 - These effects can be assessed in the context of all other C3/Sensor attacks/disruptions (EW, Deception, Kinetic Attack) that could be used, potentially together, to further opposing force operations.



Advantages of Using the JAS Wargame Mode (2)

- Attrition is calculated for specific weapons/munitions and local conditions such as day/night, moving/stationary, protection measures, **AND** unit based “human soft factors” (training, leadership, morale, etc.) that impact unit effectiveness.
- Humans input orders, various priorities, and then subordinate agents maneuver units, task sensors, and direct fire. The agents deal with routes, delays, engagements, and JAS algorithms and data compute attrition.
- Analytical Wargames can be replayed in JAS simulation mode with all human inputs to support the review decisions and outcomes and paused to observe specific actions and results in more detail and make changes to improve outcomes.



JAS Functionality (Release 3.20 Dec 2010)

✓ – Implemented
 P – Partially Implemented
 – Not yet Implemented

POC
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This and other
 JAS briefings can
 be found on
www.allthatjas.us

C3	
✓	JTF Command and Control
✓	Land, Maritime, Air C2
✓	Communications
✓	Indications and Warning
P	Electronic Warfare
P	Restore Destroyed C2
P	Information Warfare
ISR	
✓	Intelligence Processing
✓	Sensing
✓	Reconnaissance
✓	Collection Plan
✓	Perceived Truth
	Combat ID Errors
Land	
✓	Maneuver
✓	Direct Fire
✓	Indirect Fire
✓	Forcible Entry (Airborne)
✓	Attack Helicopters
✓	Maneuver Planning
✓	Land Sustainment
✓	Rear Area Security
P	Mobility / Countermobility
Intertheater Logistics	
✓	Intertheater Lift Scheduling
✓	Intertheater Lift Movement
✓	Air POD and Sea POD Operations

Air	
✓	Dynamic ATO Planning
✓	Close Air Support
✓	Cruise Missiles
✓	JTCB Planning
✓	Air Defense (Surface-to-Air)
✓	Counter Air (Air-to-Air)
✓	Attack / Interdiction (Air-to-Ground)
✓	Fleet Air Defense
✓	Air-to-Surface
P	Suppression of Enemy Air Def
✓	Air Unit Sustainment
✓	Time Critical Targeting
✓	Integrated Air Defense
P	Air Delivered Mines
✓	Air Refueling
P	Multi-Mission Aircraft
Space	
✓	Force Enhancement
✓	Space Control
P	Counter Space
TBMD	
✓	Threat Missile
✓	Airborne Laser
✓	DSP Cueing
✓	Simplistic TBMD C2
✓	Theater Wide Joint Defense
✓	Terminal Defense
P	Integrated TBMD C2

Intratheater Logistics	
✓	Road and Air Transportation/Ports
✓	Rail and Pipeline Movement
✓	Host Nation Support/Infrastructure
✓	Sustainment and Production
P	Maintenance and Service Support
Maritime	
✓	Surface-to-Surface
✓	Submarine on Ship
✓	Naval Blockade
✓	ASW (Submarine on Submarine)
✓	ASW (Ship on Submarine)
✓	Mine Warfare (Ship Dep'd Mines)
✓	Naval Gun Fire Support
✓	Forcible Entry (Amphibious)
✓	Maritime Sustainment
✓	ASW (Air on Submarine)
✓	Countermine
Special Operations	
✓	Special Reconnaissance
✓	Direct Action (DA) - Forcible Entry
✓	DA - Control Long Range Fires
WMD	
✓	Chem/Bio Offense
✓	Chem/Bio Defense (MOPP)
✓	Unit Effects
P	Nuclear and EMP
Agent Operations	
✓	Individual & Collective Rules
✓	Crisp and Fuzzy Rules
Weather	
✓	Air, Land & Oceanographic