

## AGGREGATE LEVEL SIMULATION PROTOCOL (ALSP) MANAGING CONFEDERATION DEVELOPMENT

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### ABSTRACT

ALSP provides computerized support, via a confederation of models, for Joint military training exercises which allows the use of familiar training simulations. The collective group of simulations communicating via ALSP is known as the ALSP Confederation. The 1993 ALSP Confederation is composed of three Service models: USA Corps Battle Simulation (CBS), USAF Air Warfare Simulation (AWSIM), and USN Research, Evaluation, and Systems Analysis (RESA) model. This paper will address ALSP Confederation development and the management processes that focus this joint development effort.

### 1 BACKGROUND

As early as 1989, experiments in distributed wargaming were being initiated to determine the feasibility of using aggregate level warfare simulations to provide automated support to joint exercises. The results of using the experimental combination of models to support the ACE 89 exercise, while not without shortcomings, did emphasize the utility of using disparate simulations in concert.

The Defense Advanced Research Project Agency (DARPA) funded a proposal from The MITRE Corporation, a Federally Funded Research and Development Center (FFRDC) to investigate ways to generalize and systematize a confederation in which disparate constructive simulations would work together to support joint military training exercises. The project was titled Aggregate Level Simulation Protocol (ALSP).

The history of the ALSP project is thoroughly presented from a technical research perspective in the document titled "Aggregate level Simulation Protocol (ALSP) Program Status and History" by David W. Siedel, The MITRE Corporation. The purpose of this paper is to describe the structure necessary for the development of a working confederation of simulations

from the management perspective.

### 2 MANAGEMENT STRUCTURE

As the original research project took on the mantle of producing a simulation support system for military training exercises, DARPA devised a plan to transition responsibility for the program to the military modeling and simulation community. In 1992, a memorandum of agreement was signed between DARPA and the US Army Simulation, Training and Instrumentation Command (STRICOM) transferring the management responsibility for further development of ALSP. In March 1993, the Executive Council for Modeling and Simulation (EXCIMS) approved the ALSP Management Plan officially recognizing STRICOM as the Executive Agent for ALSP.

The ALSP Management Plan provided definite guidelines for the development of a management structure to facilitate the development of a confederation of simulations utilizing the ALSP communication protocols. One of the most important components ensuring the success of this development process is the complete cooperation of the proponents and developers of the simulations composing the confederation. Every step in the development process must be coordinated.

Figure 1 shows the structure established to develop the relationships - technical and managerial - necessary to ensure a coordinated, cooperative effort among the participants developing the ALSP Confederation. The next several paragraphs will explain the roles and responsibilities of the various groups depicted in the figure.

**Executive Council for Modeling and Simulation.** To energize a project and provide it with authority, there must be an organization that directs its establishment and support by the community it benefits. In Modeling and Simulation this energy and direction is provided by the Executive Council for Modeling and Simulation

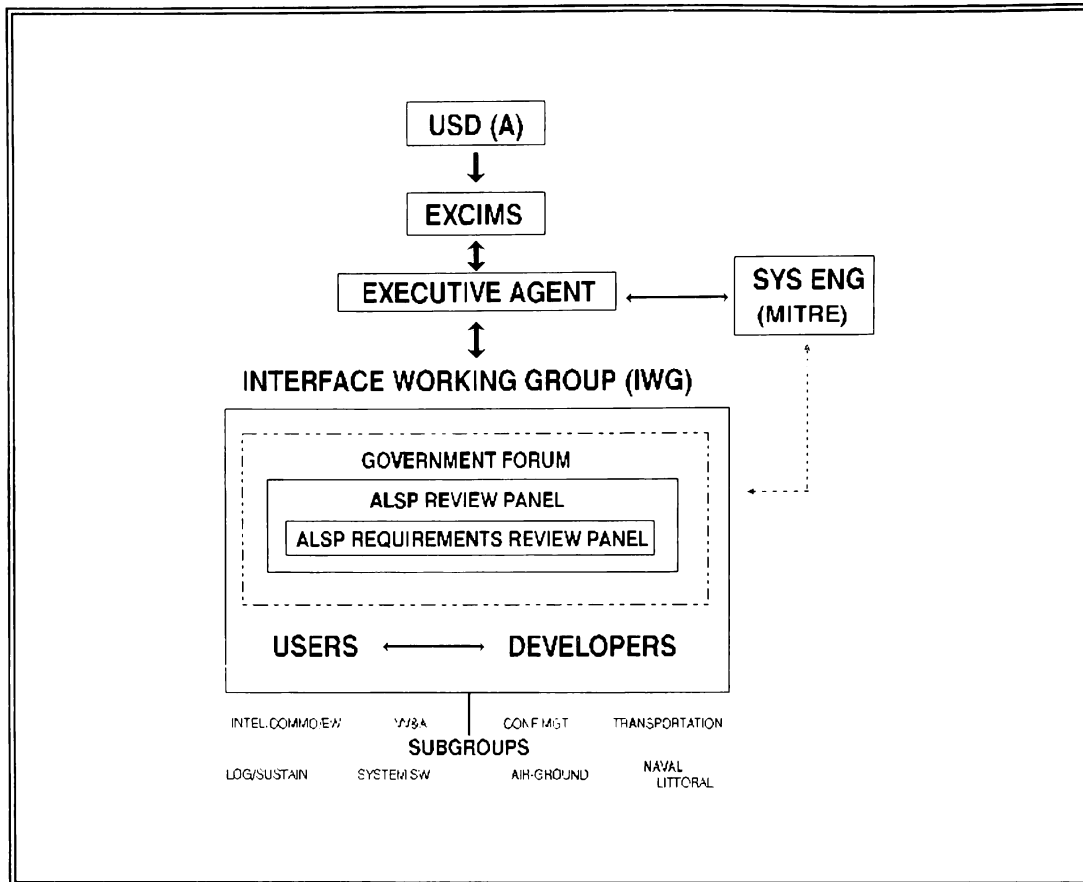


Figure 1 ALSP Management Structure

established by the Under Secretary of Defense for Acquisition. Through the Modeling and Simulation (M&S) Working Group of the EXCIMS, oversight of the ALSP activity and policy level guidance is provided. In order to ensure guidance is executed and day-to-day management is accomplished, the EXCIMS established an Executive Agent for ALSP. The Executive Agent for ALSP is STRICOM. This assignment was formalized with the approval of the ALSP Management Plan in March 1993.

**Executive Agent.** The Executive Agent executes the ALSP mission according to the guidance of the EXCIMS provided through the M&S Working Group. This includes coordinating funding for the support of the ALSP Systems Engineer; ensuring that the groups established to determine requirements, monitor progress, and implement the ALSP Development Process are actively engaged in these pursuits; and scheduling limited community resources, i.e., system engineering core support. Another important function of the Executive Agent is maintaining open lines of communication with all players in the ALSP Community. The ALSP Systems Engineer is managed by the Executive Agent.

Currently, the ALSP Systems Engineering Core Support function is provided by The MITRE Corporation. Core Support includes administrative and technical support for the various groups established to focus and support the ALSP Development Process; development, maintenance, testing, transition and configuration management of the ALSP system software; support development through maintenance of the ALSP protocols, archiving ALSP software (both common and simulation software), test plans and test results; and assessment of the technical implications of protocol expansion.

**Interface Working Group.** In the early stages of the ALSP project, a group was formed to provide a forum for discussion of issues, both technical and operational. This group was called the Interface Working Group (IWG). IWG membership includes both model developers and model users from government, industry and academia. IWG meetings are held quarterly, but for a time in the early stages of confederation development the IWG met monthly. The Executive Agent chairs the IWG. This is the body of experts responsible for implementing the ALSP development, test and integration process. Reviews of user generated

requirements, candidate ALSP protocol specifications, and results of component and confederation tests promote the process of developing, integrating and testing new ALSP applications. A critical participant in the IWG is the user who generates and ranks requirements; reviews ALSP concepts, interface specifications, prototypes, and tests for implications related to requirements; and supports transition of new capabilities into exercise operations by participating in testing and operations. Without the focus provided by the user no project of this type will be useful to those it is designed to assist. Participation of the model developers in the IWG is also critical because they draft and review ALSP interface specifications and develop the software necessary to implement those specifications as enhancements to the Service and Joint simulations. The communication between these groups facilitated by the IWG is invaluable to the successful development of the ALSP Confederation.

**Government Forum - Review Panel and Requirements Review Panel.** Within the IWG is a group composed of government representatives, this is called the IWG Government Forum. This group is responsible for providing recommendations concerning: key decisions in the ALSP Development Process; ensuring user generated and prioritized requirements are addressed by developers; and ensuring resource issues and priority conflicts are brought to the Executive Agent for resolution.

Two important panels have been established from the members of this IWG Government Forum: The ALSP Requirements Review Panel (RRP) composed of Service and Joint user representatives. The ALSP Review Panel (RP) composed of Service and Joint developer representatives, OSD representative, and the user representatives from the ALSP Requirements Review Panel.

The ALSP Review Panel with user and developer representatives from the Services (USA, USAF, USMC, and USN), OSD and the Joint Staff is chaired by the ALSP Executive Agent. Among the responsibilities of this panel are making key decisions relative to the entry of a new model or capability into the confederation. These decision points are at the transition from concept phase to implementation and test, approval of an integrated, coordinated implementation and test plan, and approval of the configuration of the confederation following testing.

The ALSP Requirements Review Panel with a user representative from each Service: USA, USAF, USMC, and USN and Joint user representatives from J-7 and J-8 is chaired by the Joint representative from J-7. Responsibilities of this panel include identifying user

requirements and recommending priorities based on an assessment of the requirement for the function in the confederation; monitoring the activities and key decisions in the ALSP Development Process.

The Executive Agent for ALSP through coordination with the Services, OSD-Defense Modeling and Simulation Office (DMSO), and the Joint Staff (J-7) identified the members and established both the ALSP Requirements Review Panel and the ALSP Review Panel in FY93. Table 1 shows the composition of both of these panels. The initial meeting of the ALSP Requirements Review Panel was held on 6 April 1993 to begin identification of the Service and CINC functionality requirements for the 1994 ALSP Confederation. On 11 August 1993 at the initial meeting of the ALSP Review Panel the 1993 ALSP Confederation was accredited following the first rigorous ALSP Confederation Integration Test followed by a Confederation Test that included load testing. The first steps toward determining the configuration of the 1994 ALSP Confederation were also taken at this meeting.

Table 1: Composition of ALSP Panels

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REVIEW PANEL MEMBERSHIP (FY93)
Organization      Model Developer Representative
STRICOM, Chairman USA
CADRE/WGT         USAF
MARCORSYSCOM     USMC
NAVOPS            USN
DMSO              OSD
J-7, J-8         JOINT STAFF
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REQUIREMENTS REVIEW PANEL (FY93)
Organization      User Representatives
JWFC, Chairman   J-7 *
NSC              USA
USAF-XOMW        USAF
MCCDC-MTSP      USMC
NAVOPS          USN *
J-8             JOINT STAFF *
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\* Also model developer representative

**Subgroups.** In addition to the IWG Government Forum and its Panels, the IWG has subgroups formed from the entire membership that focus on technical development of specific functional interfaces or other issues related to the ALSP Development Process. The subgroups established early in ALSP development and continued through FY93 included Air, Intelligence, Logistics, Ground and Naval Subgroups. These subgroups developed and guided implementation of Air-to-Air, Air-to-Ground, and Ground-to-Air interaction among models within the ALSP Confederation.

With the exception of the Verification, Validation and Accreditation (VV&A) Subgroup and the Configuration

Management (CM) Subgroup which were directed by the ALSP Management Plan and initiated by the ALSP Review Panel in FY93 to develop VV&A and CM Plans for the ALSP Confederation, the number and focus of the subgroups is dictated by the functionality being developed for the Confederation.

As the 1995 ALSP Confederation Development Cycle begins an effort is being made to focus development efforts on the requirements ranked by the ALSP Requirements Review Panel. Table 2 shows the 1994 ALSP Requirements identified and ranked by the ALSP Requirements Review Panel during FY93.

Table 2: 1994 CINC Requirements

RANK	REQUIREMENT
1	Tactical Ballistic Missiles/Cruise Missiles
2	Amphibious Operations
3	Transportation and Integration Special Operations
4	Other Ship-to-Ground
5	Ship-to-Ship Command and Control Surface-to-Air Air-to-Surface
6	Intelligence Electronic Warfare Logistics-Sustainment After Action Report Space
7	Air-to-Air Air-to-Ship Non-Combat Evacuation Operations Disaster Relief Humanitarian Assistance Medical Littoral Warfare Multi-Sided Follow-On Forces
8	Air Base Operations
9	Ground-to-Ground

The IWG Subgroup structure is being changed to include subgroups in these areas: Combat Interactions, Communications/ Intelligence/ Electronic Warfare, Logistics, Space, Special Operations and Coalition Warfare. This is being done to align the subgroup structure more closely with the resolution of identified Service and CINC requirements for functionality in the ALSP Confederation. Table 3 contains a list of and

mission statements for the subgroups formed to address functionality.

Table 3: IWG Subgroups and Missions

<p>Combat Interaction Subgroup (CBT INT) Mission: ----- Continue TBM/CM ICD implementation (CINC #1) Continue MTWS Integration (CINC #2) Continue Air-to-Air ICD implementation (CINC #8) Continue ENWGS Integration (CINC # Undefined) Implement remaining existing air-ground changes Implement remaining combat interactions Start Concept Phase on Amphibious Operations (CINC #2) Start Concept Phase on Other Ship-to-Ground (CINC #4) Start Concept Phase on Ship-to-Ship (CINC # 5) Start Concept Phase on Surface-to-Air (CINC #5) Start Concept Phase on Air-to-Surface (CINC #5) Start Concept Phase on Littoral Warfare (CINC # 7) Start Concept Phase on Air Base Operations (CINC #8) Start Concept Phase on Ground-to-Ground (CINC # 9) Identify improvements to the existing air, sea, and land interfaces -----</p>
<p>Logistics Subgroup Mission: ----- Complete integration of CSSTSS as Army service support model Start Concept Phase on Transportation and Integration (CINC #3) Start Concept Phase on Logistics-Sustainment (CINC #6) Start Concept Phase on Medical (CINC #7) Review current CSSTSS implementation -----</p>
<p>Communications-Intelligence-Electronic Warfare (C3IEW) Subgroup Mission: ----- Integration of TACSIM as Army intelligence model Integration of JECEWSI as Air Force EW model  1995 Mission Start Concept Phase on Command and Control (CINC #5) Start Concept Phase on Intelligence (CINC #6) Start Concept Phase on Electronic Warfare (CINC #6) -----</p>
<p>Space Subgroup (New Subgroup) Mission: ----- Start Concept Phase on TBM/CM (CINC #1) Start Concept Phase on Space (CINC #7) Start Concept Phase on Strategic Missiles (CINC # Undefined) -----</p>
<p>Special Operations (SO) Subgroup (New Subgroup) Mission: ----- Start Concept Phase on Special Operations (CINC #3) -----</p>
<p>Coalition Warfare (CW) Subgroup (New Subgroup) Mission: ----- Start Concept Phase on Coalition Warfare (CINC #7) Start Concept Phase on Multi-sided (CINC #7) Start Concept Phase on Non-Combat Opns (CINC # 7) Non-Combatant Evacuation Operations (NEO) Disaster Relief</p>

Humanitarian Assistance  
Counterdrug operations

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**Accomplishments.** During 1993, its first year as a multi-service program, the ALSP Confederation experienced significant transition and growth. It expanded in functionality, established a management plan and a confederation integration and test process, as well as positioning itself to provide support to joint exercises in the future. Numbered among major accomplishments are:

- o Implementation of the Management Plan providing focus for the Confederation development and testing cycle.
- o Introduction of procedures for incorporating new functionality in the Confederation and for the integration and test process.
- o Increased capability with the addition of the Navy simulation to complement the existing Army and Air Force models and increased their ability to interact.
- o Successfully supported a major joint exercise, Ulchi Focus Lens 1993 (UFL 93).
- o Continued the development effort to add new capability to the 1994 Confederation.

Perhaps the most important achievement during 1993 was the development of a cohesive, cooperative group of professionals from the DoD working together to achieve a common goal of supporting major training exercises with the best simulations possible. Success for this type of endeavor is only possible if the groups evolved are willing to communicate, work closely together, and follow agreed upon procedures and protocols. The successes during 1993 are directly attributable to dedicated professionals working together to achieve a Confederation that satisfied a number of functional goals. Without their dedication the advances made would not have been possible.

**3 LESSONS LEARNED**

The first year of ALSP management was a learning experience. The ALSP Management Plan identifies three major classes of activities relative to the development of a confederation of constructive simulations, however, it clearly delineates responsibility for only one: Systems Engineering of the modeling and simulation interfaces and the Technical Management of ALSP Confederation development by the Executive Agent, STRICOM.

The other two classes of activity are the responsibility of the simulation users and their support activities: Determination of operational requirements by the CINCs and Service Components, and Operational support of

simulation and training activities to conduct exercises by the user community. Direction to insure the accomplishment of these last two activities is addressed in part in the DoD Directive on Modeling and Simulation.

The Executive Agent identified several areas needing refinements on duties, responsibilities, and processes. These concerns were raised to the M&S Working Group of the EXCIMS to consider and resolve the tough issues. This list of lessons learned issues and actions being taken under the purview of the Executive Agent, Review Panel, and Requirements Review Panel follow:

A development cycle must be established to insure the best possible ALSP Confederation for use in supporting Joint and CINC exercises. The 1993 ALSP Confederation Annual Report contained a timeline illustration with an annual development cycle. The Executive Agent recommended that the minimum development cycle that can be supported is twelve months. Additionally, certain milestones in this cycle must be earmarked for particular times to allow adequate planning for participation, e.g., major testing vehicles such as the ALSP Integration and Confederation Tests must occur routinely in the first and second quarter of a fiscal year (FY), respectively. The Executive Agent has scheduled testing for the 1995 ALSP Confederation (Integration Test 1stQtrFY95 at JWFC and Confederation Test 2ndQtrFY95 at WPC) with the intent to have testing in future years occur in these same timeframes.

Functional requirements of the Services, Joint Staff and CINCs must be considered in developing the ALSP Confederation. The ALSP Requirements Review Panel chaired by the Joint Warfighting Center (JWFC) has taken steps to insure this is done in future ALSP development cycles. The first list of Service and CINC identified requirements was published in FY93 and is driving functionality development for the 1994 ALSP Confederation. The Requirements Review Panel met early in FY94 to identify requirements for the 1995 ALSP Confederation.

Informal exercise scheduling of ALSP Confederation use for 1994 raised concerns that the process does not fairly represent the needs and priorities of the Joint community. A more formal process is needed for determining the exercises to be supported. This is an operational issue that must be addressed by the user community.

A formal funding process is needed to support Joint requirements for ALSP. Funding of ALSP activities has been derived from two sources: Core Support funded by all Services and DoD sharing the cost of this common support. All other funding requirements have been provided by the Service and Joint Developers and the

supporting Simulation Centers. As the Confederation grows in size and complexity, a funding source to support Joint activities must be identified and funded. These activities include efforts such as testing or model changes which clearly benefit the Joint Community and for which Service funding is not available. It is clear that the Services plan and program funding for Service changes to the models but it is not clear who is responsible for funding CINC or Joint requirements. Funding sources must be identified to ensure enhancements to the functionality of the ALSP Confederation required by the CINCs can be made.

Support from the EXCIMS is essential for the success of this Joint Modeling and Simulation endeavor. As the demand increases for use of the ALSP Confederation to support Joint and CINC exercises, more and more model developers are seeking to become active in the ALSP Confederation. Only the highest level of support can insure the funding necessary to make the system software and model coding changes required to build a viable ALSP Confederation and adequately test it prior to use in exercise support.

Good communication is the key to any successful endeavor. Communication between and among all participants in developing a confederation of models and simulations is absolutely required to succeed. Any problems that have arisen in the development of the ALSP Confederation can be traced back almost without exception to lack of communication. Either the question wasn't asked or the information wasn't passed. While great strides have been made, communication is still not as good as it should be among the participants. Steps are being taken to improve communication, but it will take active participation by all to accomplish this goal.

#### 4 GUIDELINES

So, you want to build a confederation of models. What do you need to do?

First and foremost, establish good lines of communication. Make sure everyone participating understands the goals and objectives, document everything so late comers do not make up their own rules but follow those established by the community.

Second, establish a single focal point and authority for directing and managing activities related to the effort.

Third, establish a budget adequate to accomplish the task that covers all development and testing activities. Do not create an atmosphere where "the golden rule - he who has the gold rules" is the driver for development of a tool for the community.

Fourth, staff the managing activity adequately. Recognize because the talent base is small that, not only in management but in technical work as well, the same

people are involved in all aspects of this development process - managing, developing, and operating.

Fifth, do not give the nay sayer more credence than the managing activity before enough time has elapsed for the project to get established. The learning curve is steep for all organizations participating in an endeavor of this type and adequate time must be allowed to overcome this obstacle.

Sixth, do not allow outside influences to shorten development schedules and increase problems in the attainment of a viable Confederation. Everyone must work for the good of the Confederation and the support it can provide for the community, not for individual gratification. Follow the established rules - do not try to short circuit the process.

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#### DISCLAIMER

The views expressed in this paper are those of the author and while every attempt was made to report the events factually the results are not to be construed to represent official positions.

#### AUTHOR BIOGRAPHY

**MARY C. (CONNIE) FISCHER** became the Project Director for ALSP in February 1993. She holds masters degrees in mathematics from the University of Tennessee and the University of Illinois, and a MBA from Western New England College. Dr. Fischer was awarded her doctorate from Columbia Pacific University in 1989 and is a graduate of the US Army Command and General Staff College.