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ADST/WDL/TR--92-03013

# ADVANCED DISTRIBUTED SIMULATION TECHNOLOGY QUARTERLY REVIEW SUMMARIES

Loral Systems Company  
ADST Program Office  
Orlando, Florida

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AUG 10 1992  
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28 July 1992

Prepared for

STRICOM  
Simulation, Training and Instrumentation Command  
Orlando, Florida

**LORAL**

Systems Company

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Loral Systems Company  
ADST Program Office  
12443 Research Parkway Suite 303  
Orlando, Florida 32826

28 July 1992

Contract No. N61339-91-D-0001

Prepared for

STRICOM  
Simulation, Training and Instrumentation Command  
Naval Training Systems Center  
12350 Research Parkway  
Orlando, Florida 32826-3275

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# REPORT DOCUMENTATION PAGE

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13. ABSTRACT (Maximum 200 words)

The ADST Quarterly Review Summaries provides an overview of all currently active ADST Delivery Orders (DO). In addition to a brief synopsis of the DO technical effort, project scheduling data and exit criteria are provided.

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# DELIVERY ORDER SUMMARIES

LOCAL

# ATAC II

Sponsor/POC DCD / Joe Bowen Phone (205) 255-4704

STRICOM POC Bryant LaFoy Phone (407) 380-4353

LORAL POC Greg Kanies Phone (407) 382-4596

Funding Source USAAVNC

Schedule: Start 15 February 1992 Stop 26 February 1993

## **Project Description:**

The objective of the ATAC II effort is to upgrade the capabilities of the Aviation Test Bed facility at Ft. Rucker in order to support the conduct of the Air-to-Air Combat, Phase II experimentation. This includes improvements to the existing AVTB to:

- increase the fidelity of the SAFOR detection tables
- add a Missile Server to the network to allow firing Hellfire Missiles with a remote designator
- improve the Air-to-Air Stinger symbology
- integrate a Digital Map with one of the Rotary Wing Aircraft devices
- procure and integrate a Mission Planning/Scenario Generation systems
- procure and integrate an After Action Review capability including a video instrumentation and editing system
- provide engineering, test support, and data analysis services.

## **Project Status:**

The ATAC II effort is progressing on schedule with the following exceptions.

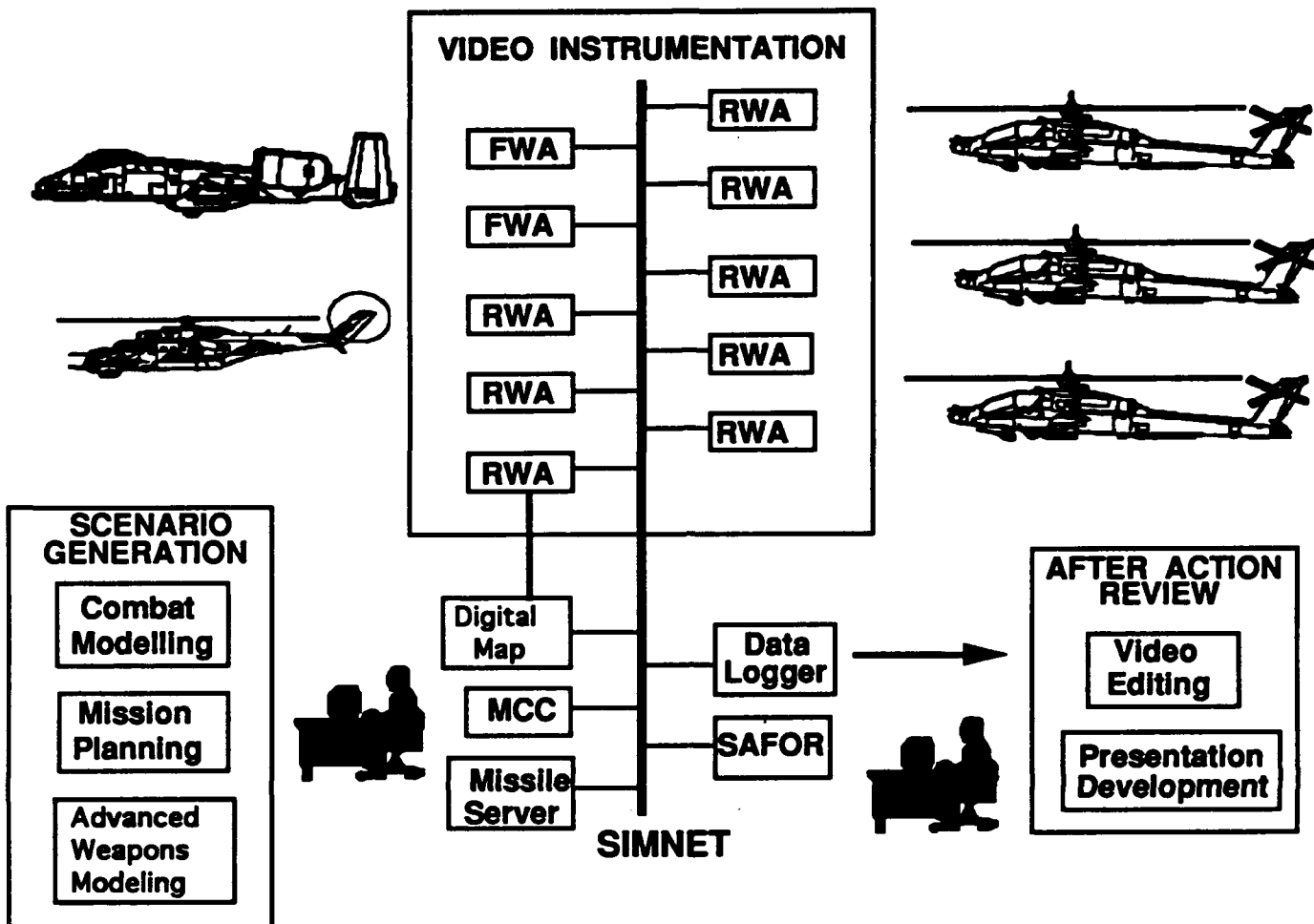
The original supplier of the video instrumentation and editing system failed to deliver. A replacement supplier has been identified and installation and integration of the system are nearly complete.

Digital Map integration has proved more difficult than anticipated. Allied Signal is on site this week performing integration testing.

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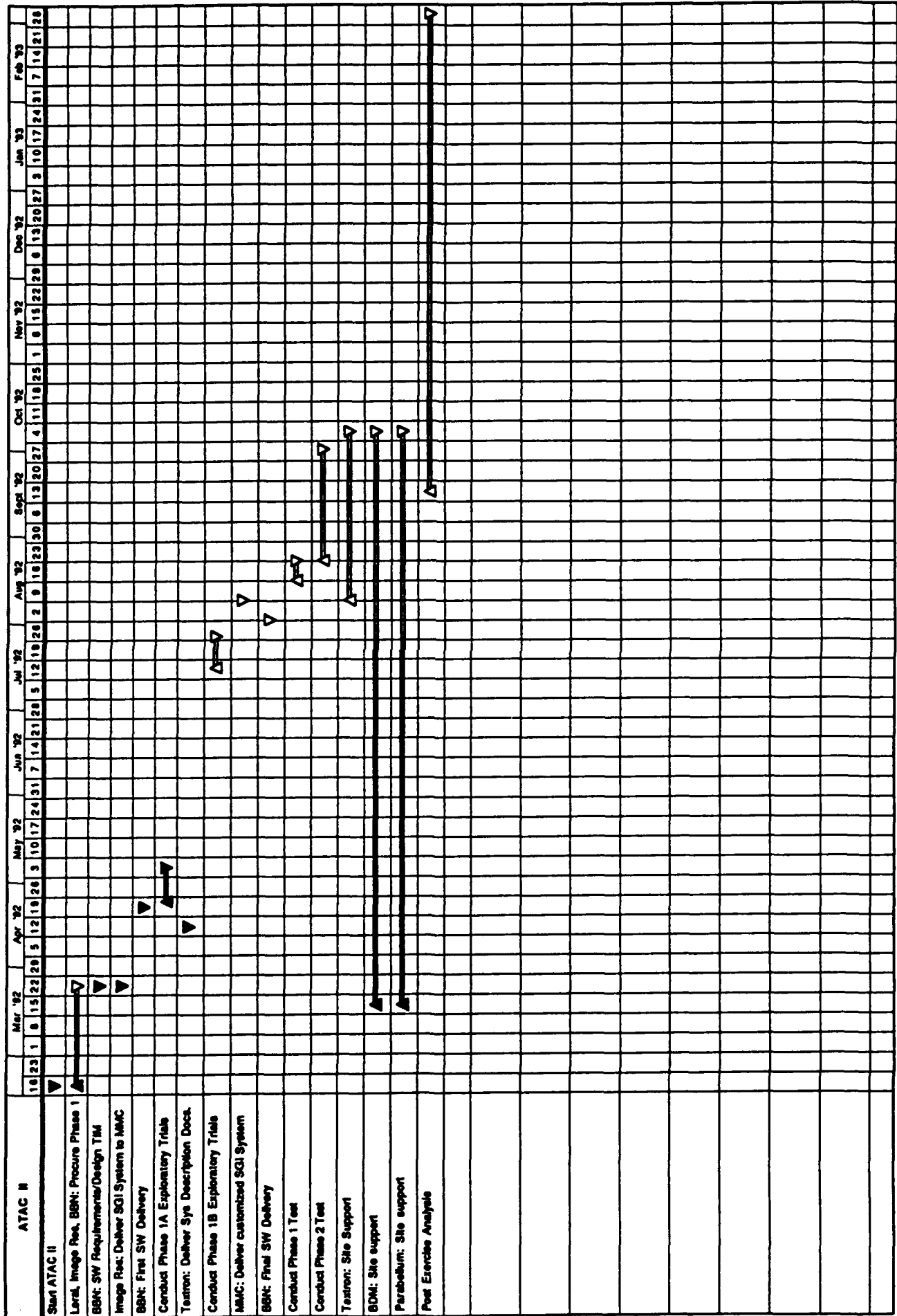
# ATAC II Configuration



## Exit Criteria or Objective

Support the conduct of the Air-to-Air Combat Phase II experiment by providing:

- Software Upgrades to the Rotary Wing Aircraft devices
- Software Upgrades to the Semi-Automated Forces detection tables
- Digital Map
- Missile Server for launch of Hellfire missiles in a remote mode
- Scenario Generation capabilities
- Video Instrumentation of the Rotary and Fixed Wing Aircraft devices
- After Action Review capabilities
- Engineering, Test Support, and Data Analysis services



# AirNet AeroModel & Weapons Model Conversion

Sponsor/POC	<u>TSM-C/Major Steve Ochsner</u>	Phone	<u>(205)255-2205</u>
STRICOM POC	<u>Mr. Bryant LaFoy</u>	Phone	<u>(205) 380-4353</u>
Loral DO POC	<u>Mr. Fred Bondzeit</u>	Phone	<u>(407) 382-4585</u>
Funding Source	<u>STRICOM</u>		
Schedule: Start	<u>7 April 1992</u>	Stop	<u>1 February 1993</u>

## **Project Description:**

Provide selected enhancements to the existing 8 AirNet Rotary Wing Aircraft (RWA) simulators. Includes design, procurement, integration, and test.

### **Enhancements:**

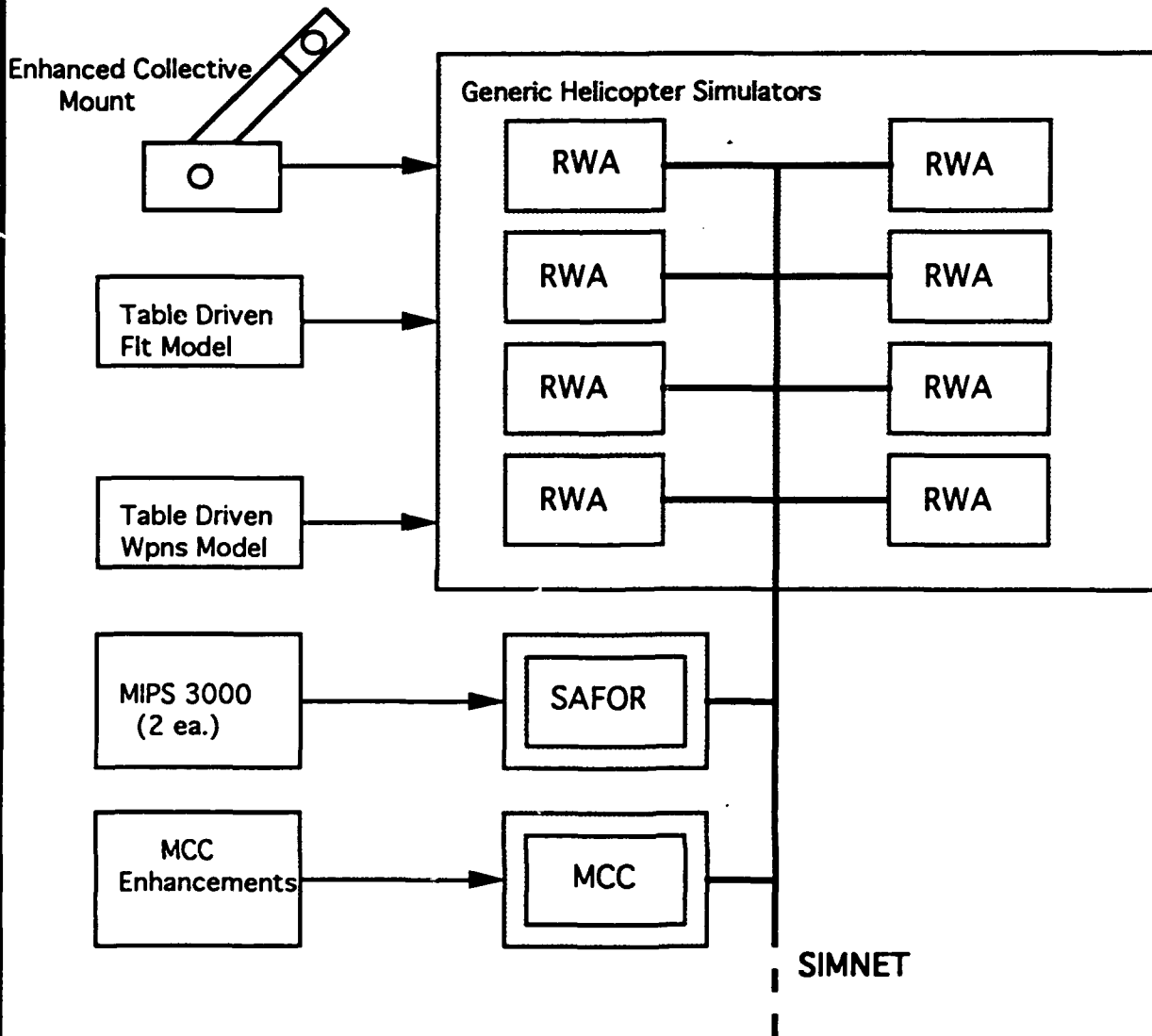
- Provide 2 additional MIPS 3000 processors for expanded SAFOR
- Replace generic flight model with a table driven flight model
- Replace generic weapons models with table driven weapons models
- Replace existing collective mount with an improved mechanism
- Enhance existing MCC to add digital message capability. Add RAH-66 related functions to manage the allocation, assignment, initialization, configuration, location, orientation, and loading of the RAH-66

### **Project Status:**

- MIPS 3000 Computers Ordered
- System Specification Complete
- Software design 75% Complete
- Hardware Design 90% Complete
- Due to Lack of Software Baseline, MCC is Behind Schedule and Over Budget
- Recovery Plan in Place Utilizing Loral At-Risk Funding

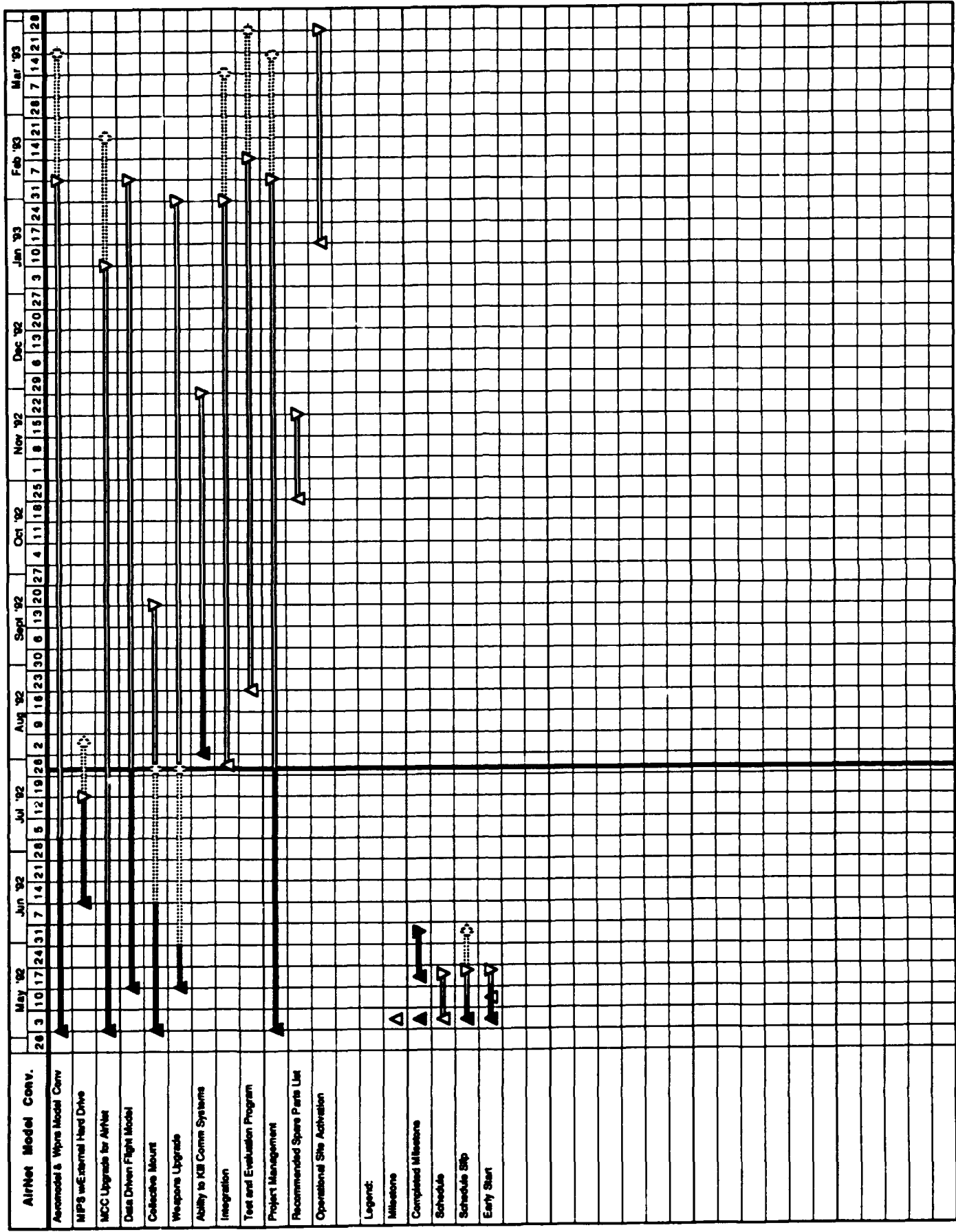
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## AirNet AeroModel & Weapons Model Conversion



### Exit Criteria or Objective

- Provide Additional MIPS Computers for Expanded SAFOR
- Improved Combined Arms Environment Through Specific Flight and Weapons Models
- Improved Collective Mount Reliability
- Digital Message Capability to Support RAH-66 Battlefield Communications
- Add Required RAH-66 Functions to the MCC
- Modular Features Transportable to RAH-66 and Other BDS-D Simulators



# BDS-D Architecture Definition & DIS Standards Development

Sponsor/POC STRICOM Phone                       
STRICOM POC Gene Wiehagen Phone (407) 380-4363  
Loral POC Bob Ferguson Phone (407) 382-4597  
Funding Source STRICOM  
Schedule: Start 1 July 1992 Stop 30 June 1993

## **Project Description:**

The primary objective of this project shall be the definition and development of the BDS-D Version 1.0 System, the first instantiation of a DIS compliant system containing heterogeneous simulators networked together. The BDS-D TDP ATD Exit Criteria shall be used to measure the performance of this system. Additional architecture objectives shall include but not be limited to the development of specifications and ICD's for the BDS-D Version 1.0 System, refinement and extension of the DIS reference model to other regimes such as instrumented ranges and higher order models, system analyses to quantify performance, and the development of BDS-D Compliance, Model VV&A and security procedures and methods. Standards objectives shall include but not be limited to the development of a strawman DIS common data base standard, extensions to the existing DIS message standards, and a correlation methodology to support determination of the interoperability of a network of dissimilar simulators.

This project will be performed over a one calendar year period. It is expected that a follow-on phase will be performed for another period of approximately one calendar year. This follow-on phase will be completed on or before September 30, 1994. The BDS-D Version 1.0 System will be completed by the end of the second phase. The exact definition and implementation schedule of the BDS-D Version 1.0 System will be specified via the BDS-D System Plan, a document produced by this project. This document will define the BDS-D road map including the BDS-D Version 1.0 System configuration, exit criteria including conformance criteria, operational concept, and cost-economic benefit metrics to show the value of DIS solutions to potential users. This document will be updated and reissued as needed.

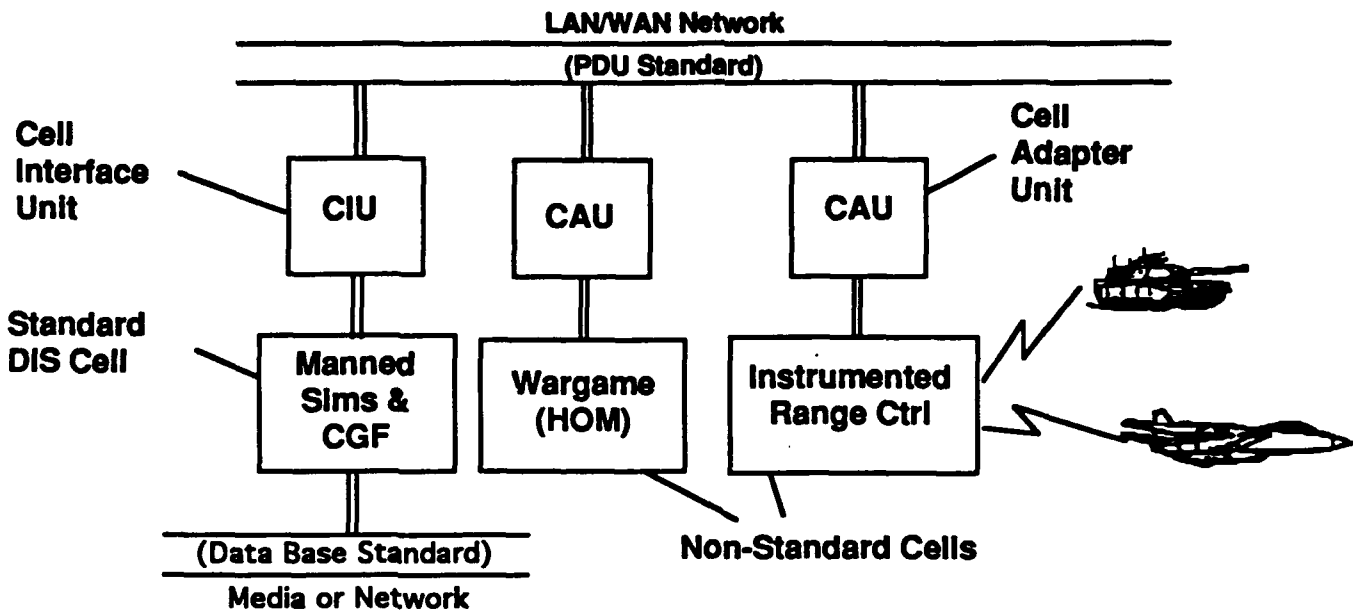
Project personnel will participate in DIS community activities including but not limited to DIS meetings and conferences, simulation and modeling standards meetings and workshops, and other forums as appropriate. The objective is to expose BDS-D architecture efforts to the DIS community at large, to encourage and facilitate standards and architecture development by the community, and to obtain feedback from these forums as well as BDS-D users.

## **Project Status:**

Contract award was made on June 30, 1992. Initial planning was performed prior to contract award using Loral funds. The IST led correlation methodology study was kicked off. An interoperability study was initiated, with initial emphasis on the various visual systems that comprise the BDS-D Version 1.0 System. System Design and User Requirements Analyses were also initiated.

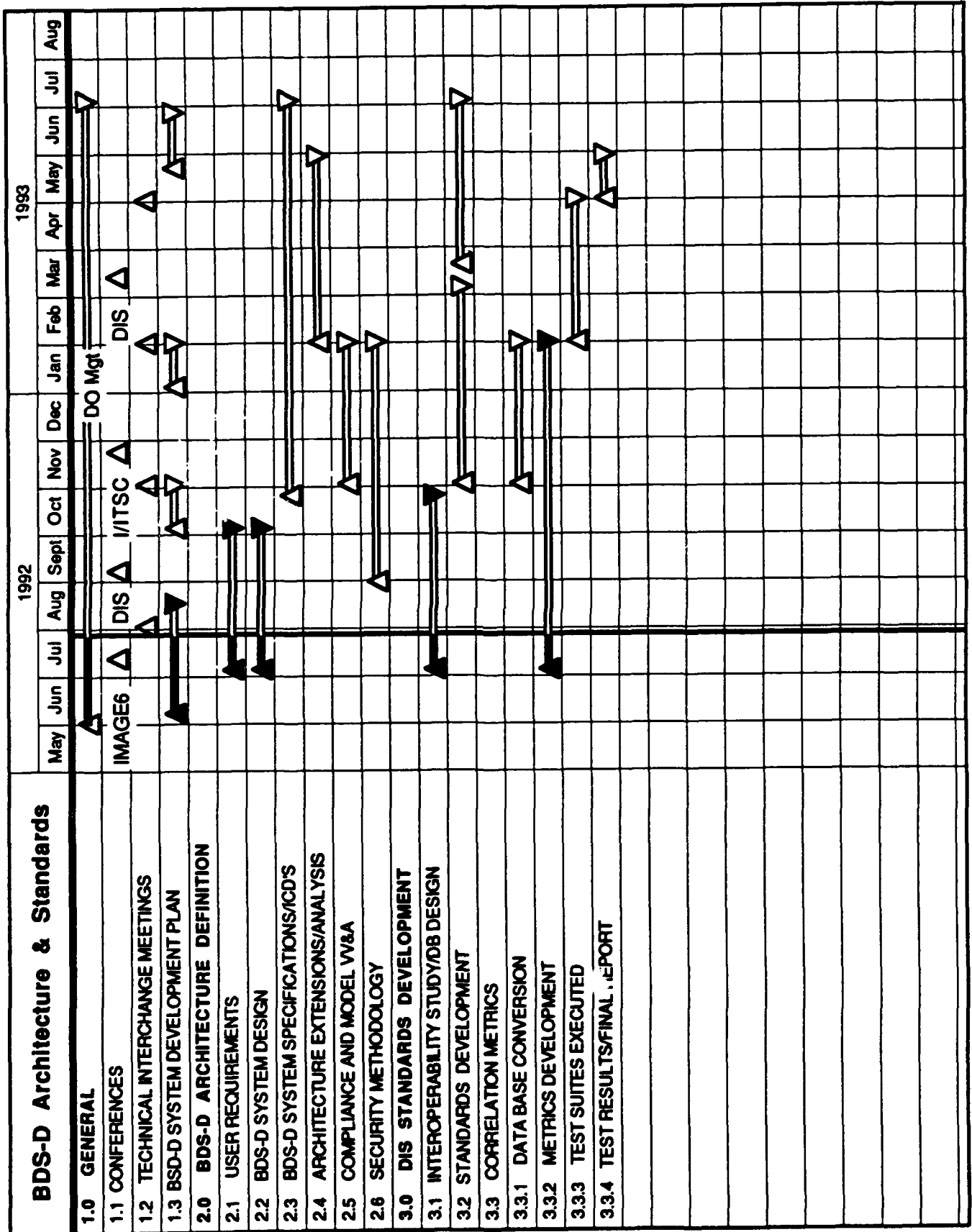
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## BDS-D Architecture Definition & DIS Standards Development



### Objectives

- **BDS-D Overall Objectives:**
  - Primary objective is the instantiation of the BDS-D Version 1.0 System consistent with DIS Architecture and Standards
  - Develop and maintain a BDS-D System Development Plan, including Roadmap, Exit Criteria, Version 1.0 System Description, Op Concept
  - Work with the DIS community to facilitate standards evolution; leverage on-going standards work from P2851, MODSIM, JMASS, etc.
- **BDS-D Architecture Objectives:**
  - Develop specifications and ICD's for the BDS-D Version 1.0 System
  - Develop extensions of DIS to HOMs and Instrumented Ranges
  - Perform system analysis to quantify network loading, CIU/CAU performance, interoperability issues
  - Develop Compliance, Model VV&A and security methods for BDS-D
- **BDS-D Standards Objectives:**
  - Develop Strawman Common Data Base Standard (Models & Data)
  - Develop complementary extensions to DIS Message (PDU) Standard
  - Develop Correlation Methodology and Metrics





## CGF Architecture & Integration of Higher Order Models

Sponsor/POC	<u>STRICOM</u>	Phone	<u></u>
STRICOM POC	<u>Gene Wiehagen</u>	Phone	<u>(407) 380-4363</u>
Loral POC	<u>Bob Ferguson</u>	Phone	<u>(407) 382-4597</u>
Funding Source	<u>STRICOM</u>		
Schedule: Start	<u>1 July 1992</u>	Stop	<u>30 June 1993</u>

### Project Description:

Loral will develop and demonstrate a modular and open architecture for Computer Generated Forces that is capable of independent component development and demonstration in a DIS environment. Key CGF objectives shall include but not be limited to the development of CGF standards for DIS, the leveraging of existing CGF technologies to provide new functionality at low cost, more realistic behaviors via use of a data driven, action-cognition human behavior model, increased CGF battlefield functionality, such as EW, air defense, and indirect fire, CGF responses to environmental effects, such as weather, and single operator control of multiple CGF echelons. The CGF will be demonstrated at Fort Rucker no later than 11 months ARO.

In addition, Loral shall define and catalog the objectives, benefits, and technology challenges associated with the Integration of Higher Order Models (IHOM). The CGF task will provide a "top-down" architecture into which the HOM can be inserted. The ability to provide integrated operation of selected CGF elements in a DIS environment shall be demonstrated at Fort Rucker no later than 11 months ARO.

This Phase 1 work will be performed over a one calendar year period. It is expected that a follow-on phase will be performed for another period of approximately one calendar year. This follow-on phase will be completed on or before September 30, 1994. The primary objective of the follow-on phase shall be the fielding of a documented, validated, and open CGF architecture with all of the capabilities of the current SAFOR plus additional simulated battlefield capabilities. In the follow-on phase this CGF system shall be focused towards the needs of the RAH-66 program and other related BDS-D Version 1.0 System requirements in accordance with the BDS-D System Plan.

### Project Status:

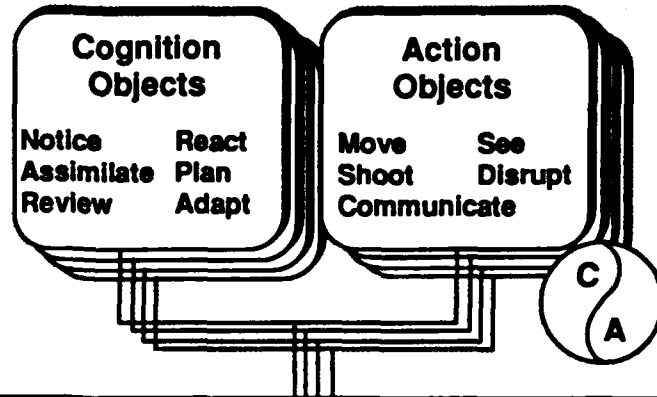
Contract award was made on June 30, 1992. A kick-off meeting was held with all team members on July 7-9 at the ADST office.

## CGF Architecture & Integration of HOM

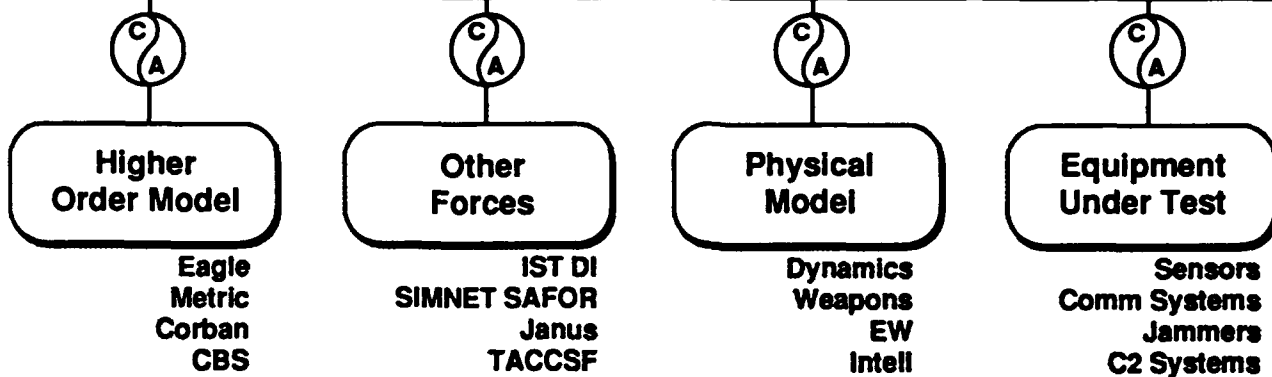
## Action-Cognition Behavior Model (ACBM)

Manned Simulators and other DIS nodes

Operator Interface



DIS Standard Messages (Extended to include C3I messages)



### External Models & Systems

- UNIX based, C and C++, runs on multiple platforms
- True object oriented design
- Objects communicate via messages
  - Messages are standardized
  - DIS Extension for C3I messages
- Source code and documentation will be available
- Standard methods to interface to existing systems

### Exit Criteria

- Modular/Reuseable Design
- DIS Compliance
- Model VV&A
- Day/night, Obscurants, Weather
- Selectively Changeable Features
- Fidelity Adequate for Nav/Maneuver
- 80 Entities Controlled by 1 CGF User
- Air Defense, Indirect Fire, EW
- Higher Order Model

LRAL

## CSRDF - BDS-D Interface

Sponsor/POC AVSCOM / Nancy Bucher Phone (415) 604-5161  
STRICOM POC Gene Wiehagen Phone (407) 380-4363  
Loral POC Jim Exter Phone (407) 382-4595  
Funding Source \_\_\_\_\_  
Schedule: Start 1 April 1992 (Step 2) Stop 31 March 1992 (Phase 1)

### **Project Description:**

The CSRDF - BDS-D Interface Delivery Order is a cooperative effort among the U. S. Army, DARPA, and the U. S. Navy. Each is aggressively pursuing interoperable simulation as a highly leverageable technology to significantly enhance combat readiness as well as system acquisition. Each has a defined role in this linkage and success is dependent on the cooperation among the three government groups and their respective contractors.

The CSRDF/BDS-D project has two Phases: Phase 1 is the specification development and linkage implementation phase. After development is completed and the linkage is established, the Phase 2 Rotorcraft Pilot Associate (RPA) evaluations will begin. The Rotorcraft Pilots Associate (RPA) Program will examine ways in which pilot workload can be reduced while improving combat helicopter mission effectiveness through the application of artificial intelligence (AI) for cognitive decision aiding and integration of advanced pilotage, target acquisition, armament and fire control, communication, controls and displays, navigation, survivability, and flight control equipment.

The following are responsibilities of STRICOM and are to be executed by Loral or its subcontractors.

1. A correlated data base with terrain data and graphic models will be developed to facilitate the combined operation of systems at Ft. Rucker and at Nasa Ames in the same battlefield environment.
2. A Data Logger will be provided for recording, searching and playing back packets that flow across the interface.
3. A long haul network interface will be established to communicate between simulator systems located in Alabama and California.
4. A protocol translation capability will be developed to allow the CSRDF system running DIS 1.0 Protocol to interoperate with the Ft. Rucker simulators running the older SimNet 6.6.1 Protocol.

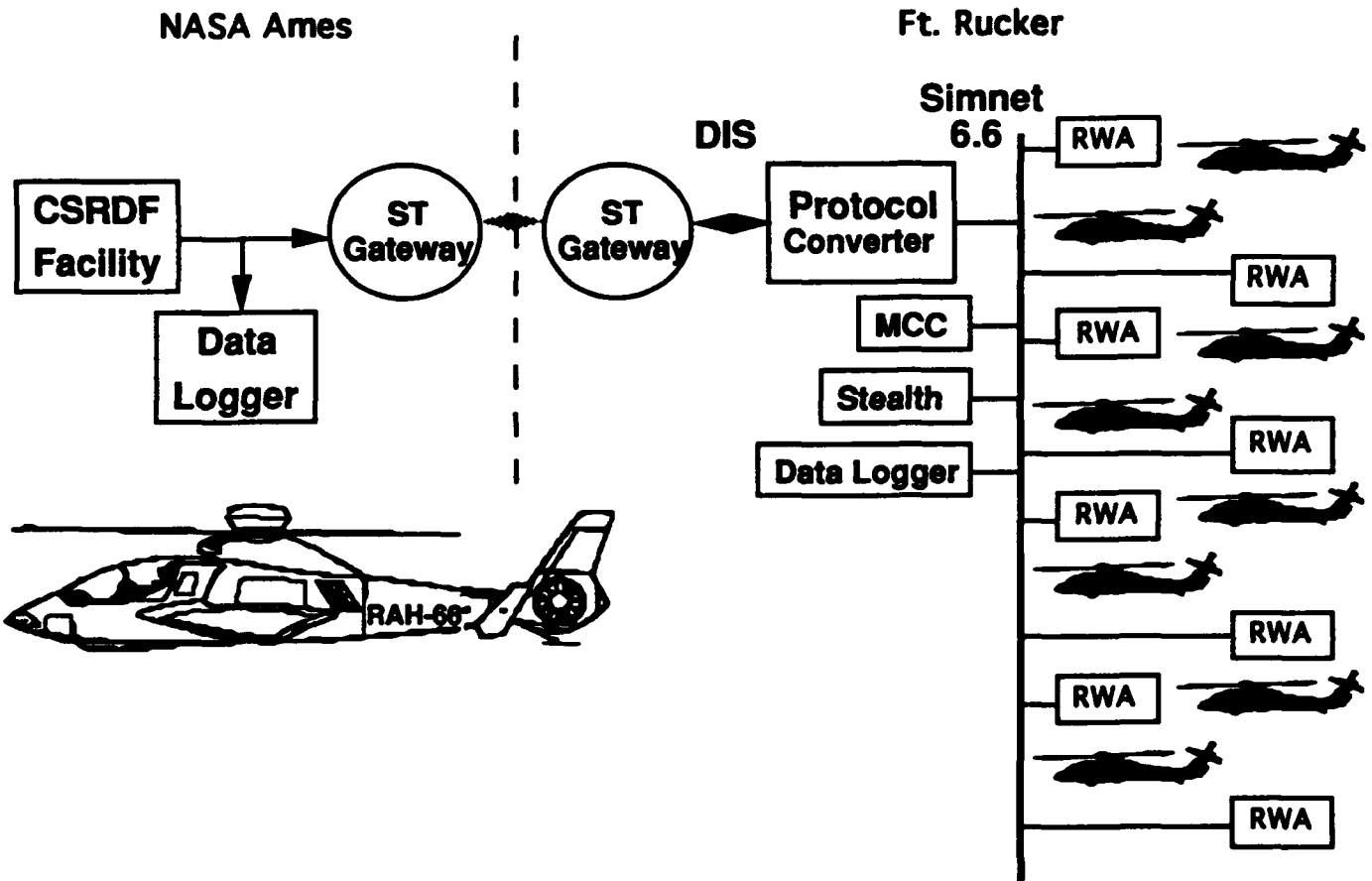
### **Project Status:**

The CSRDF - BDS-D Interface Delivery Order is progressing on schedule with the following exceptions.

The Fulda Data Base specified for the RPA evaluations was identified as GFE during the requirements phase of the program. After starting development, it was discovered the Fulda Data Base was not Government Property and therefore was not readily available without restrictions/software licensing agreements etc. The data base transformation task started about two and one half months late. However, much of the delay was used to identify faster methods of transformation thereby reducing the overall transformation time.

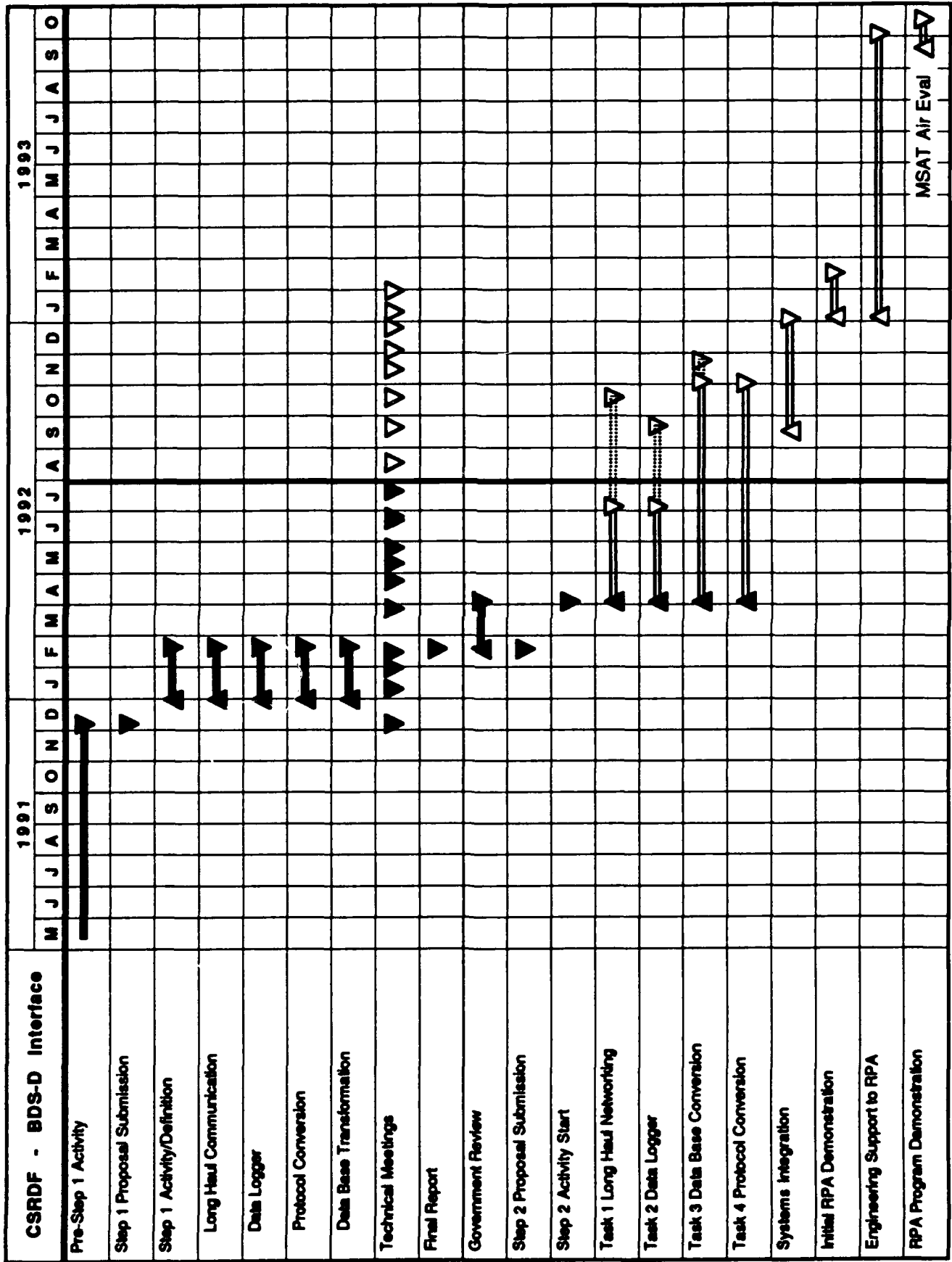
One other problem affecting a number of Delivery Orders is the late delivery of critical GFE from BBN as part of the equipment transfer under the ADST contract. Delays in receiving Data Base workstation and Data Logger equipment has caused a development schedule slip.

## CSRDF - BDS-D Interface



### Exit Criteria or Objective

- Dissimilar Simulator Fidelity
- Mixed LANs
- Wide Area Network
- DIS Compliance
- Level 2 CIG (Compuscene IV)
- Thermal Signature
- Day/Night Obscurants, Weather
- Selectively Changeable Features
- Fidelity Adequate for Nav/Maneuver



MSAT Air Eval

## Combat Vehicle Command & Control

Sponsor/POC ARI / Dr. Kathy Quinkert Phone 502-624-6928  
STRICOM POC John Collins Phone 407-380-4382  
Loral POC W. R. 'Mac' MacDiarmid Phone 407-382-4583  
Funding Source TACOM  
Schedule: Start 26 August 1991 Stop 30 September 1992

### **Project Description:**

The CVCC Delivery Order is a follow-on to earlier ARI-sponsored efforts that looked at the performance deltas of units equipped with combat vehicles utilizing enhanced command and control devices. Those units involved in earlier experiments were below battalion level. The current effort, which focuses on the battalion, involves the use of the Intervehicular Information System (IVIS), the Command and Control Display (CCD), and the Commander's Independent Thermal Viewer (CITV) as well as a steer-to display for the vehicle driver.

Hardware was procured and software developed to support the evaluations. Software bugs from previous software versions were fixed. In addition to functional and integration testing of the hardware/software suites, a total of five experimental runs are being conducted: three in the baseline condition (utilizing non-CVCC-equipped M1 simulators) and two in the CVCC condition. Based on experimental and scenario design approved by the Government, data will be collected to analyze the resulting performance deltas. A series of data collection exercise excursions will be run to analyze vertical communications within the battalion. An additional task involves the development of innovative training strategies for future development.

Major subcontractors on this effort are BDM (experimental design and evaluation) and BBN (software development and integration).

### **Project Status:**

Two of the three baseline experiments have been conducted. Integration testing occurred toward the end of June 1992. Functional testing will be conducted the week of 20 July unless the Hollis studies force schedule delays. The third baseline and the two CVCC experiments will be conducted in July and August, again subject to decisions regarding the Hollis studies. Any necessary replays, final data analysis, and technical report preparation will be accomplished following the final experiment. A no-cost extension is being proposed to allow sufficient time for thorough data analysis and reduction and preparation of the final report (to include peer review).

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## Combat Vehicle Command and Control

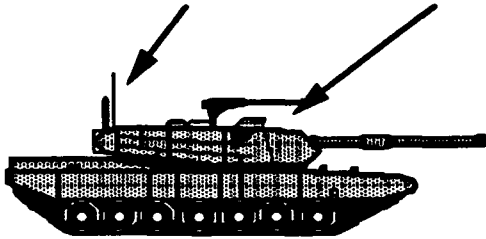
### CVCC

#### COMMUNICATION

- DIGITAL REPORTS
- DIGITAL GRAPHICS
- LRF INPUT TO REPORTS
- DIGITAL BURST TRANSMISSION

#### CITV

- INDEPENDENT THERMAL VIEWER
- HUNTER/KILLER CAPABILITY
- TARGET DESIGNATION
- INDEPENDENT LASER



#### POSNAV

- DIGITAL MAP
- OWN VEHICLE ICON
- FRIENDLY VEHICLE LOCATIONS
- ROUTE WAYPOINTS
- DRIVER'S STEER-TO-DISPLAY



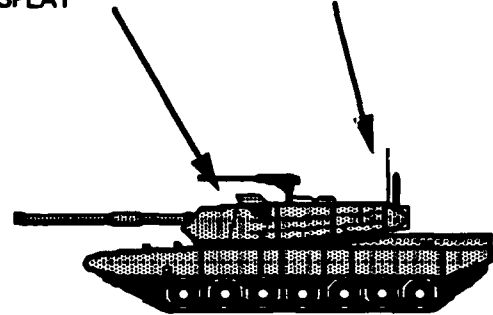
### M1 BASELINE

#### TARGET ENGAGEMENT

- GPS/GPSE/TIS
- TURRET REFERENCE DISPLAY

#### COMMUNICATION

- SINCGARS (VOICE ONLY)



#### NAVIGATION

- VISION BLOCKS
- PAPER MAP W/ OVERLAYS
- GUNNER'S LRF



### Exit Criteria or Objective

- Assess Automated Command and Control
- Horizontal Flow of Information (Formative Evaluations)
- Vertical Flow of Information (Data Collection Exercises)
- Evaluate Unit Effectiveness as a Result of Automated Command and Control
- SAFOR Message Generation

**LEVAL**

		1992																
		Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	
<b>CVCC</b>	<b>Deliverables</b>																	
Program Administration and Management	Weekly Status Reports CPSR C/SSR CFSR Test Plan (H/W, S/W, Integration) Test Results (H/W, S/W, Integration)																	
Task 1 Task 1 Delivery Order 0001 Develop Software Requirements																		
Task 2 Task 2 Delivery Order 0002 Develop Hardware Requirements	Hardware User's Guide Hardware Configuration and Upgrades																	
Task 3 Task 2 Delivery Order 0002 Develop Software Requirements	Software User's Guide TOC W/S Update ECR W/S Update CVCC Sim Update Utilities Update Software Architecture																	
Task 4 Task 3 Delivery Order 0002 Formative Evaluation	Research Plan Support Package Research Report																	
Task 5 Task 4 Delivery Order 0002 Innovative Training Methods	Innovative Training Methods Reports																	



# DOTD Training DO

Sponsor/POC DOS/LTC Aaron Phone (205) 255-3320  
STRICOM POC \_\_\_\_\_ Phone \_\_\_\_\_  
LORAL POC John Tallas Phone (205) 598-3066  
Funding Source USAAVNC  
Schedule: Start 1 January 1993 Stop 31 December 1993

## **Project Description:**

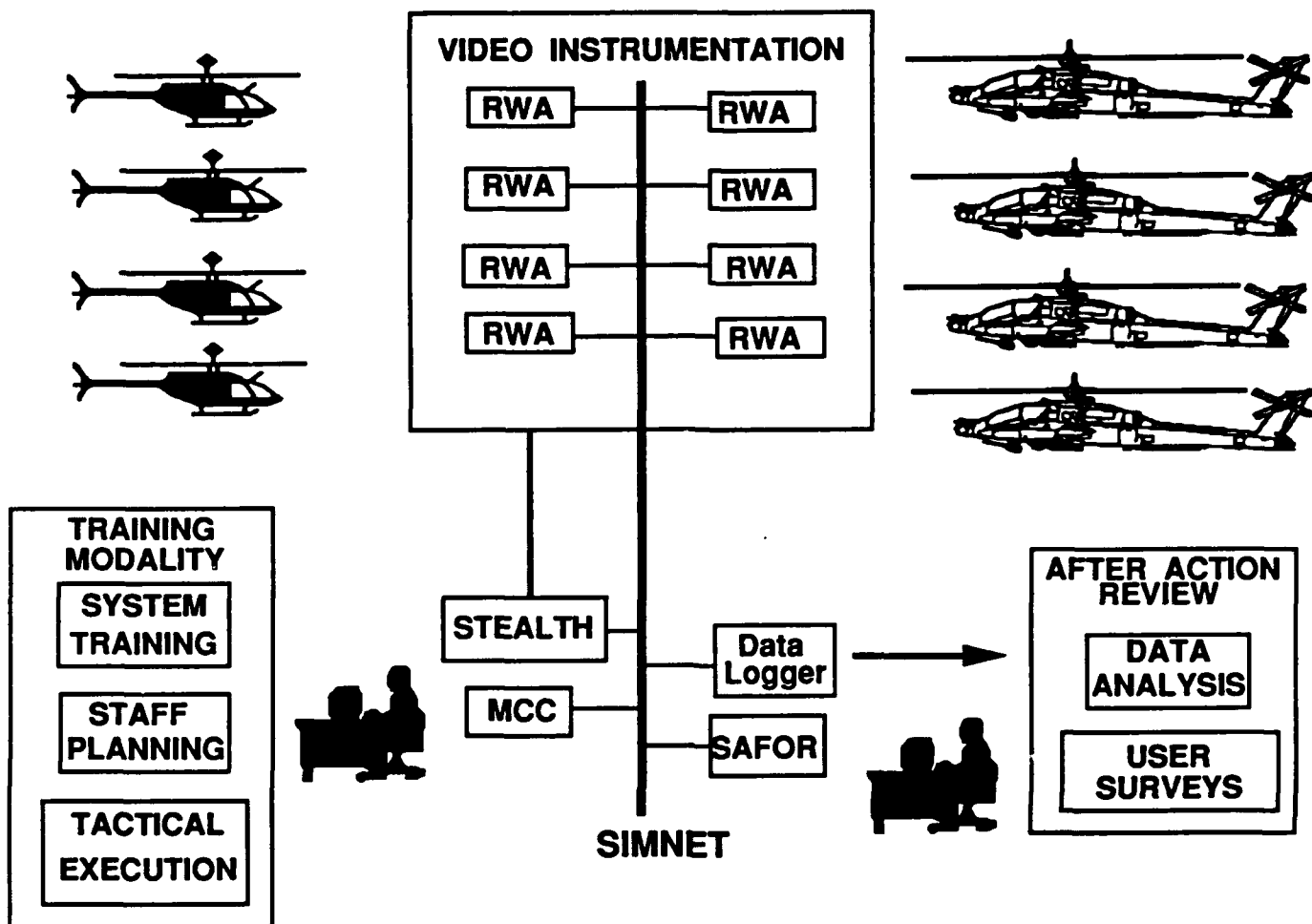
The objective of the DOTD Training Development Delivery Order is to determine the aviation pilot/crew/unit collective tasks that BDS-D can facilitate in a service school operational setting and to determine the feasibility of coordinating operational training exercises in a combined arms environment.

## **Project Status:**

The experiment continues to reap success in application and satisfaction among users. Trainer and student questionnaires have been revised to enhance internal validity. The resultant data, although admittedly subjective in nature, still indicate vast user acceptance and training potential which has not been fully exploited. Credence to this observation is provided by the US Army Aviation Center's recent statement of work submission which requests continuance of this delivery order for the duration of the LSE contract period. A final delivery order report will be submitted at the end of the current delivery order period (December 92).

LORAL

# TRAINING DO CONFIGURATION



## Exit Criteria or Objective

The overall test design was intended to evaluate the effectiveness of AIRNET as a task trainer to the identified deficiencies from the Battlefield Development Plan in a combined arms environment. The study was initially scheduled to be conducted over an 18-month period in four phases:

Phase 1 - Determine the appropriate application of AIRNET in the program of instruction (POI) for Aviation officer professional training, to determine cost comparison factors, to identify and isolate measures of effectiveness, and to establish baseline reference and comparative factors.

Phase 2 - Construct, tailor, and refine the POI application through experiments with each population in each POI of sufficient numbers to ensure application validity.

Phase 3 - Execute the applications as trial runs using the identified measures of effectiveness and cost comparison factors.

Phase 4 - Analyze and evaluate the results and publish a final technical report.

**LRAL**

	Jan '83			Feb '83			Mar '83			Apr '83			May '83			Jun '83			Jul '83			Aug '83			Sept '83			Oct '83			Nov '83			Dec '83																							
	27	3	10	17	24	31	7	14	21	28	4	11	18	25	1	8	15	22	29	5	12	19	26	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19
DOTD Training																																																									
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AVOAC EXECUTION																																																									
WOBC TRAIN-UP																																																									
WOBC EXECUTION																																																									
PCC HOW TO FIGHT																																																									

## Dynamic Terrain

Sponsor/POC	<u>STRICOM/Gene Wiehagen</u>	Phone	<u>407-380-4363</u>
IST POC	<u>Mike Moshell</u>	Phone	<u>407-658-5093</u>
Loral POC	<u>Bob Ferguson</u>	Phone	<u>407-382-4597</u>
Funding Source	<u>STRICOM via IST</u>		
Schedule: Start	<u>1 August 1992</u>	Stop	<u>1 September 1993</u>

### Project Description:

**Background.** When a weapon detonates on the ground it changes the terrain - craters are formed and buildings are destroyed. For defensive purposes berms may be erected, or trenches dug. The occurrence of these transient changes in the environment during an exercise is referred to as dynamic terrain. The difficulty representing these environmental changes on the virtual battlefield is acknowledged by STRICOM's BDS-D Advanced Technology Demonstration Technology Development Plan (ATD/TDP):

"Achievement of dynamic terrain capability in BDS-D .... simulated environments will require overcoming the technical barrier of implementing real time or near real time data base formatters as part of the simulator Image Generator design."

Loral (as a subcontractor to IST) will support the development, implementation and test of dynamic terrain in the BDS-D environment.

**Actions.** To conduct the necessary experiments and demonstrations, IST requests Loral to carry out the following actions:

1) Solicit from appropriate CIG vendors, bids to participate in the following project:

- a) the design of Dynamic Environment Protocol Description Units
- b) the modification of CIG equipment to accept these PDUs
- c) the testing of the modified CIGs within a multi-vendor testbed

2) Work with the CIG vendors and with IST during all phases of the project by participating in the design and testing phases (a, c) and by providing laboratory support and housing for the CIGs, and communications networking to IST.

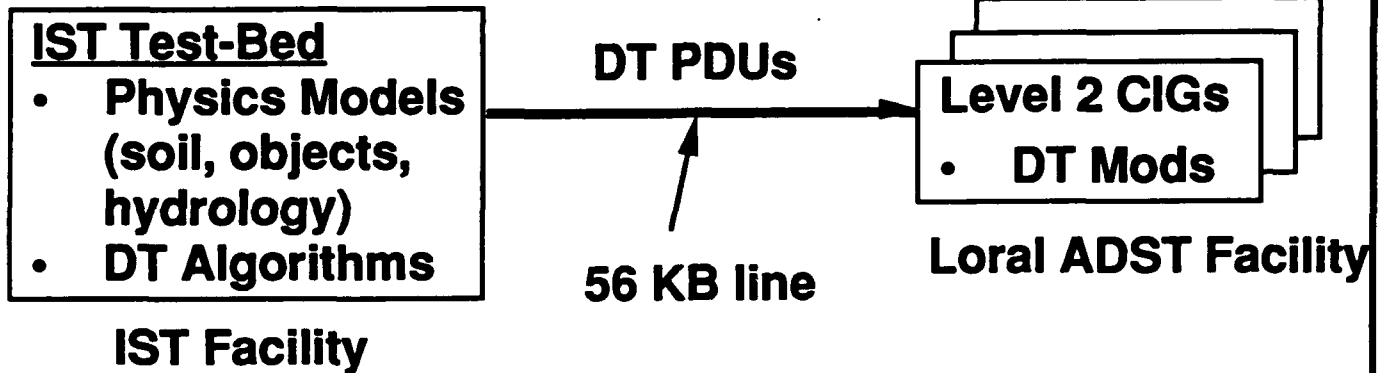
3) Work with other components of the BDS-D Testbed to maintain liaison concerning dynamic environment activities not included in the Dynamic Terrain Project (e. g. weather) so as to maximize the relevance of the results of this project to future users.

### Project Status:

Loral is currently in the process of writing a proposal to IST for Dynamic terrain; the proposal is due July 27, 1992. Contract award is expected August 3, 1992.

**LORAL**

## Dynamic Terrain



## Objectives

### Exit Criteria Objectives.

- a) Real-time changes to terrain features
- b) Selectively changeable features
- c) DIS 1.0 compliance
- d) Project 2851 compatible

**General Objectives.** The overall objective of the Dynamic Terrain project is to prove the feasibility of real-time or near-real-time Dynamic Terrain in the BDS-D environment. In order to accomplish this objective, the following objectives must also be achieved:

- a) the development of Dynamic Terrain Protocol Data Units consistent with DIS standards and protocols;
- b) the modification of one or more Image Generators to implement Dynamic Terrain;
- c) the testing and demonstration of the Dynamic Terrain modifications to the BDS-D image generators in the Loral facility, with PDUs supplied by IST over the dedicated 56kb link.

**Specific Objectives.** In order to demonstrate dynamic terrain in the form of modifications to the terrain skin and areal features such as waterways, during a real-time graphical simulation, it is desirable that image generators be able to:

- a) accept packets of information describing these changes, during a running simulation;
- b) incorporate the requested changes into the visual database with real changes to the corresponding elevation profiles (not, for instance, just superimposed texture patches to simulate a depressed area); and without causing a pause in the running simulation;
- c) subsequently, to both render visual images based on the new geometry, and to respond correctly to elevation and slope queries from moving models (if the CIG normally supports this capability), based on the modified terrain.

Dynamic Terrain Activities	1992						1993									
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
Contract Award	▽															
Obtain bids from IG vendors				△▽												
Critique & recommend IG vendors to IST					△▽											
Receive PDU Specification first draft				▽												
Critique PDU Specification first draft				△▽												
Receive PDU Specification second draft																
Critique PDU Specification second draft					△▽											
Final PDU recommendation to IST																
Authorization to implement from IST																
IG implementation at IG vendor sites																
Testing at Loral Orlando site																
Dynamic Terrain Demonstration																
Final Report																
Phase 1/Phase 2																

# Electronic Information Exchange Network

Sponsor/POC STRICOM Phone \_\_\_\_\_  
STRICOM POC Gene Wiehagen Phone (407) 380-4363  
LORAL POC Bill Lewandowski Phone (408) 473-4362  
Funding Source STRICOM

Schedule: Start \_\_\_\_\_ Stop \_\_\_\_\_

## Project Description:

Provide hardware to support software engineering and electronic information exchange for LSE.

The Institute for Simulation & Training and STRICOM have been connected to the ADST PMO and Loral Western Development Labs in San Jose.

## Project Status:

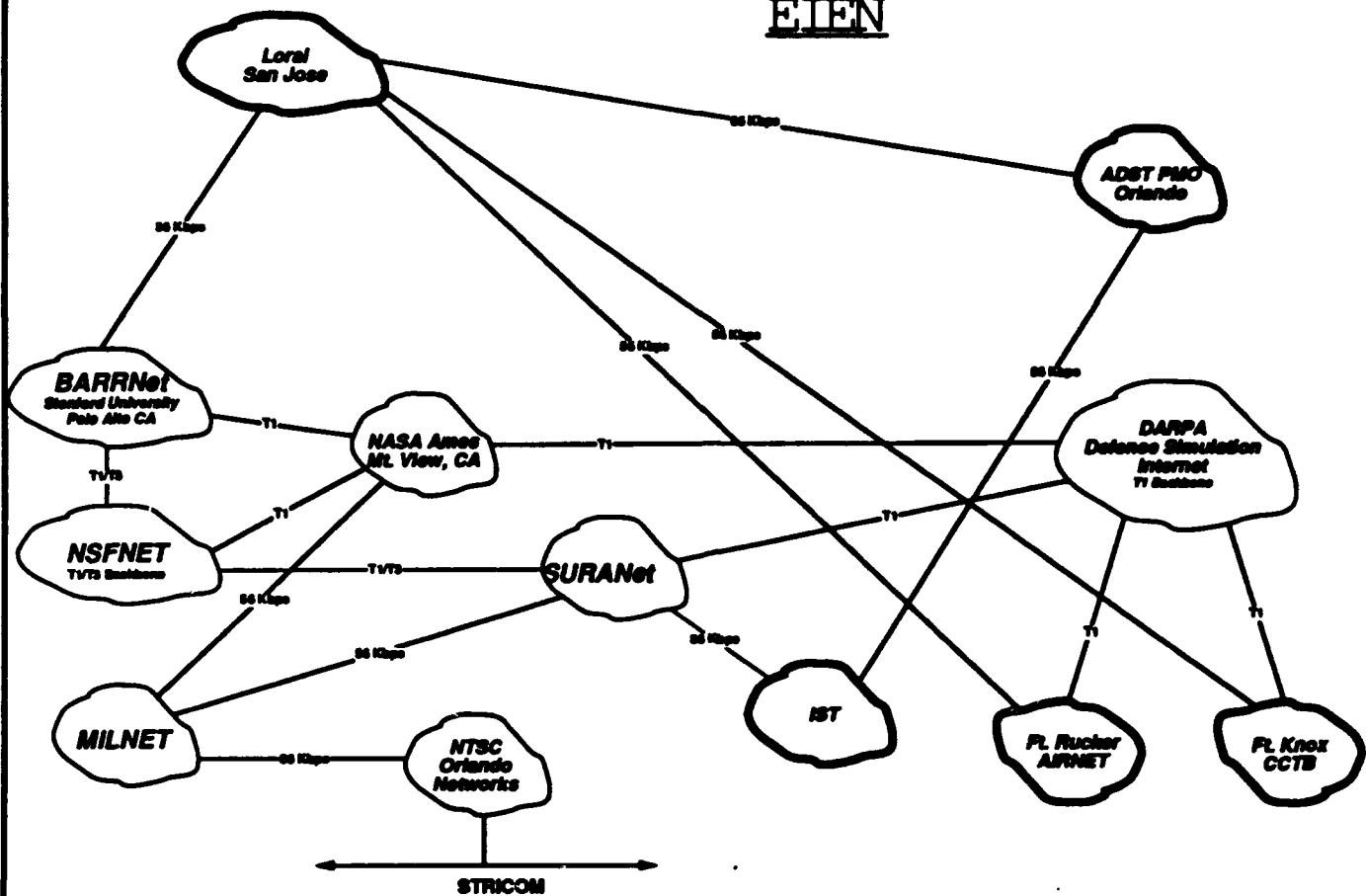
Macintosh updates for Ft. Rucker and Ft. Knox were approved by STRICOM this quarter. Equipment is about to be ordered. As part of the new current year EIEN, spare Sun Microsystems computer equipment will be bought instead of maintenance on all but critical items.

The Ft. Rucker to San Jose EIEN Data Circuit may be moved from AT&T to Sprint in the coming quarter. Even though Loral and AT&T are about to implement a Tariff 12, this circuit appears less costly with Sprint (\$12K Yr.). This is because the AT&T access point is in Montgomery AL and Sprint is in Dothan AL.

Maintenance on LSE Computer Hardware/Software and networks continues.

**LORAL**

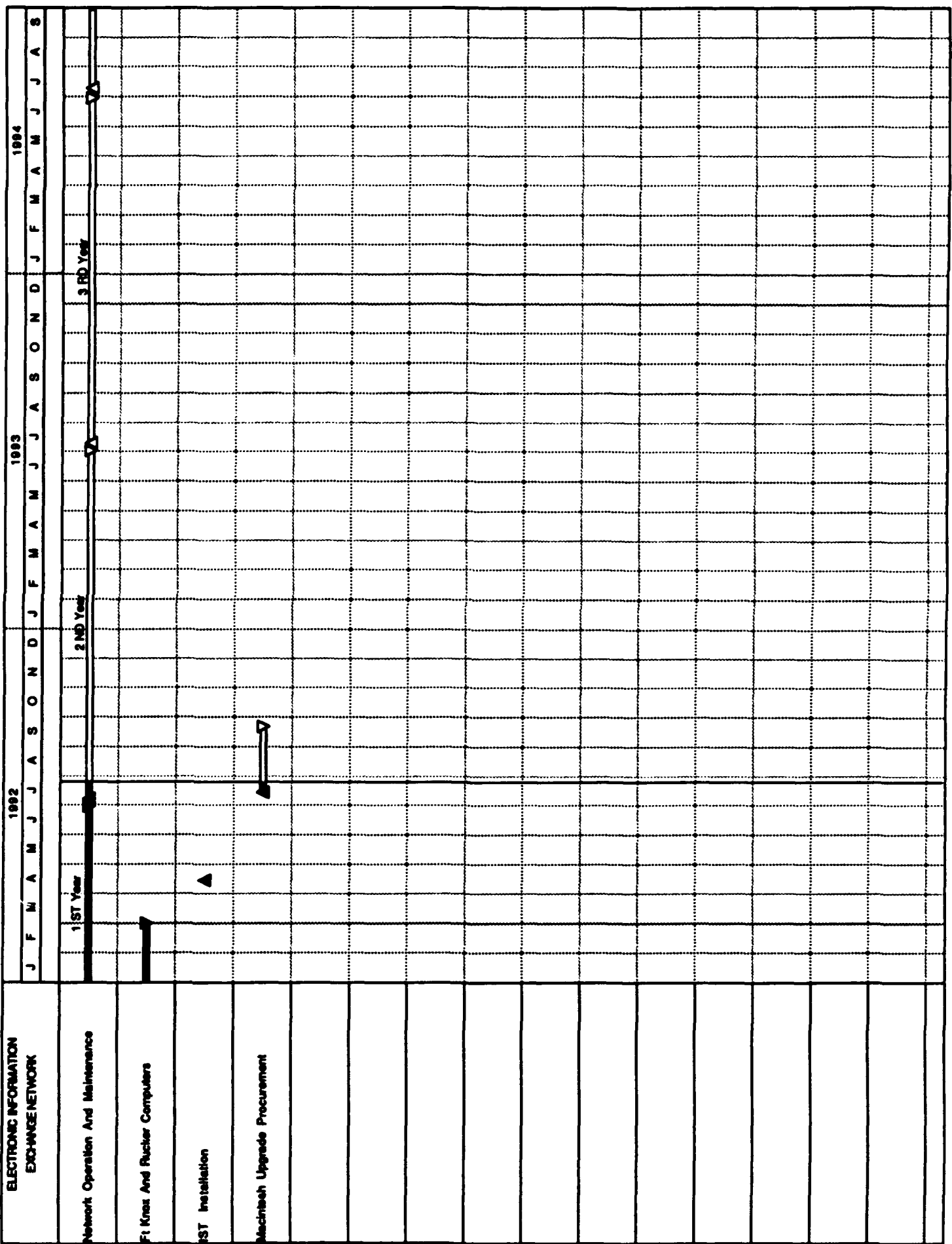
# EIEN



## Exit Criteria or Objective

- Exit Criteria -  
*System Architecture; Documentation; Controlled Public Access*
- Provide communications backbone network to allow rapid information exchange between ADST related sites.
- Provide for computing facilities at ADST sites for information processing and management
- Provide a Bulletin Board System to allow information distribution to the distributed simulation community





## HEL Intelligibility Study

<b>Sponsor/POC</b>	<u>HEL / Dr. George Garinther</u>	<b>Phone</b>	<u>(301) 278-5984</u>
<b>STRICOM POC</b>	<u>John Collins</u>	<b>Phone</b>	<u>(407) 380-4382</u>
<b>LORAL POC</b>	<u>Tom Radgowski</u>	<b>Phone</b>	<u>(502) 942-1092</u>
<b>Funding Source</b>	<u>Human Engineering Lab / STRICOM</u>		

**Schedule:** Start 2 March 1992 Stop 28 August 1992

### **Project Description:**

This experiment will help HEL develop a model that will predict soldier performance as a function of speech intelligibility. The Force-on-Force portion of this test is designed to examine speech intelligibility issues at platoon level in a freeplay war fighting environment.

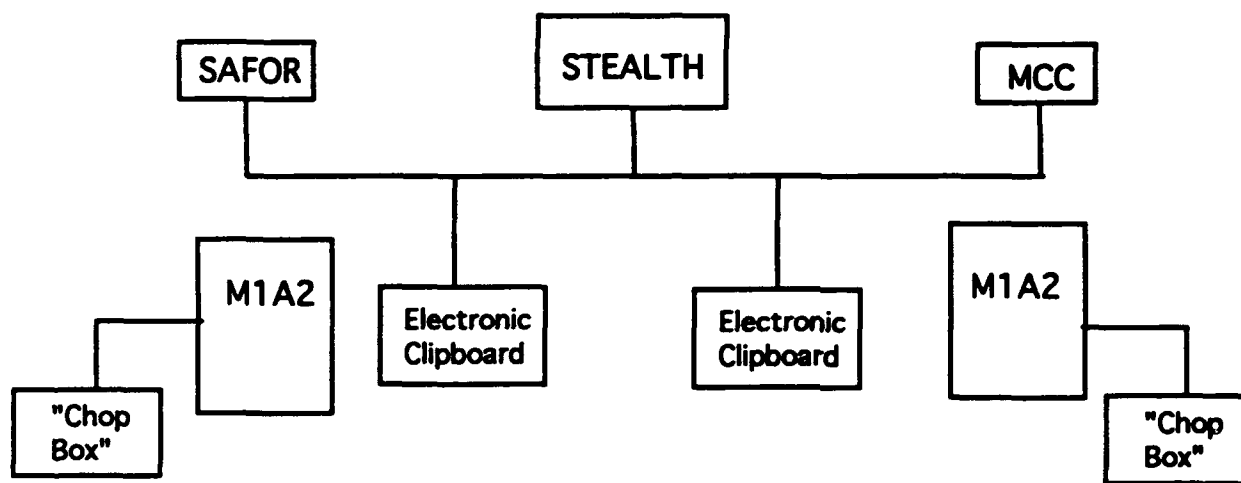
The Force-on-Force portion of this test has been postponed due to the impact of the Hollis experiment. At present, it is not known when we will be able to conduct this test.

### **Project Status:**

HEL has MIPRed funds to STRICOM to cover the cost of this activity. Refund of these costs may be required if the test cannot be rescheduled to HEL's satisfaction.

**LORAL**

## HEL Force-on-Force Test Network



### Exit Criteria or Objective

Inputs from HEL Intelligibility Force-on-Force test may include advancements in:

- Automated Data Collection Procedures
- Validity of Synthetic Battlefield

**LRAL**

**HEL Schedule not  
available  
at this time.**

**LEGAL**

# Hollis Experiment

Sponsor/POC DUSA-OR / Mr. Hollis Phone                       
STRICOM POC John Collins Phone (407) 380-4382  
LORAL POC Jorge Cadiz Phone (407) 382-4598  
Funding Source PEO-ASM / OPTEC  
Schedule: Start 30 June, 1992 Stop 18 August, 1992

## **Project Description:**

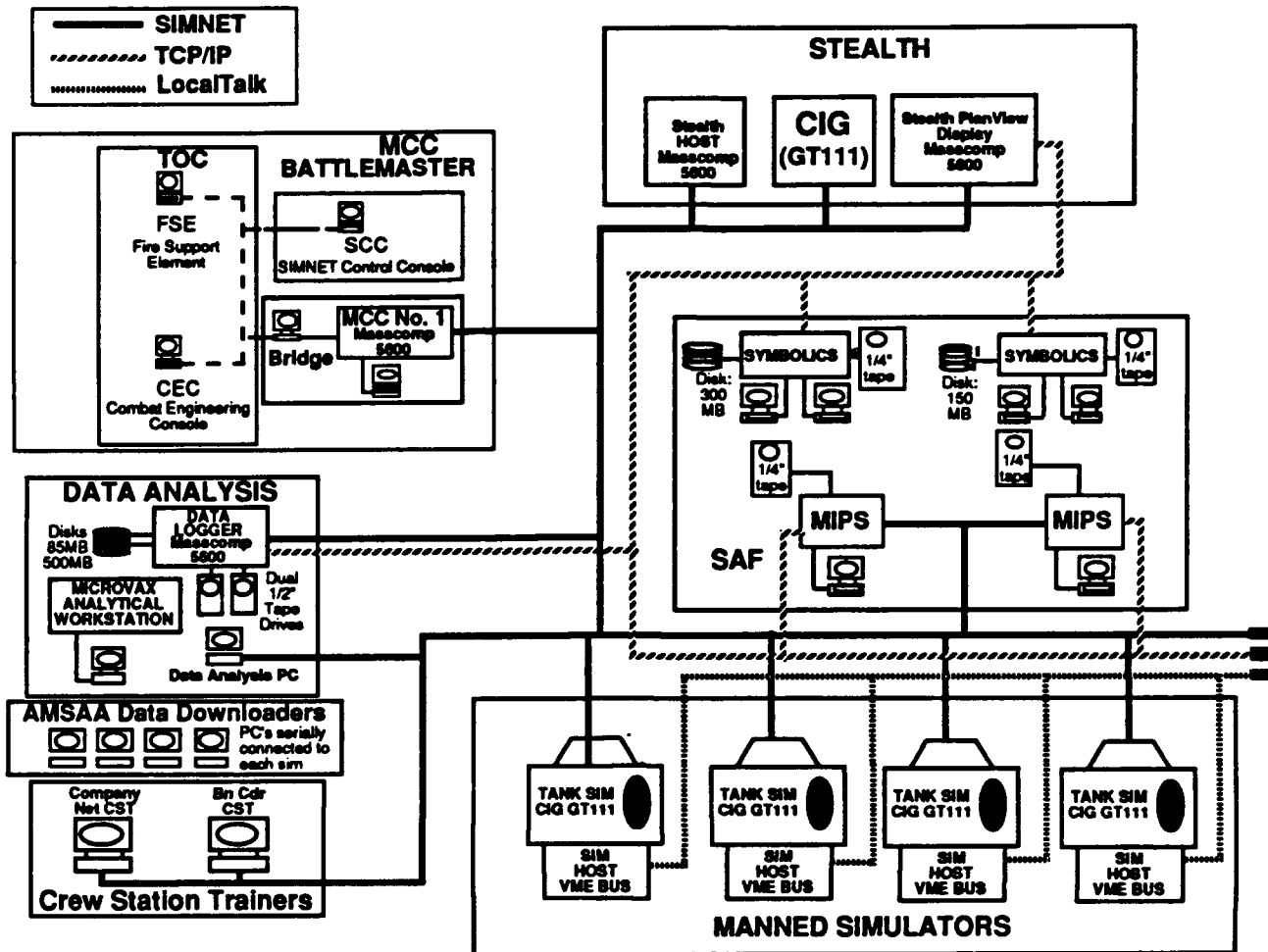
The Hollis test is utilizing the existing CCTB M1A2 devices to simulate potential variant platforms for the migration of the M1A1 to the M1A2. Test runs will be made with a M1A1, M1A1 w/CITV, M1A1 w/PosNav, and M1A2. Scenarios isolate tank on tank battles with hasty defensive and hasty offensive maneuvers. The existing four manned simulators are being used as platoon leaders with blue SAFOR providing "tethered" forces to round out each platoon. Opposing forces are provided by the red SAFOR, using the next generation advanced threat, Leo II+, from AMSAA provided data.

The system test configuration requires isolation of the test specific equipment to provide for secure operation. The equipment for this test included a stealth, an MCC, two SAFs, four manned simulators, a data analysis station, data downloaders, and two Crew Station trainers. The test schedule calls for 28 vignette of approximately 2 .5 hours each.

## **Project Status:**

- SAFOR Modifications to incorporate AMSAA Values for Pk, Pd, and Ph complete
- Modifications to Manned Vehicles to Incorporate AMSAA Pk Values for M1A1 or M1A2 complete
- DIS Classification of CCTB, Ft. Knox Complete
- Testing continuing to determine system limitations
- Classified Data for M1A2 & SAFOR Threat has been Loaded and Verified by AMSAA

# Hollis Experiment

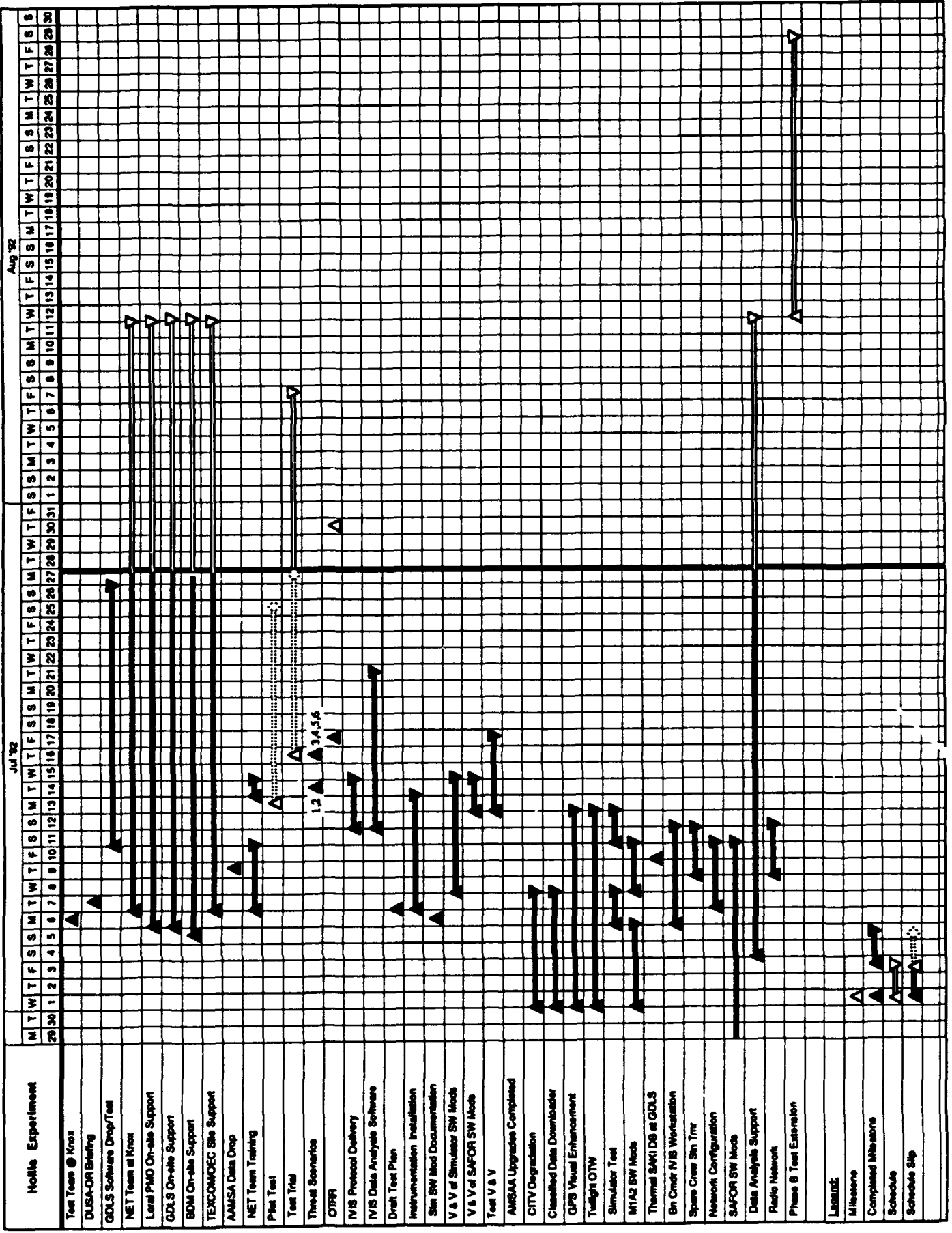


## Exit Criteria or Objective

Quantify the operational effectiveness of the M1A2 subsystems by incrementally improving the M1A1 platform to the M1A2 platform by providing:

- Test configurations of: M1A1, M1A1 w/ Pos/Nav, M1A1 w/ CITV, M1A2
- Software Upgrades to the M1A2 devices
- Software Upgrades to the Semi-Automated Forces detection tables
- Support test scenario generation
- Video/ test data Instrumentation of the M1A21 devices by TECOM
- Engineering, Test Support, and Data Analysis services

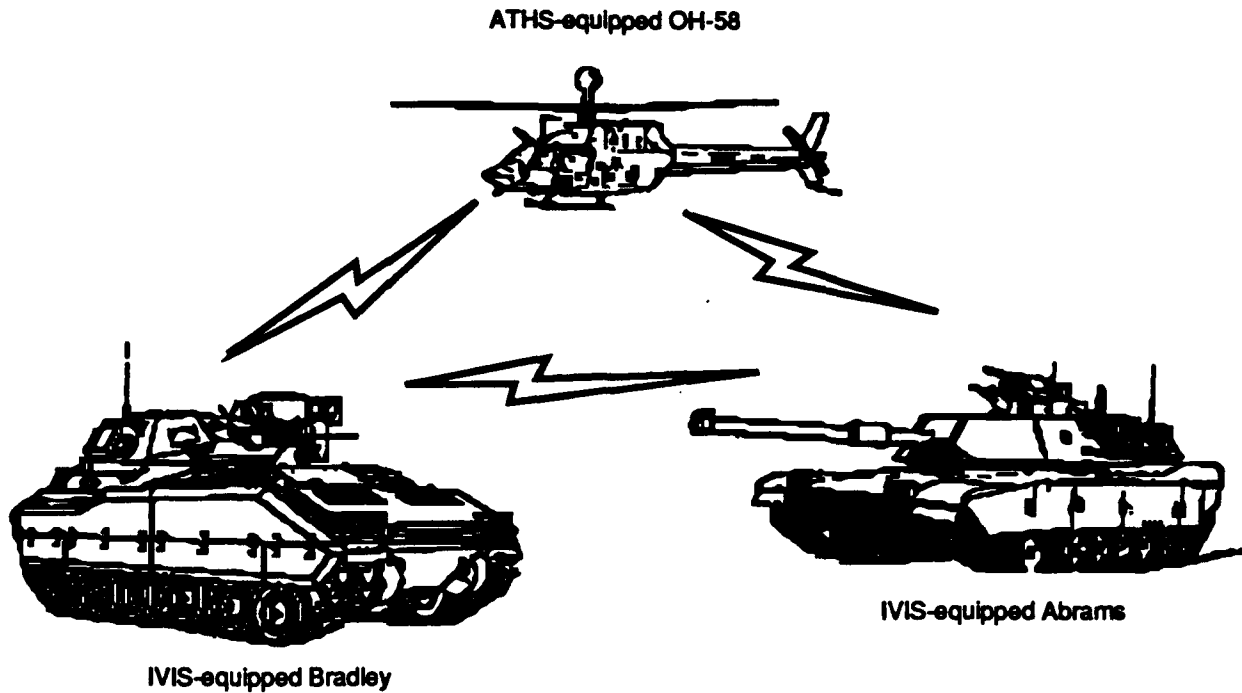
LOCAL







## IVIS Integration



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### Exit Criteria or Objective

- Install hardware and all necessary software to give all vehicles appropriate functional capabilities
- Provide Long Haul Network capabilities to support evaluations
- Collect data and prepare report to support analysis by CD personnel at the Armor School

# Land Systems Future Battlefield Design

Sponsor/POC	<u>DARPA / MAJ Jim Wargo</u>	Phone	<u>703-845-6840</u>
STRICOM POC	<u>John Collins</u>	Phone	<u>407-380-4382</u>
Loral DO MGR	<u>W. R. 'Mac' MacDiarmid</u>	Phone	<u>407-382-4583</u>
Funding Source	<u>DARPA</u>		
Schedule:	Start <u>15 November 1991</u>	Stop	<u>30 June 1992</u>

## **Project Description:**

The Land Systems Future Battlefield Design (LSFBD) Delivery Order comprised two discrete efforts. The first (the SIMNET-Janus Interconnectivity) is an investigation of a method for interconnecting manned simulators (SIMNET or BDS-D) and a closed-form analytical model, Janus-A. The Janus-A model was selected because of its general acceptance within the Combat Development community as a valid and accredited analytic tool. The objectives of this portion of the LSFBD DO were to develop a Design Data Handbook, a Functional Specification, and a Scenario Document. The overall goal is to investigate the feasibility of interconnecting manned simulators and the Janus simulation so that the SIMNET or BDS-D entities could interact on the Janus battlefield (but not necessarily the reverse).

The second part of the LSFBD DO is the Red Design Bureau. This effort defines in the Functional Requirements document the need for a synthetic, advance simulation environment for the evaluation of emerging threat developments, using the Soviet T-72 tank as the baseline threat platform. A Design Data Handbook defines the physical and functional capabilities of the T-72 and identifies potential research topics to be investigated in a proposed RDB simulation test bed. The Functional Specification, the third deliverable in this effort, defines the functional requirements for the two key elements of the simulation test bed: the virtual environment in which RDB developments will be tested and the RDB reconfigurable simulator that provides the port of entry for the human warfighter into the RDB virtual world.

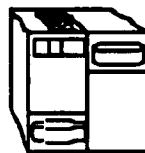
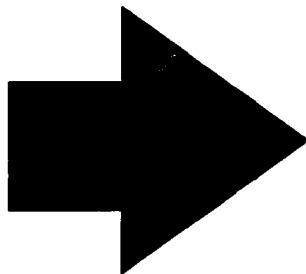
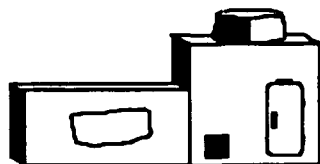
## **Project Status:**

With the delivery of all six deliverables called for in the effort, the LSFBD is concluded.

# Land Systems Future Battlefield Design

## SIMNET-JANUS INTERCONNECTIVITY

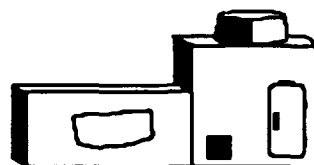
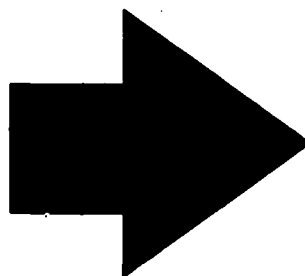
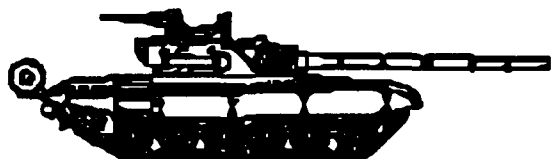
Manned Simulators on  
Virtual Battlefield



Closed-form  
Simulations

## RED DESIGN BUREAU

T72



Virtual  
Battlefield

### Exit Criteria or Objective

#### SIMNET-Janus Interconnectivity

- Design Data Handbook
- Scenario Document
- Functional Specification

#### Red Design Bureau

- Functional Requirements
- Design Data Handbook
- Functional Specification

Land Sys Fut Btl Fld	Milestones	1991		1992													
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept					
Program Management	Contract Award Kickoff Meeting	28 ▼	17 ▼														
Task 1, Red Design Bureau	Develop Funct. Reqt. Document Deliver Funct. Reqt. Document Develop Design Data Handbook Deliver Design Data Handbook Develop Functional Specs. Deliver Functional Specs. Government Review Government Acceptance																
Task 2, SIMNET-JANUS Interconnection	Develop Design Data Handbook Deliver Design Data Handbook Develop Scenario Document Deliver Scenario Document Develop Funct. Reqt. Document Deliver Funct. Reqt. Document Government Review Government Acceptance																

## Fort Leavenworth Node

Sponsor/POC CAC / LTC Russ Baldwin Phone 913-684-3802  
STRICOM POC John Collins Phone 407-380-4382  
Loral POC W. R. 'Mac' MacDiarmid Phone 407-382-4583  
Funding Source STRICOM  
Schedule: Start 29 April 1992 Stop 30 September 1992

### **Project Description:**

The Fort Leavenworth Node Delivery Order is a Step One effort that will investigate the requirements associated with establishment of a BDS-D node at Fort Leavenworth, KS. Following a determination of the requirements and their approval by the Combined Arms Command and tenant organizations at Fort Leavenworth, an analysis will be made to determine the technical feasibility of incorporating those requirements into an implementation phase (Step Two). In addition to determining the feasibility, a cost analysis will be conducted and a proposed schedule developed to support recommendations made. The results of these analyses, the proposed schedule, and recommendations will be incorporated, along with a proposed technical approach, in the final report.

The methodology for accomplishing the Step One is phased. The first phase is the requirements definition. This definition is based on in-depth interviews with various agencies who anticipate subscribing to the BDS-D node. Once the requirements have been validated, the Loral team (which includes BDM and IEI), will develop the approach, costs, and schedule for satisfying the validated requirements.

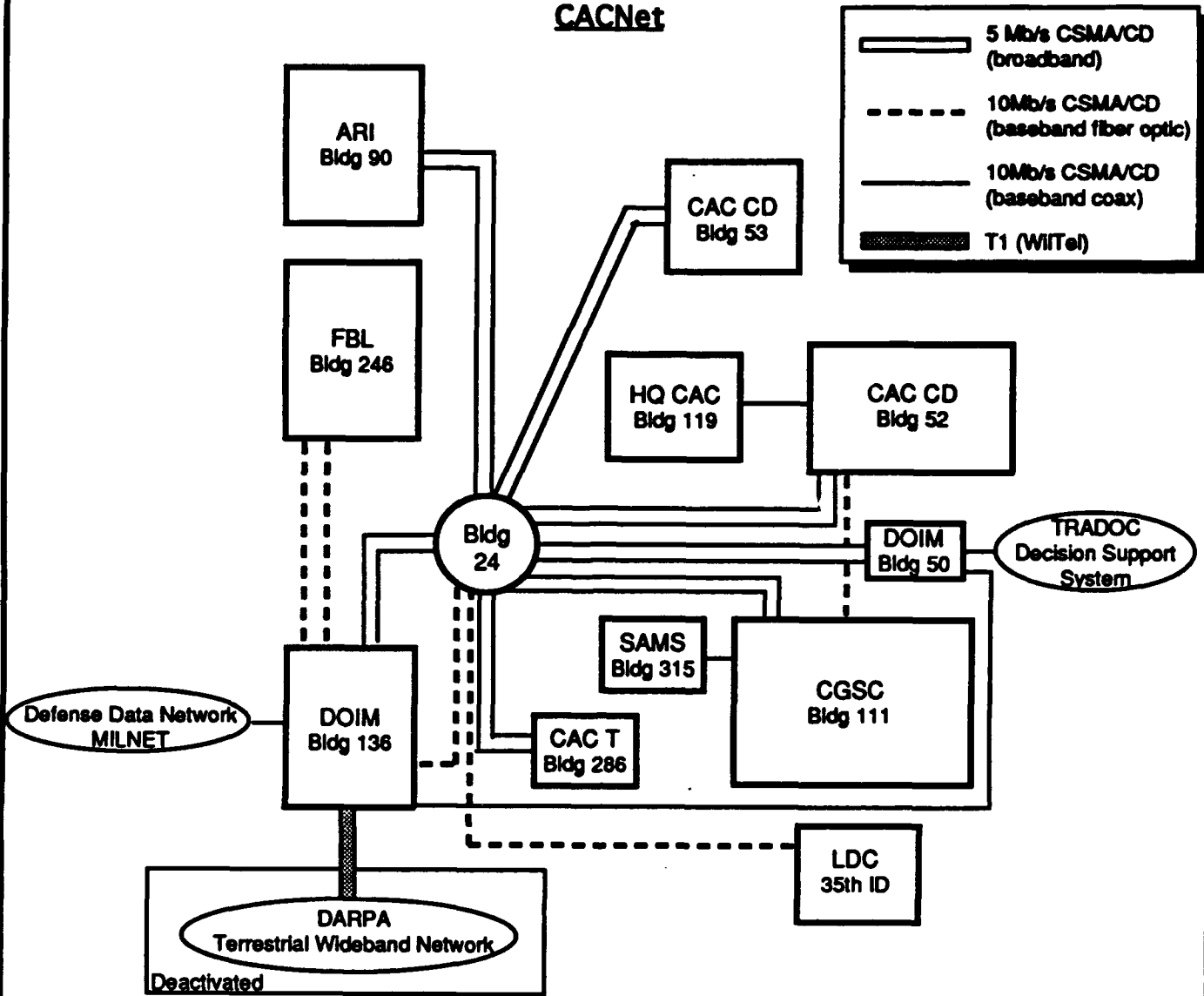
The BDS-D node will be developed on top of the existing CACNet currently in place at Fort Leavenworth.

### **Project Status:**

Prior to formal turn-on of this effort, a kickoff meeting and data collection interviews with representatives of CAC agencies were conducted at Fort Leavenworth in mid-March. Following the official turn-on, the analysis team developed a draft report on the requirements for the Fort Leavenworth node and submitted it to the Government in June. The draft is currently being staffed at Fort Leavenworth, with responses due back to CAC on 10 July. Following that, a second meeting is tentatively planned to discuss the requirements and Government comments, so that the second phase of the effort can begin.

**LORAL**

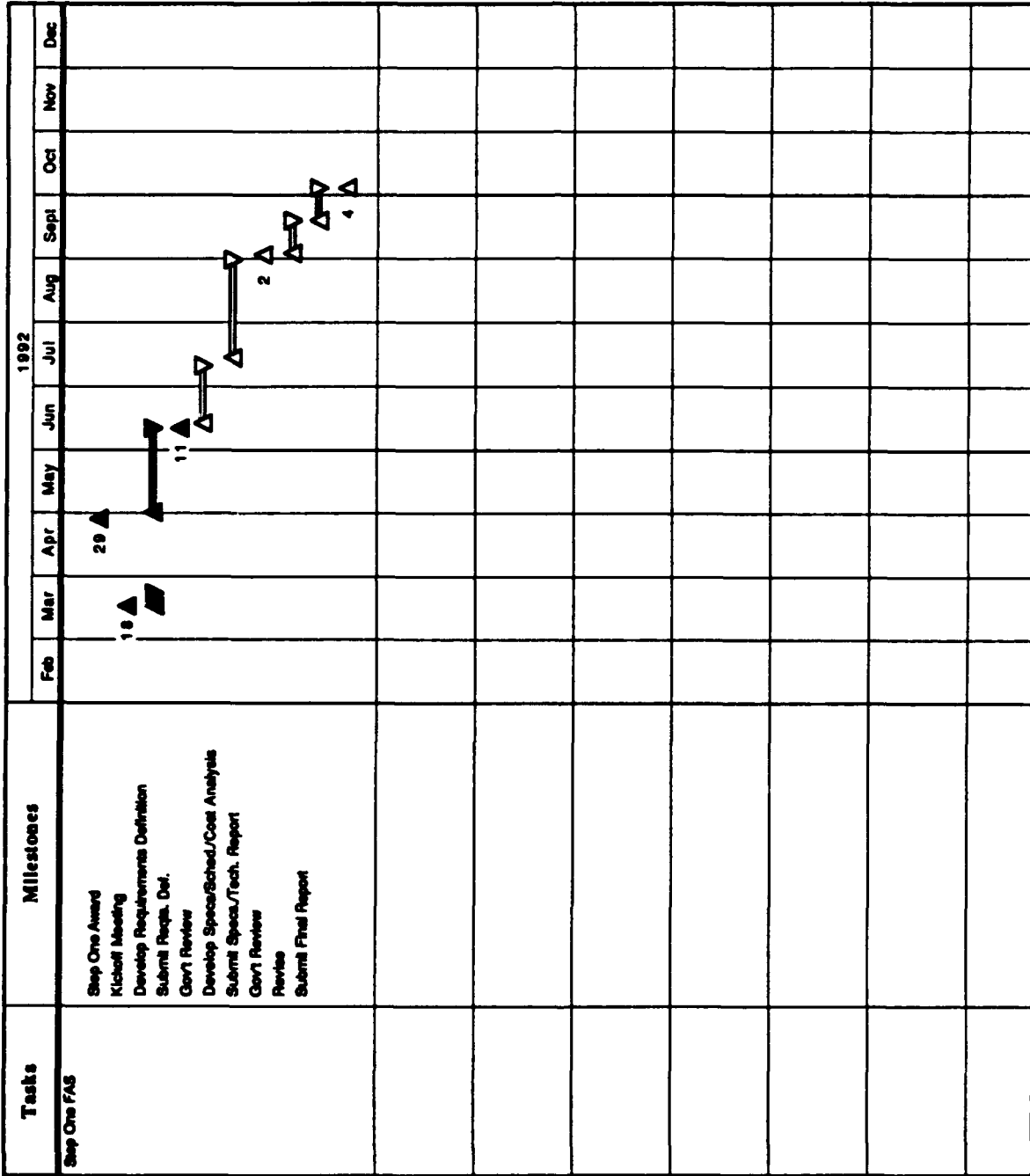
## CACNet



### Exit Criteria or Objective

- Develop Requirements for a BDS-D Node at Fort Leavenworth
- Build upon Existing CACNet
- Determine Feasibility of Implementation of Node
- Develop a Proposed Approach, Cost and Schedule for Implementation

# Fort Leavenworth Node Schedule



## Line-of-Sight Anti-Tank

Sponsor/POC	<u>PM LOSAT / Greg Tackett</u>	Phone	<u>(205) 842-0847</u>
STRICOM POC	<u>John Collins</u>	Phone	<u>(407) 380-4382</u>
LORAL POC	<u>Tom Radgowski</u>	Phone	<u>(502) 942-1092</u>
Funding Source	<u>PM LOSAT / STRICOM</u>		
Schedule:	Start <u>FY 93</u>	Stop	<u>FY 93</u>

### **Project Description:**

Examine issues regarding the development of the Line-of-Sight Anti-Tank (LOSAT) weapon system. LOSAT is a replacement for the ITV. It is designed to carry hypervelocity missiles on a modified Bradley chassis and can acquire and destroy armored targets at extended ranges.

This test requires borrowing components from another simulator (e.g., CIG). Additional funding will be made available to reconfigure the LOSAT crew compartment to simulate the LOSAT baseline configuration once LTV designs the actual system.

### **Project Status:**

Conversations with Greg Tackett, LOSAT Program Engineer, indicate that PM LOSAT is interested in conducting additional developmental testing during FY '93. The schedule and scope of these tests have not yet been determined.

**LORAL**



## Line-of-Sight Anti-Tank

LOSAT schedule and network configuration are not currently available. They will be confirmed following budget discussion currently underway between STRICOM and PM LOSAT.

---

### Exit Criteria or Objective

Inputs from LOSAT development may include advancements in:

- Crewed Simulators
- Semi-Automated Forces
- Simulator Network Fidelity

**LOSAT**

**LOSAT Schedule  
not available  
at this time.**

**LOSAL**

MIA2  
**Training Developments**

<b>Sponsor/POC</b>	<u>PM Tank - GDLS / Dan Motola</u>	<b>Phone</b>	<u>(313) 825-5693</u>
<b>STRICOM POC</b>	<u>John Collins</u>	<b>Phone</b>	<u>(407) 380-4382</u>
<b>LORAL POC</b>	<u>Tom Radgowski</u>	<b>Phone</b>	<u>(502) 942-1092</u>
<b>Funding Source</b>	<u>PM Tank / GDLS</u>		
<b>Schedule:</b>	<b>Start</b> <u>January 1991</u>	<b>Stop</b>	<u>January 1993</u>

**Project Description:**

GDLS is under contract to PM Tank to upgrade 4 CCTB M1 simulators to the M1A2 configuration. They have incorporated simulations of the Commander's and Driver's Integrated Displays, the Commander's Independent Thermal Viewer, and the Gunner's Control and Display Panel into the simulators and reworked the performance characteristics to resemble the M1A2. These vehicles will be at the disposal of the Armor Center.

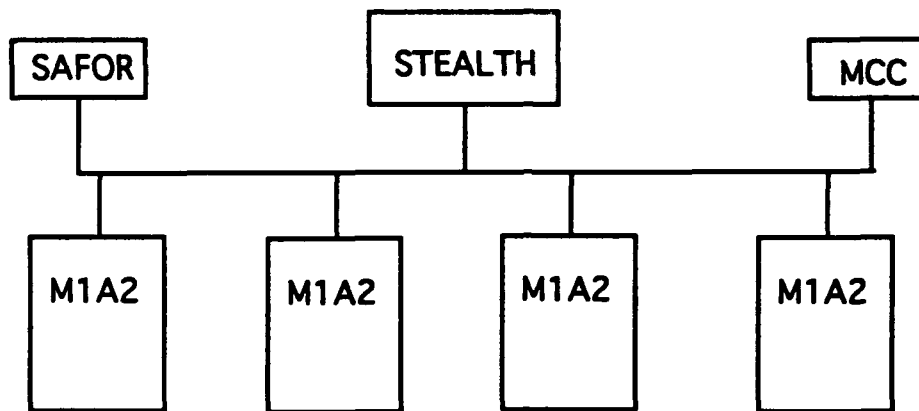
CCTB has been providing field engineer support to help integrate the new components into the vehicles. CCTB will provide board level troubleshooting of the CDLS components for the duration of the GDLS hardware support contract (18 months). GDLS will pay for the shipment and repair of these components.

**Project Status:**

These vehicles have been reconfigured to support the M1A2 comparative analysis, also known as the Hollis Study. Ft. Knox will have to determine which of these changes, if any, will remain once the test is complete.

**LORAL**

## M1A2 Training Developments Net



---

### Exit Criteria or Objective

Inputs from M1A2 Training Developments Activity test may include advancements in:

- Interaction With Real World Systems
- Simulation with Different Levels of Fidelity

**LOCAL**

**M1A2 Schedule  
not available  
at this time.**

**LRAL**

## MultiRad - War Breaker

Sponsor/POC USAF Capt. Lisa Brown Phone 602 988-6561

STRICOM POC John Collins Phone 407 380-4382

Loral POC Jim Exter Phone 407 382-4595

Funding Source U. S. Air Force / DARPA

Schedule: Start July 1991 Stop July 1993

### **Project Description:**

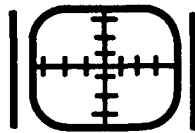
The MULTIRAD/War Breaker Delivery Order is an important element of the Advanced Distributed Simulation Technology Contract because it provides for networked extensions to Air Force weapon systems as part of the networked Simulation Battle Field environment. Elements represented include both fixed wing, F-16 and F-15, Unmanned Air Vehicles (UAV), JSTARS and Airborne Radar AWACS, as part of the DOD networked simulation assets. The on-going Network Interface Unit (NIU) development is particularly important in linking non-SimNet systems to the SimNet Network as well as interfacing dissimilar Simulation Fidelity Simulators. The linking of existing simulation assets utilizing NIU capabilities is critical for affordable simulation network extension.

The MULTIRAD/War Breaker Delivery Order contains the Knowledge Acquisition Prototype Testbed Aerospace Node KAPTAN work statement requiring long haul connections between the Armstrong Laboratory and remote sites including the Institute for Defense Analysis (IDA), McDonnell Aircraft Company, St. Louis, Hanscom, AFB., Ft. Rucker, Al, and the Joint Development Facility (JDF) in McClane, Va. Phase 1 of the War Breaker initiative is a reconstruction of the of the last days of Operation Desert Storm and specifically the U.S. Armed Forces mission to eliminate IRAQ's SCUD missiles. As a follow-on to the 73 Easting recreation of pivotal ground force action in Southwest Asia, War Breaker will provide an important combat development testbed for researching tactics and procedures involved in detection and neutralization of critical mobile targets

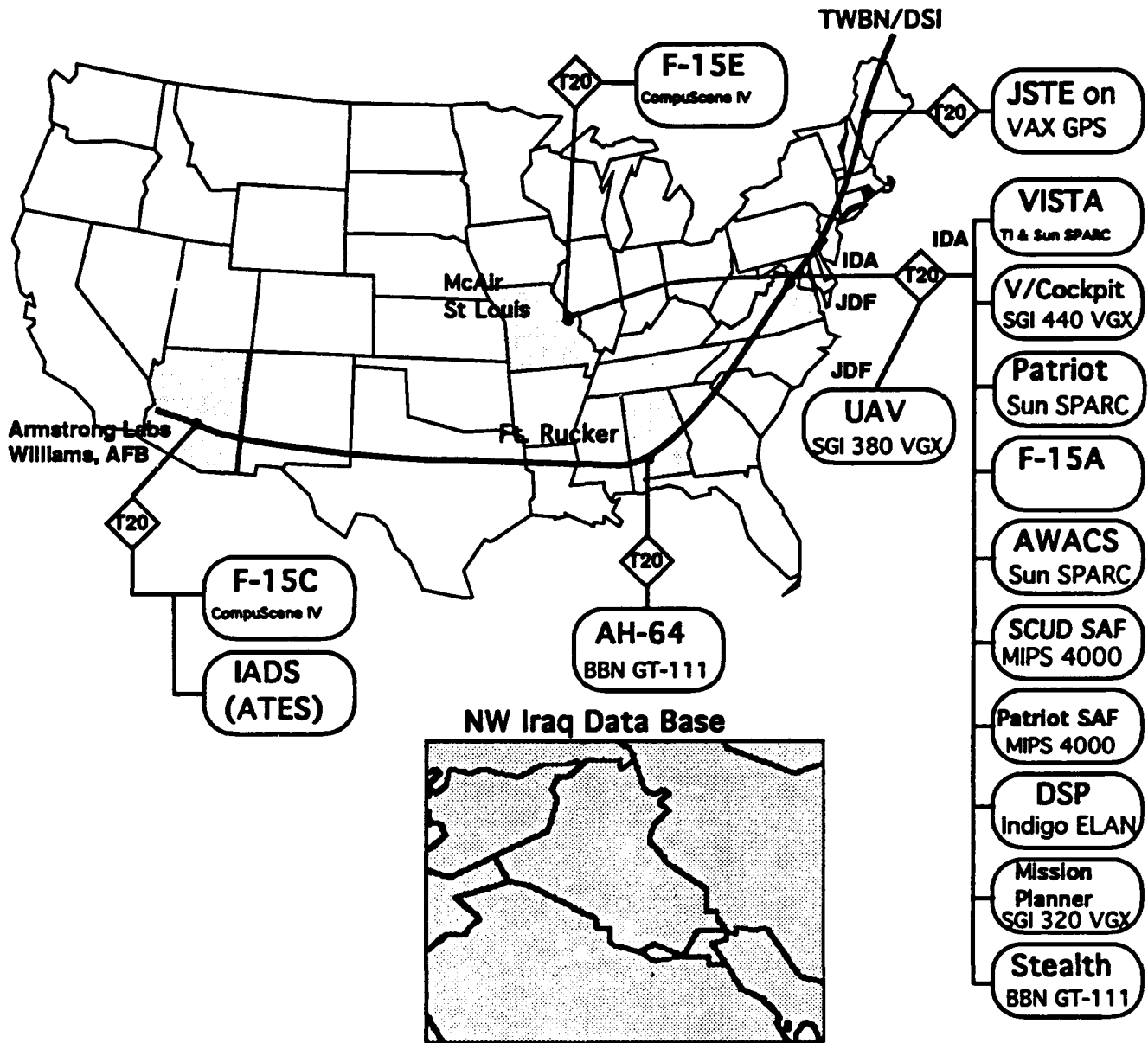
### **Project Status:**

The second year extension to the Multirad should be definitized on July 29, 1992. The period of performance is one year and includes the War Breaker activity to network simulations at several remote sites including IDA, Hanscom, AFB., McAir in St. Louis, and Ft. Rucker with systems at Armstrong Laboratory.

# MultiRaD - War Breaker

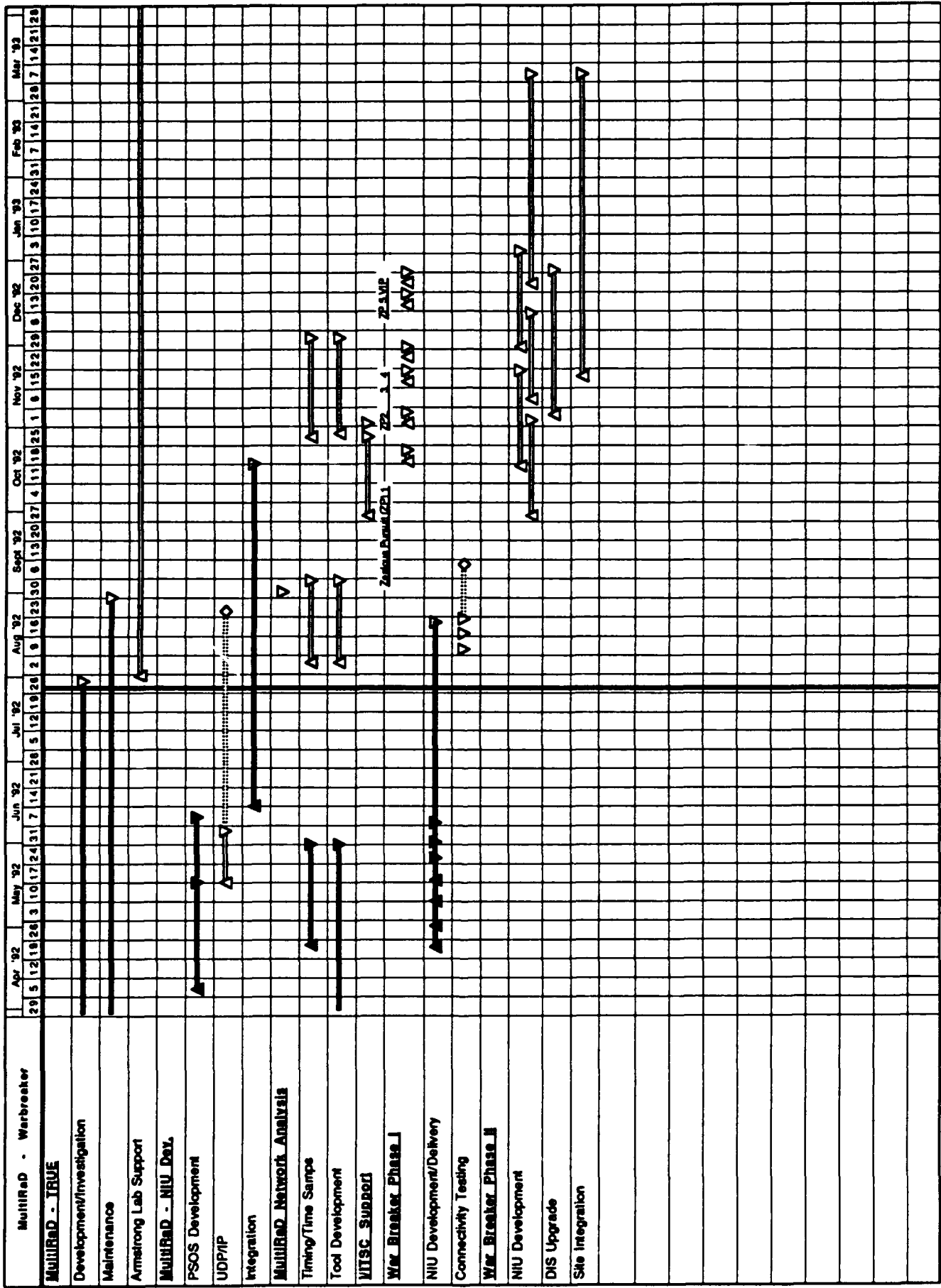


## War Breaker Phase 1



### Exit Criteria or Objective

- Disimilar Fidelity Simulations
- Wide Area Networking
- Secret Classification
- Dis Protocol (2.0 - Goal)
- Last Days Desert Storm Recreation
- Scud Hunting Tactics Eval





## NON-LINE OF SIGHT, PHASE 2 (NLOS 2)

Sponsor/POC PM NLOS / Brian Wheeler Phone (205) 842-8670

STRICOM POC Bryant LaFoy Phone (407) 380-4353

LORAL POC Greg Karies Phone (407) 382-4596

Funding Source PM NLOS

Schedule: Start TBD Stop \_\_\_\_\_

### **Project Description:**

This Delivery Order will support the conduct of the NLOS 2 experiment which will collect and evaluate data regarding the combined arms employment of the NLOS weapons system with specific emphasis on the anti-armor employment of this system.

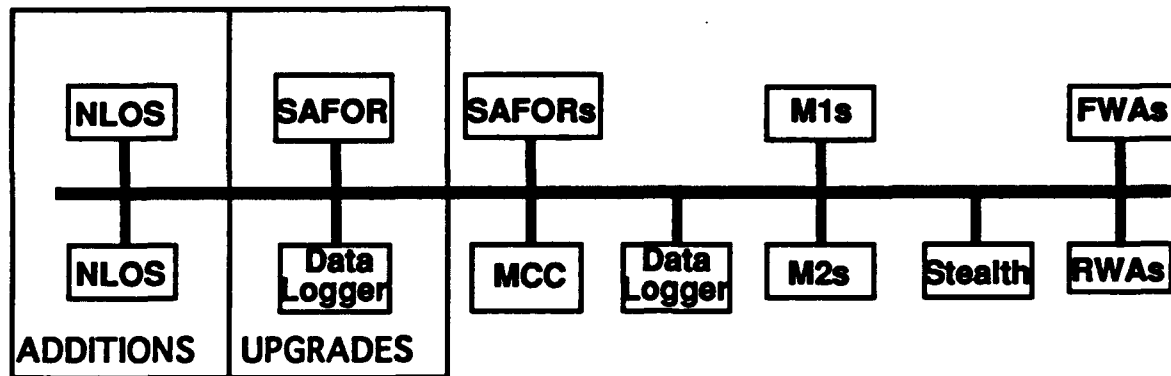
To facilitate this, the following Airnet enhancements are being considered:

- Software Upgrades to the NLOS devices
- Software Upgrades to the Semi-Automated Forces
- Procurement of an Computer Image Generators
- Procurement of additional SAFOR and Data Logger systems

### **Project Status:**

LORAL is preparing a development plan in response to the NLOS 2 requirements received from STRICOM and PM NLOS.

## NLOS, Phase 2



AIRNET

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### Exit Criteria or Objective

- Enhance the capabilities of the Aviation Test Bed facility
- Conduct the NLOS 2 experiment and document the results

NLOS II (Draft)		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NLOS 2 Start		▽															
Baseline Existing Simulation		△	△														
Develop Test Plan		△	△	△													
Procure Data Logger		△	△	△	△												
Procure SAFOR		△	△	△	△												
Procure Image Generator		△	△	△	△												
IG Database Conversion		△	△	△	△	△											
Develop Visual Systems Controller		△	△	△	△	△											
Develop S/W Enhancements		△	△	△	△	△	△										
Integrate VSC					△	△	△										
Integrate IG					△	△	△										
System Test										△	△						
Conduct Experiment												△	△				
Document Hardware												△	△				
Perform Analysis												△	△				
Final Report														▽			
Program Management Reviews			▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽

## Smart Minefield Simulator

Sponsor/POC IDA / Richard Carpenter Phone 703-845-6840  
STRICOM POC John Collins Phone 407-380-4382  
Loral POC W. R. 'Mac' MacDiarmid Phone 407-382-4583  
Funding Source DARPA  
Schedule: Start TBD Stop 30 September 1992

### **Project Description:**

The Smart Minefield Simulator is a follow-on to previous efforts sponsored by IDA under the Wide Area Mines (WAMS) program. The FY92 portion of the SMS effort will build a simulation that allows the use of conventional as well as rudimentary wide area mines (WAM) and anti-helicopter mines (AHM) to be played on the BDS-D battlefield. The wide area mine is composed of a sensor, a fire control system, and a munition. The sensor tracks the two closest vehicles within its detection range. When certain parameters are met, the fire control system fires the munition which flies in a parabolic path and then is guided to the primary target. The AHM is a variation of the WAM.

The simulation will also support at least four methods of emplacement, including specification of individual mine locations, specification of a randomly-filled area, specification of a randomly-filled line, or emplacement by artillery.

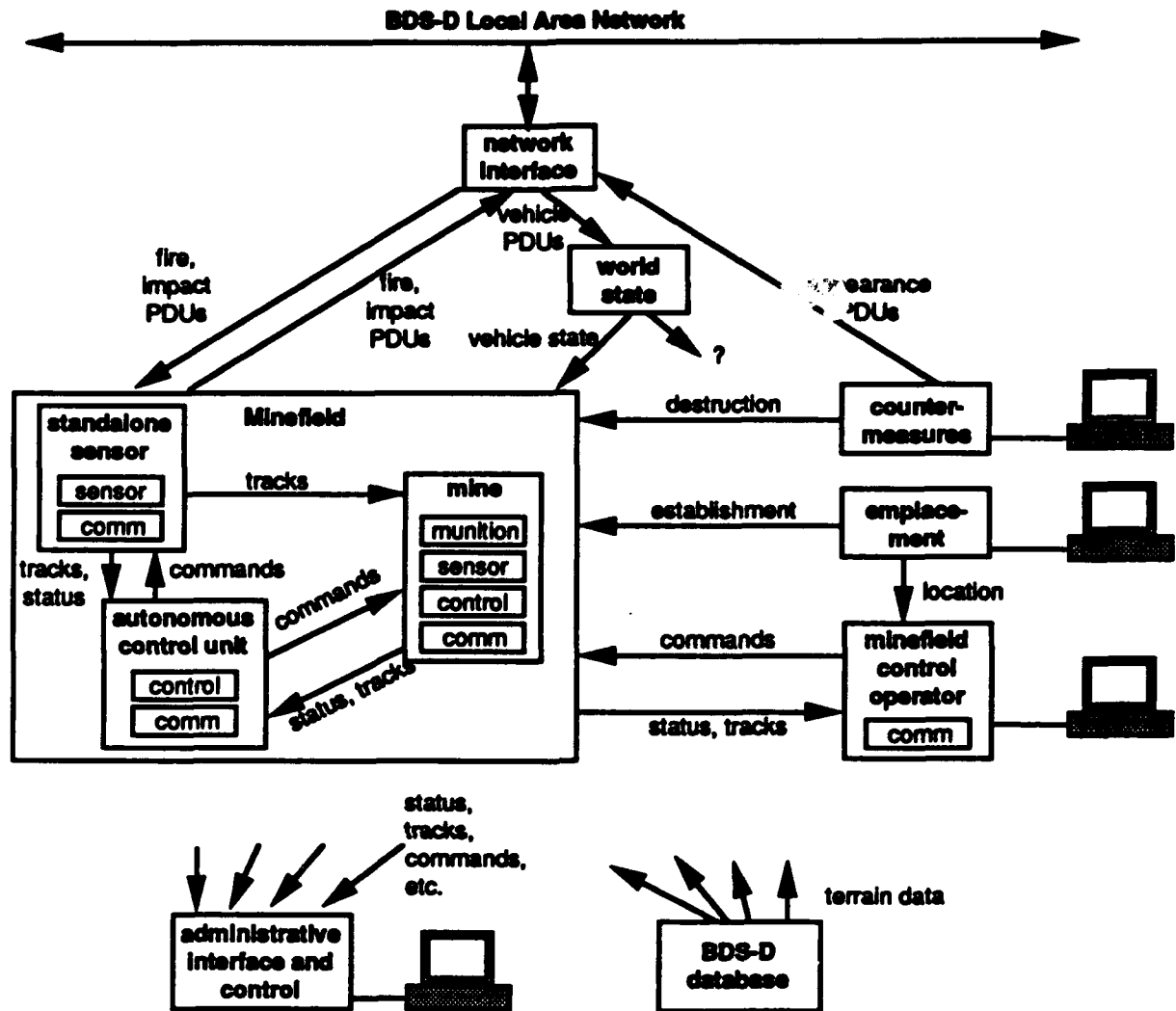
Once the simulation has been developed, two one-week tests will be scheduled at the CCTB at Fort Knox. These tests will involve only SAFOR; no manned simulators will be involved. Once the results of the tests are analyzed, IDA will make decisions on the future development of the SMS for FY93, to include objectives and test requirements.

### **Project Status:**

Although this effort has yet to be formally turned on, STRICOM gave approval to begin work with a NTE cost of \$10K. This allowed Loral to schedule a kickoff meeting which was held at IDA on 17 June. The kickoff meeting gave Loral team members the opportunity to meet with the IDA personnel involved in the effort, clarify certain management and technical issues, and receive guidance from the IDA project leaders. STRICOM has also directed Loral to revise the original proposal to include provisions for purchase of additional hardware items and spares necessary to execute the effort.

**LORAL**

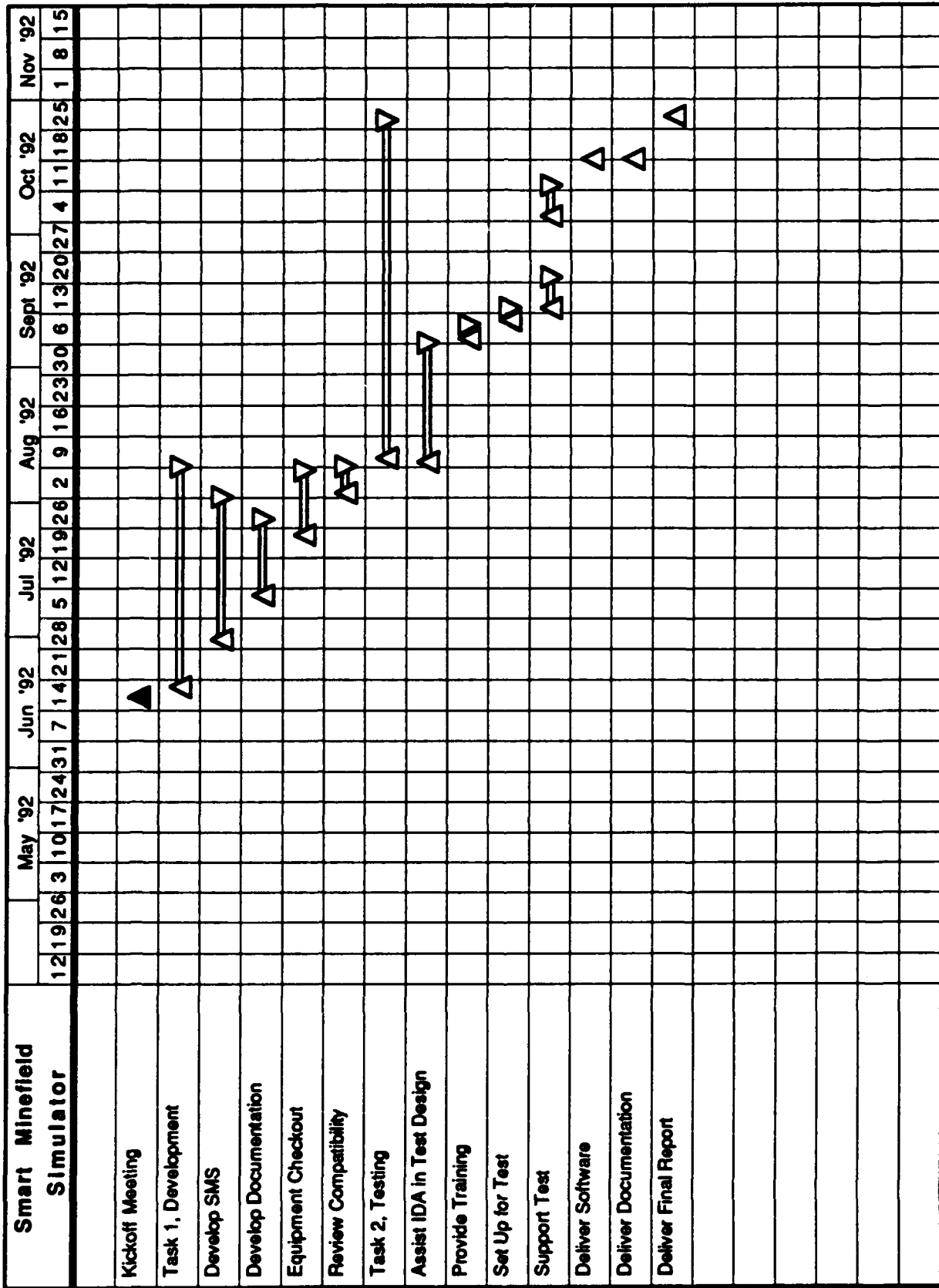
# Smart Minefield Simulator



- Administrative control has access to all components
- All modules can access BDS-D database, specifically terrain

## Exit Criteria or Objective

- Develop SAFOR-based Smart Minefield Simulator
- FY92 objectives call for conventional mine, WAM, and AHM
- Develop appropriate user interfaces
- Conduct two one-week tests of the simulation
- Develop recommendations for FY93 objectives



# Software Contract Change Proposal

Sponsor/POC STRICOM / Stan Goodman Phone (407) 380 - 8165  
STRICOM POC John Collins Phone (407) 480 - 4382  
Loral POC Richard Bright Phone (408) 473 - 7011  
Funding Source STRICOM

Schedule: Start 1 September 1992 (tentative) Stop 31 March 1993

## **Project Description:**

The Software Contract Change Proposal (SW CCP) was originally designed to provide the following support in maintaining and upgrading SIMNET software and documentation:

1. Management - provide the planning documents, attend government meetings, support acquisition of hardware, configure hardware, coordinate project resources, and subcontract management.
2. Software CM - install SIMNET 6.6.1 code baselines, develop a CM plan, expand support as the program grows, and provide baseline maintenance for development efforts.
3. Software maintenance - identify, document and repair software problems, provide yearly upgrades, perform regression testing.
4. Software documentation - develop and maintain a consistent set of documentation for all BDS-D sites.
5. Software QA - comply with the SW quality Assurance plan.
6. ADP Support - equipment installation, preventive maintenance, configuration of the operating system, and installation of upgrades as required.
7. Government Property Control - tag GFE equipment, maintain records, provide an interface to DCAS, and support PCA.
8. Site Backup Support - develop software, documentation and procedures to support maintenance at Fort Rucker and Fort Knox.

Subsequent reductions and delays in funding have resulted reducing the scope of work to the following tasks:

1. Management - provide the planning documents, attend government meeting, support acquisition of hardware, configure hardware, coordinate project resources, and subcontract management.
2. Software CM - install SIMNET 6.6.1 code baselines, develop a CM plan, expand support as the program grows, and provide baseline maintenance for development efforts.
3. ADP Support - equipment installation, preventive maintenance, configuration of the operating system, and installation of upgrades as required.
4. Government Property Control - tag GFE equipment, maintain records, provide an interface to DCAS, and support PCA.

## **Project Status:**

Continued delays in funding have resulted impacts to the AirNet and XROD delivery orders. In order to ensure program continuity Loral funded a 3 month effort, at risk, with the following objectives:

- procure missing software from BBN for AirNet
- procure missing software from BBN for RWA
- procure missing software from BBN for the M1
- build the software in the Software Development Facility (SDF) located in San Jose
- document these build procedures

To date substantial progress in achieving these objectives has been realized.

**LORAL**

SW CCP	May '92			Jun '92			Jul '92			Aug '92			Sept '92			Oct '92			Nov '92												
	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15		
MCC - Identify and procure missing code																															
MCC - Build and verify modules																															
MCC - Maintenance and Documentation																															
RWA - Identify and procure missing code																															
RWA - Build and verify modules																															
RWA - Maintenance and Documentation																															
M1 - Identify and procure missing code																															
M1 - Build and verify modules																															
M1 - Maintenance and Documentation																															
Management																															
ADP Lab Support																															



## X-Rod Experiment

<b>Sponsor/POC</b>	<u>ARDEC/Walt Townsend</u>	<b>Phone</b>	<u>(201) 724-7197</u>
<b>STRICOM POC</b>	<u>John Collins</u>	<b>Phone</b>	<u>(407) 380-4382</u>
<b>Loral POC</b>	<u>Bob Marraccini</u>	<b>Phone</b>	<u>(408) 4873-5041</u>
<b>Funding Source</b>	<u>ARDEC, DARPA</u>		
<b>Schedule: Start</b>	<u>4 May 1992 (Phase II)</u>	<b>Stop</b>	<u>30 April 1993 (revised)</u>

### **Project Description:**

The X-ROD is a tank-fired anti-armor weapon system development effort managed jointly by the U.S. Army Armament Research, Development and Engineering Center (ARDEC), DARPA and the US Army. The X-Rod is a 120mm guided kinetic energy projectile designed for extended ranges and high lethality and very high P(h) an P(k) against advanced armored threats.

When the X-Rod BDS-D experiment was initially conceived, two competing X-Rod designs (Fire-and-Forget and Command Guided) were under evaluation and the BDS-D objective was to evaluate each in the soldier-in-the-loop simulation environment. The results will be used to compare each of these methods with one another and against a baseline condition.

The X-Rod/BDS-D project has two phases: Phase 1 to develop specifications, test plan and an approach for Phase 2. During Phase 1, it became apparent that detailed subsystem specs (needed to accurately model competing designs) were not available, and the Command Guided Approach was to be canceled due to funding cuts. So the BDS-D experiment objective was modified to implement a single Fire-and-Forget model, and use the CCTB to allow investigations of the X-Rod equipped M1 Vehicle relative to the performance of conventional main gun munitions in a simulated combat environment. This approach will provide the required concept evaluation data in a time frame which still meets the needs of ARDEC and DARPA.

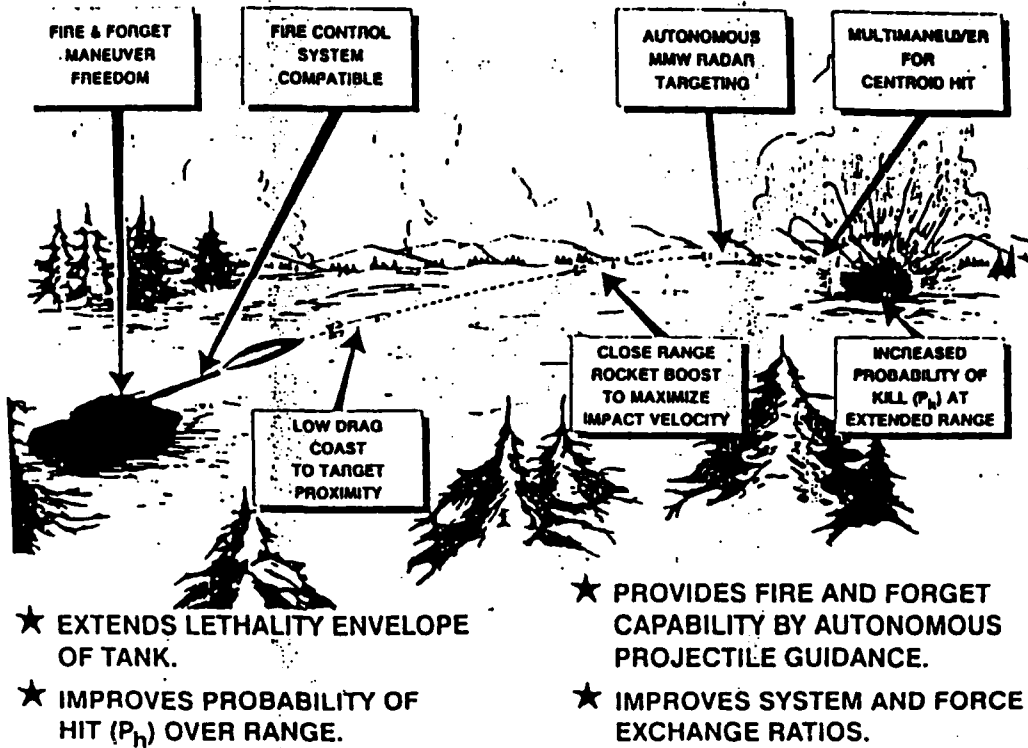
The types of data that are expected from this test will support examination of the effects of X-Rod in the areas of friendly force preservation, lethality, and crew performance in comparison to that level of performance afforded by conventional tank main gun munitions.

### **Project Status:**

Phase 2 tasks not requiring use of GFE have proceeded on schedule. Due to approximately a 2 month delay in receipt of GFE at WDL and subcontractors facilities, software/hardware development tasks and related documentation and test activities at Ft. Knox have slipped accordingly.

**LRAL**

# X-ROD

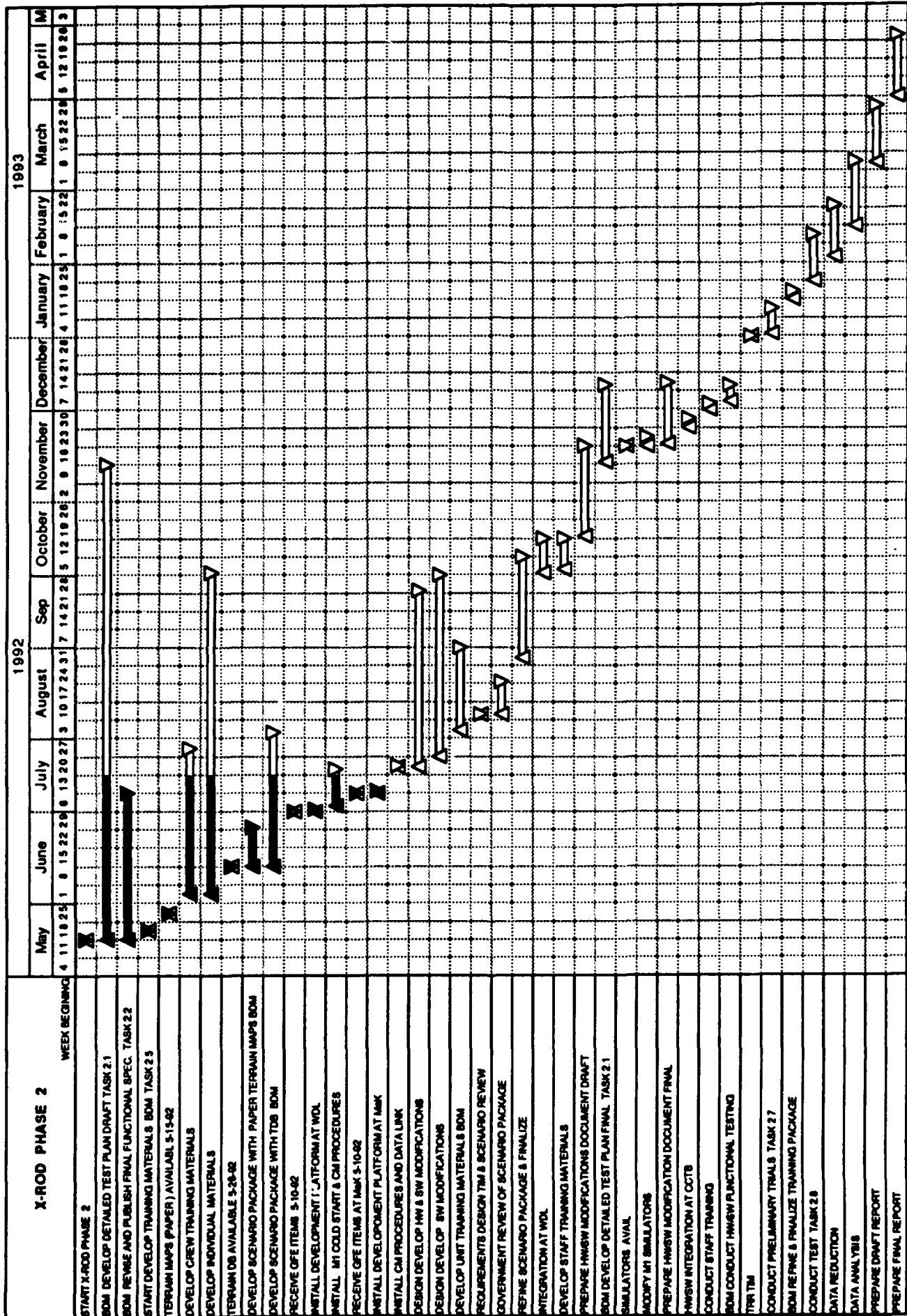


## Exit Criteria or Objective

Specific X-Rod Experiment Objectives are:

1. Determine the battlefield contribution of X-Rod in the context of simulated combat scenarios.
2. Assess the implications of X-Rod vs tank basic load (main gun).
3. Examine the potential impact of X-Rod on small-unit armor tactics.
4. Investigate soldier-machine-interface (SMI) aspects of the X-Rod design concept.
5. Assess the capability of BDS-D technology to support development of conceptual weapon systems.

LRAL



1992

1993

X-ROD PHASE 2

WEEK BEGINNING

May	June	July	August	Sep	October	November	December	January	February	March	April
4 11 18 25	1 8 15 22 29	6 13 20 27	3 10 17 24 31	7 14 21 28	5 12 19 26	2 9 16 23 30	7 14 21 28	4 11 18 25	1 8 15 22	5 12 19 26	3 10 17 24

## VIDS

Sponsor/POC	<u>PM-Survivability/Brad McNett</u>	Phone	<u>(313) 574-7640</u>
STRICOM POC	<u>Rick Copeland</u>	Phone	<u>(407) 381-8702</u>
Loral POC	<u>Bob Marraccini</u>	Phone	<u>408) 473-5041</u>
Funding Source	<u>PM-SURVIVABILITY, DCD, DARPA</u>		
Schedule:	Start <u>22 April 1992 (Step 1)</u>	Stop	<u>22 July 1992</u>

### **Project Description:**

VIDS is an experiment designed to provide a relatively low-cost and rapidly deployed BDS-D simulation platform, to facilitate the conduct of simulated threat engagements, in order to evaluate the operational effectiveness and suitability of various electronic survivability suites of sensors and countermeasures. The overall project goal is to provide PM-SURVIVABILITY and DCD (Armor School), data to review and use to revise their survivability requirements in areas such as: type of response given specific threats, response times per specific threat, angles of attack to be protected from, and multiple attack situations. The results of BDS-D testing will be compared to similar VIDS tests being conducted under the TACOM VIDS program (LTV is the prime contractor). This combined approach will provide quantitative measures of survivability effectiveness, and provide a platform for training Army Armored personnel in tactics, techniques and procedures relative to usage of VIDS equipment on armored combat vehicles.

The VIDS DO has two steps: Step 1 to develop a Feasibility Analysis Report and a proposal for Step 2. Step 2 is to be implemented in two phases: Phase 1 to develop the basic BDS-D VIDS platform, using the M1A1 vehicle and three specific sensor/countermeasures (Missile Countermeasure Device, Laser Warning Receiver and Missile Warning System), with corresponding documentation and test activities. Phase 2 to develop additional suites of survivability equipment to be later specified.

### **Project Status:**

Final version of the BDS-D VIDS Feasibility Analysis Report and Step 2 proposal were delivered on 22 July. Step 1 is complete. the Step 2, Phase 1 award is expected no later than September 1992.

**LORAL**

<b>THREAT</b>	<b>SENSOR</b>	<b>COUNTERMEASURES</b>
Range Finder Laser detected from indeterminate source	<ul style="list-style-type: none"> <li>• High Accuracy Laser Warning Receiver</li> </ul>	<ul style="list-style-type: none"> <li>• Counterfire</li> <li>• ROS and/or ORS</li> </ul>
Helicopter detected by acoustic signature. Hostile/friendly differentiation possible	<ul style="list-style-type: none"> <li>• Non-Imaging System</li> </ul>	<ul style="list-style-type: none"> <li>• ROS and/or ORS</li> </ul>
Assault platform detected by own active radar. Classification and Hostile/friendly differentiation	<ul style="list-style-type: none"> <li>• Future Armored System Radar</li> </ul>	<ul style="list-style-type: none"> <li>• Counterfire</li> <li>• ROS and/or ORS</li> </ul>
Detected Unknown upgraded to Hostile	<ul style="list-style-type: none"> <li>• Identification Friend/Foe</li> </ul>	<ul style="list-style-type: none"> <li>• Counterfire</li> <li>• ROS and/or ORS</li> </ul>
Search or Tracking radar detected from indeterminate source	<ul style="list-style-type: none"> <li>• Tank Radar Warning Receiver</li> </ul>	<ul style="list-style-type: none"> <li>• Counterfire</li> <li>• Advanced Threat Radar Jammer</li> <li>• ROS and/or ORS</li> </ul>
Mines	<ul style="list-style-type: none"> <li>• Mine Detector</li> </ul>	<ul style="list-style-type: none"> <li>• Veh. Magnetic Signature Duplication</li> </ul>
SCUD-B - Dangerous chemical and/or radiation levels present	<ul style="list-style-type: none"> <li>• Nuclear/Chemical Sensor</li> </ul>	<ul style="list-style-type: none"> <li>• NBC Overpressure System</li> </ul>
Large caliber gun fire	<ul style="list-style-type: none"> <li>• Muzzle Flash Detector</li> <li>• Threat Countermeasure System</li> </ul>	<ul style="list-style-type: none"> <li>• Threat Countermeasure System</li> <li>• Combat Protection System</li> <li>• Counterfire • ROS and/or ORS</li> </ul>
ATGM AT-2C RF Uplink	<ul style="list-style-type: none"> <li>• Missile Warning Sensor</li> <li>• Tank Radar Warning Receiver</li> <li>• Threat Countermeasure System</li> </ul>	<ul style="list-style-type: none"> <li>• Missile Countermeasure Device</li> <li>• Threat Countermeasure System</li> <li>• Combat Protection System</li> <li>• Counterfire • Chaff/Flares</li> <li>• ROS and/or ORS</li> </ul>
ATGM AT-4 Wire	<ul style="list-style-type: none"> <li>• Missile Warning Sensor</li> <li>• Threat Countermeasure System</li> </ul>	<ul style="list-style-type: none"> <li>• Missile Countermeasure Device</li> <li>• Threat Countermeasure System</li> <li>• Combat Protection System</li> <li>• Counterfire • Chaff/Flares</li> <li>• ROS and/or ORS</li> </ul>
ATGM AT-6 RF Uplink	<ul style="list-style-type: none"> <li>• Missile Warning Sensor</li> <li>• Tank Radar Warning Receiver</li> <li>• Threat Countermeasure System</li> </ul>	<ul style="list-style-type: none"> <li>• Missile Countermeasure Device</li> <li>• Threat Countermeasure System</li> <li>• Combat Protection System</li> <li>• Counterfire</li> <li>• ROS and/or ORS</li> </ul>
ATGM AT-9 Laser Homing	<ul style="list-style-type: none"> <li>• Missile Warning Sensor</li> <li>• Laser Warning Receiver</li> <li>• Threat Countermeasure System</li> </ul>	<ul style="list-style-type: none"> <li>• Laser Countermeasure Device</li> <li>• Threat Countermeasure System</li> <li>• Combat Protection System</li> <li>• Counterfire • ROS and/or ORS</li> </ul>
ATGM AT-11 Laser Beam Rider	<ul style="list-style-type: none"> <li>• Missile Warning Sensor</li> <li>• Laser Warning Receiver</li> <li>• Threat Countermeasure System</li> </ul>	<ul style="list-style-type: none"> <li>• Threat Countermeasure System</li> <li>• Combat Protection System</li> <li>• Counterfire</li> <li>• ROS and/or ORS</li> </ul>

### **Objective**

• VIDS BDS-D primary objectives is to provide PM-SURVIVABILITY and DCD (Armor School), data to review and use to revise their survivability requirements in areas such as:

1. Type of response given specific threats
2. Response times per specific threat
3. Angles of attack to be protected from
4. Multiple attack situations.

• In addition, to evaluate BDS-D capability to support VIDS-like experiments.

**LRAL**

# BDS-D VIDS STEP 1 SCHEDULE

Activities/Milestones	Weeks After Contract Award															
	May '92					Jun '92					Jul '92					
	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5
Step 1 Award	◆															
Conduct TIM				◆												
Conduct Feasibility Analysis & Test Tasks					▲					▲						
Prepare & deliver Draft FAS Report										▲						
Prepare & deliver Draft Proposal										▲						
Collect proposal cost inputs																
Incorporate Government Comments																
Prepare & deliver Final FAS Report																
Prepare & deliver Final Step 2 Proposal																

### **3 ACRONYM LIST**

<b>ARDEC</b>	<b>Army Research, Development and Engineering Center</b>
<b>ADST</b>	<b>Advanced Distributed Simulation Technology</b>
<b>AHM</b>	<b>Anti-Helicopter Mines</b>
<b>AI</b>	<b>Artificial Intelligence</b>
<b>AIT</b>	<b>Air Intercept Trainer</b>
<b>ARI</b>	<b>Army Research Institute</b>
<b>ARO</b>	<b>After receipt of order</b>
<b>ATAC</b>	<b>Air to Air Combat</b>
<b>ATD</b>	<b>Advanced Technology Demonstration</b>
<b>ATES</b>	<b>Automatic Threat Engagement Simulator</b>
<b>ATHS</b>	<b>Automatic Target Handoff System</b>
<b>ATTD</b>	<b>Advanced Technology Transition Demonstration</b>
<b>AVSCOM</b>	<b>Army Aviation Systems Command, St. Louis</b>
<b>AWACS</b>	<b>Airborne Warning and</b>
<b>BDS-D</b>	<b>Battlefield Distributed Simulation-Development</b>
<b>Bn</b>	<b>Battalion</b>
<b>CAC</b>	<b>U. S Army Combined Arms Center</b>
<b>CAU</b>	<b>Cell Adapter Unit</b>
<b>CD</b>	<b>Combat Developments</b>
<b>CCP</b>	<b>Contract Change Proposal</b>
<b>CCTB</b>	<b>Close Combat Test Bed</b>
<b>CGF</b>	<b>Computer Generated Forces</b>
<b>CGSC</b>	<b>Command and General Staff College, Ft. Leavenworth</b>
<b>CITV</b>	<b>Commander's Independent Thermal Viewer</b>
<b>CIU</b>	<b>Cell Interface Unit</b>
<b>CSRDF</b>	<b>Crew Station R&amp;D Facility</b>
<b>DARPA</b>	<b>Defense Advanced Research Projects Agency</b>
<b>DB</b>	<b>Database</b>
<b>DCD</b>	<b>Director of Combat Development</b>
<b>DIS</b>	<b>Distributed Interactive Simulation</b>
<b>DO</b>	<b>Delivery Order</b>

<b>DOD</b>	<b>Department of Defense</b>
<b>DOIM</b>	<b>Directorate of Information Management</b>
<b>DOTD</b>	<b>Directorate of Training and Doctrine</b>
<b>DUSA-OR</b>	<b>Deputy Under Secretary for the Army for Operations Research</b>
<b>ECS</b>	<b>Exercise Control Station</b>
<b>EW</b>	<b>Electronic Warfare</b>
<b>FAS</b>	<b>Feasibility Analysis Study</b>
<b>FBL</b>	<b>Future Battle Labs</b>
<b>FWA</b>	<b>Fixed Wing Aircraft</b>
<b>FY</b>	<b>Fiscal Year</b>
<b>GCI</b>	<b>Ground Control Intercept</b>
<b>GFE</b>	<b>Government Furnished Equipment</b>
<b>GPSE</b>	<b>Gunners Primary Sight Extension</b>
<b>GPS</b>	<b>Gunners Primary Sight</b>
<b>HEL</b>	<b>Human Engineering Lab</b>
<b>HOM</b>	<b>Higher Order Models</b>
<b>HQ</b>	<b>Headquarters</b>
<b>HW</b>	<b>Hardware</b>
<b>ICD</b>	<b>Interface Control Documents</b>
<b>IDA</b>	<b>Institute for Defense Analysis</b>
<b>IEI</b>	<b>Illusion Engineering, Inc.</b>
<b>IG</b>	<b>Image Generator</b>
<b>IPR</b>	<b>In Process Review</b>
<b>IRAD</b>	<b>Internal Research and Development</b>
<b>IST</b>	<b>Institute of Simulation &amp; Training</b>
<b>ITV</b>	<b>Independent Thermal Viewer</b>
<b>IVIS</b>	<b>Inter Vehicular Information System</b>
<b>JDF</b>	<b>Joint Development Facility</b>
<b>JMASS</b>	<b>Joint Modeling and Simulation Systems</b>
<b>KAPTAN</b>	<b>Knowledge Acquisition Prototype Testbed Aerospace Node</b>
<b>LAN</b>	<b>Local Area Network</b>
<b>LDC</b>	<b>Leader Development Center</b>



<b>LSFBD</b>	<b>Land Systems Future Battlefield Design</b>
<b>LSE</b>	<b>Laboratory Sustaining Effort</b>
<b>LWDL</b>	<b>Loral Western Development Labs</b>
<b>LOSAT</b>	<b>Line-of-Site, Antitank</b>
<b>MCC</b>	<b>Management Command &amp; Control</b>
<b>MDRC</b>	<b>McDonnell Douglas Reconfigurable Cockpit</b>
<b>MODSIM</b>	<b>Modular Simulator</b>
<b>MULTIRAD</b>	<b>Multiship Research and Development</b>
<b>NTSC</b>	<b>Navy Training Systems Center</b>
<b>NIU</b>	<b>Network Interface Unit</b>
<b>NLOS</b>	<b>Non line of site</b>
<b>NTE</b>	<b>Not To Exceed</b>
<b>OPTEC</b>	<b>Operational Test and Evaluation Command</b>
<b>PEO</b>	<b>Program Executive Office</b>
<b>POC</b>	<b>Point of Contact</b>
<b>POSNAV</b>	<b>Position Navigation</b>
<b>PDU</b>	<b>Protocol Data Unit</b>
<b>PMO</b>	<b>Program Management Office</b>
<b>PM NLOS</b>	<b>Project Manager, Non-Line-of-Site</b>
<b>POI</b>	<b>Program of Instruction</b>
<b>RAH-66</b>	<b>Reconnaissance Attack Helicopter "Comanche"</b>
<b>RDB</b>	<b>Red Design Bureau</b>
<b>ROM</b>	<b>Rough Order of Magnitude</b>
<b>RPA</b>	<b>Rotorcraft Pilot Associate</b>
<b>RWA</b>	<b>Rotary Wing Aircraft</b>
<b>SAFOR</b>	<b>Semi-Automated Forces</b>
<b>SAMS</b>	<b>Schools of Advanced Military Training</b>
<b>SIMNET</b>	<b>Simulation Network</b>
<b>SMI</b>	<b>Soldier Machine Interface</b>
<b>SMS</b>	<b>Smart Minefield Simulator</b>
<b>SPECS</b>	<b>Specifications</b>
<b>ST</b>	<b>Stream Two</b>
<b>SW</b>	<b>Software</b>

<b>STRICOM</b>	<b>Simulation, Training and Instrumentation Command</b>
<b>TACOM</b>	<b>U.S. Army Tank and Automotive Command</b>
<b>TBD</b>	<b>To Be Decided</b>
<b>TEC</b>	<b>Topographic Engineering Center</b>
<b>TIM</b>	<b>Technical Interchange Meeting</b>
<b>TIS</b>	<b>Thermal Imagery Sight</b>
<b>TOC</b>	<b>Tactical Operations Center</b>
<b>TRAC</b>	<b>TRADOC Analysis Command</b>
<b>TRADOC</b>	<b>U.S. Army Training and Doctrine Command</b>
<b>TSM-AT</b>	<b>TRADOC Systems Manager for Anti Tank</b>
<b>TTP</b>	<b>Tactics, Techniques and Procedures</b>
<b>USAAVNC</b>	<b>U. S. Army Aviation Center</b>
<b>VV&amp;A</b>	<b>Verification, Validation and Accreditation</b>
<b>VIDS</b>	<b>Vehicle Integrated Defense Systems</b>
<b>WAMS</b>	<b>Wide Area Mines</b>
<b>X-ROD</b>	<b>Experimental AT Missile</b>