THE JOINT THEATER LEVEL SIMULATION IN MILITARY OPERATIONS OTHER THAN WAR

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ABSTRACT

The Joint Theater Level Simulation (JTLS) is a hex based simulation modeling joint and combined forces. Its focus is the theater level of operations. Ground units are typically battalion or brigade sized units while individual aircraft and ships are modeled. JTLS was originally designed as a conflict model for course of action analysis work. Over the past few years it has undergone numerous, significant enhancements.

This paper introduces JTLS' current capabilities and suggests possible uses for missions associated with MOOTW, including peacemaking and peace enforcement operations. These include, but are not limited to, airspace control, Lines of Communication (LOC) protection (land, air, and, sea), Non-combatant Evacuation Operations (NEO), blockades, and nation building.

1 JTLS OVERVIEW

The focus of JTLS is theater level conflict. Its automated features and consolidated and aggregated reports are targeted towards a Joint Task Force (JTF) commander, and his staff, level of training audience. Originally designed and written as an analysis tool, JTLS has evolved into a robust training exercise driver with application in course of action analysis.

Recent major changes have marked the development of JTLS. The most significant of these are its change from a traditional two-sided, to a multi-sided model with a database definable number of sides from two to ten. Also significant has been its move to an open system (POSIX) environment, and the addition of a point and click graphical user interface using the Graphical Input Aggregate Control (GIAC) system. These changes have been made while retaining its robust air, ground, naval, intelligence and logistics capabilities.

The combination of its legacy joint capabilities and its new, multi-sided coalition functions have greatly enhanced its utility not only for traditional conflict scenarios, but across a greater spectrum of conflict, reaching significantly into Military Operations Other Than War (MOOTW). It is a constructive simulation using Lanchestrian attrition for ground combat and stochastic processes for individual weapons employed from specific platforms (i.e., aircraft munitions, explicit artillery fire, surface-to-air missiles, etc.). Its large 2,000 nautical mile (NM) by 2,000 NM play box, allows large force employment and intra-theater logistical operations. The 2,000 NM by 2,000 NM limit is a nominal constraint in deference to the overlay of its hex terrain board on a lambert conformal map projection. Sizes greater than this lead to undesirable and misleading distortions.

The simulation employs joint forces consisting of aggregated ground units, typically battalion sized, individual aircraft and ships, and Special Operation Forces (SOF) units. These forces conduct missions and operations typical of their structure. Ground units engage in activities across the spectrum of Battlefield Operating Systems (BOS) including combat operations, mobility, counter-mobility, combat service, combat service support, etc. Aircraft fly the full range of Air Force, Navy, Marine, Army and SOF missions. These include ground attack, close air support (CAS), aerial refueling, airborne warning and control (AWACS), etc. Naval ships engage in a full range of maritime operations including carrier, amphibious, mine and counter mine operations.

Typical conflict scenarios have historically involved a friendly force facing a single, monolithic, enemy. The realities of today's multi-polar environment have obsoleted this traditional, two sided view of military operations. In keeping pace with this modern vision, JTLS version 1.85B has moved from a two sided, conflict oriented simulation to a model capable of simulating up to 10 unique sides. Each side is defined by its color, its leader, and its relationship to each of the other sides.

The side relationships are specified for all sides and may be non-symmetric, i.e., just because we think side "white" is

a friend, they may think of us as enemy. Figure 1 shows a four sided example of this. These side relationships are user specified and dynamic during simulation operations. A user

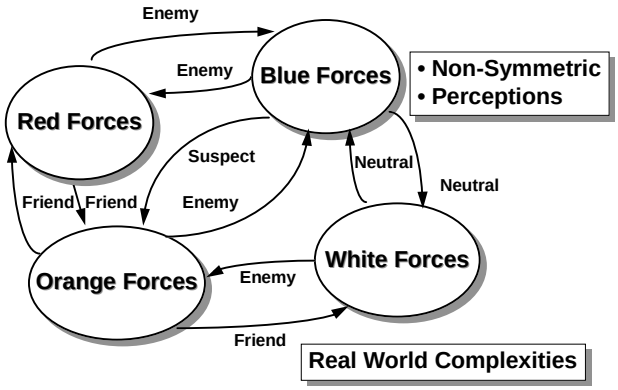

Figure 1: Side Relationship Example

chooses from four levels of side relationships; friendly, neutral, suspect, and enemy.

These chosen side relationships then determine the allowable actions between entities on each side. These actions range from those peaceful activities between two sides acting as coalition partners (friendly, or perhaps, neutral), to those types of activities normally associated with conflict. A few examples of these are shown in Table 1.

Table 1: Examples of Allowable Actions Between Sides

Allowable Action	Friend	Neutral	Suspect	Enemy
Ship Supplies, In-Process Through Ports	Yes	Yes	Yes	
Airlift, Airdrop Supplies and Units	Yes	Yes		
Air Mission Package Join-Up and Refueling	Yes			
Affected by Jamming and Air Missions Subject to Interception		Yes	Yes	Yes
Air Missions Avoid ADA Coverage			Yes	Yes
Subject to CAS Attack, Kill Discovered Convoys				Yes

Explicit, doctrinal Rules of Engagement (ROE), specified for each unit and air mission, further control engagements between entities. ROE settings of Weapons Free, Weapons Tight, Weapons Hold and No Fire are possible for surface-to-surface, surface-to-air and air-to-air engagements. These allow coalitions precise control over units and missions within their purview.

Another vital characteristic of a side is its perception of the battlefield. Each side develops and maintains its own, unique intelligence picture of all other simulation entities by employing its intelligence collection assets. These include reconnaissance missions, humint teams, SOF teams, surface detection sensors, etc. How well, or how poorly, a particular side employs these assets to maintain their intelligence perception of the battlefield (IPB) will dictate their ability to effectively conduct operations. Sides may share intelligence information with other sides, through user directives, during game play. Thus, coalition partners may choose to assist each other with controlled intelligence interchange.

Each side is comprised of one or more factions. Factions are defined by their leader and prototype definitions associated with their particular BOS. Factions are dynamic. They may form, divide and switch sides during simulation operations. Thus a coalition partner may have a faction composed of politically unstable leadership which may change sides to align with a separate, hostile side, while retaining its prototype defined capabilities. Figure 2 helps illustrate how factions operate. Note the differing combat systems and supplies used by each faction.

The evolution of JTLS is continued in version 2.0. The primary focus of this version is two fold. Primary is its move to an open systems environment. The IEEE POSIX standard was chosen as the most viable path. Simulation operation has been demonstrated on Sun SPARC workstations, Hewlett-Packard workstations and backward compatibility is maintained in the DEC VMS environment. Additionally, unix hosted user interfaces have been tested on Macintosh and PC compatible platforms. This open system design enables users to operate JTLS in a scoped

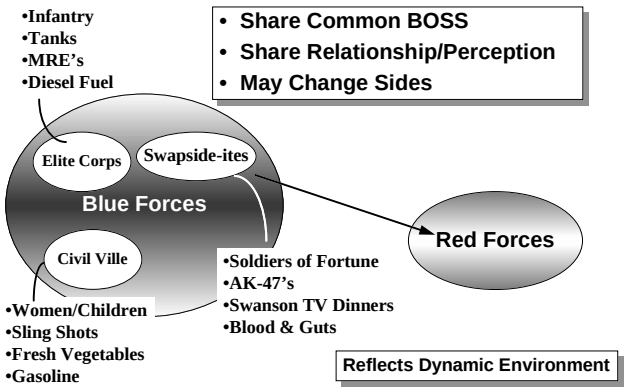

Figure 2: Factions within JTLS

environment of as few, or as many workstations as desired. Modern unix/POSIX compliance greatly eases technical requirements without sacrificing performance.

Also new in version 2.0 is a graphical user interface, further enhancing usability. The GIAC point and click

interface greatly eases training requirements and provides users an intuitive, interactive capability. The G_data system architecture inherent in the JTLS/GIAC union provides visibility of all model activity through a well defined GIAC data structure and protocol. GIAC External Modules (GEM) may be easily constructed to interface to outside systems. Links to the Global Command and Control System (GCCS), leveraged by this architecture, have been demonstrated by the Defense Information Systems Agency (DISA). Further developments are ongoing. This architecture has simplified proposed interfaces to other existing systems including Distributed Interactive Simulation (DIS) compliance, After Action Review (AAR) systems, and other real world command, control, communication and Intelligence (C^3I) systems.

The methodology for outputting simulation messages has also been completely revamped. Messages produced within the simulation include mission reports, intelligence reports, logistics reports, etc. These messages are formatted in either plain text or United States Message Text Format (USMTF) and may be electronically mailed (emailed) to other users using Simple Mail Transport (SMTP) standards. Messages are formatted locally at each user workstation using a message definition file. Multi-lingual capability is possible with translation of this definition file to the language of choice.

2 JTLS USE IN MOOTW

MOOTW entails a wide spectrum of operations. Figure 3 is an enhanced diagram taken from Joint Publication 3-07 (Office of the Chairman, Joint Chiefs of Staff 1994). It depicts a spectrum of operations ranging from all out war, to promoting peace. Specific example missions are shown for each major sub category.

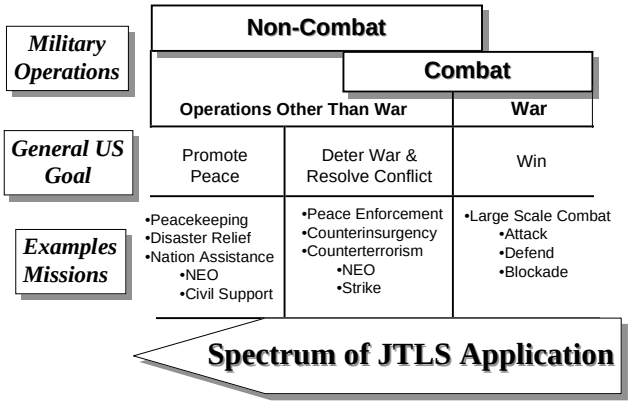

Figure 3: Spectrum of Military Operations

The UJTL provides a methodology for crosswalking strategic level tasks from operational through tactical level tasks (Chairman of the Joint Chiefs of Staff 1995). This methodology provides the framework for Joint Task Force (JTF) commanders and their staffs to assist in campaign planning. Table 2 depicts those strategic level tasks with specific application in MOOTW.

Table 2: Examples of UJTL Strategic Level Tasks Involved in MOOTW

Ref. No.	Title
ST 1.3.5	Show of Force/Demonstration
ST 1.5.2	Quarantine, Embargo, or Blockade
ST 3.2.1	Lethal Attack on Strategic Targets
ST 3.2.2	Nonlethal Attack on Strategic Targets
ST 4.4.3	Law Enforcement and Prisoner Control
ST 6.2.5.3	Secure and Protect Air, Land, and Sea LOCs
ST 8.2.1	Conduct Security Assistance Activities
ST 8.2.3	Coordinate Disaster Relief
ST 8.2.4	Provide Humanitarian Assistance
ST 8.2.5	Provide Nation Assistance Support
ST 8.2.6	Provide Military Civic Action Assistance
ST 8.2.7	Assist in Restoration of Order
ST 8.2.9.2	Support Peacekeeping
ST 8.2.9.3	Conduct Peace Enforcement
ST 8.4.1	Counterdrug Operations in Theater
ST 8.4.2	Assist in Combating Terrorism
ST 8.4.3	Support Evacuation of Noncombatants

The joint, combined and, coalition functionality within JTLS support a broad range of operational and tactical tasks implicit within these strategic level considerations. The multi-national nature of MOOTW may be exercised using the multi-sided capabilities within the simulation. The difficulties and benefits inherent in coalition operations are appropriately penalized and rewarded in a realistic fashion. Synergistic effects of intelligence sharing, cross-side logistical support, multi-sided (multi-national) air, ground and sea operations become evident. Likewise, the effects of fragmented, piecemeal operations which may occur as coalitions breakdown, are equally obvious.

Most often coalition partners will consist of separate countries speaking separate languages. Multiple languages, and their inherent barriers, present a constant challenge for JTF commanders and staffs. The simulation's multi-lingual capability, specifiable at the workstation level, can help accentuate those challenges which are typically associated with multi-national coordination activities.

These broad, strategic level considerations may be crosswalked down to operational level tasks. For the sake of brevity, I have selected a few (see Table 3) to further illustrate MOOTW applications for JTLS. The next section discusses each in turn.

2.1 Plan and Execute Show of Force

The fundamental, combat oriented, original design nature of the simulation facilitates this particular task. For example, carrier battle groups may be deployed to conduct peaceful naval, air and amphibious exercises within theater. Solidarity between friendly sides can be demonstrated via coalition operations allowed within the simulation. Maneuvers can be conducted even in the vicinity of declared hostile forces through the judicious use of ROE. Enemies may be identified and declared yet tactical restraint can be shown through localized ROE of weapons hold, or even no fire. Large scale forces may be built up through Timed Phased Force Deployment (TPFD) actions showing resolve and intent. Logistical challenges associated with closing a large force in theater can be simulated. Use of host nation ports, facilities and material handling equipment is possible. Air operations, including AWACS missions, large, multi-sided mission packages and, surgical strikes against theater operational targets can be conducted to demonstrate resolve and deter conflict.

Table 3: Examples of UJTL Operational Level Tasks Involved in MOOTW

Ref. No.	Title
OP 1.2.4.1	Plan and Execute Show of Force
OP 1.4.3	Plan and Execute Blockade
OP 4.6.4	Law Enforcement and Prisoner Control
OP 6.1.3	Provide Airspace Control
OP 6.2.5	Conduct Evacuation of Noncombatants
OP 6.5.4	Protect and Secure Air, Land and Sea LOCs

2.2 Plan and Execute Blockade

Naval forces, both surface and sub surface can provide realistic simulation of blockade operations. Civil and military shipping can be attempted by opposing and other forces. This can provide realistic and challenging intelligence collection management, peace keeping, and peace enforcement scenarios for coalition partners. Friendly forces can threaten other force's shipping operations up to, and including, application of military firepower to enforce blockades.

2.3 Provide Law Enforcement and Prisoner Control

Several options are possible. Friendly units designated as Enemy Prisoner of War (EPW) control agencies can deploy to areas designated as holding areas. Enemy units can surrender either in their entirety, or as detachments thereof. These units can be collected into holding areas. Specific ROE for EPW control units can be set to prevent combat between themselves and their prisoners, while maintaining self defense. Alternatively, separate EPW factions can be created. These may change sides, either to a side designed for prisoner control, or they can defect to an active side. Future model improvements will include gathering intelligence from prisoners, ability to construct physical barriers, and simulating the psychological impact of taking prisoners. These would include such things as the effects of mass surrender, defection, etc.

2.4 Provide Airspace Control

Identification of air tracks is by side. Once identified, they are assigned a Tactical Digital Information Link (TADIL) compliant track number. Faction specific Identification Friend or Foe (IFF) arrays stipulate how well a particular side's Integrated Air Defense System (IADS) function. This methodology provides a database specifiable probability of miss identification of aircraft as either belonging to an incorrect side, or as unknown. Table 4 shows an example probability of identification matrix for a three sided scenario. In this case, side 1 has an 85% probability of properly identifying its own aircraft and a 15% probability of miss identification spread across the other three possible states.

Table 4: Example Probabilities of Identification

	Side 1	Side 2	Side 3	Unknown
Side 1	0.85	0.05	0.05	0.05
Side 2	0.05	0.85	0.05	0.05
Side 3	0.05	0.05	0.85	0.05

Difficulties associated with coordinating identification of unknown tracks between several possible sides, fratricide, and airspace control can be simulated. Positive control measures can be implemented including designating air routes with specific altitudes. No fly zones may be specified and enforced. Simulation players can draw airspace control graphics directly as workstation map overlays. These may be shared with other players. Defector aircraft can be simulated. They can be intercepted and escorted to friendly bases.

2.5 Conduct Evacuation of Noncombatants

Refugees, and other noncombatants, can maneuver as ground units. These can be constructed as separate factions and/or units of a given side, or they may be units of a specific, non-combatant side. These refugee units can cause congestion and delay of other units moving through their vicinity. Civil Affairs teams may be deployed to help decongest areas of dense refugee movement. Rescue operations of friendly personnel (whether military or civilian) can be simulated using joint, combined and

coalition assets. For example, British helicopters could be flown in to pickup US embassy personnel within a hostile city. Noncombatants can be airlifted, moved as a ground unit or embarked aboard ships for evacuation.

2.6 Protect Air, Land and Sea Lines of Communication

Security operations may be conducted by air, land or naval forces to ensure logistics flow for intra theater supplies and personnel. Naval forces can conduct blockade operations. They may also be used to break through and thwart enemy blockade activities. Naval combat forces can conduct a full gambit of operations including mine laying and clearing, anti-submarine patrol, naval gunfire support, carrier operations, etc. to ensure passage of friendly shipping activities.

Combat Air Patrol (CAP) missions, AWACS, escort and other air missions can be used to maintain control of air Lines of Communication (LOC). CAP missions can be set to automatically intercept and engage (based on side relationship and ROE) or they may be manually paired against unknown, suspect or enemy air tracks.

Intelligence collection assets can be managed to help identify possible threats to LOCs. Ground security forces may be dispatched to deal with these threats. Response may take various forms, from small, SOF team actions to large, battalion or brigade sized rear area force actions.

3 SUMMARY

The full range of possible applications for JTLS in MOOTW are quite large. They have only been touched upon here. Its' multi-sided flexible architecture allows for investigating many of the challenges involved with coalition operations. As user demand for MOOTW capabilities within constructive simulations increase, more functionality specifically aimed to support these demands will be included in JTLS.

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