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Distributed Interactive Simulation Baseline Study: Phase 1-FY96

Ronald W. Tarr

INSTITUTE FOR SIMULATION AND TRAINING

Contract Number: N61339-93-K-0001
STRICOM

Distributed Interactive Simulation Baseline Study, Phase 1 - FY96

October 6, 1995

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INSTITUTE FOR SIMULATION AND TRAINING

DISTRIBUTED INTERACTIVE SIMULATION BASELINE STUDY

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EXECUTIVE SUMMARY

This document comprises the Phase 1 deliverable of the DIS Baseline Study which principally provides year of execution justification and rationale for the FY96 DIS budget. It also establishes the structure and direction to be followed for Phase 2 of the study.

Phase 1 Findings:

- Analysis of the FY96 DIS MDEP RDT&E program indicates that it supports the priorities, needs and funding requirements detailed in the DIS Master Plan, Master Plan Annex, and Modernization Plan. Costs and justifications were reasonably accurate.

- The Functional and Technical Manager programs are virtually identical when aggregated to the level of the categories (OMA, OPA, RDT&E) used for the investment strategy but differ significantly from the DIS Master Plan *guidance* for each category.

- Changes to the structure of DIS MDEP funding (from exclusively RDT&E to a combination of OMA, OPA and RDT&E) coupled with appropriation specific MDEP funding reductions have largely negated the effectiveness of program-wide strategic investment guidance.

- Potential funding cuts make it imperative that an overall program strategy also include appropriation specific investment strategies for each investment category.

- Potential FY96 funding shortfalls and/or inconsistencies could not be accurately identified since detailed backup documentation was not available for this study.

Phase 2 Plan:

Major goals of the Phase 2 effort include:

- Evaluate existing DIS requirement directives and identify other user requirements and functional capability needs in terms of their DIS-applicability and the technologies required to meet these needs;

- Identify, document, and quantitatively rank technical issues (a needed capability that cannot be met by current or near-term technology) in terms of their potential utility to the overall DIS program;

- Provide technical, program planning, and cost estimating support recommendations to assist the PM DIS in the formulation of a comprehensive, timely and integrated DIS program management and investment strategy plan for FY97-03.

The Phase 2 effort will follow the same general approach as Phase 1, but with a more detailed and proactive analysis of requirements, technologies and program planning for FY97-03.

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I. INTRODUCTION AND SCOPE

This document and its related appendices comprise the Phase 1 - FY96 deliverable to the Engineering Change Proposal entitled "A Global Approach to Achieving Distributed Interactive Simulation's (DIS) Full Potential," dated June 29, 1995, under STRICOM contract N61339-93-K-0001.

Phase 1 is an initial effort primarily focusing on the justification of and rationale for the FY96 PM DIS Program. It also outlines the structure and direction to be taken for Phase 2; a considerably more proactive effort applicable to FY97-03.

This document is organized in a "top-down" fashion with increasingly more detailed information as it is read front-to-back. This method is utilized to facilitate the maximum use of the reader's available time and interest level.

Participating organizations involved in the research, analysis and final preparation of this document include the US Army Simulation, Training and Instrumentation Command (STRICOM), the Institute for Simulation and Training (IST) and The Analytic Sciences Corporation (TASC) in collaboration with LORAL Advanced Distributed Simulation (ADS).

II. BACKGROUND

As the Army faces the challenge to maximize the warfighting capability of the deployed force while operating in a restrained resource environment with unpredictable threats, the use of simulators and simulation provides potential lower costs and timely examination of system performance implications.

Through DIS, the Army will use computer-aided engineering to examine component performance and engineering design to assess the battlefield operational payoff of conceptual systems and to establish an architecture with appropriate standards and protocols to permit linkage of different simulation environments into a virtual world. The use of these virtual prototypes will identify battlefield performance drivers for critical system design and operations/training while reducing the cost of operations and maintenance of existing Army weapon system assets.

The DIS Master Plan (September 1994), DIS Modernization Plan (December 1994), and the DIS Master Plan Annex (June 1995) outlined the Army's vision and resource strategy to establish the synthetic battlefield environment needed for an effective, Army-wide DIS implementation. DIS and its supporting technologies are still maturing, however. The very nature of DIS indicates the need for a comprehensive yet flexible program plan to define roles and responsibilities, convey

a logical acquisition and investment strategy, identify integration and leveraging opportunities, and address program risk areas.

To meet this need, the "Global Approach to Achieving the Distributed Interactive Simulation Full Potential" effort is focused on the goal of achieving timely, in-depth, and continuous collection, research, analysis, assessment and evaluation of all significant aspects of DIS within government, industry, and academia. The DIS Baseline Study will play an integral first step in achieving this goal.

III. PURPOSE

In order to eventually realize the true promise of DIS, the Army must be willing to make substantial up-front investments in DIS technologies. Prioritization of efforts and the proper allocation of required yet limited funding resources is key to DIS success and therefore a major challenge facing PM DIS, STRICOM.

The DIS Baseline Study was undertaken to assist the PM DIS, STRICOM, in successfully meeting this challenge. The results of this study will form the foundation of a recommended integrated management approach for expanding participation and exploitation of available resources in the modernization of DIS programs. Major goals of this effort are to:

- Evaluate existing DIS requirement directives and identify other user requirements and functional capability needs in terms of their DIS-applicability and the technologies required to meet these needs;

- Identify, document, and quantitatively rank technical issues (a needed capability that cannot be met by current or near-term technology) in terms of their potential utility to the overall DIS program;

- Provide technical, program planning, and cost estimating support recommendations to assist the PM DIS in the formulation of a comprehensive, timely and integrated DIS program management and investment strategy plan for FY97-03.

IV. APPROACH

The DIS Program Baseline effort is designed to provide management insight into the ability of the technology community to support its user requirements and functional needs. This approach, pictured in Figure 1, is based upon three principal tasks in a two-phase effort. One ancillary activity, the DIS Taxonomy, will serve to

develop a common frame of reference and terminology with which to form the relationship between identified requirements and technology issues.

Because this effort began too late in the FY96 budget cycle to be applied in a forward, systematic manner, the Phase 1 effort uses elements of this methodology as appropriate. For example, the largest Phase 1 effort has been to identify, analyze, and consolidate those requirements underlying the submitted budget. Other task areas are less complete and have been tailored to the activities that make up the execution year (FY96), including "by exception adjustments."

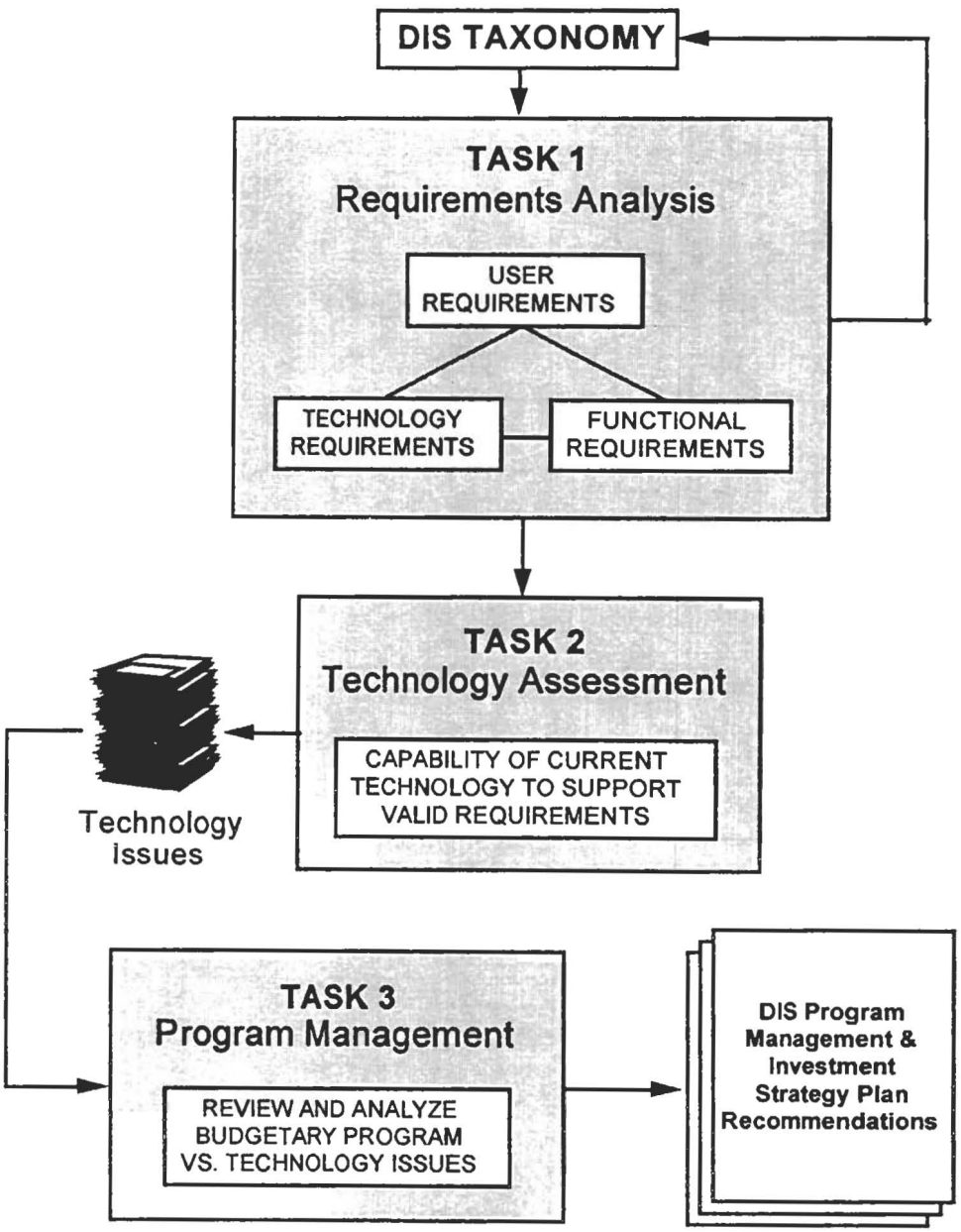

Figure 1. DIS Baseline Approach

The Phase 2 effort will follow much the same approach, but with detailed analysis for FY97-03. This methodology will be applied in a logical, systematic manner with the results of each preceding task directly supporting the task(s) which follow. Tracking the need for each program element defined as a technology issue (based upon documented user requirements, functional capabilities, and existing technology) will support PM DIS in the development of its programmatic, acquisition, and budgetary plans and in explaining the rationale for these decisions.

In the following paragraphs, the approach taken for each of the three tasks that make up the underlying methodology for this project is discussed as well as its individual application to Phase 1 and Phase 2.

A. Requirements Analysis.

The objective of the User Requirements Task is to evaluate existing requirement directives and identify other applicable user requirements in the context of DIS applicability and functional capability needs. From this information will be extracted an integrated set of technology requirements which must first be met to support the valid user requirements that have been identified.

This complex task is being approached as a two step process. The first step involves the collection and integration of requirements from all elements of the user community. For the PM DIS Baseline Study, the "user" community is large and diverse, including not only the traditional "field soldiers" the functional area manager (TRADOC) normally represents but also other programs and demonstrations that will need to use DIS as an enabling foundation. This list, including over 50 distinct programs (see Table 1, DIS Related Programs), is expected to grow continuously as DIS becomes more widely available. For example, a STRICOM requested electronic survey sent to over 4,000 addresses as a "DIS Master Plan Information Request" revealed several new programs involving DIS-related technologies (see Appendix 9). An integral part of this effort is to solicit from the user agencies some type of prioritization of requirements (integral to the Technology Assessment task). This "user clearinghouse" activity by the Technical Manager is consistent with the original charter and is the most unique feature of this program.

The second step of this task involves the translation of the user requirements and functional capability needs into technology capability "levels." In making this translation, it will be found that some requirements are much more technology dependent (.e.g., the ability to support a given number of players on an exercise) than others (e.g., updating of core capabilities which are budget limited). An important part of this effort is to identify those requirements which are and are not specifically technology driven.

Under Phase 2 of the Baseline Study, the full process described above will be applied. Under Phase 1, the primary effort has been based upon a review and analysis of the DIS Master Plan and Master Plan Annex and the identification of potentially useful programs, particularly the study of four "key" programs:

- Battlefield Distributed Simulation - Development (BDS-D)
- Synthetic Theater of War - Army (STOW-A)
- Anti-Armor Advanced Technology Demonstration (A2ATD)
- Warfighter's Simulation (WARSIM) 2000

B. Technology Assessment.

The Technology Assessment task compares the results of the previous task - Requirements-driven technology capability needs versus current technology levels - in order to define "technology "issues" which are defined as:

> *"A needed technology capability (as derived from a validated requirement) that cannot be supported by current or near-term technology."*

In Phase 2 of the study, a formal engineering panel will be formed to assist in the identification and classification of these technology issues. Once the issues have been identified and documented, they will be ranked in terms of their utility to the overall PM DIS program. This ranking will be based upon the functional user agencies' ranking of their requirements and upon an assessment of the number of different user requirements requiring any given technology capability.

For Phase 1, a brief assessment of current R&D needs with respect to the FY96 budget has been conducted. The basis for this work has been the FY96 Research, Development, Test, and Evaluation (RDT&E) budget plan for DIS. In addition to this evaluation, the Phase 1 effort includes a commentary on the technology state of the overall DIS Program and an assessment of existing CAAN (Combined Arms Assessment Network) sites. While not conclusive at this point, the information obtained from this analysis is critical to establishing a start-point for the more in-depth approach that will be taken Phase 2.

C. Program Management.

The final step in the Baseline methodology is dependent upon the output from the previous tasks, Requirements Analysis and Technology Assessment, to support the development of a recommended PM DIS program management and investment strategy plan. This support includes reviews and recommendations with respect to budgetary issues, and background documentation, justification and rationale supporting those recommendations.

Multiple products will be developed to support sustaining analytic efforts in the future. These will include, but not necessarily be limited to:

- a *DIS Requirements Knowledge Base*;
- an *integrated program plan* which shows major milestones for all DIS related programs and dependency linkages between them;
- a *Key Issues/Program Impact Matrix (KI/PIA)* which depicts the impact all technology development programs will have on the resolution of the technology issues; and
- a *technology development program strategy* which depicts the evolutionary changes in the level of technology needed by both on-going user requirements and supportable by R&D efforts.

Phase 1 activities were primarily an "external review" of the FY96 budget that had already been submitted. Phase 2 will provide a full application of the above methodology in support of the development of FY97-03 budget proposals with the ultimate product being a recommended PM DIS Program Management and Investment Strategy Plan.

V. FINDINGS

This section includes a short summarization of the findings from the initial analyses of the three principal tasks for Phase 1 of the DIS Baseline Study. A more thorough, detailed discussion of each task follows this section as Parts 1 through 3. Appendices attached near the rear of this document consist of additional supporting material which may be consulted for further information.

A. Requirements Analysis (see Section V, Part 1 for more detail).

Efforts to date are best described as background or preliminary work in preparation for Phase 2 of the Baseline Study. Although considerable documentation has been collected on selected primary DIS programs (BDS-D, A2ATD, STOW-A and WARSIM-2000), the data is insufficient to support a comprehensive analysis of all requirements for these and other DIS-related programs. Actions recently initiated by PM DIS to identify points of contact and sources of more detailed, current information should soon begin to produce useful data in support of this analysis.

Because of the scarcity and relative age of the documentation obtained thus far (most over two years old), the information was not particularly useful in

discerning an *identifiable* DIS impact in FY96. This task has little bearing, therefore, on the Phase 1 effort.

Refinement of the taxonomy and design of the Baseline knowledge base are proceeding and will provide the framework to manage and analyze the information. Efforts in Phase 2 will focus on gathering and analyzing requirements data from other DIS-related programs, as well as the principal programs identified above. The emphasis will be on information which feeds the taxonomy-driven Baseline knowledge base.

B. Technology Assessment (see Section V, Part 2 for more detail).

Since DIS is not a "system," in the traditional sense, the development of improved capability at the DIS sites has followed a technology development path rather than a traditional system development path due to the extraordinary technical challenges associated with producing realistic synthetic environments. Because of optimistic initial functional requirements and the lack of engineering expertise in distributed simulations that existed early in the program, it was not possible to perform the comprehensive engineering analysis necessary to produce an optimal DIS system. The result is that the DIS environment appears to suffer from a lack of cohesion. For example, the proposed expenditures for FY96 RDT&E funds were developed by polling the engineering expertise available, prioritizing their recommendations, and selecting those that could meet funding and timing constraints. A new approach has been proposed (detailed in Section V, Part 2, Technology Assessment) that would delineate the technical means required to establish the ability to represent in simulation the combined arms function of a digitized battalion task force at the core DIS facilities. This approach will be attempted in Phase 2.

An examination of the existing Core DIS Facilities (CDF's) [Mounted Warrior Test Bed (MWTB), Land Warrior Test Bed (LWTB), and Aviation Test Bed (AVTB)] was accomplished for the Phase 1 effort. Concentrating on capabilities currently available and significant achievements accomplished, it was revealed that some facility improvements are still needed to achieve full capability, however a wide variety and scope of experiments and exercises have been successfully conducted at each site. The ability to replicate a "full" battalion task force to the degree of fidelity required is still a major shortcoming, however, and will be examined in detail for the Phase 2 effort.

C. Program Management (see Section V, Part 3 for more detail).

Analysis of the FY96 DIS MDEP RDT&E program indicates that the FY96 plan indeed adheres to and supports the intended investment strategies, needs and requirements of the DIS Master and Modernization Plan documents and

annexes, if not their specific funding prioritization. Furthermore, the analysis concludes that the Technical Manager's program solidly supports the guidance of the Functional Manager plans in that they are almost identical. Lastly, an assessment of the costs included in the RDT&E (R) and Procurement (P) Budget Justification Sheets (P&R Forms) for FY96 shows that they were financially accurate, sufficiently thorough and justifiably complete.

It was noted, however, that changes to the structure of DIS MDEP funding (from exclusively RDT&E to a combination of OMA, OPA and RDT&E) coupled with appropriation specific MDEP funding reductions have largely negated the effectiveness of program-wide strategic investment guidance. Potential (and likely) funding cuts make it imperative that an overall program strategy also include appropriation specific investment strategies for each (OMA, OPA, RDT&E) category. This is a fundamental aspect of the Phase 2 approach.

It is too early in the Baseline Study to attempt to draw conclusions concerning the effect that other DIS-related programs will have on DIS and its environment. Documentation collected to date on these programs is generally aggregated at a high level and out-of-date. Detailed status, scheduling, budget and other current, pertinent data for all DIS-related programs must be identified, collected and analyzed before the interactions and effects can be identified. These tasks will be undertaken in Phase 2 of the Baseline Study.

Part 1

REQUIREMENTS ANALYSIS

A. Introduction.

The first priority for the DIS Baseline is to identify the requirements which must be satisfied by DIS and its environment. These requirements are generated from a variety of different sources. For example, one set of operational needs was solicited from users and documented in the DIS Master Plan. Another set, specific to STOW-A, is documented in the Master Plan Annex. Other requirements are derived from programs such as BDS-D and A2ATD, which require certain DIS capabilities in order to execute their plans. Conversely, the same programs that place requirements on DIS are, in some cases, producing products and results which satisfy other DIS requirements. The articulation, analysis and integration of these requirements and DIS contributions are key to the baseline.

B. Scope.

This following pages summarize the work to date and the plan-of-attack for Phase 2 of the Requirements Analysis task for the DIS Baseline Study. It describes the methodology being used to capture DIS-related requirements information and addresses the actions taken to develop a taxonomy for DIS. The taxonomy is a key component of this task and will address each of the items of information which should be included in the Baseline knowledge base.

Next, the requirements provided by the Functional Manager in the DIS Master Plan and its Annex are addressed and correlated using keywords. A discussion of problems encountered in using these needs/requirements for the basis of DIS is also included. A summarization of the priorities and other guidance provided in the body of these plans is followed by the needed technical capabilities identified in the Modernization Plan.

The information collected to date on DIS-related requirements is then presented. For those selected DIS programs for which documentation is on-hand (BDS-D, A2ATD, STOW-A and WARSIM-2000), descriptive information on technical objectives, exit criteria, schedules, accomplishments, etc. is provided.

C. Methodology.

The systematic methodology developed to document and analyze DIS requirements is shown below in Figure 2 and discussed in subsequent paragraphs.

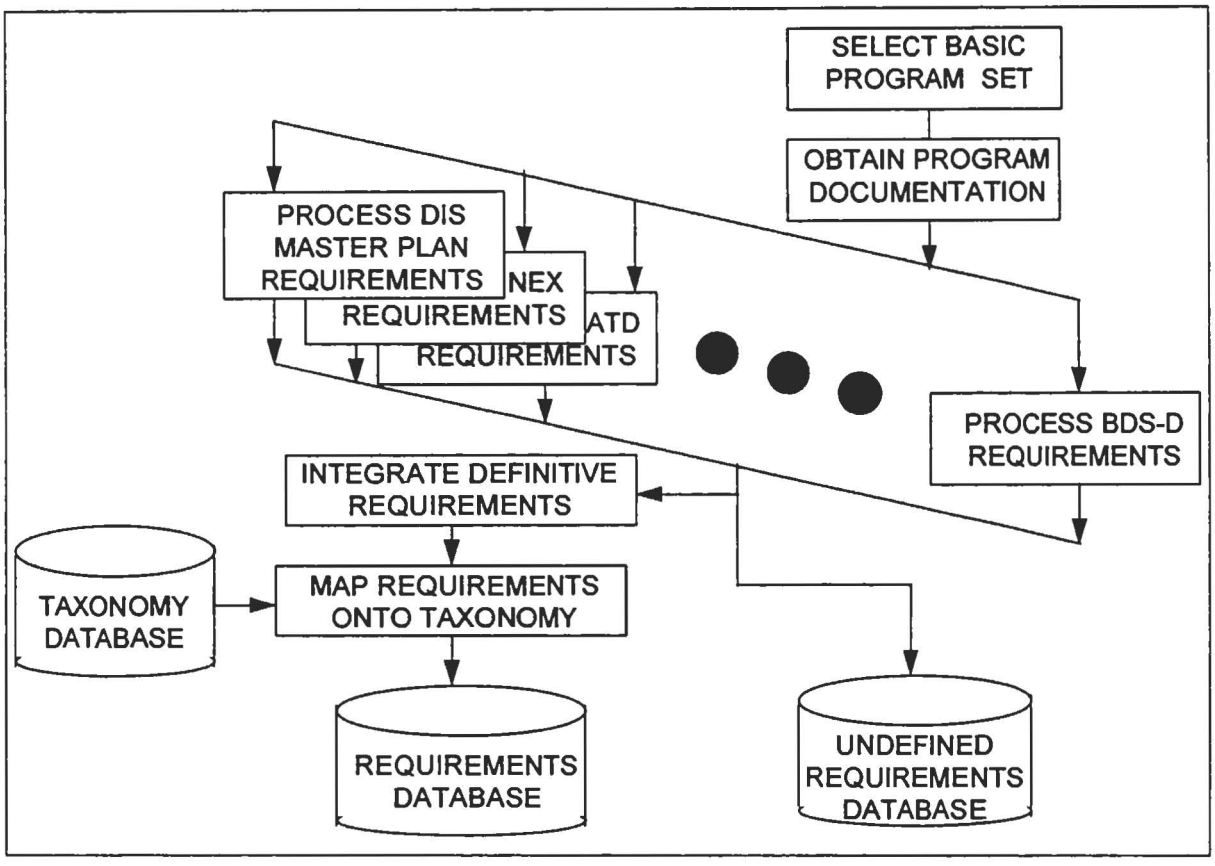

Figure 2: DIS Requirements Analysis Methodology

The list of DIS-related programs and projects for baseline analysis was initially compiled as the 16 Key Integrating Programs and the 8 Key Interfacing Programs described in Chapter IX of the Master Plan. Additional programs such as Comanche and WARBREAKER were added to the list to bring it up to date (Table 1).

Key Driving Programs /1

Combined Arms Tactical Trainer (CATT(CCTT))
Advanced Concepts and Technology Program II (ACT II)
Rapid Force Projection Initiative (RFPI)
Anti-Armor ATD (A2ATD)
Battlefield Distributed Simulation - Development (BDS-D)
Advanced Technology Demonstrations (Other)
Warfighter's Simulation (WARSIM 2000)
Combat Service Support Training Simulation System (CSSTSS)
Virtual Brigade
Battle Labs
Louisiana Maneuvers (LAM)
Theater Missile Defense
Directed Energy Weapon (DEW)
Simulation and Time Synchronization
Digitization of the Battlefield
Major Tests

Key Interfacing Programs 2/

Synthetic Theater of War (STOW)
DMSO/AMIP/SIMTECH Projects
Special Operations Forces Inter-Simulation Network/Joint Conflict Model (SOFNET/JCM)
Global Surveillance and Communications (GS&C)
Simulation in Training and Advanced Readiness (SIMITAR)
Joint Precision Strike Demonstration (JPSD)
Joint Warfighting Center (JWFC)
Joint Training and Simulation Center (JTASC)

Other Programs

Comanche
AFS/Crusader
Fires Support Combined Arms Tactical Trainer (FSCATT)
Virtual Proving Ground
WARBREAKER

1/ DIS Master Plan Chapter IX, Page IX-1
2/ DIS Master Plan Chapter IX, Page IX-2

Table 1. DIS-Related Programs

These programs were then reviewed to determine the degree to which each has affected or will affect DIS. The following thirteen programs were judged as the most significant to DIS and were selected for analysis as part of the Baseline effort:

- Anti-Armor ATD (A2ATD)
- Battlefield Distributed Simulation - Development (BDS-D)
- Combined Arms Tactical Trainer (CATT(CCTT))
- Joint Precision Strike Demonstration (JPSD)
- Synthetic Theater of War (STOW)
- Virtual Brigade
- Warfighter's Simulation (WARSIM 2000)
- Comanche
- AFS/Crusader
- FSCATT
- Virtual Proving Ground
- WARBREAKER
- DMSO High Level Architecture

Because of the short time frame for completion of Phase 1 (the FY96 review), the list was narrowed to the following four programs for the initial review:

- Battlefield Distributed Simulation - Development (BDS-D)
- Synthetic Theater of War - Army (STOW-A)
- Anti-Armor Advanced Technology Demonstration (A2ATD)
- Warfighter's Simulation (WARSIM) 2000

Data collection efforts were then initiated to identify and collect the necessary documentation for program analysis. A matrix of project information availability is at Table 2. This matrix shows for each program, the data source(s), the category(ies) of information available from that source and the date of that source. The order of programs across the top of the matrix (left to right) indicates the relative priority given that program for data collection and analysis.

Table 2. Project Information Availability

	BDS-D	A2ATD	STOW	WARSIM	CATT	JPSD	WARBREAKER	RFPI	FXXI Train	Commanche	AFS/Crusader	FSCATT	Virtual PG
Description	Tech Dvlpmt Plan Sep-93 Pg 2	Tech Demo Plan May-93 Pg 1	ORD (Draft) Jul-95 Pg 1.1	ORD Aug 93 Pg 1, A1									
Objectives	Tech Dvlpmt Plan Sep-93 Pg 1	Tech Demo Plan May-93 Pg 1, 5	ORD (Draft) Jul-95 Pg 1.1										
Purpose		Tech Demo Plan May-93 Pg 2											
Requirements			ORD (Draft) Jul-95 Pg 4.1	ORD Aug 93 Pg 4									
Schedules	Tech Dvlpmt Plan Sep-93 Pg 5, 6, 23	Tech Demo Plan May-93 Pg 17	Action Plan Jan 95 Pg 10 ORD (Draft) Jul-95 Pg 8.1	ORD Aug 93 Pg 24									
Budgets	Tech Dvlpmt Plan Sep-93 Pg 19	Tech Demo Plan May-93 Pg 26											
Exit Criteria	Tech Dvlpmt Plan Sep-93 Pg 20	Tech Demo Plan May-93 Pg 2											
Deliverables	Tech Dvlpmt Plan Sep-93 Pg 14	Tech Demo Plan May-93 Pg 7, 16											
Developmental Matrix			Action Plan Jan 95 Annex A ORD (Draft) Jul-95 Section B										
DIS Attributes		Tech Demo Plan May-93 Pg 2											
Assumptions			Action Plan Jan 95 Pg 8	ORD Aug 93 Pg A-4-1									

The next step in the requirements development methodology was to identify the items of information which were required for the baseline in order to associate requirements and/or deliverables from the various programs to DIS. An initial list of taxonomies was compiled from the terms used in the Master Plan (Evolving Technologies and Capabilities and Objective DIS Environment), the DIS Modernization Plan (Needed Technical Capabilities and DIS Current Assessment) and the organization of the Workshop on Standards for Interoperability of Distributed Simulations (Work Groups and Sub-Work Groups)(Table 3). In addition, the objectives and sub-objectives from the Department of Defense Modeling and Simulation Master Plan and the Army Modeling and Simulation Master Plan were incorporated into this analysis (Table 4). From this amalgamation of terms describing capabilities, technologies, technical needs, work groups, objectives and objective DIS environments, a first draft DIS baseline taxonomy evolved as shown in Table 5. This taxonomy will be adjusted during the course of the baseline as required, and will be used throughout this analysis to describe attributes of DIS.

Table 3. DIS Master Plan & Modernization Plan Taxonomies

Evolving Technologies & Capabilities *	Needed Technical Capabilities **			DIS Current Assessment**			DIS Standards Organization	Objective DIS Environment*
	Infrastructure	Operations	Enhancements	Infrastructure	Operations	Enhancements		
DIS Architecture & Networks			Architecture			Open, Object Oriented Architecture & V&V	System Architecture	
Data Standards								Standards Library (Algorithyms, data, terrain, etc.)
Communication Standards				WAN Communications				Transportable DSI nodes and on-demand circuits
Software Standards Development								
Automated Forces			Enhance AF			Automated Forces	Communications, Simulated Environment	Accurate physically, behaviorally and tactically
Dynamic Environment	Upgrade CDFs		Continue R&D			Dynamic Environment	Land, Atmosphere, Sea	Accurate representation
Terrain (Dynamic & Static)	Upgrade CDFs		Enhance representation	Synthetic Battlespace		Digital Terrain		Dynamic terrain effected by weather and man
			Continue R&D					Consistent and interpretable across all DIS simulations
V&V Methodology			Fully Develop				VV&A	Individual simulators and confederations of linked simulators
Reconfigurable Simulators	Begin Development					Moduler, Reconf Sims		Reusable simulators (ACR)
Virtual/Constructive/Live Linkages						Linkage of Dissimilar Sims	Live Entity Integration	Interface classified and unclassified
Performance Measures								Automated collection/recording of simulation events
								Collect/record actions, events w/ min human action (ACR)
C4I			Enhance replication in V & C		Communications		Radio Communications	Realistic portrayal
								Bandwidth to support large number of entities, large exercises
							Strategic & Tactical Communications	
							Communications Architecture	
Instrumentation & Testing								
Instrumentation & Training								
	Establish LWTB							
	Upgrade CDFs Sim Capability							
	Common Database Dvlpment							
	OSF networked to DIS							
	Develop multi-level security						Security	Protect sensitive unclass, all level of classified
								Dual standardized databases - class, unclass
			Complete DIS PDU 2.0					
			Demo PDUs for agg/disagg					
			Maintain Cell Interface/Adapter Unit					
			Prototype Soldier Enhancements					
			Develop multicasting capability					
			Develop advanced data compression techniques					
			Continue interop test stds/procd work					
				DIS Infrastructure Equipment				
					Site Operations			
					System Engineering & mgt			
							Simulation Mgt	
							Interface	
							Electromagnetic Emissions	
							Fidelity Requirements	
							Logistics	
								Represent all phase of warfare including OOTW
								Standard model classes for cross domain use
								New sims w/ min software changes (ACR)
								Transfer maturing design and concept between sims (ACR)
								Virtual prototyping for design validation (RDA)
								Virtual factories (RDA)
								Realistic scenarios for T&E (RDA)
								Assessment of soldier-machine performance (RDA)
								Use live test telemetry for final system evaluation (RDA)
								Train multi echelon, join and/or combined (TEMO)
								Exercise all elements of battle staff (TEMO)
								Train where located (TEMO)
								Minimize support requirements (TEMO)
								Prepare for voice activation (TEMO)
								Support virtual portal to see battlefield (TEMO)
								Automated course-of-action analyzer (TEMO)
								Rapid and friendly scenario development (TEMO)
								AAR capability (TEMO)
								Rapid introduction of real situation (TEMO)
								Integrate electronically recorded real situation (TEMO)

* DIS Master Plan
** DIS Modernization Plan

Table 4. Taxonomy of M&S Master Plans

Objective 1 Develop Common Technical Framework	Objective 2 Representation of Natural Environment	Objective 3 Representation of Systems	Objective 4 Representation of Human Behavior	Objective 5 Infrastructure for Dvlpr/User Needs	Objective 6 Share Benefits of M&S
		OSD Master Plan Sub-Objectives /1			
1.1 High Level Arch 1.2 Conceptual Models of Mission Space 1.3 Data Standards	2.1 Terrain 2.2 Oceans 2.3 Atmosphere 2.4 Space		4.1 Individuals 4.2 Groups and Organizations	5.1 Field Systems 5.2 VV&A 5.3 Repositories 5.4 Communications 5.5 Coordination	6.1 Quantify Impact 6.2 Education 6.3 Dual-Use
		Army Master Plan Sub-Objectives /2			
System Services Distributed Simulation User Interfaces Data and Repositories	Terrain Dynamic Environment	Battlefield Algorithms Acquire, Move, Attrition, Arm, Fix, Supply, Service, C3 systems, OOTW, Stratagic Activities Mobilization Deployment, Redeploy Warfighting Sustainment Cost Representation	Battlefield Algorityms Reasoning Computer Generated Forces	VV&A	

1/ DoD Modeling and Simulation Master Plan, June 1994
2/ Army Modeling and Simulation Master Plan, May 1995

ID #	Taxonomy Name
1000000	Data Standards
1010000	Terrain Data Standards
1020000	Dictionary/Directory Systems
1031000	Nomenclature Standardization
1040000	Expanded DBMS for Data Providers
1050000	Reusable Models and Simulations
1060000	Common Data Repositories
2000000	Software
2010000	Reusable Software Libraries
3000000	Hardware
3010000	Aircraft Simulators
4000000	Standards and Protocols
4010000	Aggregation and Disaggregation
4020000	Architecture
4030000	Automated Forces
4040000	Behavioral Models
4050000	Communications
4060000	Dynamic Environment and Terrain
4060100	Digital Terrain
4060200	Mobility Modeling
4060300	Dynamic Environment - Natural
4060400	Dynamic Environment - Man Induced
4070000	Instrumentation and Testing
4080000	Instrumentation and Training
4090000	Logistics
4100000	Networks
4100100	Multi-Cast Network Standards
4100200	Secure Network Standards
4110000	PDUs
4110100	C4I Information
4110200	Radiation
4110300	Voice
4120000	Security
4120100	Multi-Level Security Guidelines
4130000	Training Performance Measures
4140000	Protocol Converters
4150000	Simulation Management
4160000	Software
4170000	Domain Linkage
4180000	Verification and Validation
4180100	Fidelity Requirements
4180200	Procedures
5000000	Infrastructure
5010000	Core DIS Facilities
5010100	Develop New Sites
5010200	Upgrade/Maintain Old Sites
5010201	Upgrade Simulators
5010202	Upgrade Data Bases
5010203	Update Displays
5010204	Interface OSF with DIS
5020000	Battle Labs
5020100	Develop New Sites
5020200	Upgrade/Maintain Old Sites
6000000	Simulators
6010000	Reconfigurable Simulators

Table 5. Draft DIS Baseline Taxonomy

D. Master Plan and Master Plan Annex Requirements.

Appendix C of the DIS Master Plan documents "Valid Operational Needs by Functional Area". These needs were derived from an Army-wide data call in the summer of 1993. The needs were "validated" by a users group in the fall of 1993. The Plan lists the needs in two different ways. The first shows 108 "Valid Operational Needs" administratively numbered from 1 to 189. Gaps in the numbering system indicate submissions which were rejected as not being valid. The second method expands on the first, exploding the 108 needs into 230 more detailed statements of need. The 230 needs are grouped into 7 major categories (Acquisition, Combat Developments, Operational Analysis, Research and Development, Terrain, Test and Evaluation, and Training) and 83 General Areas. This second listing also associates a fiscal quarter deliver date with most, but not all, individual needs. For purposes of later reference, the 83 unnumbered General Areas have been sequentially numbered for baseline purposes.

There are several problems which make analysis difficult for these needs:

1. In most cases, needs in the second list of 230 carry the administrative number from the first list (1 to 189) as a way to track between the lists. This referencing system is incomplete however, as all 108 administrative numbers are not accounted for in the list of 230 needs and some of the 230 needs have no reference to the administrative number.

2. A second problem in analyzing this information is that of the list of 108 needs, about 20% are nothing more than the name of a system or demonstration, i.e.; "Javelin" or "Scout Sensor ATD" and provide no information on the specific need or needs represented.

3. Still a third problem is the difference in the level of detail among the different needs. Specificity varies even among the more detailed list of 230 from the very general "Improve ALSP" to the very specific "10 centimeter (terrain) resolution".

4. Fourth, there is no prioritization among any of the needs in either list.

5. And finally, the information is now over two years old.

Another set of needs developed by the Functional Manager is presented in Appendix B to the DIS Master Plan Annex. The Master Plan Annex, which is intended to reflect significant changes in the requirements for DIS since publication of the Master Plan, specifically addresses three programs; Joint Venture and Warfighter XXI, programs which "...make extensive use of DIS technology"..., and Synthetic Theater of War - Architecture (STOW-A), described as "...an important application of DIS".

1. Represent joint/allied combined arms combat, combat support, and combat service support
2. Enable constructive entity(ies) to be coincident with and controlled by virtual simulators
3. Maintain consistency of states, events, outcomes with other simulations within STOW
4. Maintain identical environmental conditions, both natural and man-made, with other simulations
5. Connect with other simulations within STOW through the DIS standard protocols
6. Allow either player-in-the-loop or automated command and control of entities
7. As a minimum, represent a Bde and lower, with appropriate slice of higher-than-Div
8. Be portable across operating systems and hardware platforms
9. Comply with applicable joint and allied interoperabilty standards, employ DoD symbology
10. Employ and protect classified information (when necessary) depicting technologies
11. Represent capabilities, functions, and interactions using approved/accepted algorithms
12. Load and modify data bases depicting system, forces, terrain and other model parameters
13. Collect, synthesize and display simulation-driven data to enable replay and analysis
14. Rapid terrain generation capability
15. Crisis mission rehearsal capability
16. Means of transmitting selected unclassified pieces of result information from classified events
17. Improve semi-automated forces capabilities
18. Improve entity management
19. Develop division level capability (12,000 entities) + OPFOR 28K (i.e., force on force)
20. Improve V&V of simulation linkages & interactions
21. Make CBS DIS compatible
22. Develop and improve common terrain for all simulation categories (C,V,L)
23. Improve the graphic environment
24. Develop capability to aggregate to higher levels
25. De-aggregate to lower levels
26. Develop capability to compress data
27. Improve reliability
28. Upgrade STOW components

(Source: DIS Master Plan Annex, Appendix B)

Table 6. DIS Master Plan Annex STOW-A Requirements

Table 6 lists 28 requirements for STOW-A from the DIS Master Plan Annex (numbering does not reflect any intentional priority). There is some confusion about what these requirements represent. The body of the appendix (Chapter III, para E4) describes the appendix requirements in the context of DIS as "...representative WF XXI requirements for STOW-A". The introduction to the appendix uses the words "...STOW-A requirements ...for ACR domain and the TEMO domain". These two statements appear to be in conflict. Additional investigation is required.

The needs/requirements of the Master Plan and its Annex were compared and contrasted using key words. Keywords were derived from each set of requirements, then crosswalked between the two sets to infer associations between the Master Plan needs and the Annex requirements. Table 7 provides the results of keywording the requirements of the Annex. Table 8 shows the results of keywords applied to the General Categories of the Master Plan needs.

Located at Appendix 1 is an 18-page analysis which shows the implied association, or mapping, between the DIS Master Plan needs and Annex requirements based on this keyword analysis. This mapping was done at the General Category level rather than at the lower detail of the actual need.

In addition to the needs/requirements listed in appendices to the Master Plan and Annex, the body of both these documents contain significant documentation of goals, priorities, investment strategies and other DIS guidance. Pertinent guidance has been extracted from the DIS Master Plan and Master Plan Annex. Due to the length of this information, they have been included at Appendix 2 and Appendix 3, respectively. The DIS Master Plan Annex significantly adds to the guidance of the Master Plan. However, the only change of substance made to Master Plan guidance is a reordering of Master Plan priorities 6 (Develop Instrumentation for connectivity to Testing and Training) and 7 (Evolve PDU's) in the Annex and the addition of an eighth priority (Soldier Enhancements).

The DIS Modernization Plan contains a discussion of "Needed Technical Capabilities" for DIS. These capabilities represent to a limited degree, the technical solution to some of the Functional Managers requirements. The Modernization Plan also provides an assessment of the current state of the DIS infrastructure, operations and enhancements. Included in the assessment is a description of planned improvements, including (at least for part of the infrastructure), expected contributions to the DIS environment from other programs (Appendix 4). This list of improvements from other programs will be useful in comparing what is expected from various programs vs. what the program documentation states will be produced.

The results of the preliminary analysis of these requirements in terms of the FY96 program are summarized in Section V, Part 3, Program Management.

Table 7. Key Words From Master Plan Annex Stow-A Requirements

Rqmnt #	Key Words Sorted by Word
3	(linked) simulations
13	AAR
5	ALSP
6	automated c&c
7	bde & lower representation
19	capability for 28K OPFOR entities
19	capability for 40k entities
19	capability for Div level
24	capability to aggregate to higher units
26	capability to compress data
25	capability to de-aggregate to lower units
21	CBS DIS compatible
10	classified information
16	classified information transfer
2	coincident live, virtual, constructive entities
22	common terrain
3	consistent states between simulations
15	crisis mission rehearsal
1	css
5	DIS standard protocols
7	div & higher slice
2	entities
19	entities
18	entity management
4	environmental conditions
23	graphic environment
4	identical environmental conditions
27	improve reliability
9	interoperability standards
1	joint/allied
6	player-in-the-loop
8	portability across hardware
8	portable operating systems
14	rapid terrain generation
15	rehearsal
17	SAF capability
11	standard algorithms
11	standard data
11	standard methologies
9	standard symbology
11	standards
28	STOW
1	support analysis, testing , experimentation
22	terrain
1	testing
28	upgrade STOW components
12	user friendly
20	V&V

Rqmnt #	Key Words Sorted by Rqmnt #
1	support analysis, testing , experimentation
1	css
1	joint/allied
1	testing
2	coincident live, virtual, constructive entities
2	entities
3	consistent states between simulations
3	(linked) simulations
4	identical environmental conditions
4	environmental conditions
5	DIS standard protocols
5	ALSP
6	automated c&c
6	player-in-the-loop
7	bde & lower representation
7	div & higher slice
8	portability across hardware
8	portable operating systems
9	interoperability standards
9	standard symbology
10	classified information
11	standard algorithms
11	standard data
11	standard methologies
11	standards
12	user friendly
13	AAR
14	rapid terrain generation
15	crisis mission rehearsal
15	rehearsal
16	classified information transfer
17	SAF capability
18	entity management
19	capability for 40k entities
19	capability for Div level
19	capability for 28K OPFOR entities
19	entities
20	V&V
21	CBS DIS compatible
22	common terrain
22	terrain
23	graphic environment
24	capability to aggregate to higher units
25	capability to de-aggregate to lower units
26	capability to compress data
27	improve reliability
28	upgrade STOW components
28	STOW

Table 8. DIS Master Plan Valid Operational Needs Association to Key Words

Key Word	Appears in Requirement #
Terrain	8,21,42,43,45,46,59,70,179
Threat	2,3,4,5
DIS Standards & Protocols	1,9,62,65,173,79
Clock	11
Data Compression	12
DIS Architecture	13,50
Reconfigurable Simulators	14,98,99,100,102,119
SAF	15,18,73,185,186
Security	23,171,188,189
LAM	51
VV&A	54,74,187
CSS	61132
Environmental Factors	71,112,136,137,178
AAR	67172
C2	68
ADT's	139,140,141,142,143,144,145,146,147,158,149,150, 151,152,123,154,155,156,157,158,159,160,161,162, 163,164,165,167,168,170
CIG	75
SEI Support	6
DIS Testbed	10
ALSP	19
WARSIM 2000	20
CSA Seminar	52
Virtual Reality/Prototyping	53
DIS State of the Art	55
Integrate JANUS with DIS	57
JANUS Fast Movers	66
Enhanced Simulators	72
Javelin	93
Bradley Stinger Fighting Veh	94
DIS Interface to A2ATDS	97
Deep Opns Coord Cell	101
Logistics Command System	103
ARWA Initiative	107
Embed DIS in Lab Nodes	109
Integration of Eagle and SIMNET	110
Embedded Training	113
CC Manpower & Personnel Integration Lab	117
Extended Air Defense Test Bed	120
Breacher	134
Simulation of Hvy Bde Opns	184
Realistic C4I Nodes in CGS & SAF	185
Vehicle Performance Modeling and VV&A	187

E. Requirements from other Programs.

The needs and requirements found in other DIS-related programs are much more disparate than those provided by the Functional Manager. As shown in the Project Information Availability matrix at Table 2, key documentation is available for four of the first five programs scheduled for inclusion in Phase 1 - BDS-D, A2ATD, SEP and WARSIM 2000. In the case of BDS-D, A2ATD and WARSIM, the documentation may be outdated since it was all produced in 1993. STOW-A documents are dated in 1995. Efforts continue to collect more recent and more detailed information.

Regardless of the age of the information, much of the descriptive information concerning technical objectives, exit criteria and deliverables is probably still valid and is thus included in the Phase 1 report. The major difficulty with the information presented here is the general lack of specificity. The more detailed information needed will probably be found in plans and reports dealing with specific exercises and experiments.

1. Battlefield Distributed Simulation-Development (BDS-D) Advanced Technology Demonstration (ATD)

BDS-D is the Army's major technology development program in the area of Advanced Distributed Simulations. The ATD is divided into three major areas: Standards and Architecture; Battlefield Representation, and Battlefield Force. All are essential to achieving a credible, interactive, synthetic environment that will support the goals and visions of Army leadership. The purpose of BDS-D ATD is to demonstrate an accredited warfighter-in-the-loop, battalion level combined arms synthetic environment capability that will support virtual prototyping, concept formulation, requirements definition, effectiveness evaluation, and mission area analysis. The Technical Objectives of BDS-D are:

- Develop and demonstrate an open, object oriented system architecture for a distributed simulation capability that will be used to link geographically separated sites into a virtual interactive synthetic environment.

- Develop and promote Distributed Interactive Simulation Protocols and Standards in support of the system architecture.

- Demonstrate linkages of dissimilar, mixed fidelity simulators and simulations using DIS protocols and standards.

- Demonstrate an enhanced Battlefield Representation capability that: provides appropriate terrain; is sensitive to environmental and atmospheric effects; and provides appropriate visual, thermal and electromagnetic signatures.

- Demonstrate an increased capability in Force Representation by improving both crewed (man-in-the-loop) simulators and Computer Generated Forces (CGF) performance.

BDS-D deliverables are associated with fiscal year milestones. Data collection has not yet progressed to the point that these milestones can be updated or verified as complete. Deliverables from the 1993 Technical Development Plan include:

(a.) Open, Object-Oriented Architecture.

By FY94, Version 2.0 of the DIS protocols will be completed and submitted to IEEE for approval. The initial draft of Version 3.0 will be circulated for comments. The test bed for conformance testing will be upgraded as new versions of the standard are approved.

By FY95, the functionality and prototypes of the peripheral equipment required for network simulators operating in an enhanced battlefield environment will be completed. This includes the data loggers, STEALTH, Master Control Consoles, and After Action Review Capability.

By FY95, the methodology for VV&A of synthetic environments will be established.

By FY95, the technical approaches for data compression will be demonstrated.

By FY94, the functional requirements and a prototype Cell Interface Unit and Cell Adapter Unit will be completed.

(b.) Battlefield Representation.

By FY94, two terrain data bases which meet the BDS-D exit criteria with respect to size and fidelity will be completed. These data bases represent the NTC and Fort Hunter Liggett.

By FY94, establish the visual system interoperability text bed.

By FY94, demonstrate dynamic terrain.

(c.) Force Representation.

By FY95, prototype rotary wing and ground simulators based on modular, reconfigurable design principles .

By FY94, an updated version of SAFOR-ModSAF 1.0, which has been VV&A'd will be fielded.

By FY95, an enhanced version of ModSAF will be delivered which will include more battlefield operation systems (both blue and opposing forces) and battlefield conditions of day/night, adverse weather and countermeasures. Growing the SAFOR from a battalion level to a division will be demonstrated in FY97, and a Corps level SAFOR by FY00.

By FY94, establish a library of data and models for Army systems.

Table 9 depicts exit criteria which were established for BDS-D in the Technical Development Plan:

• System Architecture	
Standards & Validation	
DIS Standards	DIS Std 2.0
Validation	Validated Models & Methodology
Documentation	Complete CM Controlled Public Access
• Simulator Network	
LANs	Mixed
LAN Inter-Connect	Wide Area Network (WAN)
Fidelity	Mixed
Classification	Secret
• Battlefield Representation	
Environmental Effects	
Day/Night	Yes
Obscurants/Weather	Yes
• Terrain	
Gaming Areas	150X300 KM
Cultural Features	Selectively Changeable
Surface	Dynamic, Near Real Time
Trafficability	Operator Selectable
Fidelity	Adequate for Navigation & Maneuver
• Signatures	
Thermal	2 Levels of Background, 4 Levels of Weapon Platforms
Electromagnetic	Active Emitters
• Force Representation	
Crewed (Man-In-The-Loop) Simulators	8 Level II Simulators, Modular Design, Standard Interfaces, 80% Reconfigurable
Computer Generated (CGF) Forces	Single Operator Control, 80 Level II Platforms, Add Air Defense, Indirect Fire, and EW Platforms.

Table 9. BDS-D Exit Criteria

(2.) Anti-Armor Advanced Technical Demonstration (A2ATD).

The purpose of A2ATD is to develop and demonstrate a verified, validated and accredited DIS capability to support anti armor weapon system virtual prototyping, concept formulation, requirements definition, effectiveness evaluation, and mission area analysis on a combined arms battlefield at the Battalion Task Force or Brigade level. A2ATD will investigate the effectiveness of specific anti-armor weapons in a combined arms synthetic environment at the battalion task force or brigade level. A2ATD will focus on the V&V issues in all DIS domains.

The following are identified in the Technology Demonstration Plan as DIS attributes needed for anti-armor weapons evaluation:

- Capability to simulate all current weapon systems in a combined arms Battalion Task Force or Brigade and future anti armor weapons being developed (US and threat) in either manned simulators or SAFOR.
- High fidelity, high resolution, reconfigurable manned simulators that have been verified, validated, and accredited.
- Verified, validated and accredited SAFOR that is consistent with standard Army weapon system assessment algorithms used in constructive models and manned simulator behavior.
- Capability to evaluate the spectrum of target acquisition and smart weapon sensors (visual, IR radar, laser, and acoustic) during day and night and in a variety of weather and terrain with man made obscurants and countermeasures.
- Capability to analyze the cause of simulation outcomes.
- Capability to modify and input weapon system performance into DIS data base structures.
- Capability to link constructive models to DIS.
- Capability to conduct classified experiments up to top secret and special access.

The technical objectives of the demonstration, also found in the Technology Demonstration Plan, are designed to satisfy the needed capabilities listed above:

- Accredit simulators used in A2ATD experiments, semi-automated forces, and the BDS-D simulator.
- Develop, demonstrate, and document techniques/analytical tools to evaluate the causes of simulation outcomes.
- Demonstrate the linkage of constructive models (JANUS and EAGLE) to DIS.
- Demonstrate upgraded virtual prototypes (M1A1, M2A3, NLOS, LOSAT) and virtual prototypes to be developed (AGS, JAVELIN, Comanche, Apache).
- Leverage FY93 effort to evaluate a SAP program in DIS on a local area network to define Special Access Program (SAP)/Top Secret (TS) communication requirements on a wide area network, facilities upgrades and procedures for experiments at BDS-D facilities.

A2ATD deliverables include:

- Plans and reports documenting VV&A of simulations, ModSAF, and BDS-D for anti armor heavy force evaluations and light force evaluations.
- Implementation, documentation and demonstration of analysis tools comparable to constructive simulators in BDS-D (capable of using existing post processors) for analyzing causes of simulation outcomes.
- Definition of DIS standards (beyond 2.0) required for anti armor evaluation.
- Report defining SAP communication requirements on a wide area network, facilities upgrades required, and procedures.
- Report documenting JANUS DIS compatible SAFOR.
- Plans and reports documenting all experiments.

Exit criteria identified in the Technical Demonstration Plan are as follows:

- Demonstrate the use of DIS for anti armor weapons evaluation at the combined arms battalion task force level for heavy and light forces.
- Demonstrate constructive model (JANUS) linkage to DIS.
- Demonstrate local area network and define wide area network SAP/TS requirements.

(3.) Synthetic Theater of War - Architecture (STOW-A).

The STOW-A Draft Version 1.0 ORD (July 95) defines STOW-A as a suite of hardware and software used to link live, virtual and constructive legacy simulations, which will support prototyping for the future, study and testing of concepts and equipment, mission rehearsal and training. The ORD notes the overlap between the STOW-A ORD and ORDs for WARSIM 2000, CATT and JSIMS, noting the need to ensure that the STOW architecture of today be used as a test bed for new technologies and simulations prior to their being fielded.

The STOW Action Plan provides the following information defining the current status of STOW and the FY96-FY98 program. By the end of FY95, the STOW environment will be refined and stabilized as the STOW Baseline in USAREUR for units to conduct up to brigade level training exercises and mission rehearsals. Prairie Warrior 95 accomplished the following:

- Developed two brigade (heavy, light, SOF inclusion) functionality capability.
- Integrated BBS 3.0 into STOW-A.
- Initiated CBS to DIS linkage.
- Added new terrain data base correlation and connectivity.
- Improved current DIS network and added CONUS sites.
- Continued developing SAF/ModSAF.
- STOW-A transition almost complete.

The FY96-98 program focuses on support to the AWEs. Concurrently, the ARPA ADS program will continue the STOW development for a STOW-A environment to support Corps level training. This will also require technology not yet developed. FY96 is marked by developing STOW Baseline to execute up to brigade level training exercises and mission rehearsals for units (heavy, light, SOF inclusive) located throughout CONUS. It will include fielding to USFK. As the capability to execute division level exercises is refined, it the becomes part of the STOW-A Baseline. Incremental releases of STOW-A functionality are provided as STOW Baseline (the field) following the verification, validation and accreditation after an AWE test. Detailed capabilities are provided in the draft ORD. Capabilities and milestones are summarized in Table 10, below, and in more detail at Appendix 5.

I. Milestone 1 (No later than 1 October 1995)
- Support a Division Stow-A exercise
- Complete integration of ModSAF
- CONUS DIS network established
- Linkage to JANUS 6.0 accomplished
- STOW-E transition from USAREUR complete

II. Milestone 2 (No later than 1 April 1996)
- Corps STOW-A exercise
- Link to CBS via DIS
- Full integration of SAF/ModSAF
- Robust CONUS communications with expansion to USFK

III. Milestone 3 (No later than 1 April 1997 (STOW-A 3.0))
- Support JTF operations
- Full linkage between CBS SAF/ModSAF via DIS

IV. Milestone 4 (No later than 1 October 1997
- Supports STOW 97 (Unified Endeavor 98-1)
- Fully capable communication link between service STOW assets worldwide

V. Milestone 5 (No later than 1 January 1998 (STOW-A 4.0))
- Stable code supporting JTF operations
- Supports division AWE
- Fully tests Force XXI digitization
- Supports all three simulation domains (TEMO, ACR, RDA)

Table 10. STOW-A Capability Milestones

(4.) Warfighters' Simulation (WARSIM) 2000.

WARSIM 2000 is the Army's future training simulation for commanders and battle staffs from battalion through theater level across the continuum of operations. The ORD requires that WARSIM be DIS-compliant, capable of linking simulators such as CATT, to live instrumented vehicles and to other models and simulations, including those of other services. The key DIS capabilities required by WARSIM are:

- Standard digital terrain knowledge bases to support constructive simulations. The terrain standards must permit linking constructive simulations to high and low-fidelity simulators for ground and air vehicles.
- DIS protocols linking live and constructive simulations.
- Standards for after action reporting.
- Security standards for DIS. The DIS network must be capable of transmitting and protecting classified up to top secret, special compartmented information.

Unlike the other programs discussed to this point, WARSIM should be considered primarily as a "user" of DIS rather than a "developer."

F. Conclusions.

Although it was not possible to identify any requirements effects on the FY96 DIS program plan, a working methodology has been developed and the foundation has been made for the significant effort required under Phase 2.

It is too early in the study to draw any conclusions pertaining to FY97-03, but the analysis of additional information and data on the many DIS-related programs will play a key role in identifying, categorizing and ranking specific DIS requirements; critical information to the follow-on tasks of technology assessment and program management.

Part 2

TECHNOLOGY ASSESSMENT

A. Introduction.

Once valid DIS-related requirements have been identified and categorized (as discussed in Section V, Part 1, Requirements Analysis), they must be analyzed in comparison to the technologies required for their implementation. From this analysis must be derived a set of technology *issues*; needed technology capabilities that cannot be supported by current or near-term technology.

Once these issues have been identified and documented, they can be ranked in terms of their utility to the overall PM DIS program and leveraging opportunities may be identified. Only in this manner can an integrated and comprehensive program management and investment strategy plan be formulated (see Section V, Part 3, Program Management) that will maximize limited program funding.

B. Scope.

For Phase 1, an assessment of the capabilities currently available at the Core DIS Facilities (CDF's), a brief commentary of significant achievements accomplished at the CDF's, facility improvements completed and projected, and a listing of equipment located at each site is provided. Also discussed is a plan to delineate the technical means required to establish the ability to represent in simulation the combined arms functionality of a digitized close combat task force at the core DIS facilities. For background information, Appendix 6 contains the PM DIS Recommended MDEP RDT&E Program for FY96.

In Phase 2, this section will prescribe a strategy to replicate a battalion task force in a DIS environment at each CDF site in order to best accommodate the three DIS domains (TEMO, ACR, RDA). The section will then identify the technologies that embody or are directly linked to DIS and prioritize their applicability to meeting user requirements and associated functional capabilities. This analysis will be specifically important to the formulation of the Phase 2 Program Management Plan (see Section V, Part 3) including a DIS investment strategy for FY97-03. Also during Phase 2 we will analyze and report on the applicability and projected timeline of expected technologies that will be available to support the ongoing maturity of DIS and recommend an investment strategy.

C. Methodology.

One important characteristic of the DIS program is the sometimes tenuous connection between the functional requirements for DIS, taken as a "system", and

the technical requirements used to establish priorities for management, research and development funding by the program office. This apparent lack of coordination can be attributed to a number factors but can be best understood by taking note of the fact that DIS is not really a "system" (nor was it designed that way) and that the development of improved capability at the DIS sites has followed a technology development path rather than a traditional system development path due to the extraordinary technical challenges associated with producing realistic synthetic environments. Because of the expectations for the initial functional requirements and the lack of engineering expertise in distributed simulations that existed early in the program, it was not possible to perform the comprehensive engineering analysis necessary to produce an optimal system. Thus, the history of advanced distributed simulation development has been one of technological trial, iterative refinement, and incremental progress in improving the fidelity and scope of the synthetic environment and the breadth and number of represented systems.

The result of this ostensibly distributed approach, imposed as it was by technical limitations, is that the DIS environment appears to suffer from a lack of cohesion. In actuality, it is quite a robust capability as the numerous successful experiments executed at the core DIS facilities will bear out. Purportedly obsolete technology has been used to conduct investigations into the usefulness of digital command and control systems, improved sensors, and tactics development as well as to provide commander and staff training, support mission analysis, perform human factors investigations, and execute large-scale exercises linking constructive, virtual, and live units. In the vast majority of these cases, the ultimate customer has been well pleased with the results of the exercise and has often credited the distributed simulation with being able to provide decision support that would otherwise have been unavailable.

Engineers and developers who have worked with the technology have been concerned primarily with solving near-term problems and making the changes necessary to meet experimental deadlines. Work-arounds have been used to address these needs, but usually some improved capability has also resulted from the development effort. In addition, the lessons learned are formally captured in documentation but more importantly add informally to the basis of engineering expertise available for the next experiment. Problem statements and recommended solution approaches from these cognizant engineers form an excellent summary of the immediate needs of the DIS sites. In the near term, the best strategy for investment of scarce research and development dollars is to address the most important problems identified by the DIS domain experts. The proposed expenditures for FY96 RDT&E funds were developed in this way by polling the engineering expertise available, prioritizing their recommendations, and selecting those that could meet funding and timing constraints.

In the long term, we can now approach the DIS development and investment strategy in a new way. The experience gathered over the past few years in

simulation technology and in the conduct of experiments makes it possible today to reassess the functional requirements, determine the unique strengths that can be contributed by distributed simulation, and define an objective system (and the means required to implement it) which best satisfies those requirements at a reasonable cost. A better understanding of the nature of the infrastructure required to support experiments at the core DIS facilities, the effort involved in developing new simulator capabilities and executing changes, and the time required to set up meaningful large-scale exercises has been a natural consequence of the efforts of the last few years. The best way to put this hard-won knowledge to good use is to plan an investment strategy that results in the most capable distributed simulation system consistent with approved functional requirements and funding limitations.

To do this, we propose to delineate the technical means required to establish the ability to represent in simulation the combined arms function of a digitized battalion task force at the core DIS facilities. The task force is the smallest self-contained tactically and doctrinally significant maneuver element and represents a scale that is well-suited to the strengths of distributed simulation and technically feasible to implement. The ability to properly represent a digitized task force serves to coordinate the DIS sites with the EXFOR program and provides simulation capability to support the entire digitization of the battlefield effort within the Army. The first step in this process will be to examine the significant documentation on task force operations contained in Army FM 71-2-2 and FM 71-123 and supporting literature. Using these as a basis, we will identify the key systems and operations which must be represented to replicate task force activity on the synthetic battlefield and which are technically feasible to simulate. We then intend to examine the list of systems and operations and develop a recommended objective system including simulator types, CGF requirements, and supporting infrastructure definition.

When all the components of the objective system have been defined, we will then examine current capabilities and development work underway to identify potential shortfalls, inefficiencies, and duplicative efforts. We will choose candidate technologies which show the greatest promise in maturing into the objective system components. Finally, we will take these engineering judgments and develop a plan and schedule for growing the existing ADS capabilities into the objective system.

Our continued research will focus on identifying the current and the potential extent the STOW program is able to link live, virtual and constructive simulations in a DIS environment supporting combined arms training operations. Using technology forecasts, after action and lessons learned reports, we hope to determine and recommend the most cost effective and optimum mix of the three types simulation systems that will support combined arms operations as an experimental and prototype base system at the Core DIS Facilities.

C. CDF Update.

For foundational purposes we have provided a recent status report of Core DIS Facilities (CDF) significant events, capabilities and operations, and included inventory lists of the major equipment at each site. The CDF discussion is followed by a short commentary and conclusion.

1. Mounted Warrior Test Bed (MWTB).

In FY 95, MWTB conducted and executed fourteen (14) different experiments and exercises with various one (1) to six (6) month period of performances. Experiments ranged from the October 94 AUSA and the May 95 Ft. Knox Armor Conference to the Anti-Armor Advanced Technology Demonstration (A2ATD) and the Focused Dispatch Advance Warfighting Experiment (FD AWE). During the first quarter of FY95, the MWTB concentrated its efforts on supporting not only the October AUSA, but the U.S. Army Material Systems Analysis Activity's (AMSAA) A2ATD sub-experiments and the second phase of a Joint Services experiment called the Multi-Service Distributed Training Testbed (MDT2). This experiment was headed by Dr. Frank Moses from the Army Research Institute. This allowed the MWTB to demonstrate the ease of connecting multiple Distributed Interactive Simulation (DIS) sites into one experiment to conduct meaningful training. After finishing the A2ATD sub-experiments, the MWTB quickly transitioned and reconfigured the M1A2 (Level 2 CIG) simulators from the A2ATD experiment mode into a training mode and executed a Saudi Arabia Foreign Military Sales training delivery order called Project Sword.

MWTB began the third quarter FY 95 with support to Focused Dispatch Advanced Warfighting Experiment (FD AWE), and quickly reconfigured the entire MWTB to prepare for April's Phase 1 of FD AWE. Phase 1 was the first step in coordinating and planning a live-virtual experiment which would involve 46 different military and civilian organizations. The Fort Knox Mounted Battlespace Battle Lab (MBBL) was the primary customer responsible for the AWE. STRICOM was selected as the technical integrator for the experiment. Focus Dispatch included the Single Channel Ground and Airborne Radio System (SINCGARS) model, and interfaced prototype Digital Command and Control (C2) systems and on-simulator tactical displays to the SINCGARS model. Phase 1 of FD AWE was successfully completed during the 4-20 April time-frame. The MWTB then shifted gears to start preparing for and to conduct the Crewman's Associate Advanced Technology Demonstration (CAATD).

Finally, fourth quarter FY 95 has the MWTB continuing to prepare for the live-virtual phase of FD AWE. The Live-Virtual phase of FD AWE provided significant challenges, and identified all 46 organizations, new and additional systems required integration. This experiment required incorporating several dimensions into a battalion size battle. The whole battle was designed to

replicate certain battlefield conditions, which in turn would come together on a computerized terrain map. This final phase of Focus Dispatch demonstrated and tested a simultaneous mix of virtual and live exercises on a battalion level. In addition, it included not only live platforms, but three (3) Virtual-Reality Sites (Ft. Knox, Ft. Rucker and Ft. Bliss). The live portion of experiment was conducted at a old Muhlenberg County strip mine operated by the Kentucky Army National Guard. One (1) company of real M1 tanks and Bradley Fighting Vehicles were in the field at Greenville, KY. The remaining three (3) companies were played by both tank simulators (M1 Sims) and Modular Semi-Automated Forces (ModSAF) at Fort Knox, KY. Blue Air (Rotary Wing) helicopter simulators were played from Fort Rucker, AL and projected into the fight via the DSI network. Finally, a simulated Air Defense Platoon was played from Fort Bliss, TX and projected into the fight via the DSI network. This successful three (3) week experiment will allow the Army to continue to increase its use of computer-simulated training.

All indicators show that FY96 will be just as challenging. Currently, the MWTB is preparing to conduct several additional A2 ATD sub-experiments and OCT 95 AUSA in first Quarter FY96. In addition, second and third quarters have several interesting experiments scheduled (i.e., SKALNOTTY Phase III, AL Qurain Phase II, CAC2 Phases I & II, and Countermine CEP). The MWTB's Major Equipment List is shown in Table 11.

QUANTITY	DESCRIPTION
4	M1A2 Simulators
8	CVCC Simulators
2	M2/3 Simulators
1	LOSAT Simulator
1	STEALTH
2	Shadow Box
4	SAFOR
4	PVD
3	MCC
1	Long Haul Net
2	Dual tape data logger
1	Single tape data logger
1	Micro VAX data analysis equipment

Table 11. Major Equipment at the MWTB

2. *The Land Warrior Test Bed (LWTB).*

Upgrades completed in 1995 at the LWTB include the installation of a fiber optic LAN, DIS Stealth, full data logging capability, video data collection, and, an additional ModSAF suite. Facility improvements such an uninterruptable power supply, security accreditation, and maintenance equipment were also made. Simulation devices resident at the LWTB are the M1, M2, LOSAT, and two NLOS simulators (see Table 12). Future upgrades are planned this fall to support the growing LWTB customer base and planned experiments. Upgrades to the LWTB have been outlined in a study completed by Loral ADS which details hardware and software components required of a fully operational DIS site and the specific simulator requirements to support the dismounted battlespace. Site upgrades include expansion to a second facility to provide adequate space for new simulation devices, new DIS software, and, improvements in maintenance support.

Experiments to be conducted at the LWTB in FY96 include A2ATD, EFOG-M Virtual Prototype Experiment, AUSA Demonstration, and Prairie Warrior. In addition, activities related to supporting GEN II Soldier System ATD and the MOUT ACTD are expected to result in the development of simulation devices for individual combatants. Development of these devices and the infrastructure upgrades already complete have positioned the LWTB as a fully operational CDF capable of supporting a wide range of simulation activities. With close partnership with the Dismounted Battlespace Battle Lab and other customers the LWTB has made considerable progress towards its goal of supporting the Army's needs for simulation of the dismounted battlespace.

QUANTITY	DESCRIPTION
1	M1 Simulators
1	M2/3 Simulators
1	LOSAT Simulator
1	NLOS Simulator
1	HMMWV Simulator
1	I-Port Simulator
2	STEALTH
3	SAFOR (ModSAF, SAF-DI, and Odin)
1	PVD
1	MCC
2	Long Haul Net (Red and Black)
1	Data Logger
2	Video Tele-Conferencing Systems (PicTel)

Table 12. Major Equipment at the LWTB

3. The Aviation Test Bed (AVTB).

The AVTB will have supported a wide variety of experiments and demonstrations while simultaneously completing a major site upgrade, the integration of the Aviation Warfighting Cell (AWC). Shortly after completion of Prairie Warrior 95, the attention at the AVTB shifted to the preparations required for the installation and integration of the AWC. AWC includes the Comanche Player Station, the Longbow Player Station, and a Cell Manager. These assets are scheduled to arrive at the AVTB in early November. After installation and integration work is complete, AWC will be exercised during experiment #5 of the Anti-Armor Advanced Technology Demonstration (A2ATD). Experiment #5 is scheduled to begin on 4 December 1995 and will be the first experiment demonstrating the utility of both Comanche and Longbow simulators in a DIS environment. The AWC will provide the AVTB with DIS compliant, Level II simulators for use in future AWEs, ATDs, and other developmental efforts. During preparations for the AWC, the AVTB continued to support a variety of events. In July, AVTB efforts focused on the software/hardware integration work required to support the Focused Dispatch Advanced Warfighting Experiment. Completed in August, Focused Dispatch established critical digital communications linkages between various command and control stations and associated aviation assets. In addition, this experiment created the infrastructure for an Aviation Digitization Lab, a critical component for aviation interaction in future experiments.

Other significant AVTB activities will be the support of the Tactical High Energy Laser (THEL) Simulation and support of an experiment named Bird Dog. The THEL simulation work is scheduled to begin on October 9th. The simulation will study effects of threat tactical high energy laser on simulated friendly forces. Bird Dog will be as a series of simulation events designed to determine how unmanned aerial vehicles can and should be used by aviation commanders.

The AVTB continues to support a wide variety of training events. In support of Fort Rucker, the AVTB supports programs such as, the Aviation Officers' Basic and Advanced Courses, Warrant Officer Training Courses, and the Apache Commanders' Course. In addition to its Fort Rucker customers, the AVTB is expanding its collective training support to both active and reserve units throughout the country, and is preparing to play major supportive roles in Joint Venture exercises such as Prairie Warrior 96 and STOW and PW 97. The AVTB's Major Equipment List is shown in Table 13.

QUANTITY	DESCRIPTION
1	Long haul network
2	Local area networks
2	AppleTalk networks
8	Rotary wing aircraft (RWA) simulation devices
2	Fixed wing air (FWA) simulators
2	M1 Abrams tank simulators
2	M2/M3 Bradley Fighting Vehicle (BFV) simulators
1	Stealth vehicle with logging, playback, and VCR recording capabilities
2	Plan view displays (PVD) powered by Massachusetts Computer Corp. MASSCOMP 5600 computers
4	Semi-automatic forces (SAFOR) workstations
4	Generic air defense simulators
2	Non-line of sight (NLOS)/fiber-optic guided missile (FOG-M) simulators
2	Management command and control systems (MCC)
2	Simulation networking control consoles (SCC)
1	Close air support (CAS) Macintosh workstation
1	Fire support Macintosh workstation
1	Combat engineer Macintosh workstation
1	Administration and logistics Macintosh workstation
1	Maintenance Macintosh workstation
2	Data loggers powered by MC5600 MASSCOMP computers
8	Bolt, Beranek, and Newman (BBN) GT-111 computer image generators (CIGs)
4	BBN GT-101 CIGs
1	Micro VAX 3600 Computer for data analysis
1	Video/Audio Data Production Center
2	T1 Terrestrial Wideband Gateways
1	Encrypted Longhaul System
1	Video Teleconference System
2	56 kilobyte lines
1	PC SAS Data Output Terminal

Table 13. Major Equipment at the AVTB

D. Conclusions.

As the operational expectations and technical requirements for DIS and the synthetic environment are evolving, the challenge to remain flexible and active in our analysis and conclusions of DIS and related technologies and programs is critical. Another area of analysis we will watch closely and explore during Phase 2 will be the planned and projected impact High Level Architecture (HLA) will have on DIS technology, systems, program timelines and applications. It is hoped that the Architecture Management Group (AMG) will publish the initial set of HLA standards

and prescribe to what extent legacy (virtual and constructive) systems might be expected to conform. We will also review the worthiness and current usefulness of the second data call of operational requirements and the list of STOW requirements listed in the Master Plan Annex and make recommendations as appropriate. Specifically, we will attempt to determine whether the second data call is still accurate and sufficient to correctly identify the technical capabilities necessary to mature DIS and synthetic environment.

It is expected that during Phase 2 of the DIS Baseline Process, the release of the first DoD M&S Master Plan will be available for review to ensure current DIS programs and activities comply with DoD level guidance and supports the plan's goals and objectives. We will also evaluate STOW technologies and capabilities and identify leveraging opportunities where possible. The success of recent STOW technology demonstrations (SEP) may provide valuable insight as we attempt to identify the optimum coalition of live, virtual, and constructive systems needed to replicate the battalion task force at the CDF's. We will also describe rationale and justification for CDF modernization and expansion to include Fort Sill, Fort Bliss and Fort Leonard Wood, and the necessity to link these test bed facilities with AMC RDEC's and Battle Labs to form a sufficient synthetic environment federation to adequately represent and portray the seven Battlefield Operating Systems (BOS) and support the three DIS domains -- TEMO, RDA and ACR.

Note: IST thanks Dr. Tony Valle of LORAL ADS for his contributions to this assessment.

Part 3

PROGRAM MANAGEMENT

A. Introduction.

The final step in the Baseline methodology is dependent upon the output from the previous tasks, Requirements Analysis and Technology Assessment, to support the development of a recommended PM DIS program management and investment strategy plan. This support includes reviews and recommendations with respect to budgetary issues, and background documentation, justification and rationale supporting those recommendations. Prioritization of efforts and allocation of required funding (budgeting process) is key to DIS success.

B. Scope.

This section details the results of a review and analysis of the DIS RDT&E (R) and Procurement (P) Budget Justification Sheets (P&R Forms) for FY96 which was conducted under subcontract by TASC. The analyses were performed in two parts. Part I consisted of an assessment of the costs included in the P&R Forms to determine financial accuracy and Part II was a review of the justification documentation to assess thoroughness, completeness and consistency.

Also included are the results of an analysis of the FY96 DIS MDEP RDT&E program. It shows how and where the FY96 plan is supported by guidance, priorities and rationale from the DIS Master and Modernization Plans. In support of this analysis are two tables which should be of particular use to PM DIS in defending the FY96 MDEP. Table 20 examines the FY96 program in terms of the investment guidance of the Master Plan. Table 21 identifies the supporting rationale for the FY96 program based on guidance and priorities drawn from the Master Plan, Master Plan Annex, and Modernization Plan.

During Phase 2, IST and TASC will analyze the requirements established by TRADOC and identify alternative acquisition and supportability strategies for DIS and the technologies need to support the associated programs and projects. A technical "specification" and exit criteria will be developed for each technology necessary to continue the implementation of DIS and prepare a recommended acquisition strategy for the program. The strategy will address program management, program risk, complexity, technical risk, leveraging of opportunities and the integration of related DIS efforts. Efforts will include the development of specialized program management tools which will track and highlight DIS-related information. Life cycle cost information will be projected to assist in the

determination of funding requirements for the FY97-03 DIS program to support P&R Form preparation and investment strategy development.

C. Methodology.

One of the most important steps within the budget process is the submission of the Research, Development, Test and Evaluation (RDT&E) and Procurement Budget Justification Sheets (aka P&R Forms). These forms justify, by fiscal year, the annual budget for a program by Budget Activity and Program Element.

Given their importance, a P&R Form analysis effort was performed in two parts. Part I assessed the costs included in the P&R Forms to determine financial accuracy and Part II reviewed the justification documentation to assess thoroughness, completeness and consistency.

- FY96 DIS P&R Form Review
- Master Plan/MDEP Plan Budget Analysis
- FY96 DIS MDEP RDT&E Analysis
- Functional vs. Technical Managers' Guidance.
- Effects of Other DIS-Related Programs.

D. RDT&E (R) and Procurement (P) Budget Justification Sheets Analysis.

(a.) Part I - Financial Review

Part I includes an assessment of the PM DIS P&R Forms costs for financial accuracy. Copies of the FY96 P&R Forms are included as Appendix 7 to this document.

R-Forms:

The R-Forms for the DIS project office consist of four budget item justification sheets/budget activities. The four activities are: Demonstration and Validation (PE #0603760A-Distributive Interactive Simulations-Advanced Development), Engineering and Manufacturing Development (PE #0604715A-Non-System Training Devices-Engineering Development), Management Support (PE #0604759A-Major Test and Evaluation Investment) and Engineering and Manufacturing Development (PE #0604760A-Distributive Interactive Simulations-Engineering Development).

The following is an assessment of the costs information contained in the DIS R-Forms:

Program Element Number	Program Element Title	Project Number	FY96 Cost (K$)
0603760A	DIS-Advanced Development	DC80	$0

Table 14. DIS Advanced Development Costs

There is no funding allocated for FY96, which appears consistent with the PM DIS proposed MDEP. The Demonstration and Validation budget reflects prior year FY95 funding.

Program Element Number	Program Element Title	Project Number	FY96 Cost (K$)
0604715A	NSTD-Eng Development	DC91	$6,139

Table 15. DIS NSTD-Eng Development Costs

The cost of $6,139 that is shown on page 1 is consistent with annual funding (DC91-Distributed Interactive Simulation) shown on page 5, the Project Change Summary on page 6 and the Project Cost Breakout on page 7 of the R-Forms. The FY96 Planned Program cost on page 5 is consistent with other cost references of $6,139 and the breakout sums properly. There is insufficient backup documentation to verify the costs with the FY96 program requirements. Cost is transferred to Project Element 0604760A Distributed Interactive Simulation-Engineering Development Project DC77-Interactive Simulation in FY97. This project element more accurately reflects the efforts being performed.

Program Element Number	Program Element Title	Project Number	FY96 Cost (K$)
0604759A	Major Test & Evaluation Investment	DC55	$2,773

Table 16. DIS Major T&E Costs

The cost of $2,773 shown on page 1 is consistent with annual funding (DC55-Distributed Interactive Simulation Technology) shown on page 2, and the Project Change Summary on page 3 of the R-Forms. The FY96 Planned Program cost is consistent with other cost references of $2,773. There is insufficient backup documentation to verify the costs with the FY96 program requirements. Costs are transferred to Project Element 0604760A Distributed

Interactive Simulation-Engineering Development Project DC73-Synthetic Theater of War and DC74-Developmental Simulation Technology in FY97.

The Engineering and Manufacturing Development budget activity (FY95 & FY97-FY01) is not within the scope of this report. Costs for DC73 and DC74 are currently shown in DC55 for FY96. Cost for DC81 is currently shown in DC91 for FY96.

Program Element Number	Program Element Title	Project Number	FY96 Cost (K$)
0604760A	DIS-Engineering Development	DC73	$0
0604760A	DIS-Engineering Development	DC74	$0
0604760A	DIS-Engineering Development	DC77	$0
0604760A	DIS-Engineering Development	DC81	$0

Table 17. DIS Engineering Development Costs

Based on the above costs (PE #0604715 and PE #0604759A), the funding requirement for FY96 is $8,912K. AMC PM-DIS, Memorandum for HQ TRADOC, Subject: FY96 RDT&E Execution Plan for MDEP TBIS, dated 16 August 1995 and STRICOM TMA Program Funding Requirements for PM DIS, dated 8 August 1995 state that the RDT&E funding for FY96 is $6,912K. In FY94, STRICOM TMA approved a year of execution reprogramming of $2,000K for FY96 and budget documentation (R-Forms) will reflect this reprogramming the year of execution. When the R-Forms are submitted in April of 1996, the funding change will be reflected.

P-Forms:

The P-Form for the DIS project office consists of one budget item justification sheet/budget activity. The activity is Other Procurement: Army 3 (OPA)-Other Support Equipment (P-1 Item Nomenclature: Reconfigurable Simulators (KA6000)).

The following is an assessment of the costs information contained in the DIS P-Forms.

P-1 Item Nomenclature	P-1 Item Number	FY96 Cost (K$)
Reconfigurable Simulators	KA6000	$12,616

Table 18. DIS Reconfigurable Simulators Costs

The cost of $12.6M shown on page 1 is consistent with sum of the Cost Elements contained on page 2 (Weapon System Cost Analysis Exhibit (P-5)) for FY96. However, the Gross P-1 End Cost on page 2 (Weapon System Cost Analysis Exhibit (P-5)) for FY96 does not reflect the cost of Cost Element 3-Testing ($254,000). The hardware unit cost and quantities reflected on page 2 are consistent with the unit cost and quantities on pages 3 and 4 of Budget Procurement History and Planning Exhibit (P-5A). The total cost of Cost Element F-Reconfigurable Ground Simulator ($2,357K) does not reflect the multiplication of the unit cost ($785,000) by the quantity (3). The discrepancy ($2K) is probably due to rounding, therefore, not considered a significant problem. The FY96 cost of $12,616K is consistent with the STRICOM TMA Program Funding Requirements for PM DIS, dated 8 August 1995 and the cost information contained in Section C, Other Program Funding Summary, of the latest PM DIS R-Forms. There is insufficient backup documentation to verify the costs with the FY96 program requirements.

(b.) Part II - Justification Documentation Review

Part II includes an assessment of the PM DIS P&R Forms justification documentation to assess thoroughness, completeness and consistency.

R-Forms:

For Budget Activity Demonstration and Validation Program Element 0603760A DIS-Advanced Development, cost and justification relates to FY95 and is not within the scope of this analysis.

For Budget Activity Engineering and Manufacturing Development Program Element 0604715A Non-System Training Devices-Engineering Development Project DC91-Distributive Interactive Simulation, the following is an area of concern:

Page 5, Section A, Mission Description and Budget Item Justification, FY96 Planned Program cost of $2,434 states: "Provide system engineering, configuration management, and standard development for core DIS facilities and Battle Lab Reconfigurable Simulators." Based on current Battle Lab Reconfigurable Simulator Initiative (BLRSI) program documentation, an Early Entry Operations and Support Services module and Ground Vehicle module

are being developed in FY96 for operations/testing at the Operational Support Facility in Orlando, Florida during FY97. This supports the R-Form documentation for this Program Element. However, Page 7, Section A, Project Cost Breakout of $2,434 for FY96 states: "Develop module definition for Soldier Combat Service Support and early entry SIMS." If the module definition for Soldier Combat Service Support and early entry SIMS relates to the system engineering, configuration management and standard development efforts, this should be referenced on page 5 within the FY96 Planned Program information. If there is no relationship, there is inconsistency in the rationale.

For Budget Activity Management Support Program Element 0604759A Major Test and Evaluation Investment Project DC55-Distributed Development Simulation Tech, documentation and justification appear to be appropriate.

For Budget Activity Engineering and Manufacturing Development Program Element 0604760A Distributive Interactive Simulations-Engineering Development Project DC73-Synthetic Theater of War, Project DC74-Developmental Simulation Technology, DC77-Interactive Simulation, DC81-Reconfigurable Simulator Engineering Development, cost and justification relates to FY95 and FY97-FY01 and is not within the scope of this report.

P-Forms:

For Budget Activity Other Procurement: Army 3 (OPA)-Other Support Equipment (P-1 Item Nomenclature: Reconfigurable Simulators (KA6000)), documentation and justification appear to be appropriate.

E. Master Plan/MDEP Plan Budget Analysis

A comparison of the DIS Master Plan guidance vs the Functional Manager's and PM DIS Technical Manager's plans was performed to determine the degree to which the Technical Manager's plan was divergent.

The following four investment categories were utilized for this analysis:

- Research to expand DIS technological capabilities,
- Maintenance and sustainment of the Army's current DIS assets,
- Controlled procurement of hardware and software and applied research toward user's functional requirements and
- Enhancements to the synthetic environment and product improvements programs for existing programs.

Table 19 compares the Master Plan guidance for near term investment strategy with the recommended investment plans of the Functional Manager and Technical Manager as a percentage of each investment category.

Investment Strategy Categories	Master Plan Guidance	Functional Manager Plan	Technical Manager Plan
Research to Expand Tech Capabilities	30%	14%	14%
Maintain & Sustain Current DIS Assets	25%	38%	38%
Functional Requirements	30%	40%	40%
Enhance/PIPs to Synthetic Environment	15%	7%	8%

Table 19. FY96 MDEP Plan vs. Master Plan Near Term Investment Strategy

Table 19 clearly shows that both funding programs are substantially below the recommended investment for research to expand technical capabilities (16% below guidance) and for enhancements/PIPs to synthetic environment (-7 and -8%). Conversely, both programs were significantly above the target for maintenance and sustainment of current DIS assets (+13%) and for functional requirements (+10%).

Table 20 provides a more detailed examination of the same information by disaggregating the four investment categories into the following eight separate elements of the recommended RDT&E program:

- Architecture and Standards
- VV&A
- IPT Support to ModSAF
- BLRSI
- DIS Operations
- Reconfigurable Simulators
- DIS Enhancements
- Soldier Enhancements

The variation between the programs and guidance shown is primarily caused by changes to the structure of the funding program for DIS from previous years. When the investment strategy was developed, all DIS MDEP funding was RDT&E. In FY95, the program was realigned to reflect funding in OMA, OPA and RDT&E. Also in FY95 and FY96, the DIS infrastructure was significantly underfunded, primarily in RDT&E and OPA. The allocation of OMA (which represents the fixed costs captured in the Maintenance and Sustainment category) remained fairly constant, while the RDT&E funding was programatically reduced. Thus, even as the

OMA funding remained fairly constant, the OMA percentage of the total MDEP increased significantly. The RDT&E reductions caused similar a percentage increase in the category Functional Requirements which generally relates to OPA funding.

The four categories used for the investment strategy are very closely aligned with appropriations. Maintenance and Sustainment is primarily OMA, Functional Requirements aligns with OPA, and the two categories of Research and Enhancements generally share RDT&E funds. Given this close relationship between categories and appropriations (which are often targeted for specific budget action), strategic investment guidance should be provided for each of the four categories *separately* rather than in aggregate. This would avoid skewed data when appropriation-specific reductions are made.

Table 21 provides yet another viewpoint by contrasting the Technical Manager's FY96 DIS MDEP RDT&E program to the guidance detailed in the DIS Master Plan, Master Plan Annex, and Modernization Plan. It lists the valid need(s) each element addresses from the Master Plan and the Master Plan Annex. Further, the table associates each element with the infrastructure funding requirements of the Master Plan Annex, the Modernization Plan core MDEP funding guidance, and with other supporting statements from the body of the Master Plan.

The immediate conclusion which may be derived from the analysis of the information in these tables is that while the Technical Manager's and Functional Manager's plans are nearly identical, they both vary greatly from the original *guidance* provided in the DIS Master Plan when broken down to the four basic investment categories. However, upon closer examination as depicted in Table 21, it is found that the Technical Manager's plan closely adheres to and supports the *intended* investment strategies, needs and requirements of the Master Plan, Master Plan Annex, and Modernization Plan, if not their specific funding prioritization.

For further background information on FY96 funding, Apppendix 6 contains the recommended "FY96 RDT&E Funding Plan and Justification for Upgrades at the CDF's" which is especially pertinent to the Phase 1 effort of the Baseline Study.

Table 20. FY 96 MDEP Plan vs. Master Plan Near Term Investment Strategy

Investment Strategy Categories	Investment Strategy 2/	MDEP Baseline Program	RDA$	OPA$	OMA$	Total$	Functional Manager Plan Program	RDA$	OPA$	OMA$	Total$	Technical Manager Plan Program	RDA$	OPA$	OMA$	Total$
Research to Expand Tech Capabilities	**30%**					**13%**					**14%**					**14%**
Systems Architecture		Arch & Stds	0.240			0.240		0.240			0.240	DMSO/ARPA HLA	1.170			1.170
Standardization																
V&V		VV&A	1.290			1.290	VV&A	1.830			1.830	VV&A	0.850			0.850
Environmental Attributes																
Force Representation		IPT Spt MODSAF	0.420			0.420	IPT Spt to MODSA	0.420			0.420	IPT Spt to MODSAF	0.420			0.420
		BLRSI	2.079			2.079	BLRSI	2.079			2.079	BLRSI	2.079			2.079
Maint & Sustain Current DIS Assets	**25%**					**38%**					**38%**					**38%**
DIS Operations					12.100	12.100	DIS Operations			12.100	12.100				12.100	12.100
Functional Requirements	**30%**					**40%**					**40%**					**40%**
Hardware/Software Procurement/ User Functional Requirements		Reconfigurable Sims		12.600		12.600	Reconfigurable Sims		12.600		12.600	Reconfigurable Sims		12.600		12.600
Enhance/PIPs to Synthetic Environment	**15%**					**9%**					**7%**					**8%**
		DIS Enhancements	0.841			0.841	DIS Enhancement	0.841			0.841	DIS Enhancements	0.861			0.861
		Soldier Enhancement	2.042			2.042	Soldier Enhancem	1.500			1.500	Soldier Enhancemen (21 CLW and SINCGARS Rehost)	1.530			1.530
		Totals	**6.912**	**12.600**	**12.100**	**31.612**		**6.910**	**12.600**	**12.100**	**31.610**		**6.910**	**12.600**	**12.100**	**31.610**

1/ Master Plan Near Term dates (FY94-95) slipped two years (to FY96-97) per Master Plan Annex
2/ Master Plan Chapter IV, Para B 2, Page IV-2

Table 21. FY96 MDEP RDTE Technical Manager's Plan vs. Master Plan and Modernization Plan Annex Guidance

Documented Needs/Requirements

R&D Program	$M	Master Plan Valid Needs 1/	Master Plan Appendix C 2/	Master Plan Annex (STOW Rqmts) /3	Master Plan Annex Infrastructure Funding Reqmts Section VI, Para D2	Mod Plan Needed Cap Sect 3, Para 4	Mod Plan Core MDEP Funding Sect 5, Para 6b	Master Plan Other Supporting Statements
BLRSI	2.079	14,98,99,100,102	6,9,74			Para c(1)(a)		
IPT Spt to MODSAF	0.420	15,18,73,185,186	3,23,76,83	17		Para b(2),b(3)(c)_2		
SINGARS Rehost	0.705	68	54	6	b(Upgrade)	Para b(2),b(3)(c)_1	Para (1)	
Land Warrior C3I	0.825	55,167,168	65	6	c(Enhancements)	Para b(3)(a)_5	Para (1)	
DIS Tools	0.635	55,172	34,79	14	c(Enhancements)	Para b(1)(d)	Para (1)	
ATM Impacts	0.226	109	54	5,6,21	b(Upgrade)	Para b(2),b(3)(c)_1	Para (6)	
DMSO/ARPA Arch	1.170	55		4,5,12,15,23		Para b(3)(a)	Para (1)	Primary Objective Pg I-2
VV&A	0.850	54,74	30,75	20		Para b(3)(a)_1	Para (2)	
	6.910							

1/ Master Plan Valid Needs

#14 Reconfig Ground Vehicle
#15 MODSAF
#18 SAF Dismounted Infantry
#54 VV&A of DIS
#55 Advance the State of the Art in DIS
#68 Support Analysis of Bde/Bn C2
#72 Enhance Simulators
#73 Improved MODSAF
#74 DIS VV&A Methodology
#98 Reconfig Fire Tm Spt Vehicle
#99 Reconfig Artillery Cannon Simulator
#100 Reconfig Artillery Missile Simulator
#102 Reconfig Artillery Resupply Vehicle Simulator
#109 Embed DIS in Army Labs
#167 21CLW TLD
#168 Generation II Soldier ATD
#172 Standards for AAR
#185 Realistic C4I in CGF, SAF
#186 CS & CSS in SAF

2/ Master Plan Appendix C List (Numbered sequentially)

#3 Automated Forces
#6 Reconfigurable Simulators
#9 Reconfigurable Simulators
#23 Automated Forces
#34 Automated data collection from training
#54 Hardware (Upgrade simulators)
#65 Communications(Various, C3I simulators, Integrate communications,etc.)
#74 Simulators(Reconfigure with minimum changes)
#76 Automated Forces
#79 AAR(DIS compliant AAR systems to support training events)
#83 Enhancements

3/ Master Plan Annex (DIS Requirements for STOW)

#4 Maintain identical environments
#5 Link simulations via DIS protocols
#6 Interface w/ operational C4I, Realistic C4I systems
#12 Standards for algoritymns, data, methodologies
#14 Collect, synthesize, display simulation-driven decisions, events, outcomes and input/output data to enable replay, analysis and understanding of simulated operations and its cause and effect relationships.
#15 Rapid terrain generation
#17 Share unclassifed data between classified and unclassified enents
#20 Develop division level (12K entities) plus OPFOR 28K
#21 Improve V&V of simulation linkages and interactions.
#23 Develop common terrain for C,V, L

F. Conclusions.

Based on the P&R Form analyses performed, costs and justifications are reasonably consistent with the overall PM DIS MDEP for FY96. Since detailed backup documentation was not available, however, potential funding shortfalls or inconsistencies could not be identified.

For Budget Activity Engineering and Manufacturing Development Program Element 0604715A Non-System Training Devices-Engineering Development Project DC91-Distributive Interactive Simulation, there appears to be an inconsistency in the rationale between Page 5, Section A, "Mission Description and Budget Item Justification, FY96 Planned Program cost of $2,434" and Page 7, Section A, "Project Cost Breakout of $2,434 for FY96."

Conclusions drawn from the analysis of the Master Plan guidance vs. Functional and Technical Managers' plans indicate the Functional and Technical Manager programs are virtually identical when aggregated to the level of the four categories used for the investment strategy but both programs differ significantly from the Master Plan *guidance* in each of the categories. However, a more detailed analysis reveals that The Technical Manager's plan adheres to and supports the *intended* investment strategies, needs and requirements of the Master Plan, Master Plan Annex, and Modernization Plan, if not their specific funding prioritization.

Changes to the structure of DIS MDEP funding (from exclusively RDT&E to a combination of OMA, OPA and RDT&E) coupled with appropriation specific MDEP funding reductions have negated the effectiveness of existing program-wide strategic investment guidance. A more useful form of investment guidance would address each appropriation or investment category separately.

VI. CONCLUSIONS

As demonstrated in this document, the Phase 1 DIS Baseline Study provides additional justification and rationale for the year-of-execution FY96 DIS program budget. Through multiple analyses of existing guidance and plans, it also provides some insight into the DIS funding plan, speculates on certain programmatic problem areas, and offers suggestions for improvement. Particular points of interest include:

- Costs included in the FY96 P&R Forms appear to be financially accurate and sufficiently complete to support the DIS Modernization Program. However, there is insufficient rationale and backup documentation to verify the costs with the FY96 Reconfigurable Simulators program requirements and minor inconsistencies appear to exist in the justification documentation of P&R Forms.

- The Functional and Technical Manager programs are virtually identical when aggregated to the level of the four categories used for the investment strategy but differ significantly from the *guidance* provided for each category. Even so, a more detailed analysis of the FY96 DIS MDEP RDT&E program indicates that it adheres to and supports the *intended* investment strategies, needs and requirements of the DIS Master Plan, Master Plan Annex, and Modernization Plan, if not their specific funding prioritization.

- Changes to the structure of DIS MDEP funding (from exclusively RDT&E to a combination of OMA, OPA and RDT&E categories) coupled with appropriation specific MDEP funding reductions have largely negated the effectiveness of existing program-wide strategic investment guidance.

- Potential funding cuts make it imperative that an overall program strategy also include appropriation specific investment strategies for each investment category. An investment strategy coupled directly to these individual categories should be considerably more useful to PM DIS as it would support both planned and unforeseen adjustments more appropriate to the individual programs.

Phase 2 of the DIS Baseline Study will be largely comprised of a detailed evaluation of user requirements and the technologies needed to support them. The major product upon the conclusion of Phase 2 will be support for the PM DIS as recommendations in the development of an integrated and comprehensive DIS Management and Investment Strategy Plan for FY97-03.

The tasks and sub-tasks involved for Phase 2 are obviously substantial and involve some element of risk in information gathering and budgetary forecasting. However, the early results of research and analyses obtained through the preliminary Phase 1 effort are encouraging and indicative of the potential long-term importance of this task to PM DIS.

APPENDICES

APPENDIX 1

Association Between DIS Master Plan Valid Operational Needs and Master Plan Annex Requirements

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
Acquisition	1	Environmental Enhancements	- weather (sleet, snow, rain, etc.); obscurants (smoke, fog, etc.): (93,94)	4
	2	Terrain	- high fidelity level II(93,94)	14,22
	3	Automated Forces	- a realistic AF that represents behaviorally and physically like a close combat system (93,94)	17,18
	4	DIS Protocols to Support TAMDS	- to provide the necessary DIS standards and protocols necessary to implement interpretability between live, virtual and constructive TAMD simulations (79)	2,3,5,9,11
			- expand the protocols to include specific message types and info needed for exchange of TAMD real time C2	5
			- a need to evolve simulation protocols to permit the interface and interoperability of dissimilar simulations: live, virtual, constructive.	5
			- convert interfaces between live, constructive and virtual simulations	
			- a tactical data link translator which allows CADEX to communicate via tactical data protocols on tactical communications networks	
			- embed simulation in tactical operations center	
			- methodology for verifying timing synchronization of message traffic	
Combat Developments	5	Advanced Field Artillery Tactica	- develop a DIS protocol converter between the DIS network and AFATDS (97)	
	6	Reconfigurable Simulators	- an easily modified, physically and software wise, reconfigurable Fire Support Team Vehicle (98)	
			- an easily modified, physically and software wise, reconfigurable Artillery Cannon simulator that simulates the Paladin or the Advanced Field Artillery System (99)	

1/ DIS Master Plan Appendix C, Pages c-3 to c-24 consecutively numbered.

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
2/ DIS Master Plan Annex Appendix B				
			- an easily modified, physically and software wise, reconfigurable Artillery Missile Simulator that simulates MLRS, ATACMS, or HIMARS (100)	
			- an easily modified, physically and software wise, reconfigurable Artillery Resupply Vehicle simulator for the FARV A, FAASV, and HEMTT (102)	
	7	Automated Deep Operations Coordination Cell for Corps and Echelons above Corps	- a JSTARS ground station simulator (101)	2,3,6
			#NAME?	
			- interfaces between different combinations of live, virtual and constructive simulations.	
			- collecting and analyzing human machine performance data interface/ protocol converters between and for TIBS, UAV RVT, FDDM, and AFATD	
			- capability to run real time with a switchable man in the loop/simulator in the loop/stand alone capability	
	8	Logistics	- develop and establish realistic logistics play in the synthetic environment (103)	1
			- develop and provide the interface CSSCS linkage to DIS	
	9	Reconfigurable Simulators	- an easily modified, physically and software wise, reconfigurable Advanced Rotary Wing Aircraft simulator that simulates FAST, RAH-66, AH-64, Longbow and OH-58D Kiowa (107)	17
			- a visual system module	
			- ability to use SAFOR or MODSAF for real-time or faster than real-time analysis	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
	10	Embedding of DIS into Army	- convert both Knox and Rucker from SIMNET to DIS 2.0+ protocols (109)	28
	11	Integrate Eagle with BDS-D Simulators	- develop methodologies and processes for integrating a constructive aggregated model with a virtual distributed simulator (55)	3
			- develop and test a set of protocols for use in variable resolution models that link the constructive and virtual domains.	
			- a very high resolution soldier-system performance of reconnaissance information gathering and C2 tasks as input to the Corps level battlefield modeling capabilities of Eagle (110)	
	12	Integration of Dynamic Atmospheric Thermal Environments into DIS	- provide atmospheric thermal conditions for the synthetic environment to allow soldiers to train and fight with FLIER, IR and NVG using the same developmental algorithm (112)	4
	13	Embedded Training	- capability to replicate threat radar, infrared, ultraviolet, laser systems(113)	
	14	C2 Manprint	- a synthetic capability to simulate an operationally and synergistically effective tactical operations center for the aviation brigade, battalion and separate company (117)	
	15	DIS Compliance	- Provide the interface to make Patrior and THAAD simulators DIS compliant (119)	
	1	Extended Air Defense Testbed	- requisite software to enable the EADTB to become DIS compliant (120)	4,5,9,11,22
			- a synthetic environment that is object-oriented, data-driven, open-ended, symmetric and interactive, that allows anti-tactical ballistic missile defense operations, satellite-ground and air-based sensors, land-based and sea-based air operations, explicit, adaptive C3I, atmospheric and terrain phenomena.	
	17	Combat Service Support	- provide capability to simulate ammunition supply, missile system	1

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			maintenance, eod and TMDE support. (132)	
			- interface with Standard Army Ammunition System, impose controlled supply rates, exercise automated Class V architecture, determine ammunition transportation requirements.	
			- simulate number of unexploded ordnance incidents requiring support, number of requests for EOD support, how often are area denial munitions encountered	
			- simulate TMDE support, type of supported weapon system, diagnostic time, repair time. reliability of TMDE	
	18	Engineer Operations	- capability to simulate in the synthetic environment engineers breaching natural obstacles (streams, dry gaps, tree falls), simple obstacles (wire, craters, berms, abatis, minefields) and complex obstacles (any combination of simple and natural) (134)	4
	19	Dynamic Terrain	- capability to simulate in the synthetic environment natural obstacles (streams, dry gaps, tree falls), simple obstacles (wire, craters, berms, abatis, minefields) and complex obstacles (any combination of simple and natural) (134)	4,11,14,22
	20	Smoke	- develop smoke PDUs for the synthetic environment (136)	4
			- ensure all types of smoke are represented	4
	21	NBC	- develop NBC PDU's for The synthetic environment (137)	4
			- ensure accurate portrayal of weapons of mass destruction	4
	22	Communication Networks	- local area networks that provide a minimum of 8,000 entities (objects, vehicles, aircraft, etc.) per demonstrated exercise (184)	
	23	Automated Forces	- a realistic Command, Control, Communication, Computer and Intelligence	1,17

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			AF(185)	
			- AF elements that are responsive to digital messaging systems covering the BOSS with emphasis on IVIS, AFATAOS, and ATHS	
			- must adequately portray the CSS vehicles and equipment; requirement to perform key functional capabilities on the battlefield interactively with other AF or manned simulators (186)	
	24	Security	-a security site survey to certify the simulation system and its components to determine current limitations and future design criteria to facilitate classified operations (188)	10,16
	25	Simultaneous Exercises	-capability to conduct multiple simultaneous classified, unclassified, or combination of each exercise without security compromise (189)	10,16
Operations Analysis	26	One Meter Terrain	- provide object-oriented, near-reality database and 3d view perspective (59	14,22
			- a more realistic representation of terrain features viewed in their actual location	
			- increased target identification	
	27	CSS AE2CAP	- initial condition computerized data templates for input of CSS data during the warfight setup phase (61)	1,13
			- interactive DIS send/receive capability for responding to warfight dynamics (changes in combat and combat support state variables) with CSS responses (changes in CSS state variables)	
			- automated collection of simulation events (warfight environmental conditions, CSS requirements and response transactions) for post-processing analysis	
	28	Database Library of 3D Standa	- develop a database library of standard icons to represent terrain features	4,5,9,11,22

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
		Feature Icons	that support a single real world view in a DIS environment (62) - focus on terrain features that affect movement, concealment, intervisibility	
	29	Icons for Standard Nomenclatu Database	- provide a point and click graphic user interface to present weapon system data map unit symbols, and standardized icons of systems visually represented in models and simulations (65)	4,5,9,11,22
	30	VV&A	- develop, test, and document the DIS integrated verification process to include network traffic system integrally, simulation compatibility, new protocols, certification methods for data consistency among simulators/simulations, and an evaluation of the effectiveness and completeness of the process (54) - develop, test, and document the DIS integrated verification process for the intended use - recommend accreditation procedures for large scale, joint, distributed applications - complete VV&A implementation guide	4,5,9,11,20,22
	31	Integrate JANUS into DIS	- complete, more adequate quantification of human target acquisition (57) - results will enhance the surveillance and target acquisition algorithms - provide the groundwork for automated forces	8,17
	32	Integrate Eagle with BDS-D Simulators	- develop methodologies and processes for integration a constructive aggregated model with a virtual distributed simulator (55) - develop and test a set of protocols for use in variable resolution models that link the constructive and virtual domains	2,3,8,24,25

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
	33 Integrate JANUS with Eagle	- provides the basis for a smooth transition from the aggregate to disaggregate to virtual simulators (58) - provides the interface that makes the output from JANUS and EAGLE output to DIS and vice versa	3,24,25
	34 Automated Data Collection fro Training Exercises	- provide the capability to automatically collect, analyze, and assess performance data from the individual soldier through brigade level (67) - ability to capture data, down load it into a simulation, and repeat the simulation in real time or faster than real time - ability to isolate variables of choice for data collection and analysis	13
	35 Analysis of Bde/Bn C2	- a processor that receives the combat state information and translates the vectors into information depending on the echelon to receive the information and the issues being addressed. This processor would capture trigger decisions (68) - a decision processor that uses the info output to the combat state information translator and produces orders for implantation by lower units - a processor that could receive the orders and take action - a feed-back mechanism that captures cause and effect relationships between execution and closure	7,13
	36 JANUS Fast Movers	- provide analysis and summary of investigation/research of seamless integration of JANUS with virtual fixed wing simulation (66) - provide a realistic portrayal of fixed and rotary wing aircraft characteristics for the JANUS model and semi-automated forces	13,17
	37 General Headquarters	- a Title 10 laboratory (equivalent of a CTC) (50)	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			- integrate and represent the peacetime/wartime mobilization, deployment, and warfighting procedures/actions	
			- develop a game plan for implementation above	
	38	LAM Strategic Preparedness & Force Readiness Analysis	- develop an army model that allows strategic preparedness and force readiness analysis to be modeled (51)	13,15
			- interfaces with real world hardware, real world databases (class & unclassifed), modular design, item system resolution, individuals manned or unmanned, HO staff represented at functional level as separate actors, individual staff functions either manned or unmanned, voice, message, digital communication, real time or faster speeds, cause and effect analysis capability, telescoping to allow closer examination of units, user friendly AAR that is quick, fully automated data collection on either real or simulated actors, automated data reduction into standard statistical forms	
	39	Seminar System for CSA	- develop and build a battlefield combat seminar trainer (52)	
			- capability for HQDA and CSA to run or see the results and effects of TRANSCOM, FORSCOM, and AMC models and simulations	
	40	Virtual Reality/Virtual Prototypin	-develop a virtual reality capability that allows modeling the system and subsystems engineering and physical science characteristics; views the system and subsystem in 3d; move inside the system for soldier suitability; conduct human factors assessments; perform engineer and developmental type tests; investigate the ram, sustainment and logistics issues; integrate virtual reality (engineering science level of detail) for CD and soldier in the loop evaluations (53)	5,6
	41	Temperature	- variance between -25 to +125 degrees F (1139-170)	4
	42	Signatures	- acquistic signatures and propagation, seismic signatures and propagation (1139-170)	4

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
	43 Visual Spectrum	- 4 inch cell or better (155)	
	44 Weather	- dynamic, high fidelity weather including temperature and wind speed vs. altitude profiles (162,165)	4
		- battlefield condition: wind velocity as a function of time (162,156)	
	45 Environment	- dynamic, holes created by explosive charges with update rates on the order of seconds (162,165)	4
Research & Development	46 Scenario Development	- company combined arms exercise (139)	4,7
		- battalion level, armed recon/light attack (140)	
		- various lighting conditions (bright sunlight to moonless night) (139-170)	
		- different types of illumination (natural and man-made) (139-170)	
		- HRS 24,25.1,27,29,30,31,33,37,38,41 & 42 (139-170)	
		- US Bde vs. Rebel Militia Co. & Mech. Inf. Bn (143,154,156,157)	
		- Joint Task Force/Corps level and below; threat post 1997 (148)	
	47 Environment	- synthetic environment should simulate sleet, snow, hall, rain, fog (139-170)	4
		- capability to simulate affect soldiers by fatigue, heal stress, panic and load (139-170	
		- simulate dismounted soldiers(157,160,161,167,168,169,170)	
		- capability to simulate target interrogation through MMW	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			IFF/CID (158)	
	48	Security	- operate at a secret level security classification	10,16
			- capability of running various combinations of classified and unclassified exercises (139-170)	
	49	Entities	- item to Corps level (139,170)	19
	50	Terrain	- desert, northern forest (139-170) arctic, tropical (145,161,165)	11,14,22
			- figh clutter (trees, rocks, clouds), man-made cultural features (roads buildings, fences, powerlines, antennas) vehicle hulks (139,170)	
			- 1 meter postings (140,155,159,164)	
			- desert, mouintain, urban, jungle (139,170)	
			- 30 meter posting (143)	
			- .25 meter post spacing (145)	
			- high fidelity in S1000 or compatible format with MODSAF, 20 X 20 KM BOX,400 polygons/sq km, IR textures of at least 12 bit precision (149)	
			- level 2 terrain for Ft Hood and SWA (150)	
			- 10 meter posting (154,156,157,158,166-170)	
			- .25 meter postings(160)	
			- 10 centimeter resolution (162)	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
	51 Atmospheres	- FLIR, TV, MILLIMETER WAVE (139-170)	4
		- capability to simulate a full spectrum of visual, IR, radar, and noise signatures (39,170)	
	52 Artificial Light	- flares, muzzle flash, burning vehicles, explosions, fires, missile exhaust, sodium and mercury lights (145,158,159,160)	4
	53 OPFOR	- threat systems that can move, shoot and communicate, survive and be tactically employed (140)	19
		- Chinese, Iraq, Iran (145)	
		- post 2005 side & top attack smart mine (151)	
	54 Hardware	- upgrade all simulators, CIG, SAFOR, and terrain databases al Knox and Rucker to a level II. fidelity (141,150)	8,27,28
		- DSI connectivity at Benning (150)	
		- DSI connectivity at U.S. Army Combined Arms Support Command, U.S. Army TEC, CECOM, U.S. Army WES (152,153)	
	55 Air Drop Operations	- capability to conduct airdrop operations in a DIS environment (143)	
	56 Intelligence	- capability to simulate a ground processing station capable of receiving, storing, processing,, correlating, and reporting/displaying, in Near Real Time, Radar, IMINT, SIGINT, and HUMINT obtained from multiple sensors and processors (144)	
	57 Viewpoint	- capability to detect incoming targets with a 90 degree azimuth field of view (147)	
	58 Clock	- capability of running real-lime or faster than real-time with no noticeable transport delays (139)	4

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			- ability to update the synthetic environment 5 times per second (147)	
			- 24 hour day environment (159,160	
			- realistic real time video representation of the .6-.9 micron spectral band of the intensifier(1 69)	
	59	Automated Forces	- need capability to model T80, T72, T64A, BMP 1 & 2, M1, M2, LOSAT, friendly enemy artillery, and dismounted infantry (149)	17
	60	Security	- a security site survey to certify the simulation system and its various components to determine current limitations and future design criteria to facilitate classified operations (188)	10,16
	61	Simultaneous Exercises	- capability to conduct multiple simultaneous classified, unclassified, or combination of each exercise without security compromise (189)	2,10,16
	62	PDU's	- development and approval for PDUs that include IEW sensor emissions (communication & non-communications), signal, obscurants, and common ground station entity (144)	17
			- develop MODSAF 2.0 (150)	
	63	Mines	- capability to simulate over 2000 different combinations of conventional and scatter anti-tank, smart, anti-personnel, and non-conventional devices consisting of booby traps, homemade mines, and similar devices (146,151)	4
			- capability to simulate mine detection equipment to include the sensor interaction, radar, IR, magnetic; the aural and visual output; display within display; helmet mounted display; mine/minefield marking and GPS connection for digital input of minefield boundaries; false positive as well as false negative	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
		targets; variability of accuracy with soil and weather; detection of Tripwires (146,151)	
	64 Obscurants	- should accurately simulate all types of obscurants, smoke and dust (139-170)	4
		- 1-14K visibility, 50-80% /km IR transmission (140)	
		- level 2 obscurants (139 - 170)	
	65 Communications	- should simulate air/ground communications and data links (139,140)	
		- electronic warfare (140,148)	
		- a suite of diverse sensors that provides real-time intelligence in the cockpit for mounted forces (141)	
		- a single, cohesive & survivable battlefield system which will allow the transmission of C2 on the move, including voice, data, digital and video imagery (142,153)	
		- capability to simulate wireless communications systems and network protocols for various types of communication modes (142)	
		- capability to simulate the effects of thruput vs delay, bit-error-rate, and comm impairments due to multpath fading and frequency selective fading (142,153)	
		- capability to simulate battle damage assessment (148)	
		- capability to conduct intelligence correlation and analysis (148)	
		- capability to integrate live and actual sensors, weapons, processors, and communications with simulations and simulators (-148,151)	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			- DIS network must provide digital C3 in the form of CVCC through SINGARS simulators or directly over the network (149)	
			- capability to simulate real time voice, multi-resolution video and high resolution imagery, and integrated services over mobile and satellite comm systems (153)	
			- voice and digital comm systems up to 10 kms (139-170)	
			- capability to simulate a Bde TOC, Bn, Co. and Plt TOCs (166)	
			- capability to rapidly change communications media, protocols, net structure and routing algorithms(166)	
			- all entities for CLW/GEN II should have GPS/Digital compasses and maps for navigation(167)	
Terrain	66	Environmental Effects	- DIS environment that supports the use of MMW radar, laser range finders, and 2nd GEN FLIRS (178)	4,11,22
			- radiation hazards from active sensors	
			- capability to communicate through Army standard radios	
			- be able to send and receive voice and digital data	
			- communicate ground-to-ground, ground-to-air, and air-to-ground	
			- common terrain databases (NTC, JRTC, CMTC)	
	67	NATO Reference Mobility Mod	- mobility specific terrain (179)	22
	68	Standard Digital Terrain Datab	- a set of standards for terrain databases to support constructive simulations (42)	22

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
	69 Dynamic Electronic Battlefield Terrain Data	- Upgrade TAFSM to access, use, and effect this terrain (43)	11,14,22
		- develop standard DIS protocol data units	
		- ability to send dynamic updates via DIS as TAFSM events effect the terrain (craters, destroyed terrain features, etc.	
	70 Theater and National Missile Defense	- data from distributed sensors and simulators at high bandwidths must be synchronized for data fusion (45)	
	71 Dynamic Environmental and Terrain Modeling	- environmental effects include atmospheric and smoke clouds, dust atmospheric and aerosol fogs, fire, smoke, explosions, and haze (46)	
		- dynamic terrain includes tank ditches, bomb craters, building/structural alterations, and ability to modify terrain/vegitation	
Test & Evaluation	72 Terrain	- exact replication of existing terrain (photographic quality)(70)	14,22
		- terrain resolution where elevations are averaged closer than 125 meters	
		- 3D foliage and buildings -more realistic effects or cross-country traveling on vehicle speeds	
		- ability to dig-in positions (dynamic terrain)	
		- terrain databases larger than ranges of direct fire weapons	
	73 Environmental Factors	- varying light levels (day, night, dusk, dawn, etc..) (71)	4
		- weather conditions like dust, haze, fog, rain, and snow	
		- electro communication jamming for both blue and red forces	
		- smoke on the battlefield,	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
		- representation of laser effects	
	74 Simulators	- simulators that closely represent actual vehicle performance characteristics(72)	
		- must exactly replicate hardware functions and crew interactions like an actual system	
		- reconfigurable with minimal changes to software or hardware.	
		- vehicle simulators must respond to changes in soil type/cone index and gradients	
		- vehicle movement sensation platform.	
		- development of high fidelity simulators for air defense, indirect fire, engineers, sensor system, countermeasure devices, and threat	
	75 VV&A	- methodology for V&V of simulators, including man-machine interface and computational algorithms (74)	17,20
		- AF, to include interaction with manned simulators, man-in-the loop simulator perception of AF, correct algorithms	
	76 Automated Forces	- same performance methodologies as manned simulators (73)	11,17,23
		- intelligence for CIG routines that allows AF to move and react as individual entities	
		- development of pre-certified rules of engagement, tactics, doctrinal responses accessed by AF controlled during battle	
		- capability for fratricide -methodology that allows AF to more closely replicate vehicle dynamics	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	#	General Area	Master Plan Operational Need	Requirement # /2
			- computer image graphics that replicates the profile and coloring of the actual vehicle/system	
			- increased number of AF operators	
			- evaluation of proper mix of AF to manned simulator	
	77	CIG Hardware	- improved to much greater than 48 vehicles and/or battlefield activities (mirror actual battefield activity)(75) .	
Training	89	Security	- DIS standards and PDUs to support multi level security requirements of training exercises (171)	10,16
			- Support use of classified data in virtual training systems	
	79	AAR	- DIS compliant MR systems to support training events involving live, virtual and constructive simulations (172)	13
	80	Linkages	- Integrate constructive and live simulations into the DIS operational environment through development of PDU standards (173,177)	2,21
			- Link BBS/SIMNET	
			- Link JANUS with DIS	
			- Improve ALSP -Link constructive simulations to instrumented ranges	
			- Correlate heterogeneous simulators.	
	81	Terrain	- Standards for terrain databases to support constructive simulations, compatible with data produced by Digital Terrain Support System(DTSS)	11,14,22
			- Develop rapidly reconfigurable databases for DIS	

Appendix 1. Association Between DIS Master Plan Valid Operational and Master Plan Annex Requirements 1/

Categories	# General Area	Master Plan Operational Need	Requirement # /2
	82 Standards	- DIS Version 2 and 3 to support CCTT	4,5,9,11
		- Provide DIS capability to integrate Deployment/Redeployment Simulations	
		- Include NBC data as part of DIS standard data	
	83 Enhancements	- DTAD Level 1 and Level 2 Terrain Resolution	All
		- Dynamic Terrain	
		- Standard Databases	
		- Integrate threat simulations	
		- Real Time data filtering/compression on WAN	
		- SAFOR/MODSAF development	
		- Virtual Reality \Virtual Prototyping	
		- Complete Weather Conditions	
		- AFATDS interface to DIS	
		- Develop user friendly stealth display	
		- Integrate virtual reality systems into DIS	
		- Support preclusion gunnery capabilities in CATT	
		- Portray instrumented range (CMTC) scenarios In a constructive simulation (JANUS)	
		- Portray maintenance activities In DIS	

APPENDIX 2

DIS Master Plan
Statements of Requirements and Priorities

Appendix 2

DIS Master Plan, Statements of Requirements and Priorities

Listed below are extracts of guidance and priority information from the DIS functional manager's priorities, as identified in the DIS Master Plan (Sep 94). The information shown below also integrates changes to the Master Plan guidance made by the DIS Master Plan Annex (Jun 95).

1. "The *primary objective* of the DIS program is to establish an architecture with appropriate standards to permit the linkage of different simulation environments into a seamless, nearly virtual-like world." "*Another primary objective* is...to reduce operations and sustainment costs (due to technology improvement and efficiencies learned over time) while expanding DIS growth in the long-term." (pg I-2 Master Plan)

2. "The *ultimate goal* is to field a credible DIS capability that efficiently supports the functional requirements of the three domains. The *number one priority* is to converge Army simulations into a common architecture which readily permits robust connectivity and fully integrated functionality among live, virtual, and constructive simulations without the need for significant interfacing software." (IV-4 Master Plan and VI-1 Annex)

3. "The *following requirements must be pursued in order of priority...*"(IV-4 Master Plan). {Chap VI (Realigned DIS Priorities), Master Plan Annex, pg VI-2, reverses 6 and 7 below, added number 8, and changes the lead-in from "requirements" to "enabling investments in functional requirements".}

a. Common Simulation Architecture

b. Establish a Terrain Std and Library of Compliant Terrain Databases

c. Embed Battle Command and C4I

d. Develop Dynamic Environmental Effects

e Achieve Credibility Through VV&A and Stds for Data and Modeling

f. Develop Instrumentation for Connectivity to Testing and Training

g. Evolve the PDUs

h. Soldier Enhancements (added - Master Plan Annex)

4. "There is a *paramount requirement* to represent the dismounted soldier within the synthetic environment." Major enhancements enable individual soldier operations to be depicted within constructive simulations; but there is no viable capability to depict the soldier in virtual simulations, and little is being done to link live soldiers from the field into DIS. The mounted virtual capability must be complemented by the dismounted virtual capability. (IV-7 Master Plan)

5. "There is a *paramount requirement* to enhance the combat functionality of fire support within the synthetic environment." Within the near-term, Ft Sill should be resourced with a developmental simulator. (IV-7 Master Plan)

6. Following is a breakout of priorities for the near term (FY94-95), mid term (FY96-01) and long term (FY02-03), along with a recommended investment strategy assuming an *unconstrained* budget. Category percentages are intended only to convey a general trend: (IV-1 to IV-4 Master Plan) {**NOTE**: Chap VI, Master Plan Annex, states "The cumulative effect of insufficient near-term infrastructure funding will cause the mid-term investment strategy to slip minimally two years to the right." "Actual funding levels for the near-term (FY94-95) failed to meet the "minimal growth" threshold ($8-10M/yr). Consequently, critical infrastructure capital investments have been deferred and the development and building of the synthetic environment seriously delayed. The near-term $25M unfinanced requirements will prohibit adding additional Army CDFs during the mid-term."}

a. "The *priority of effort for the near term* (FY94-95) should focus on increasing the M&S capability of battle command, dismounted infantry, engineers, logistics support and intelligence within the synthetic environment. Major R&D of standard PDUs and linkages are required. Increasing the representation of "realistic" communications is important." (IV-1). Near Term investment strategy: R&D to expand tech capabilities to include system architecture (open systems, C4I structures), standardization (nomenclatures, icons, terrain, communication protocols, physical algorithms and cognitive processes), V&V (for individual systems and the network as a whole), environmental attributes (CIGs, terrain features, weather and obscurants), and force representations (crewed simulators, reconfigurable sims, and AF) - 30%. Maintenance and sustainment of current DIS assets - 25%; Functional requirements (controlled procurement of HW/SW and applied research) - 30%, Enhancements and PIPs - 15%.

b. "...continued maturity of technology advances remains a high priority of effort. Major efforts within the mid-term (FY96-01) must focus on continuing to evolve battle comand, dismounted infantry, engineer, logistics support and intelligence M&S capability. The *priority of effort* is air defense, field artillery, and increasing the representation of "realistic" communications." Mid Term investment strategy: R&D - 20%, Functional requirements - 30%, Enhancements and PIPs - 15%, Maintenance and sustainment - 35%.

c. "...long term efforts (FY02-03) are characterized by converging categories... leading into a common shared seamless environment, operating with standardized PDUs, HW/SW, and DIS compliant simulation platforms. Increasing the representation of "realistic" communications continues to be a high priority." Long Term investment strategy: Maintenance and sustainment - 40%, Enhancements and PIPs - 25%, Functional requirements - 20%, R&D - 15%.

7. Based upon more realistic funding expectations, the DIS core efforts are prioritized in terms of sustainment (minimum support for the Core DIS Facilities (CDF) [AVTB, MWTB, LWTB, and OSF]- lights, overhead, etc), upgrades (improvements to equipment on hand), enhancements (development or procurement of new capabilities), and expansion (adding new facilities and capabilities). The "Achieving Competitive Edge" funding level ($40M - FY94, $40.2M -FY95) was believed to be the "must maintain at all costs" funding level in view of the mission of DoD technical lead for DIS (IV-5/6 Master Plan). That proposed funding level was expected to cover operations and communications at the CDF, V&V, scheduling support, CIG upgrades, two transportable nodes, a reconfigurable ground simulator capability, and initial development of data collection capabilities. (Pgs IV-6 thru IV-12 Master Plan provide a more detailed execution plan for the CDF for the near, mid, and long term. This includes CDF expansion.)

8. "...the *objective end state*, in terms of functional capabilities, is described by ...tenets and elements". "These elements are used to ...evaluate functional requirement submissions for resource considerations while ensuring the Army's highest ROI. (III-2 to III-7 Master Plan)

a. "The objective DIS environment will have the following *elements in common* (across all three domains)... in no order of priority":

1). Ability to represent all phases of warfare (crisis action, mob, deployment, campaign, redeployment, demob) and the entire spectrum of conflict to include OOTW.

2). A VV&A'd simulation environment for individual simulations and confederations of linked simulations.

3). Automated forces that are perceived to be accurate physically, behaviorally, and tactically.

4). Realistic portrayal of C4I.

5). Accurate representation of environmental effects, natural and man-made, day/night light conditions, smoke and obscurants, and weather. Includes dynamic terrain affected by weather and man. Terrain databases must be consistent and interoperable across all DIS compliant simulations.

6). System must protect sensitive unclassified and all levels of classified and proprietary processes and data.

7). Ability to interface classified simulations with unclassified simulations without compromise.

8). Must provide dual standardized databases - classified and unclassified.

9). Provide and maintain a library of standard approved data, nomenclatures, icons, algorithms, software, and terrain databases.

10). Should provide a system of automated collection/recording of simulation events.

11). Should provide transportable DSI nodes and on-demand circuits.

12). Should have sufficient communications network bandwidth to support large number of entities and large scale exercises.

13). Standard model classes must be developed for use across domains

b. Within the ACR community, DIS offers the progressive and iterative use of simulations for experimentation which will facilitate reduced acquisition times for materiel systems and early introduction of warfighting capabilities to the field. DIS will provide the following capabilities within the ACR domain:

1). Ability to introduce new simulations into the synthetic environment with minimum software changes, to include the individual soldier as a virtual simulation entity.

2). Reusable simulators that can be reconfigured at low cost.

3). Ability to collect and record actions, reactions, and events generated by humans with minimum interference by observers and controllers.

4). For new system concepts, early access by the user at home stations.

5). Ability to transfer maturing system concept and design among simulations and simulators.

c. Within the RDA community, DIS will provide operational testers the environment to conduct tests and evaluations more quickly which will assist in reaching the RDA goal of reduced costs, production of better products, and reduction of the acquisition life cycle by at least one third. DIS will provide the following RDA capabilities:

1). First three are same as para 4b1,2, and 3 above. The test community may require a higher fidelity for reconfigurable simulators than that required by the ACR community.

2). Ability to evaluate development, design, validation, production, and sustainment of weapons systems life cycle through virtual prototyping.

3). Ability for early examination of manufacturing issues (virtual factories) through virtual prototyping.

4). Creation of realistic scenarios in the synthetic battlefield to improve the T&E planning process.

5). Assessment of soldier-machine performance through interaction of increased levels of friendly and threat forces.

6). Ability to transform telemetry data from live test to post test virtual simulations to permit sensitivity analysis for final system evaluation.

d. Within the TEMO domain, DIS will provide the following capabilities in pursuit of the goal to integrate seamless maneuver, gunnery, staff and leader training in a combined arms and joint environment to assist in producing trained and ready units:

1). Simultaneously train multi-echelon, joint and/or combined forces.

2). Must exercise all elements of the battle staff as part of leader development.

3). Train wherever located - home station, field, on-the-move.

4). Ability to operate with the tactical C2 system workstations.

5). Must minimize support requirements (workstation and OPFOR controllers & observers) needed for simulated exercises.

6). Technologies must be prepared to allow voice activation should weapons platforms employ such in the future.

7). Should support virtual portal to "see the battlefield" in constructive simulations ao commanders can train as they will fight.

8). Must have an automated course-of-action analyzer that can run real time or faster and is on-line before, during, and after the exercise.

9). DIS environment must have the capability for rapid and user friendly scenario development.

10). Must have an AAR capability which automatically synchronizes multimedia; instantaneous feedback/replay upon demand to capture all "critical" events; and can be customized to meet user defined needs.

11). For military operations aspects, must permit rapid introduction of a real situation (joint, combined, or multi-national) into the synthetic environment to support the planning process.

12). Must be able to evaluate operational plans and courses of action wherever the staff is located.

13). Must be able to integrate an electronically recorded real operation into the synthetic environment.

APPENDIX 3

DIS Master Plan Annex,
Statements of Requirements and Priorities

Appendix 3

DIS Master Plan Annex, Statements of Requirements and Priorities

Chapter II, Force XXI Joint Venture

IIE2 Examples of DIS technologies developed by STOW

a. Provide the capability to take original ideas on equipment improvement and expand them (in the synthetic environment) by experimenting to find the best piece of equipment. Experiment with equipment in tactical scenarios. Return the equipment to the synthetic environment for final refinements. Develop an entity containing the final refinements and send it back into the synthetic environment for additional experimentation. Send the equipment to a virtual factory for experimentation on the manufacturing process, cost and capability related purchase alternatives.

b. Provide the capability to prototype and experiment with new force structures having different types of capabilities in virtual and constructive simulations. Experiment with this prototype unit throughout the continuum of war at the tactical and operational level.

c. Capability for a virtual factory to identify components in old equipment that still possess value for futuristic equipment.

IIF4 BDS-D and A2ATD provide the key technologies necessary for development of the Army's DIS synthetic environment including a verified, validated and accredited object oriented architecture and DoD/Industry promulgated standards and protocol.

They focus on developing a DIS electronic battlefield capability from combatant to theater echelon level.

The technology synchronously links geographically separated sites into a combined arms battlefield.

It enables constructive, virtual and/or live simulations to be networked together based on the need, experiment or activity.

The key technologies are high speed parallel and distributed computations, computer networking protocols and standards to link dissimilar simulations and simulators, computer graphics and animation, semi-automated forces, object oriented simulations architectures and standards, automated intelligent modeling and tools, local networks, wide area networks and long haul technologies.

IIF5 The Integrated Unit Simulation System (IUSS) platoon level combat model provides an automated environment for the analysis of soldier system equipment. IUSS combines heat stress, soldier load, ballistic and chemical models with environmental, geographic, and rules of engagement data in a force on force simulation. (It) provides human posture, and appearance and fire/detonation PDU's.

IIF7 Examples of ATD/ACTDs critical technologies and supporting M&S that are available for incorporation into DIS include:

Robotics
Composition materials
Smart Structures
microelectronics
sensor fusion
multi-domain sensor detectors
nanotechnology
micro-electromechanical technology
advanced propulsion and fuzzy logic guidance and control
simple means of data compression
satellite-based communications and sensing on platform
sensor and data fusion
advanced wireless communications
advanced light weight large screen hi fidelity and flat panel displays
multi-functional digital radios
advanced distributed simulation for virtual prototyping of large scale complex C4I systems and architectures
integrated product and process development for reduced development cycle time, affordability and high reliability.

IIG4 .. the functional requirement (for FBCB2) includes:

automatic position location reporting
color digital map graphics and hasty map products
graphic displays of location of radio nets members
enemy position location
automated logistics and operational status reports
templates for digital reports
requests and information storage and recall

IIG6 CAC2 ATD will develop an information architecture that will demonstrate shared situation awareness with Battlefield Combat Identification System for brigade and below.

CAC2 will provide C3 functional upgrades for the DIS synthetic environment. It will then use DIS to validate the functional requirements which results from the CAC2 front end analysis jointly conducted by CECOM and TRADOC subject matter experts.

By FY1996, Army Materiel Systems Analysis Agency will develop and demonstrate a validated, verified and accredited DIS capability to assess and evaluate anti-armor weapon system effectiveness in a combined arms synthetic environment at the battalion task force or brigade level.

BDS-D will demonstrate the capability to create a validated, multi-spectral, multiple use combined arms synthetic battlefield using wide area networking to link and synchronize simulation capability and semi-automated forces at multiple, geographically separated sites.

BDS-D will demonstrate the tools to link simulations with simulators and initiate development of tools to link field exercises with simulations and semi-automated network management.

....(DIL or ATCCS?) requires that the legacy systems have the capability to operate over AIN or DSI, or that high fidelity simulators and simulations be available to provide a clear picture of the impact of a horizontally and vertically integrated digital information network.

IIG10 Development of the following C4I capabilities that comply with the Army technical architecture in STOW is critical.

Integrate live C4I systems with constructive virtual simulations

Realistically represent the dynamic communications network structures envisioned.

Have the capacity to support the flow of digital communications needed to provide situational awareness.

Chapter III Warfighter XXI

Play all BOS to support evaluations of horizontal and vertical integration.

Play force sizes up to Corps level

Account for the environmental effects on C4I operations.

Have computer generated forces that generate realistic levels of communications on the tactical internet.

The ability to link C4I and Warfighter simulations and simulations of other services and allies to provide Theater-level to foxhole assessment of digitization.

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IIIE3 Examples of capabilities WFXXI expects from the synthetic environment (STOW) include the following

Provide the capability to participate in interactive Joint Mission Force Package rehearsals from distant locations with Army force packages ranging in size from team to Corps and applying to all contingencies.

Provide the capability to conduct real-time collective training at home station and CTC's with active component and reserve component Army force packages up to Corps level forces.

Furnish the commander the tools necessary to conduct a formal after actions review of the training event.

APPENDIX 4

DIS Modernization Plan
Technology Assessment

Appendix 4. DIS Modernization Plan Technology Assessment

Needed Technical Capability 1/

- Infrastructure
  - Establish LWTB
  - Begin Reconfig Sim Dvlpmnt
  - Upgrade CDF
    - Battlespace visualization
    - Terrain databases
    - Simulation capabilities
    - Security
  - Upgrade CDF AAR
  - DIS Common Database dvlpmnt
  - OSF networded to DIS
  - Develop multi-level security capability

- Operations

- Enhancements
  - Architecture
    - Fully develop DIS VV&A methodology and policy
    - Complete DIS PDU 2.0
    - Demo standard PDU's for aggregation/disaggregation
    - Maintain configuration of Cell Interface and Cell Adapter Units
    - Prototype soldier enhancements
    - Develop multicasting capabilities
    - Develop advanced data compression techniques
    - Continue work on interoperability tests stds and procedures
  - Battlefield
    - Enhance terrain representation
    - Continue R&D into dynamic terrain, virtual reality, dynamic environment
  - Battleforce
    - Enhance C4I replication in virtual and constructive
    - Enhance automated forces

Current Technical Capability 2/

	Assessment	Planned Improvements
Infrastructure		
Synthetic Battlespace Representation	Red	
CDF's	Red	A2, BDS-D, LOS, NLOS upgrading M1A2s, LOSAT and NLOS at NWTB and LWTB Armored Gun and Javelin sims being developed by PMs. CAC2, BDS-D, A2 developing realistic commo models in support of DOTBF. Terrain databases being developed in SIF Avn Warfighting Cell being developed by Avn PEO for fielding as independent cell at AWTB to support A2 with Level 2, DIS compliant sims. Includes Apache Longbow and Comanche simulators. AF enhancements ongoing based on STOW and BDS-D requirements MWTB and AVTB sims to be upgraded over next three years.
Battle Labs	Amber	Reconfigurable simulators program will help, when funded.
RDECs	Red	Existing or planned simulators to support weapon system design - M2A3/M3A3, Paladin, Bradley with Stingers, and Comanche-like
Test Sites	Red	
CTCs	Red	STOW developing links between live, virtual and constructive sims
DIS Infrastructure Equipment	Amber	
CDFs	Amber	A2 funding LAN upgrade at MWTB, Stealth enhancement at MWTB
Battle Labs	Amber	
RDECs	Red	
Test Sites	Red	
CTCs	Red	
Wide Area Network Communications	Amber	
CDFs	Amber	
Battle Labs	Amber	
RDECs	Amber	
Test Sites	N/A	
CTCs	N/A	

	Assessment	Planned Improvements
Operations		
Site Operations	Red	
System Engineering & Management	Red	To Green in mid term based on programs in place.
Communications	Green	
Enhancements		
Architecture		
Open Object Oriented Architectur	Amber	PDU standards being worked
Architecture and V&V		
Linkage of Dissimilar Simulators	Amber	
Battlefield		
Digital Terrain	Amber	
Dynamic Environment	Red	DMSO funding research
Battleforce		
Modular, Reconfigurabale Sims	Red	
Automated Forces	Amber	CCTT adding weapons system capability JPS linking Eagle with MODSAF

1/ Section 3, Para 4
2/ Section 4, Para 5

APPENDIX 5

STOW-A Developmental Matrix

Appendix 5. STOW-A Developmental Matrix

Phase 0 Baseline Present Capability (STOW-E)	Phase 1 Baseline Near-Term Capability (STOW 1.0)	Pase 2 Baseline Mid-Term Capability (STOW-1.2-2.0)	Phase 3 Baseline Far-Term Capability (STOW 3.0-4.0)
Mission Scope	**Mission Scope**	**Mission Scope**	**Mission Scope**
TEMO USAREUR\CONUS	TEMO USAREUR\CONUS	TEMO ACR CONUS\OCONUS	TEMO ACR RDA JOINT (JTF) CONUS\OCONUS
Baseline Entity Count	**Baseline Entity Count**	**Baseline Entity Count**	**Baseline Entity Count**
5,000 Brigade Capability	5,000 Brigade Capability	10,000\50,000 Division\Corps Capability	Corps Capability
Protocols	**Protocols**	**Protocols**	**Protocols**
DIS protocol draft std. 2.0.3	DIS protocol draft std. 2.0.3	DIS 1278.1-1994	DIS 1278.1 ?
Simulations	**Simulations**	**Simulations**	**Simulations**
Constructive-BBS 2.3.2@CMT	Const.-BBS 3.0@NSC,CMTC CBS (Manual Interface)	Const.-BBS 3.0@NSC,CMTC Janus 6.0 CBS (Feasibility)	Const.-BBS ?@NSC,CMTC Janus 6.0 CBS (Feasibility)
Virtual-Simnet@GTA,AVTB	Virtual-Simnet@MWTB,GTA, AVT,ModSAF 1.2	Virtual-Simnet@MWTB,GTA, AVTB,LWTB, ModSAF 1.3	Virtual-Simnet@MWTB,GTA, AVTB,LWTB ModSAF 2.?
Live-CMTC-IS	Live-CMTC-IS	Live-CMTC-IS	Live-CMTC-IS,NTC?,WSMR?
Interfaces	**Interfaces**	**Interfaces**	**Interfaces**
BBS-DIS:AIU,SIMCOM SIMNET-DIS: ATU AVTB-DIS:CAU CMTC-IS-DIS:BODAS	BBS-DIS:AIU,SIMCOM(new) SIMNET-DIS: ATU AVTB-DIS:CAU CMTC-IS-DIS:BODAS(new)	BBS-DIS:?IU via ModSAF Janus-DIS SIMNET-DIS:CAU CMTC-IS-DIS:BODAS(next gn	BBS-DIS:?IU via ModSAF Janus-DIS CBS-DIS: ? SIMNET-DIS:CAU CMTC-IS-DIS:BODAS(nxt gn)

Appendix 5. STOW-A Developmental Matrix

Network Infrastructure	Network Infrastructure	Network Infrastructure	Network Infrastructure
LAN: CMTC-GTA;5 T1s WAN: DSI Phase 1	LAN: CMTC-GTA;5 T1s WAN: DSI Phase 1	? WAN: DSI Phase 1	? ?
AAR\Analysis Capability	**AAR\Analysis Capability**	**AAR\Analysis Capability**	**AAR\Analysis Capability**
BODAS	BODAS(updated)	BODAS(updated)	?
Semi-Automated Forces	**Semi-Automated Forces**	**Semi-Automated Forces**	**Semi-Automated Forces**
SAF 4.3.3	SAF 4.3.3(const. instantiation) ModSAF 1.2(sd-alone v. sim)	ModSAF	ModSAF
Terrain Databases	**Terrain Databases**	**Terrain Databases**	**Terrain Databases**
STOW-E 0105: Grafenfels	STOW-E 0105: Grafenfels Korean Database?	STOW-E 0105: Grafenfels Korean Database? Others?	STOW-E 0105: Grafenfels Korean Database? Others?
Baseline Validation Exer.	**Baseline Validation Exer.**	**Baseline Validation Exer.**	**Baseline Validation Exer.**
Atlantic Res. 94 STOW-E 94	Prairie Warrior 95 USAREUR Brigade Training	2AD Division Exercise Prairie Warrior 96 (April 96) TF XXI AWE USAREUR Brigade Training	Prairie Warrior 97 (April 97) STOW 97 (UE 98-1 Oct 97) DIV XXI AWE (1 Jan 98) USAREUR Brigade Training
	Dissem & Feedback	**Dissem & Feedback**	**Dissem & Feedback**
	Gateway Distributed Srch &Retrieval Interactive Access AAR Requirements	Gateway Distributed Srch &Retrieval Interactive Access AAR Requirements Multimedia Comms	Gateway Distributed Srch &Retrieval Interactive Access AAR Requirements Multi-level security
	Additional Requirements	**Additional Requirements**	**Additional Requirements**
	STOW-E bsline Corrections	Stable Code Sppt BDE OPS Fielding priorities: 1-CMTC, 2-Ft. Hood 3-NTC, 4-JRTC 5-Ft. Brag, 6-Korea	Stable Code Sppt DIV OPS Stable Code Sppt JFT OPS Fully tests Force XXI Digitiz.

Appendix 5. STOW-A Developmental Matrix

	Other Considerations	Other Considerations	Other Considerations
	Standardization of interfaces	Standardization of interfaces	Standardization of interfaces
	Logistics	Logistics	Logistics
	VV&A Requirements	VV&A Requirements	VV&A Requirements
	DIS Standards Development	DIS Standards Development	DIS Standards Development
	DIS Test Tools	DIS Test Tools	DIS Test Tools
			T&E Requirements

APPENDIX 6

PM DIS Recommended MDEP RDT&E Program for FY96

APPENDIX 6

PM DIS Recommended MDEP RDTE Program for FY96

Element 1. BLRSI. Per PM DIS letter of 16 August 1995, BLRSI is #1 priority of FY96 for PM DIS. Recommended FY 96 funding $2.079M.

Element 2. Integrated Product Team (IPT) Support to MODSAF. Recommended FY 96 funding $0.420M.

Element 3. Soldier Enhancements. Recommended FY 96 funding $1.530. Specific programs are:

SINCGARS Rehost

Description. The current SINCGARS simulation is an accurate, detailed model (using the code developed by MITRE for CECOM), but it runs on host computers which are more powerful and hence more costly than are really necessary. Rehosting the SINCGARS code to a less expensive UNIX platform would not only allow the system to be used in a wider variety of experiments due to reduced cost, it would also allow the code to be reorganized into a more modular form making it more flexible.

Justification. The SINCGARS is a critical component in the representation of command and control systems within the battalion task force. A widely available, low-cost, accurate SINCGARS simulation would increase the fidelity of exercises which must represent radio communications, and would increase commonality across experiments. It would also allow the simulation to be easily modified to provide appropriate levels of fidelity to better meet the requirements of a particular experiment. This is a valid requirement listed in the Master Plan number 54, and as a needed capability in the Mod Plan Section 3, Para (2),(3)(c)_1.

21st Century Land Warrior (21CLW) C3I Simulation

Description. Command and control equipment to support the next generation foot soldier is envisioned as providing him with capabilities analogous to those currently available in vehicle systems like IVIS. In addition to a sophisticated radio with the ability to operate on multiple networks, a situational awareness display and the ability to transmit digital imagery will give the individual soldier the same degree of participation in the digital battlefield now enjoyed by vehicles. In order to support the development of doctrine and tactics that properly use this new capability, it is necessary to develop a simulation of its effects on a combined arms battlefield.

Justification. A simulation of the 21CLW C3I system within the BDS-D sites is the only means available to investigate the effects of next generation infantry on the combined arms battlefield. Investment in this simulation will support advances in the ability to simulate effectiveness not only for the infantry, but for special forces and police as well. It will bring the capabilities to represent heavy and light forces more into line and will provide a stepping stone towards the eventual development of a fully-immersive virtual environment for the individual combatant. This is a valid requirement listed in the Master Plan number 65 at Appendix C 2, p C18; and in the STOW Annex, number 6; and as a needed capability in the Mod Plan, Section 3, Para (3)(a)_5.

Element 4. DIS Enhancements. Recommended FY 96 funding $0.861M. Specific program are:

DIS Tools

Description. A number of different and incompatible tool sets to support DIS experiments have been developed over the last few years. Typically, these tool sets were developed under slightly different requirements to satisfy different user communities. An effort to consolidate these tools and develop them into robust, practical, and maintainable systems would provide enhanced capabilities at the CDF sites and help transition work done under Tech Base into Delivery Order (DO) experiments.

Justification. An exercise is only as useful as the data it produces and the decisions it supports. Getting the maximum value out of an exercise requires support tools in the form of stealths, plan-view displays, loggers, radio stealths, and after-action review suites. A "productized" collection of such tools is an investment with significant return in the form of improved data gathering and analysis capability. In addition tools designed to operate together and sharing a common data / knowledge base would result in a powerful synergy and add to the ability to support complex experiments at the CDFs. This is also called for as a valid requirement listed in the Master Plan number 55 [Advancing the State of the Art in DIS] and 172 [Standards for After Action Review systems] and number 34, p. C-11 and 79, p. C-23; and in the STOW Annex, number 14; and as a needed capability listed in the Mod Plan, Section 3, at Para (1)(d).

ATM Transition Impacts

Description. The decision has already been made to upgrade the Defense Systems Internet (DSI) to support Asynchronous Transfer Mode (ATM) on the backbone in 1996 and on the tail circuits in 1997. The increased bandwidth and traffic

control capabilities of ATM will be a welcome addition, but the real strength in this technology lies in its ability, using cell switching technology, to form a "virtual local-area network (LAN)" over a wide-area network (WAN). This strength is nullified, however, if the simulators and other devices on the local-area network do not support ATM themselves (in that case, a gateway acts as a translator between the LAN and WAN and the advantages of cell switching are lost). Upgrading the simulators and DIS tools to support ATM will involve not only hardware, but also entail significant changes to networking software and to algorithms currently used to optimize performance in an Internet Protocol/User Datagram Protocol (IP/UDP) environment. A research program is needed to assess the impacts of this change in the DSI network, estimate the transition costs and to make recommendations to permit the CDFs to smoothly transition to take advantage of the new capabilities in ATM. The investigation would use an isolated ATM LAN at the Orlando Support Facility (OSF) and an ATM router to simulate WAN connectivity.

Justification. This is a true research effort since the impact of the transition to ATM on the DSI has not been performed. This effort is essential if the CDFs are to leverage off of the investments currently being made by the Defense Modeling and Simulation Office (DMSO) in upgrading the DSI network. This is a development which is taking advantage of the current networking state-of-the-art and may add significant capabilities in the range of experiments that can be performed using the DSI. This is a valid requirement listed in the Master Plan number 109 and at Appendix C, number 54, p. c16; and in the STOW Annex, number 5,6, and 21; and as a needed capability listed in the Mod Plan Section 3, Para (2),(3)(c)_1.

Element 5. Architecture and Standards. Recommended FY 96 funding $1.170 for DMSO/ARPA High-Level Architecture Prototype.

Description. The High Level Architecture (HLA) currently under development by DMSO and Advanced Research Projects Agency (ARPA) represents a complimentary approach to heterogeneous simulator interoperability. It focuses on the development of an architecture for the simulator infrastructure and simulation management subsystems, rather than on the simulator internals. The Battlefield Distributed Simulation - Developmental (BDS-D) architecture developed under the Advanced Distributed Simulation Technology program (ADST) (with extensions from Dynamic Virtual Worlds and other efforts) can be modified and enhanced to support the HLA framework structure. This will ensure DIS compatibility with the greater M&S community and will also create M&S synergy through feedback to the HLA group.

Justification. Using the HLA as a basis for improving the simulator infrastructure at the CDFs will maximize the leverage and benefit of that program while simultaneously improving the sites capabilities to support advanced simulation concepts such as dynamic terrain and environments. This is a valid requirement listed in the Master Plan number 55; and in the STOW Annex, numbers, 4,5,12,15, and 23; and as a needed capability in the Mod Plan Section 3, Para (3)(a).

Element 6. VV&A. Recommended FY 96 funding $0.850.

Description. Not available.

Justification. Not available.

APPENDIX 7

FY96 RDT&E Budget Item
Justification Sheets (P&R Forms)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 4 - Demonstration and Validation

PE NUMBER AND TITLE: 0603760A Distributive Interactive Simulations - Advanced Development

PROJECT: DC80

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC80 Reconfigurable Simulator Advanced Development	10302	0	0	0	0	0	0		0	10302

A. **Mission Description and Budget Item Justification:** This program element (PE) provides for advanced development of an overarching architecture for reconfigurable simulators. Project DC80 is focused on development of both the software and hardware interfaces and specifications required to completely determine a reconfigurable simulator. Emphasis is also placed on defining those software and hardware modules which have broad applicability across a wide range of reconfigurable simulators. Work done on this program will have benefit across the Army and DoD by providing standards for interoperability and software reuse in this emerging domain. This program element focuses on efforts associated with advanced technology development used to demonstrate general military utility to include demonstration and validation in the area of reconfigurable simulators and is correctly placed in Budget Activity 4.

Project DC80 - Reconfigurable Simulators Advanced Development: Initiates advanced development of reconfigurable simulators for use in TRADOC Battle Laboratories. Program provides advanced development of modular software and hardware architectures for reconfigurable simulators. Development will provide a common framework for the development of a new generation of reconfigurable simulators that can be used to explore a wide variety of critical issues for the Force Projection Army. FY 95 efforts include work on a reconfigurable generic rotary wing aircraft simulator, an armored vehicle simulator which will provide a basis for work on any ground vehicle system, a battle command and control vehicle, a fire support vehicle for use by both the artillery and air defense, and a combat service support module.

Acquisition Strategy: Competitive development leading to competitive procurement against performance specifications

FY 1995 Accomplishments:

•	7302	Develop overarching software architecture for reconfigurable simulators through complete domain analysis
•	2100	Develop and demonstrate modular hardware architecture suitable for reconfiguration
•	900	Define generic software modules necessary for defining the reconfigurable simulator in the context of its architecture
Total	10302	

FY 1996 Planned Program: No planned program.

FY 1997 Planned Program: No planned program.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 4 - Demonstration and Validation

PE NUMBER AND TITLE: 0603760A Distributive Interactive Simulations - Advanced Development

PROJECT: DC80

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget (FY 1996)	11787		
Appropriated Value (FY 1995)	8223		
Adjustments to FY 1995 Appropriated Value	2093		
Current Budget Estimate Submission	10302		

Change Summary Explanation:
Funding: Net amount reprogrammed (2093) from Project DC81, PE 0603760A

C. Other Program Funding Summary

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
RDTE, A Budget Activity 5 PE 0604760A, Project DC81 Distributive Interactive Simulation	2279	0	0	0	0	0	0	0	2279
RDTE, A Budget Activity 5 PE 0604715A Project DC91, Distributive Interactive Simulation	3373	6139	0	0	0	0	0	0	9512
RDTE, A Budget Activity 5 PE 0604760A Project DC77, Interactive Simulation	0	0	3745	11328	6992	17063	14053	Cont'd	Cont'd

D. Schedule Profile: The efforts funded in this project are non-system specific and represent continuing advanced development in the area of Reconfigurable Simulators; therefore, no milestones are provided.

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Request for Proposal release		X*										
Contract Award				X								
Software/Hardware Integration						X						

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: September 1995

BUDGET ACTIVITY: 4 - Demonstration and Validation

PE NUMBER AND TITLE: 0603760A Distributive Interactive Simulations - Advanced Development

PROJECT: DC80

A. Project Cost Breakdown

	FY 1995	FY 1996	FY 1997
Software Development	7302		
Modular Hardware Development	2100		
Technical Data	900		
Total	10302		

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1995	FY 1995	FY 1996	FY 1997	FY 1998	Budget to Complete	Total Program
Product Development Organizations											
TBD	Best value contract	Sep 95	9627	9627	0	9627	0	0		0	9627
Support and Management Organizations											
Miscellaneous	Various	Various	675	675	0	675	0	0		0	675

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1995	FY 1996	FY 1997	FY 1998	Budget to Complete	Total Program
Product Development Property	Not Applicable								
Support and Management Property	Not Applicable								

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: September 1995

BUDGET ACTIVITY: 4 - Demonstration and Validation

PE NUMBER AND TITLE: 0603760A Distributive Interactive Simulations - Advanced Development

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1995	FY 1995	FY 1996	FY 1997	FY 1998	Budget to Complete	Total Program
Test and Evaluation Property		Not Applicable								
				Total Prior to FY 1995	FY 1995	FY 1996	FY 1997		Budget to Complete	Total Program
Subtotal Product Development					9627					9627
Subtotal Support and Management					675					675
Subtotal Test and Evaluation					0					0
Total Project					10302					10302

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A 'Non-System Training Devices - Engineering Development

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
Total Program Element (PE) Cost	47886	55303	53666	54753	49039	68069	50583		Continuing	Continuing
DC82 Louisiana Maneuvers	5720	5973	4987	4005	4021	3997	3990		Continuing	Continuing
DC91 Distributive Interactive Simulation	3373	6139	0	0	0	0	0		9512	9512
D241 Non-System Training Devices	25876	31121	35382	36732	31923	49583	31928		Continuing	Continuing
D396 Tactical Simulation (TIARA)	3376	2083	2879	3205	2382	3997	3990		Continuing	Continuing
D573 STRICOM and Naval Air Warfare Center Training Systems Division	9541	9987	10418	10811	10713	10492	10675		Continuing	Continuing

Mission Description and Budget Item Justification: Program Element funds engineering development of Non-System Training Devices to support force-on-force training at the Combat Training Centers (CTC), general military training and training on more than one item/system, as compared with system devices which are developed in support of a specific item/weapon system. Training devices and training simulations provide force multipliers that improve combat effectiveness by providing realistic training while helping to control rapidly escalating costs. Training devices maximize the transfer of knowledge, skills and experience from the training situation to a combat situation. Force-on-force training at the National Training Center (NTC), Ft. Irwin, CA; Joint Readiness Training Center (JRTC), Ft. Chaffee, AR, and Combat Maneuver Training Center (CMTC), Hohenfels, Germany; and battle staff training in Battle Command Training Program (BCTP) will provide increased combat readiness through realistic collective training in low, mid, and high intensity scenarios. Project DC82, Louisiana Maneuvers, is intended to energize and guide the restructuring of the Army while simultaneously keeping it combat-ready for any contingency. Project DC91, Distributive Interactive Simulation (DIS), includes engineering development of techniques and technology for DIS and related simulations and simulator efforts (transferred to PE 0604760 in FY97). Project D241, Non-System Training Devices-Combined Arms, develops simulation training devices for Army-wide use, including the CTCs. Project D396 Tactical Simulation, is an intelligence simulation/driver for both training (intelligence driver for Corps Battle Simulation (CBS)) and testing. Project D573, STRICOM/Naval Air Warfare Center Training Systems Division (NAWCTSD) Support, funds in-house costs of project support by US Army Simulation, Training and Instrumentation Command (STRICOM) and NAWCTSD. This Program Element supports research efforts in the engineering and manufacturing development phases of the acquisition strategy and are therefore correctly placed in Budget Activity 5.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: DC82

COST (*In Thousands*)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC82 Louisiana Maneuvers	5720	5973	4987	4005	4021	3997	3990	——	Continuing	Continuing

A. Mission Description and Budget Item Justification

DC82 - Louisiana Maneuvers (LAM): LAM will serve as a laboratory for the Army to practice its roles and missions, to develop and explore options, to assess and direct progress, to provide a framework for decisions by senior leaders, and to facilitate the Army's transformation. LAM will consist of a series of related exercises forming a campaign to assess the Army of the 21st century in areas of policy, doctrine, organization, training, materiel, leader development, and soldier issues shaping the force. As an evolving process, LAM will exploit the results and outcomes of each exercise by incorporating lessons learned in order to enhance the value of follow-on exercises. Overall, LAM will focus the Army's self-assessment of institutional effectiveness, provide direction for change, and orient the Army's leadership to accomplish the national military strategy with available resources.

Acquisition Strategy: Competitive procurement against performance specifications.

FY 1995 Accomplishments:

•	2468	Initiate development of simulation linkages
•	3252	Conduct issue investigation by AMC, TRADOC, FORSCOM & Strategic Space Defense Command
Total	5720	

FY 1996 Planned Program:

•	736	Initiate development of simulation linkages for Association of U. S. Army
•	737	Initiate development of simulation linkages for Synthetic Theater of War (STOW)
•	4500	Continue issue investigation by AMC, TRADOC, FORSCOM & Strategic Space Defense Command
Total	5973	

FY 1997 Planned Program:

•	737	Continue development of simulation linkages for Association of U. S. Army
•	738	Continue development of simulation linkages for Synthetic Theater of War (STOW)
•	3512	Continue issue investigation by AMC, TRADOC, FORSCOM & Strategic Space Defense Command
Total	4987	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: DC82

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	5848	5973	4987
Appropriated Value	5725		
Adjustments to Appropriated Value	- 5		
Current Budget Submit/President's Budget	5720	5973	4987

C. Other Program Funding Summary

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
OPA2, Appropriation	433	846	941	774	171	147	149	Cont'd	Cont'd
BE4162 MACOM Automation Systems									

D. Schedule Profile

	FY 1995				FY 1996				FY 1997							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Issue Investigation by AMC, TRADOC, FORSCOM, and SSDC				X				X				X				
Simulator Linkages				X				X				X				

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT DC82

A. Project Cost Breakdown	FY 1995	FY 1996	FY 1997
Development of simulation linkages	2468	1473	1475
Issue investigation by AMC, TRADOC, FORSCOM & Strategic Space Defense Command (SSDC)	3252	4500	3512
Total	5720	5973	4987

B. Budget Acquisition History and Planning Information: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: DC91

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC91 Distributive Interactive Simulation	3373	6139	0	0	0	0	0	——	9512	9512

A. Mission Description and Budget Item Justification

DC91 - Distributive Interactive Simulation (DIS) - DIS technology provides wide area simulation networking in support of modeling and simulation, doctrinal development, training, and operations, utilizing live, virtual and constructive simulations. This project was established in FY 95 and funding restructured from Project D241 to allow better tracking of DIS efforts. Effective FY 97 this project was transferred to PE 604760 which more correctly describes the program effort.

Acquisition Strategy: Competitive procurement against performance specifications.

FY 1995 Accomplishments:

- 1415 Continue DIS site operations
- 1958 Initiate systems engineering and integration contract

Total 3373

FY 1996 Planned Program:

- 2434 Provide system engineering, configuration management, and standard development for core DIS facilities and Battle Lab Reconfigurable Simulators
- 2450 DIS verification, validation and accreditation
- 1255 Provide enhancements to and integration of simulation software upgrades to support Advance Warfighting experiments

Total 6139

FY 1997 Planned Program: Project transferred to PE 0604760, Project DC 77 Interactive Simulation

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	3445	6139	3745
Appropriated Value	3373		
Adjustments to Appropriated Value			
Current Budget Submit/President's Budget	3373	6139	0

Change Summary Explanation:

Funding: FY97 Current Budget Submit reflects transfer of Project DC91 to PE 604760

C. Other Program Funding Summary

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
RDTE, Budget Activity 5	2279							0	2279
PE 0604760A Project DC81 Battle Lab Reconfigurable Simulators									
RDTE, Budget Activity 4	10302							0	10303
PE 0603760A Project DC80 Battle Lab Reconfigurable Simulators									
OPA 3, Appropriation KA6000, Recon Simulators		12616							12616
OMA, Reconfigurable Simulators		12100							12100

D. Schedule Profile

	FY 1995				FY 1996			
	1	2	3	4	1	2	3	4
Award SEI Contract				X*				
DIS Verification and Validation								X
Simulator upgrades								X
Reconfigurable Simulator Contract						X		

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT DC91

A. **Project Cost Breakdown**

	FY 1995	FY 1996	FY 1997
Operate DIS facilities	1415		
Award SEI Contract	1958		
Develop module definition for Soldier Combat Service Support and early entry SIMS		2434	
Simulation Software upgrades		1255	
DIS Verification and Validation		2450	
Total	3373	6139	

B. **Budget Acquisition History and Planning Information**: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: D241

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
D241 Non-System Training Devices	25876	31121	35382	36732	31923	49583	31928	——	Continuing	Continuing

A. Mission Description and Budget Item Justification

D241 - NSTD Combined Arms: This project is used to develop prototype training devices to support Combined Arms (Infantry, Armor, Aviation, Air Defense, Artillery, Engineer, Chemical, and Support troops) training and multi-system training within the Army, to include the Reserve Components. Corps Battle Simulation (CBS) is the Army's standard command and staff training simulation at the corps/division level. Brigade/Battalion Battle Simulation (BBS) is a simulation that trains commanders and their staff in command & control skills via two sided, free play, real time computer driven exercises. Combat Service Support Training Simulation System (CSSTSS) is a training simulation which supports training at battalions through echelons-above-corps levels to provide the level of detail required to train logistics commanders and staffs. CSSTSS will be linked to CBS to provide integrated maneuver and logistics training. Distributed Interactive Simulation (DIS) will allow training simulations representing different weapons systems and command levels at geographically dispersed locations to interact with one another in real time to provide more realistic combined arms training. Warfighter Simulation (WARSIM) will be the next generation battle simulation to replace CBS and BBS. Entity Based Model (EBM), a follow-on effort of JANUS, is a single high resolution model to meet the needs of Training, Exercise, and Military Operations (TEMO), Research, Development, and Acquisition (RDA) and Advanced Concepts Requirements (ACR) communities. WARSIM will utilize current technology to efficiently provide training support and linkage to other simulations and simulators. WARSIM will comply with DIS standards and open architecture to meet the Army's training requirements into the next century. Multiple Integrated Laser Engagement Simulation 2000 (MILES 2000) will provide additional cost effective weapon system capabilities during tactical engagement exercises. Simulated Area Weapons Effects-Radio Frequency (SAWE-RF) simulates area weapons effects using distributed processing techniques and a radio frequency communications system. The Intelligence Electronic Warfare Tactical Proficiency Trainer (IEWTPT) will provide the initial capability for sustainment training for military intelligence units. Guard Unit Armory Device Full Crew Interactive Simulation Trainer - Armor (GUARDFIST I) provides reserve components armor battalions full crew gunnery sustainment training. This project funds the development of training devices, simulators, simulations and instrumentation for the Combat Training Centers (CTC's) to include Opposing Forces Surrogate Vehicles (OSV's) for display of doctrinally correct threat at the CTC's. The Air Ground Engagement System II (AGES II) will permit the inclusion of aviation assets in MILES tactical engagement exercises. Devices developed will enable the Army to train units collectively to obtain synergistic results through the employment of weapons and support systems in their respective battlefield roles. The Fire Support Combined Arms Tactical Trainer (FSCATT), provides for initial and sustainment gunnery training, and can be linked as part of the CATT family. FSCATT is designated as the Army's only defense acquisition pilot program IAW the Federal Acquisition Streamlining Act (FASTA).

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT D241

Acquisition Strategy: Competitive procurement against performance specifications.

FY 1995 Accomplishments:

•	1488	Initiated development of CBS 1.5.3
•	5755	Initiated development of FSCATT Phase I
•	1445	Development of AGES II upgrades
•	7500	Development of CSSTSS
•	1480	Continue development of devices, simulators and simulations to support training at the CTCs (i.e. NTC, JRTC, CMTC, and BCTP), to include CTC-IS Ages II
•	4735	Awarded Engineering Manufacturing and Development (EMD) contract to 3 contractors for future downselect, WARSIM 2000
•	580	Continued limited BBS enhancements
•	731	Continue enhancements of BCTP AAR for Armywide CBS
•	500	Complete development of M113 OSV
•	1487	Complete development of CBS 1.5.2
•	175	Complete Initial Operational Test and Evaluation of GUARDFIST I
Total	25876	

FY 1996 Planned Program:

•	498	Entity Based Model (EBM) concept formulation
•	598	Continue limited BBS enhancements
•	3902	Continue development of the CSSTSS
•	2192	Continue development of devices, simulators and simulations to support training at the NTC, JRTC, & CMTC
•	3484	Complete CBS 1.5.3 and continue limited enhancements to CBS
•	10936	Exercise contract option to downselect to prime contractor for WARSIM 2000 EMD
•	6970	Continue development of FSCATT Phase I
•	2541	Develop form and fit of SAWE-RF to weapons systems to support CTC integration efforts
Total	31121	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT D241

FY 1997 Planned Program:

•	498	Initiate EMD phase for Entity Based Model (EBM)
•	4080	Continue limited BBS (597) and CBS (3483) enhancements
•	25847	Development of the CSSTSS (2985); WARSIM 2000 EMD (18304); and IEWTPT (4558)
•	889	Initiate development MILES 2000 for new weapon systems (i.e., armored gun system and Bradley A3)
•	4068	Complete development of FSCATT Phase I
Total	35382	

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	24680	31121	31314
Appropriated Value	24161		
Adjustments to Appropriated Value	1715		
Current Budget Submit/President's Budget	25876	31121	35382

Change Summary Explanation:
Funding: FY 95 - Net reprogramming of 1807 from DIS. FY97 - Current Budget Submit reflects realignment of procurement funding to R&D ($4068)

C. Other Program Funding Summary

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
OPA3, Appropriation	78185	71561	102660	70903	88890	97430	117482	Cont'd	Cont'd
NA0100 Training Devices, Nonsystem									
OPA3, Appropriation	29289	22208	5609	13919	14914	28832	34802	Cont'd	Cont'd
MA6600 CTC Support									
OPA3, Appropriation	0	0	18084	21044	30190	27280	16686	Cont'd	Cont'd
NA0174 Fire Support Combined Arms Tactical Trainer									

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: D241

D. Schedule Profile

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
WARSIM Contract Award			X*									
CSSTSS Milestone III IPR					X							
CSSTSS Milestone III Approval								X				
EBM Concept Formulation Contract Awd						X						
WARSIM Downselect Option/Award						X						
AGES II/CTC-IS Site Integration						X						
GUARDFIST I Milestone III			X*									
JRTC-IS IOC								X				
FSCATT IOC										X		
M113 OSV Milestone IIIA				X								
SAWE-RF Milestone III IPR								X				
IEWTPT Contract Award									X			
JRTC MOUT-IS Contract Award			X*									
Miles 2000 New Weapon System Initiate									X			

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT D241

A. Project Cost Breakdown	FY 1995	FY 1996	FY 1997
System Development	25200	29885	34710
Test and Evaluation	626	1000	87
Technical Data	50	236	585
Total	25876	31121	35382

B. Budget Acquisition History and Planning Information: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: D396

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
D396 Tactical Simulation (TIARA)	3376	2083	2879	3205	2382	3997	3990	——	Continuing	Continuing

A. Mission Description and Budget Item Justification

D396 - Tactical Simulation (TACSIM):. Tactical Simulation (TACSIM) is the intelligence driver for the Corps Battle Simulation (CBS). It provides simulated, raw intel data to drive the intel analysis function during training exercises. TACSIM is a TIARA program.

Acquisition Strategy: Competitive procurement against performance specifications.

FY 1995 Accomplishments:

•	1050	Completed TACSIM 2.1.6 development
•	590	Completed TACSIM/CBS development for CBS
•	1028	Initiated TACSIM 2.1.7 development
•	218	Continued TACSIM/ALSP interface development
•	490	Initiated development of Warfighters' Simulation (WARSIM) intelligence capability
Total	3376	

FY 1996 Planned Program:

•	868	Complete TACSIM 2.1.7 development
•	175	Complete TACSIM/ALSP interface development
•	565	Initiate TACSIM 2.1.8 development/compatibility with CBS
•	475	Continue development of Warfighters' Simulation (WARSIM) intelligence capability
Total	2083	

FY 1997 Planned Program:

•	800	Complete TACSIM 2.1.8
•	186	Initiate minor TACSIM enhancements
•	1893	Continue development of Warfighters' Simulation (WARSIM) intelligence capability
Total	2879	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT D396

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	3448	2083	2879
Appropriated Value	3376		
Adjustments to Appropriated Value			
Current Budget Submit/President's Budget	3376	2083	2879

C. Other Program Funding Summary: Not Applicable

D. Schedule Profile

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Software Build				X				X				X
Developmental Test and Evaluation		X*				X				X		

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT D396

A. Project Cost Breakdown	FY 1995	FY 1996	FY 1997
Software Development	938	538	772
System Engineering	760	537	587
Configuration Management	610	370	566
Technical Data	460	269	385
Developmental Test and Evaluation	608	369	569
Total	3376	2083	2879

B. Budget Acquisition History and Planning Information: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604715A Non-System Training Devices - Engineering Development

PROJECT: D573

COST (*In Thousands*)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
D573 STRICOM and Naval Air Warfare Center Training Systems Division	9541	9987	10418	10811	10713	10492	10675	——	Continuing	Continuing

C. **Other Program Funding Summary**: Not Applicable

D. **Schedule Profile:** The nature of this project does not lend itself to acquisition milestones.

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604715A Non-System Training Devices - Engineering Development PROJECT D573

A. Project Cost Breakdown	FY 1995	FY 1996	FY 1997
Fund STRICOM Personnel	6706	6795	6940
Fund NAWCTSD Support	1584	1689	1862
Front End Analysis	1251	1503	1616
Total	9541	9987	10418

B. Budget Acquisition History and Planning Information: Not Applicable

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 6 - Management Support

PE NUMBER AND TITLE: 0604759A* Major Test and Evaluation Investment

COST (*In Thousands*)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
Total Program Element (PE) Cost	49853	66874	41396	40856	34604	36931	39687		Continuing	Continuing
DC55 DISTRIBUTED DEV SIMULATION TECH	2820	2773	0	0	0	0	0		Continuing	Continuing
D983 MAJOR TEST & EVALUATION -USAKA	2081	2488	2489	2489	2491	2626	2753		Continuing	Continuing
D984 MAJOR TECHNICAL TEST INSTRUMENTATION	24558	37933	33830	35740	29507	29364	30832		Continuing	Continuing
D986 MAJOR USER TEST INSTRUMENTATION	20394	23680	5077	2627	2606	4941	6102		Continuing	Continuing

Mission Description and Budget Item Justification: All Major Test and Evaluation (T&E) Investment programs have been consolidated into a single Program Element for oversight and management. The increase in Project D984 in FY 1996 is due to realigning projects from project D453, PE 0605602A. The FY 1996 - FY 2001 program funds only the minimum level required to develop the new testing capabilities required to evaluate advanced weapon system technologies and gain the planned efficiencies through manpower reductions at Test and Evaluation Command (TECOM) and U.S. Army Operational Test and Evaluation Command (OPTEC). Project DC55, Distributed Development Simulation Technology, transfers in 1997 to PE0604760A.

This program funds development and acquisition of major developmental test instrumentation for the TECOM test activities including Major Ranges and Test Facility Bases (MRTFB): White Sands Missile Range (WSMR), NM; Yuma Proving Ground, (YPG), AZ; Aberdeen Test Center (ATC), MD; Dugway Proving Ground (DPG), UT; and US Army Kwajalein Atoll (USAKA), Marshall Islands. Program also funds development and acquisition of major field instrumentation for U. S. Army Operational Test and Evaluation Command (OPTEC) test organizations. It also provides the capabilities to create simulated tactical environments during conduct of user testing of new weapon systems and to develop and upgrade other range instrumentation in support of testing and training. "Major instrumentation is defined as exceeding $2 million per year or $10 million acquisition cost in Research, Development, Test and Evaluation (RDT&E) funding". Requirements for instrumentation are identified through a long range survey of project managers, Research, Development and Engineering Centers (RDECs), and Battle Laboratories developing future weapon systems and the test programs required for these systems. Army testing facilities are also surveyed to determine current testing capability shortfalls. This PE is appropriate to Budget Activity 6 because it includes research and development effort directed toward support of installations or operations required for general research and development use.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 6 - Management Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

PROJECT: DC55

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC55 DISTRIBUTED DEV SIMULATION TECH	2820	2773	0	0	0	0	0	——	Continuing	Continuing

A. Mission Description and Budget Item Justification **Project DC55 - Distributed Development Simulation Technology:** This project supports the Core Distributed Interactive Simulations (DIS) Facilities (CDF) at Fort Knox, KY, Fort Rucker, AL, Fort Benning, GA and the Operational Support Facility in Orlando, FL, which provide virtual combined arms battlefield with the warfighter-in-the-loop to evaluate weapon system concepts, tactics, doctrine and test plans. The project also develops and applies Distributed Simulation technology, and provides systems engineering management support to FORCE XXI and the Synthetic Theater of War (STOW). Funding Line Transfers in FY 1997 to 0604760A to establish effort in Distributed Interactive Simulations Program Element, under projects DC74 Developmental Simulation Technology and DC73 STOW.

FY 1995 Accomplishments:

•	2758	Continued sustainment of Advanced Distributed Simulation Technology support which enables combat, materiel, and training developers and testers to perform experiments to test tactics, doctrine and weapon design
•	62	Small Business Innovative Research (SBIR)/Small Business Technology Transfer (STTR)/Federally Funded Research and Development Centers (FFRDC)
Total	2820	

FY 1996 Planned Program:

•	2773	Continue sustainment of Advanced Distributed Simulation Technology support which enables combat, materiel, and training developers and testers to perform experiments to test tactics, doctrine and weapon design
Total	2773	

FY 1997 Planned Program:

•	0	Funding Line Transfers in FY 1997 to 0604760A to establish effort in Distributed Interactive Simulations Program Element, under projects DC74 Developmental Simulation Technology and DC73 STOW
Total	0	

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	2859	2787	2740
Appropriated Value	2820		

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 6 - Management Support	PE NUMBER AND TITLE 0604759A Major Test and Evaluation Investment
	PROJECT DC55

	FY 1995	FY 1996	FY 1997
Adjustments to Appropriated Value			
Current Budget Submit/President's Budget	2820	2773	2726
Changes to FY 1997 since President's Budget Submit			
- Increased			+11160
- Transferred to PE 0604760A			-16626
Current POM Submit	2820	2773	0

Change Summary Explanation: Realignment of FY97 funding to provide distributed simulation technology in support of the FORCE XXI training (8000) and the Synthetic Theater of War (3000) which was unfunded in the FY96 President's budget. Funding Line Transfers in FY 1997 to 0604760A to establish effort in Distributed Interactive Simulations Program Element, under projects DC74 Developmental Simulation Technology and DC73 STOW.

Funding: None

Schedule: None

Technical: None

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 6 - Management Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

PROJECT: D983

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
D983 MAJOR TEST & EVALUATION -USAKA	2081	2488	2489	2489	2491	2626	2753	——	Continuing	Continuing

A. Mission Description and Budget Item Justification: Project D983 - Major Test and Evaluation (T&E) Investment - USAKA: This project funds the purchase of major Improvement and Modernization (I&M) equipment at the US Army Kwajalein Atoll (USAKA) in the Marshall Islands. USAKA is a national test range supporting Army, Ballistic Missile Defense Organization (BMDO), US Air Force, National Aeronautics and Space Administration (NASA), and other customers. Major Test and Evaluation (T&E) items are defined as costing $2 million in a single year or items costing $10 million for total acquisition. Upgrades to radar, telemetry, optics, command/control and other equipment are required to maintain USAKA as a national test range. Approximately $5 million of range improvements are required annually to maintain USAKA test range capability in support of current projected workload.

FY 1995 Accomplishments:

•	2037	Technical Control Facility (TCF) Replacement: The TCF replacement is required due to the age and lack of maintainability of the current equipment . The replacement provides the opportunity to relocate the facility and consolidate the mission voice circuits, data circuits and fiber optic terminal equipment in the same building for 24 hour monitoring
•	44	SBIR/STTR
Total	2081	

FY 1996 Planned Program:

•	2488	Global Positioning System Translator Processory System Ground Translator Processor (GTP). The GTP development is required to allow Kwajalein Missile Range (KMR) to maintain and improve its ability to acquire accurate timing and spacial positioning data on test objects and thus enhance the dynamic metric and miss-distance measurement capabilities
Total	2488	

FY 1997 Planned Program:

•	2000	Advanced Research Project Agency-Lincoln C-Band Observable Radar (ALCOR) Computer/Receiver Upgrade. The ALCOR computer/receiver upgrade is required to improve performance, increase system reliability and reduce maintenance costs
•	489	Complete Global Position System Translator Processory System GTP installation and integration.
Total	2489	

B. Project Change Summary

	FY 1995	FY 1996	FY 1997

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 6 - Management Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

PROJECT: D983

	FY 1995	FY 1996	FY 1997
Previous President's Budget	2109	0	0
Appropriated Value	2820		
Adjustments to Appropriated Value			
Current Budget Submit/President's Budget	2820	2488	2489

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 6 - Management Support

PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment

PROJECT: D984

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
D984 MAJOR TECHNICAL TEST INSTRUMENTATION	24558	37933	33830	35740	29507	29364	30832	———	Continuing	Continuing

A. Mission Description and Budget Item Justification: **Project D984 - Major Technical Test Instrumentation:** This project develops and acquires major test instrumentation to perform developmental testing of weapon systems at U. S. Army Test and Evaluation Command (TECOM) activities. Major instrumentation is defined by having one or more of the following attributes: joint service requirements, multiple command use, high visibility, large dollar value, produces a new capability or requires intensive management during acquisition. This project funds major instrumentation that exceeds $2 million per year or $10 million acquisition cost in RDT&E funding. Funding increases in FY 1996 are due to realignment of major instrumentation funding from PE 0605602A, D453, and three new instrumentation development efforts: Hardened Subminiature Telemetry Sensor System which is a new technology development for testing smart munitions and weapons; Frequency Surveillance System (FSS) which will augment manpower reduction and result in greater operations efficiency, and allow the monitoring of new frequency spectrums used by our modernized weapon systems; and Dynamic Infrared Scene Projector (DIRSP) which will be used in testing new Infrared munitions and missiles by hardware in the loop simulation and virtual testing.

FY 1995 Accomplishments:

- 426 Continued the instrumentation of the Trench Warfare II (TW) link, high speed networking, and ethernet hub for Fiber Optic Network (FON).
- 6500 Continued acquisition of laser illuminator, instrumentation installation at the Perryman Test Area (PTA) and the Munson Test Area (MTA); initiated development of fiber optics at C-field, completed Barricade B1 range instrumentation and continued development of vehicle on-board data acquisition and sensors for Land Combat Instrumentation (LCI)
- 6924 Conducted Source Selection Evaluation and awarded prime contract for the WSMR Test Support Network (TSN). Initiated work on the Eastern Fiber Optic Backbone. WSMR-TSN is a total range data transmission system which greatly improves test products while decreasing dramatically operational cost
- 7448 Continued WSMR execution of the Army's portion of the Global Positioning System (GPS) full rate production contract, acquiring and fielding hardware and software at all Army test organizations
- 2743 Provided in-house support (engineering analysis, concept formulation, salaries, travel, etc.) to on going projects and continued analysis of future instrumentation requirements
- 517 SBIR/STTR/FFRDC

Total 24558

FY 1996 Planned Program:

- 3362 Continue the instrumentation of the TW II Link, high speed networking, and ethernet hub. Initiate securing the Fiber Optic Network (FON) for classified data transmission.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY: 6 - Management Support	PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment — PROJECT: D984

•	3950	Complete instrumentation of MTA, acquisition of laser illuminator, development of fiber optics at C-field, Barricades B2 and B3 range instrumentation and continue development of vehicle on-board data acquisition , installation of PTA instrumentation and sensors for LCI.
•	9670	Continue Phase I on the Eastern Fiber Optic Backbone and complete installation of Network Management System. WSMR-TSN is a 3 phase 8 year developmental project with Initial Operating Capability (IOC) in FY 1997 and Full Operating Capability (FOC) in FY 2003.
•	2360	Initiate Phase II of Frequency Surveillance System (FSS) modernization project, automating seven sites capable of monitoring frequencies from 2 Mhz to 100 Ghz at WSMR.
•	12381	Continue WSMR execution of the Army's portion of the GPS full rate production contract, acquiring and fielding hardware and software at all Army test organizations.
•	210	Continue from FY 1995 (PE 0605602A, D453) capability for system level Army Tactical Command and Control System (ATCCS) technical test project at WSMR/Electronic Proving Grounds (EPG).
•	2290	Initiate Hardened Subminiature Telemetry and Sensor System (HSTSS) project at PM ITTS as lead management activity to develop transmitters, antennas, sensors, polymer batteries and electronic packaging techniques in support of flight tests of indirect/direct fire and smart munitions at Yuma Proving Grounds (YPG) and other Army locations. HSTSS is a five year Army project with FOC in FY 2000. Office of the Secretary of Defense (OSD) funded FY93-95 as a Test Technology Development Program
•	500	Initiate a Dynamic Infrared Scene Projector (DIRSP) project to conduct performance testing of night vision sensors and Infrared (IR) imaging seekers, and provide the capability to fully simulate and synthesize present and future battlefields with a mix of real and simulated objects, at Redstone Technical Test Center (RTTC). DIRSP is a four year project with IOC in FY 1999
•	1937	Provide in-house support, concept formulation and engineering analysis to future instrumentation requirements.
•	1273	Provide program management support
Total	37933	

FY 1997 Planned Program:

•	1408	Complete the instrumentation of the TW II Link, high speed networking, and ethernet hub. Continue securing the FON for classified data transmission at ATC.
•	4000	Complete installation of PTA instrumentation , acquisition of second laser illuminator, complete Barricade C/Hi Velocity range instrumentation, and complete development of vehicle on-board data acquisition and sensors for LCI at ATC.
•	10981	Complete Phase I of WSMR TSN contract support and exercise option on Phase II to install Feeder cable on Eastern Backbone.
•	3560	Award contract for Phase II of FSS modernization project at WSMR.
•	6427	Conclude the Army's portion of the GPS production contract for all Army test organizations.
•	207	Conclude capability for system level ATCCS technical test at EPG.
•	2500	Award the engineering development contract for HSTSS at YPG.
•	1340	Continue implementation of the DIRSP project at RTTC.
•	2302	Provide in-house support, concept formulation and engineering analysis to future instrumentation requirements.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 6 - Management Support	PE NUMBER AND TITLE 0604759A Major Test and Evaluation Investment PROJECT D984

•	1105	Provide program management support
Total	33830	

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	29894	27420	24432
Appropriated Value	24558		
Adjustments to Appropriated Value			
Current Budget Submit/President's Budget	24558	37933	33830

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)			DATE: September 1995
BUDGET ACTIVITY: 6 - Management Support	PE NUMBER AND TITLE: 0604759A Major Test and Evaluation Investment		PROJECT: D986

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
D986 MAJOR USER TEST INSTRUMENTATION	20394	23680	5077	2627	2606	4941	6102	——	Continuing	Continuing

A. Mission Description and Budget Item Justification: Project D986 - Major User Test Instrumentation: This project finances the development of major field instrumentation for Operational Testing (OT) and Force Development Testing and Experimentation (FDTE). The Mobile Automated Instrumentation Suite (MAIS) will provide users the capability to measure the performance of hardware and personnel under realistic tactical conditions for large scale operations (up to 1830 players). The MAIS will instrument combat systems in the operational forces to provide Real Time Casualty Assessment (RTCA) and Time, Space, and Positioning Information (TSPI) data. MAIS will provide protocol data unit (PDU) transformation to link with Distributed Interactive Simulation (DIS). This data will provide objective assessment for new materiel acquisition, force structuring, doctrine and tactics modification, and, through the Advanced Research Projects Agency (ARPA) PDU format, part of the DIS, provide data to validate the future DoD warfighting models and simulations. The MAIS, a non-major system acquisition, achieved Milestone I/II in FY 90. Current program (one control center and 131 player units) reflects revised Initial Operational Capability (IOC) from FY 1996 to FY 1997. The FY 1996 increase was realigned from MAIS production funds to minimize risk during test and to complete project development for a production decision. One additional control center and 469 player units are programmed in Other Procurement, Army appropriation.

FY 1995 Accomplishments:

- 7319 Conducted hardware/software integration and subsystem level test; conducted initial player unit/command control and communication (C3) center integration and test.
- 5500 Conducted simulations/analysis to verify Time Division Multiple Access (TDMA) network; met network data latency requirements; completed formal operational verification tests to validate that the Encryption card and Player Units met National Security Agency (NSA) security requirements.
- 3600 Conducted Engineering Validation Tests (EVT) to demonstrate system functionality of C3 center Player Units, and data communications network; completed player unit brassboard integration and tests.
- 200 Released player unit drawings to commence assembly of initial system player units.
- 3342 Completed C3 Center assembly and quality assurance inspections; initiated procurement for software development support facility and logistics shelters, shelter racks and equipment.
- 433 SBIR/STTR/FFRDC

Total 20394

FY 1996 Planned Program:

- 10882 Assemble player units
- 900 Complete logistics shelter assembly and install equipment
- 5726 Complete system integration and test

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 6 - Management Support	PE NUMBER AND TITLE 0604759A Major Test and Evaluation Investment
	PROJECT D986

- 1600 Conduct player unit qualification test
- 4572 Conduct system developmental test

Total 23680

FY 1997 Planned Program:

- 3575 Conduct system operational test
- 1502 Initiate product refurbishment

Total 5077

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget	20674	19198	3109
Appropriated Value	20394		
Adjustments to Appropriated Value			
Current Budget Submit/President's Budget	20394	23680	5077

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

COST (*In Thousands*)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
Total Program Element (PE) Cost	2279	0	17631	20531	10364	21041	18123		Continuing	Continuing
DC73 Synthetic Theater of War	0	0	11160	6500	0	0	0		Continuing	Continuing
DC74 Developmental Simulation Technology	0	0	2726	2703	3372	3978	4070		Continuing	Continuing
DC77 Interactive Simulation	0	0	3745	11328	6992	17063	14053		Continuing	Continuing
DC81 Reconfigurable Simulator Engr Dev	2279	0	0	0	0	0	0		0	2279

Mission Description and Budget Item Justification: Distributed Interactive Simulation (DIS) is a synthetic environment within which humans may interact through a systematic connection of different subcomponent simulations, simulators and/or instrumented live task forces. These DIS components may reside at multiple and distant locations, using different simulation equipment, tied together through use of a standard communication architecture. This Program Element provides for the engineering development and application of DIS technology to electronically link all subcomponents together to recreate a scaleable battlefield, both horizontally and vertically. The synthetic environment is used to verify the scenarios, tactics/techniques and procedures, train testers on new hardware/software and conduct trial test runs before costly live field tests. Project DC73, Synthetic Theater of War, supports engineering development and integration of the Synthetic Theater of War (STOW) and FORCE XXI. Project DC74, Developmental Simulation Technology, provides engineering development of DIS tools, techniques, standards and applications in support of the Army's Core DIS Facilities (CDF) at Forts Knox, Benning and Rucker, and the Operational Support Facility in Orlando, FL. Project DC77, Interactive Simulation, focuses on engineering development of techniques and technology for DIS and related simulations and simulator efforts. Project DC81, Reconfigurable Simulator Engineering Development, is focused on development of engineering techniques and equipment for reconfigurable simulators. Beginning in FY97, the Army realigned funding for these projects together and redefined the Program Element to more clearly describe and identify Distributed Interactive Simulation development efforts. Work done on this program will have benefit across the Army and DoD by providing standards for interoperability and software reuse in this emerging domain. This Program Element supports research efforts in the engineering and manufacturing development phases of the acquisition cycle and is therefore correctly placed in Budget Activity 5.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC73

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC73 Synthetic Theater of War	0	0	11160	6500	0	0	0	——	Continuing	Continuing

A. Mission Description and Budget Item Justification

Project DC73 - Synthetic Theater of War: This project supports engineering development and integration of the Synthetic Theater of War (STOW) and FORCE XXI. Development focuses on leveraging existing and emerging technology in a manner that produces substantial and continual improvements in combat readiness through the use of full spectrum, high fidelity, distributed simulation capability to support a large scale DIS user based exercise/experiment for JOINT VENTURE training and analytical needs. This program was unfunded in the FY1996 President's Budget, and subsequently was temporarily included in Program Element 0604759A, Major Test and Evaluation Investment, Project DC55 - Distributed Development Simulation Technology.

Acquisition Strategy: Competitive development leading to competitive procurement against performance specifications

FY 1995 Accomplishments: Not Applicable

FY 1996 Planned Program: Not Applicable

FY 1997 Planned Program:

- 3000 Develop and apply distributed simulation technology to support the Synthetic Theater of War
- 8160 Develop and integrate emerging simulation technology in support of FORCE XXI training program.

Total 11160

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget (FY 1996)	0	0	0
Appropriated Value (FY 1995)	0		
Adjustments to FY 1995 Appropriated Value	0		
Adjustments to Budget Year (FY 1997) since FY 1996 President's Budget			11160
Current Budget Estimate Submission	0	0	11160

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604760A Distributive Interactive Simulations - Engineering Development PROJECT DC73

Change Summary Explanation:

Funding: This program was unfunded in the FY1996 President's Budget, and subsequently was temporarily included in Program Element 0604759A, Major Test and Evaluation Investment, Project DC55 - Distributed Development Simulation Technology.

C. Other Program Funding Summary

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
OPA3, KA6000, Reconfigurable Simulators	0	0	500	0	0	0	0	Cont'd	Cont'd
OMA	0	0	8985	12028				Cont'd	Cont'd

D. Schedule Profile

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Award Engr & Integration Contract										X		
Development of DIS tools, standards											X	
Systems Integration											X	

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC73

A. Project Cost Breakdown

	FY 1995	FY 1996	FY 1997
Systems Engineering & Integration			6760
Hardware Design & Development			1800
Reliability, Availability and Maintainability			2000
Verification, Validation & Accreditation			600
Total			11160

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1995	FY 1995	FY 1996	FY 1997	Budget to Complete	Total Program
Product Development Organizations										
TBD	Competitive Best Value	Dec 96	TBD	9210	0	0	0	9210	Cont'd	Cont'd
Support and Management Organizations										
Miscellaneous	Various	Various	1350	1350	0	0	0	1350	Cont'd	Cont'd
Test & Evaluation Organizations										
Miscellaneous	Various	Various	600	600	0	0	0	600	Cont'd	Cont'd

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC74

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC74 Developmental Simulation Technology	0	0	2726	2703	3372	3978	4070	———	Continuing	Continuing

A. Mission Description and Budget Item Justification

Project DC74 - Developmental Simulation Technology: This project supports the Core Distributed Interactive Simulation (DIS) Facilities (CDF) at Fort Knox, KY, Fort Rucker, AL, For Benning, GA and the Operational Support Facility in Orlando, FL, which provide virtual combined arms battlefield with the warfighter-in-the-loop to evaluate weapon system concepts, tactics, doctrine and test plans.

Acquisition Strategy: Competitive development leading to competitive procurement against performance specifications

FY 1995 Accomplishments: Development activities funded in PE 0604759A, Major Test and Evaluation, Project DC55, Distributive Dev Simulation Technology.

FY 1996 Planned Program: Development activities funded in PE 0604759A, Major Test and Evaluation. Project DC55, Distributive Dev Simulation Technology.

FY 1997 Planned Program:

•	2726	Continue development of Advanced Distributed Simulation Technology support which enables combat, materiel and training developers and testers to perform experiments to test tactics, doctrine and weapon design.
Total	2726	

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget (FY 1996)	0	0	0
Appropriated Value (FY 1995)	0		
Adjustments to FY 1995 Appropriated Value			
Adjustments to Budget Year (FY 1997) since FY 1996 President's Budget			2726
Current Budget Estimate Submission	0	0	2726

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604760A Distributive Interactive Simulations - Engineering Development PROJECT DC74

Change Summary Explanation:

Funding: Funds in support of this project are transferred from Program Element 0604759A, Major Test and Evaluation Investment, Project DC55, Distributed Development Simulation Technology.

C. **Other Program Funding Summary**

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
RDTE, A Budget Activity 5, PE 0604715A, Project DC91, Distr Interactive Simulation	3373	6139						0	9512
RDTE, A Budget Activity 4, PE 0604760A, Project DC77, Interactive Simulation			3745	11328	6992	17063	14053	Cont'd	Cont'd

D. **Schedule Profile**

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
ADST Contract Award										X		

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604760A Distributive Interactive Simulations - Engineering Development PROJECT DC74

A. Project Cost Breakdown

	FY 1995	FY 1996	FY 1997
Systems Engineering & Integration			1800
Primary Hardware Development			476
Reliability, Availability and Maintainability			450
Total			2726

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1995	FY 1995	FY 1996	FY 1997	Budget to Complete	Total Program
Product Development Organizations										
TBD	Competitive Best Value	Dec 96	TBD	2126	0	0	0	2126	Cont'd	Cont'd
Support and Management Organizations										
Miscellaneous	Various	Various	320	320	0	0	0	320	Cont'd	Cont'd
Test & Evaluation Organizations										
Miscellaneous	Various	Various	280	280	0	0	0	280	Cont'd	Cont'd

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC77

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC77 Interactive Simulation	0	0	3745	11328	6992	17063	14053	——	Continuing	Continuing

A. Mission Description and Budget Item Justification

Project DC77 - Interactive Simulation: This project focuses on engineering development of techniques and DIS technology of wide area simulation networking in support of modeling and simulation, doctrinal development, training, and operations, utilizing live, virtual and constructive simulations. Development also supports related simulations and simulator efforts, including the Battlelab Reconfigurable Simulators. Development activities associated with this project were budgeted in Program Element 0604715A, Non-System Training Devices Engr Dev, Project DC91, Distributive Interactive Simulation, in FY1995 and FY1996.

Acquisition Strategy: Competitive development leading to competitive procurement against performance specifications

FY 1995 Accomplishments: Funded under Project DC 91, Distributive Interactive Simulation, PE 0604715A

FY 1996 Planned Program: Funded under Project DC 91, Distributive Interactive Simulation, PE 0604715A

FY 1997 Planned Program:

- 1395 Provide systems engineering, configuration management, and standards development for Core DIS Facilities
- 2350 DIS verification, validation and accreditation

Total 3745

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget (FY 1996)	0	0	0
Appropriated Value (FY 1995)	0		
Adjustments to FY 1995 Appropriated Value			
Adjustments to Budget Year (FY 1997) since FY1996 President's Budget			3745
Current Budget Estimate Submission			3745

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE September 1995
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604760A Distributive Interactive Simulations - Engineering Development PROJECT DC77

Change Summary Explanation:

Funding: This project was funded in Program Element 0604715A, Non-System Training Devices Engineering Development, Project DC91, Distributive Interactive Simulation.

C. **Other Program Funding Summary**

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
RDTE, A Budget Activity 5, PE 0604715A, Project DC91, Distr Interactive Simulation	3373	6139	0	0	0	0	0	9512	9512
OPA3, KA6000, Reconfigurable Simulators		12616	17287	6500	0	0	0	Cont'd	Cont'd
OMA		12100	12200	12300	12400	12500	12600	Cont'd	Cont'd

D. **Schedule Profile**

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Award SEI Contract										X		
DIS Verification & Validation												X
Simulator Upgrades												X

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC77

A. Project Cost Breakdown

	FY 1995	FY 1996	FY 1997
Systems Engineering & Integration			2000
Develop DIS tools, techniques, standards			1000
Verification, Validation & Accreditation			745
Total			3745

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1995	FY 1995	FY 1996	FY 1997	Budget to Complete	Total Program
Product Development Organizations										
TBD	Competitive Best Value	Dec 96	TBD	2385	0	0	0	2385	Cont'd	Cont'd
Support and Management Organizations										
Miscellaneous	Various	Various	900	900	0	0	0	900	Cont'd	Cont'd
Test & Evaluation Organizations										
Miscellaneous	Various	Various	460	460	0	0	0	460	Cont'd	Cont'd

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC81

COST (In Thousands)	FY 1995 Actual	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate		Cost to Complete	Total Cost
DC81 Reconfigurable Simulator Engr Dev	2279	0	0	0	0	0	0	——	0	2279

A. Mission Description and Budget Item Justification

Project DC81 - Reconfigurable Simulator Engineer Development: This project initiates engineering development of both software and hardware for reconfigurable simulators for use in TRADOC Battlelabs. Simulators developed in this program are not system specific, but will represent generic equipment. Reconfigurable simulators will be used to simulate existing and developmental equipment to explore new concepts and systems for technology insertion, and for the development of doctrine necessary to mesh new equipment items into training and battle situations. Continuing development efforts in support of this project are transferred to PE 0604715A, Project DC91, Distributive Interactive Simulation in FY1996.

Acquisition Strategy: Competitive development leading to competitive procurement against performance specifications

FY 1995 Accomplishments:

•	1160	Develop engineering techniques, drawings and specifications for design and fabrication of reconfigurable simulators.
•	679	Build prototype reconfigurable simulators with various designs for evaluation in Battlelabs.
•	440	Conduct verification, validation and accreditation of software and hardware reconfigurable simulator modules
Total	2279	

FY 1996 Planned Program: Program continues as part of PE 0604715A, Project DC91, Distributive Interactive Simulation

FY 1997 Planned Program: Program continues as part of PE 0604760A, Project DC77, Interactive Simulation

B. Project Change Summary

	FY 1995	FY 1996	FY 1997
Previous President's Budget (FY 1996)	6412	0	0
Appropriated Value (FY 1995)	6278		
Adjustments to FY 1995 Appropriated Value	- 3999		
Current Budget Estimate Submission	2279	0	0

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

Change Summary Explanation:

Funding: Reprogrammed $3.999M to Project DC80, PE 0603760A, Distributive Interactive Simulations - Advanced Development

C. **Other Program Funding Summary**

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	To Compl	Total Cost
RDTE, A Budget Activity 5, PE 0604715A, Project DC91, Distributive Interactive Simulation	3373	6139	0	0	0	0	0	9512	9512
RDTE, A Budget Activity 5, PE 0604760A, Project DC77, Interactive Simulation			3745	11328	6992	17063	14053	Cont'd	Cont'd
OPA3, KA6000, Reconfigurable Simulators		12616	17287	6500				Cont'd	Cont'd
OMA	0	12100	12200	12300	12400	12500	12600	Cont'd	Cont'd

D. **Schedule Profile**

	FY 1995				FY 1996				FY 1997			
	1	2	3	4	1	2	3	4	1	2	3	4
Award Competitive System Contract				X								
Primary Hardware Development					X							
Systems Integration						X						

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: September 1995

BUDGET ACTIVITY: 5 - Engineering and Manufacturing Development

PE NUMBER AND TITLE: 0604760A Distributive Interactive Simulations - Engineering Development

PROJECT: DC81

A. Project Cost Breakdown

	FY 1995	FY 1996	FY 1997
Systems Engineering	1160		
Primary Hardware Development	679		
Reliability, Availability, and Maintainability	440		
Total	2279		

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1995	FY 1995	FY 1996	FY 1997	Budget to Complete	Total Program
Product Development Organizations										
TBD	Competitive Best Value	Sep 95	2079	2079	0	2079	0	0	0	2079
Support and Management Organizations										
Miscellaneous	Various	Various	200	200	0	200	0	0	0	200

UNCLASSIFIED

REPORTS CONTROL SYMBOL DD-COMP(AR)1092	BUDGET ITEM JUSTIFICATION SHEET	DATE: September 1995
APPROPRIATION/BUDGET ACTIVITY: OTHER PROCUREMENT: ARMY 3 OTHER SUPPORT EQUIPMENT	P-1 ITEM NOMENCLATURE: RECONFIGURABLE SIMULATORS (KA6000)	

		FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
QUANTITY								
COST (IN MILLIONS)			12.6	17.3	17.2	8.3	4.2	3.4

DESCRIPTION:

THE RECONFIGURABLE SIMULATOR PROGRAM (RSP) PROVIDES SIMULATORS FOR USE IN THE ARMY'S CORE DISTRIBUTED INTERACTIVE SIMULATION FACILITIES (CDF). THE RSP WILL LEVERAGE OFF OVERREACHING ARCHITECTURE AND PROCURE SIMULATORS WITH SUBSTANTIALLY MORE CAPABILITY THAN CURRENT SIMULATORS AT A SIGNIFICANT REDUCTION IN COST. THESE SIMULATORS WILL PROVIDE A WIDE RANGE OF FUNCTIONALITY OF AVIATION AND GROUND SIMULATOR ASSETS. THE SIMULATOR UPGRADES WILL ENHANCE THE CDF CAPABILITY OF THE ARMY TO ANALYZE USER REQUIREMENTS AND EVALUATE ALTERNATIVE TECHNICAL APPROACHES FOR SATISFYING THOSE REQUIREMENTS. UPGRADES WILL INCREASE CAPABILITIES OF SIMULATOR VISUAL DISPLAY SYSTEMS, COMPUTER IMAGE GENERATORS, HOST COMPUTER PROCESSING POWER AND NETWORK INTERFACE STANDARDS. THE FY97 PROCUREMENT SUPPORTS THE BATTLE LAB RECONFIGURABLE SIMULATOR INITIATIVE TO PROVIDE RECONFIGURABLE SIMULATORS FOR THE ARMY'S BATTLE LABORATORIES. THESE SIMULATORS WILL PORTRAY A WIDE RANGE OF FUNCTIONAILITY, AND WILL CONCENTRATE ON GROUND, AIR, AND BATTLE COMMAND VEHICLES AND SYSTEMS TO SPAN ALL BATTLEFIELD OPERATING SYSTEMS. THE SIMULATORS WILL BE FIELDED TO THE DISMOUNTED BATTLE SPACE BATTLE LAB (FORT BENNING, GA), AVIATION TEST BED (FORT RUCKER, AL), AND BATTLE COMMAND BATTLE LAB (FORT LEAVENWORTH, KS).

JUSTIFICATION:

RECONFIGURABLE SIMULATORS AND UPGRADES PROCURED FOR THE ARMY'S CORE DISTRIBUTED INTERACTIVE SIMULATION FACILITIES LINK WITH BATTLE LABORATORIES, RESEARCH AND DEVELOPMENT CENTERS, INDUSTRY AND ACADEMIA TO CHANGE THE CURRENT PARADIGN OF CONDUCTING BUSINESS IN THE MATERIEL ACQUISITION PROCESS. THE FY97 PROCUREMENT OF RECONFIGURABLE SIMULATORS ARE ESSENTIAL TO ARMY ACHIEVING OBJECTIVES OF FORCE XXI, LOUISIANA MANEUVERS, SYNTHETIC THEATER OF WAR (STOW), NUMEROUS ADVANCED TECHNOLOGY DEMONSTRATIONS, AND ADVANCED WARFIGHTING EXPERIMENTS THE FY97 PROCUREMENT WILL PROVIDE THE CDF WITH THE NECESSARY TOOLS TO COMBINE MATERIEL DEVELOPMENT, TRAINING DEVELOPMENT, AND REQUIREMENTS VALIDATION AT THE SAME FACILITIES. THE FY97 SIMULATOR UPGRADES ARE REQUIRED TO ACCURATELY PORTRAY AVIATION AND GROUND ASSETS IN THE SYNTHETIC ENVIRONMENT, WITH PARTICULAR EMPHASIS ON THE EMERGING VIRTUAL SIMULATION DOMAIN, INCLUDING MANNED SIMULATORS OPERATING IN A SYNTHETIC ENVIRONMENT. THE FY97 RECONFIGURABLE SIMULATORS ARE REQUIRED TO PROVIDE THE ARMY WITH THE ABILITY TO DETERMINE THE WAR-FIGHTING IMPACT OF A VARIETY OF EMERGING SYSTEMS, TECHNOLOGIES AND CAPABILITIES FOR THE FORCE PROJECTION ARMY.

WEAPON SYSTEM COST ANALYSIS EXHIBIT (P-5) RECONFIGURABLE SIMULATORS (KA6000)		A. APPROPRIATION/BUDGET ACTIVITY OTHER PROCUREMENT: ARMY3 OTHER SUPPORT EQUIPMENT			B. WEAPON RECONFIGURABLE SIMULATORS			C. MANUFACTURER NAME PLANT CITY/STATE LOCATION UNKNOWN			D. DATE September1995		
Weapon System Cost Elements	Ident. Code	Unit cost	Qty	Total Cost	FY95 Unit cost	FY95 Qty	FY95 Total Cost	FY96 Unit cost	FY96 Qty	FY96 Total Cost	FY97 Unit cost	FY97 Qty	FY97 Total Cost
1. HARDWARE													
A. HELMET MOUNTED DISPLAY SYS Bemmy CDF upgrade	A							67,900	4	272			
B. COMPUTER IMAGE GENERATOR	A							291,000	4	1,164			
C. FIBER DISTRIBUTED DATA INTERFACE	A							969,000	1	969			
D. SIMULATOR UPGRADE-FT RUCKER	A							1,164,000	4	4,656			
E. RECONFIG. AVIATION SIMULATOR	B										1,164,000	2	2,328
F. RECONFIG. GROUND SIMULATOR	B							785,000	3	2,357	785,000	10	7,850
G. SIMULATOR UPGRADE-FT KNOX	A							910,792	3	2,732	750,780	3	2,252
H. RECONFIGURABLE FIRE SUPPORT SIMULATOR	B										808,550	2	1,617
I. RECONFIGURABLE BATTLE COMMAND SIMULATOR	B										2,275,000	1	2,275
J. STOW SUITE	A										500,000	1	500
2. GOVERNMENT ENGINEERING										212			321
3. TESTING										254			141
GROSS P-1 END COST										12,362			17,143

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		PAGE 1 OF 1 PAGES EXHIBIT P-5

A - COTS
R - STILL IN DEV - BLRSI

BUDGET PROCUREMENT HISTORY AND PLANNING EXHIBIT (P-5A)					A. DATE: September 1995					
B. APPROPRIATION / BUDGET ACTIVITY: OTHER PROCUREMENT: ARMY 3					C. P-1 ITEM NOMENCLATURE: RECONFIGURABLE SIMULATORS (KA6000)					
LINE ITEM / FISCAL YEAR	CONTRACTOR AND LOCATION	CONTRACT METHOD & TYPE	CONTRACTED BY	AWARD DATE	DATE OF FIRST DELIVERY	QUANTITY	UNIT COST	SPECS AVAILABL NOW	SPEC REV REQ'D	IF YES, WHEN AVAILABLE
A. HELMET MOUNTED DISPLAY SYS										
FY96	UNKNOWN	C/CPFF	NAVAL AIR WARFARE CENTER ORLANDO, FL	Dec 95	Feb 96	4	67,900	Yes	No	
B. COMPUTER IMAGE GENERATOR										
FY96	UNKNOWN	C/CPFF	NAVAL AIR WARFARE CENTER ORLANDO, FL	Dec 95	Feb 96	4	291,000	Yes	No	
C. FIBER DISTR DATA INTERFACE										
FY96	UNKNOWN	C/CPFF	NAVAL AIR WARFARE CENTER ORLANDO, FL	Dec 95	May 96	1	969,000	Yes	No	
D. SIMULATOR UPGRADE-FT RUCKER										
FY96	UNKNOWN	C/CPFF	NAVAL AIR WARFARE CENTER ORLANDO, FL	May 96	Oct 96	4	1,164,000	Yes	No	
E. RECONFIG AVIATION SIMULATOR										
FY97	UNKNOWN	C/CPIF	NAVAL AIR WARFARE CENTER ORLANDO, FL	May 97	Oct 97	2	1,164,000	No		Mar 97
F. RECONFIG GROUND SIMULATOR										
FY96	UNKNOWN	C/CPIF	NAVAL AIR WARFARE CENTER ORLANDO, FL	May 96	Dec 96	3	785,000	No		Mar 96
FY97	UNKNOWN	OPTION		Dec 96	Jun 97	7	785,000	No		Nov 96

D. REMARKS

F. RECONFIGURABLE SIMULATORS WILL BE PROCURED THROUGH PRODUCTION OPTIONS TO THE COMPETITIVE R&D CONTRACT.

BUDGET PROCUREMENT HISTORY AND PLANNING EXHIBIT (P-5A)					A. DATE: September 1985					
B. APPROPRIATION / BUDGET ACTIVITY: OTHER PROCUREMENT: ARMY 3					C. P-1 ITEM NOMENCLATURE: RECONFIGURABLE SIMULATORS (KA6000)					
LINE ITEM / FISCAL YEAR	CONTRACTOR AND LOCATION	CONTRACT METHOD & TYPE	CONTRACTED BY	AWARD DATE	DATE OF FIRST DELIVERY	QUANTITY	UNIT COST	SPECS AVAILABL NOW	SPEC REV REQ'D	IF YES, WHEN AVAILABLE
G. SIM UPGRADE-FT KNOX										
FY96	UNKNOWN	C/CPFF	NAVAL AIR WARFARE CENTER ORLANDO, FL	May 96	Oct 96	3	910,792	Yes	No	
FY97	UNKNOWN	OPTION		May 97	Oct 97	3	750,760	Yes	No	
H. RECONFIG FIRE SUPPORT SIM										
FY97	UNKNOWN	C/CPIF	NAVAL AIR WARFARE CENTER ORLANDO, FL	Apr 97	Oct 97	2	808,550	No		Nov 96
I. RECONFIG BATTLE COMMAND SIM										
FY97	UNKNOWN	C/CPIF	NAVAL AIR WARFARE CENTER ORLANDO, FL	May 97	Nov 97	1	2,275,000	No		Mar 97
J. STOW SUITE										
FY97	UNKNOWN	C/CPIF	NAVAL AIR WARFARE CENTER ORLANDO, FL	Dec 96	Jul 97	1	500,000	Yes	No	

D. REMARKS

F. RECONFIGURABLE SIMULATORS WILL BE PROCURED THROUGH PRODUCTION OPTIONS TO THE COMPETITIVE R&D CONTRACT.

CODE "B" ITEM DESCRIPTION	DATE: September 1995	REPORT CONTROL SYMBOL: DD-COMP(AR) 1092

APPROPRIATION	ACTIVITY	P-1 ITEM NOMENCLATURE:
OTHER PROCUREMENT: ARMY3	OTHER SUPPORT EQUIPMENT	RECONFIGURABLE GROUND SIMULATORS - MOUNTED (KA6000)

1. CURRENT DEVELOPMENT AND TEST STATUS

		SCHEDULE DATE		
		CURRENT	LAST REPORTED	REASON FOR DELAY
a. DEV TEST & EVAL (DT&E)	PLAN/ACTUAL	NA		
b. INITIAL OPER TEST & EVAL (IOT&E)	PLAN/ACTUAL	NA		
c. OPER TEST & EVAL/PPQT	PLAN/ACTUAL	MAR 96		
d. AVAIL DATE OF TECH DATA PKG OR PERFORMANCE SPECIFICATIONS	PLAN/ACTUAL	MAR 96		

2. ESTIMATED DATE OF APPROVAL FOR SERVICE USE

Apr-96

3. EQUIPMENT ITEM(S) TO BE REPLACED

BDSD SIMULATORS

4. EXTENT OF IMPROVEMENT OVER ITEM(S) EQUIPMENT TO BE REPLACED

WILL PROVIDE LEVEL II SIMULATION ENVIRONMENT

5. DEVELOPMENT CONTRACT INFORMATION

CONTRACTOR NAME	PLANT LOCATION	COMPONENT	THROUGH FY8	CY8	BY1	BY2	BEYOND BY'S
UNKNOWN			6.230	0.300	0.000	0.000	
TOTAL RDT&E FUNDING		SEE REMARKS	6.230	0.300	0.000	0.000	

6. REMARKS

1 c. PPQT/Preproduction Qualification Test

ROTE CONTRACT TO BE AWARDED 28 SEP 95.

CODE "B" ITEM DESCRIPTION	DATE: September 1995	REPORT CONTROL SYMBOL DD-COMP(AR) 1092

APPROPRIATION	ACTIVITY	P-1 ITEM NOMENCLATURE:
OTHER PROCUREMENT: ARMY3	OTHER SUPPORT EQUIPMENT	RECONFIGURABLE GROUND SIMULATORS - LIGHT (KA6000)

1. CURRENT DEVELOPMENT AND TEST STATUS

		SCHEDULE DATE		
		CURRENT	LAST REPORTED	REASON FOR DELAY
a. DEV TEST & EVAL (DT&E)	PLAN/ACTUAL	NA		
b. INITIAL OPER TEST & EVAL (IOT&E)	PLAN/ACTUAL	NA		
c. OPER TEST & EVAL/PPQT	PLAN/ACTUAL	NOV 96		
d. AVAIL DATE OF TECH DATA PKG OR PERFORMANCE SPECIFICATIONS	PLAN/ACTUAL	NOV 96		

2. ESTIMATED DATE OF APPROVAL FOR SERVICE USE

Dec-96

3. EQUIPMENT ITEM(S) TO BE REPLACED

BDSD SIMULATORS

4. EXTENT OF IMPROVEMENT OVER ITEM(S) EQUIPMENT TO BE REPLACED

WILL PROVIDE LEVEL II SIMULATION ENVIRONMENT

5. DEVELOPMENT CONTRACT INFORMATION

CONTRACTOR NAME	PLANT LOCATION	COMPONENT	THROUGH FYR	CYA	BY1	BY2	BEYOND BY'S
UNKNOWN			1.800	0.500	0.200	0.006	
TOTAL RDT&E FUNDING		SEE REMARKS	1.800	0.500	0.200	0.800	

6. REMARKS

1 c. PPQT/Preproduction Qualification Test

RDTE CONTRACT TO BE AWARDED 28 SEP 95.

CODE "B" ITEM DESCRIPTION	DATE: September 1995	REPORT CONTROL SYMBOL DD-COMP(AR) 1092

APPROPRIATION	ACTIVITY	P-1 ITEM NOMENCLATURE:
OTHER PROCUREMENT: ARMY3	OTHER SUPPORT EQUIPMENT	RECONFIGURABLE AVIATION SIMULATORS (XA6000)

1. CURRENT DEVELOPMENT AND TEST STATUS

		SCHEDULE DATE		
		CURRENT	LAST REPORTED	REASON FOR DELAY
a. DEV TEST & EVAL (DT&E)	PLAN/ACTUAL	NA		
b. INITIAL OPER TEST & EVAL (IOT&E)	PLAN/ACTUAL	NA		
c. OPER TEST & EVAL/PPQT	PLAN/ACTUAL	MAR 97		
d. AVAIL DATE OF TECH DATA PKG OR PERFORMANCE SPECIFICATIONS	PLAN/ACTUAL	MAR 97		

2. ESTIMATED DATE OF APPROVAL FOR SERVICE USE

Apr-97

3. EQUIPMENT ITEM(S) TO BE REPLACED

BDSD SIMULATORS

4. EXTENT OF IMPROVEMENT OVER ITEM(S) EQUIPMENT TO BE REPLACED

WILL PROVIDE LEVEL II SIMULATION ENVIRONMENT

5. DEVELOPMENT CONTRACT INFORMATION

CONTRACTOR NAME	PLANT LOCATION	COMPONENT	THROUGH FYR	CYR	BY1	BY2	BEYOND BY'S
UNKNOWN			0.200	0.500	1.000	0.000	
TOTAL RDT&E FUNDING		SEE REMARKS	0.200	0.500	1.000	0.000	

6. REMARKS

1 c. PPQT/Preproduction Qualification Test

RDTE CONTRACT TO BE AWARDED 28 SEP 95.

CODE "B" ITEM DESCRIPTION	DATE	REPORT CONTROL SYMBOL
	September 1995	DD-COMP(AR) 1092

APPROPRIATION	ACTIVITY	P-1 ITEM NOMENCLATURE:
OTHER PROCUREMENT: ARMY3	OTHER SUPPORT EQUIPMENT	RECONFIGURABLE FIRE SUPPORT SIMULATORS (KA6000)

1. CURRENT DEVELOPMENT AND TEST STATUS

		SCHEDULE DATE		
		CURRENT	LAST REPORTED	REASON FOR DELAY
a. DEV TEST & EVAL (DT&E)	PLAN/ACTUAL	NA		
b. INITIAL OPER TEST & EVAL (IOT&E)	PLAN/ACTUAL	NA		
c. OPER TEST & EVAL/PPQT	PLAN/ACTUAL	NOV 96		
d. AVAIL DATE OF TECH DATA PKG OR PERFORMANCE SPECIFICATIONS	PLAN/ACTUAL	NOV 96		

2. ESTIMATED DATE OF APPROVAL FOR SERVICE USE

Dec-96

3. EQUIPMENT ITEM(S) TO BE REPLACED

BDSD SIMULATORS

4. EXTENT OF IMPROVEMENT OVER ITEM(S) EQUIPMENT TO BE REPLACED

WILL PROVIDE LEVEL II SIMULATION ENVIRONMENT

5. DEVELOPMENT CONTRACT INFORMATION

CONTRACTOR NAME	PLANT LOCATION	COMPONENT	THROUGH PYR	CYR	BY1	BY2	BEYOND BY'S
UNKNOWN			0.200	0.780	0.200	0.000	
TOTAL RDT&E FUNDING		SEE REMARKS	0.200	0.780	0.200	0.000	

6. REMARKS

1 c. PPQT/Preproduction Qualification Test

RDTE CONTRACT TO BE AWARDED 28 SEP 95.

CODE "B" ITEM DESCRIPTION	DATE: September 1995	REPORT CONTROL SYMBOL DD-COMP(AR) 1092

APPROPRIATION	ACTIVITY	P-1 ITEM NOMENCLATURE:
OTHER PROCUREMENT: ARMY3	OTHER SUPPORT EQUIPMENT	RECONFIGURABLE BATTLE COMMAND SIMULATORS (KA6000)

1. CURRENT DEVELOPMENT AND TEST STATUS

		SCHEDULE DATE		
		CURRENT	LAST REPORTED	REASON FOR DELAY
a. DEV TEST & EVAL (DT&E)	PLAN/ACTUAL	NA		
b. INITIAL OPER TEST & EVAL (IOT&E)	PLAN/ACTUAL	NA		
c. OPER TEST & EVAL/PPQT	PLAN/ACTUAL	MAR 97		
d. AVAIL DATE OF TECH DATA PKG OR PERFORMANCE SPECIFICATIONS	PLAN/ACTUAL	MAR 97		

2. ESTIMATED DATE OF APPROVAL FOR SERVICE USE

Apr-97

3. EQUIPMENT ITEM(S) TO BE REPLACED

BDSD SIMULATORS

4. EXTENT OF IMPROVEMENT OVER ITEM(S) EQUIPMENT TO BE REPLACED

WILL PROVIDE LEVEL II SIMULATION ENVIRONMENT

5. DEVELOPMENT CONTRACT INFORMATION

CONTRACTOR NAME	PLANT LOCATION	COMPONENT	THROUGH PYR	CYR	BY1	BY2	BEYOND BY'S
UNKNOWN			1.200	1.800	0.600	0.000	
TOTAL RDT&E FUNDING		SEE REMARKS	1.200	1.800	0.600	0.000	

6. REMARKS

1 c. PPQT/Preproduction Qualification Test

UNCLASSIFIED

REPORTS CONTROL SYMBOL
DD-COMPTR(AR)1092

DATE September 1995

PRODUCTION SCHEDULE

APPROPRIATION / BUDGET ACTIVITY

OTHER PROCUREMENT: ARMY 3
OTHER SUPPORT EQUIPMENT

P-1 ITEM NOMENCLATURE
RECONFIGURABLE SIMULATORS

(KA8000)

FACILITY NO	U/M	S/R/V	PROGRAM QUANTITY FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	ACCEPT PRIOR TO 1 OCT	BAL DUE AS OF 1 OCT	FISCAL YEAR 96 CALENDAR YEAR 96 OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
A		A	4							4			A		1	1	1	1				
B		A	4							4			A		1	1	1	1				
C		A	1							1			A					1				
D		A	4							4								A				
E		A		2						2												
F		A	3							3								A				
F		A		10						10												
G		A	3							3								A				
G		A		3						3												
H		A		2						2												
I		A		1						1												
J		A		1						1												
TOTAL MONTHLY PRODUCTION									0	39	0	0	0	0	2	2	3	3	0	0	0	0

FACILITY NO	U/M	S/R/V	PROGRAM QUANTITY FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	ACCEPT PRIOR TO 1 OCT	BAL DUE AS OF 1 OCT	FISCAL YEAR 97 CALENDAR YEAR 97 OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
A		A	4							4			1									
B		A	4							4			1									
C		A	1							1												
D		A	4							4	1	1	1	1								
E		A		2						2								A				
F		A	3							3			1	1	1							
F		A		10						10			A						1	1	2	2
G		A	3							3	1	1	1									
G		A		3						3								A				
H		A		2						2							A					
I		A		1						1								A				
J		A		1						1			A							1		
TOTAL MONTHLY PRODUCTION											2	2	3	2	1	0	0	0	1	2	2	2

FACILITY NO	U/M	S/R/V	PROGRAM QUANTITY FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	ACCEPT PRIOR TO 1 OCT	BAL DUE AS OF 1 OCT	FISCAL YEAR 98 CALENDAR YEAR 98 OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	LAYER
A		A	4							4													0
B		A	4							4													0
C		A	1							1													0
D		A	4							4													0
E		A		2						2	1	1											0
F		A	3							3													0
F		A		10						10	2	2	2										0
G		A	3							3													0
G		A		3						3	1	1	1										0
H		A		2						2	1	1											0
I		A		1						1		1											0
J		A		1						1													0
TOTAL MONTHLY PRODUCTION											5	6	1	0	0	0	0	0	0	0	0	0	0

FACILITY NO	MANUFACTURER'S NAME & LOCATION	PRODUCTION RATES MINIMUM	1-86	MAXIMUM	MONTHS TO REACH MAX AFTER 0 DAY	PROCUREMENT LEAD TIME	ADMIN LEAD TIME PRIOR TO 1 OCT	ADMIN LEAD TIME AFTER 1 OCT	MANUFACTURING TIME	TOTAL AFTER 1 OCT
	COTR									
						INITIAL				
						REORDER				

REMARKS 1. FAT SEP-NOV 96 E,H,L FAT JUL-SEP 97

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APPENDIX 8

DIS Baseline Study References

Appendix 8. DIS Baseline Study References

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APPENDIX 9

DIS Information Request Summary

DIS INFORMATION REQUEST SUMMARY

10/6/95

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#1	Mobile Automated Instrumentation Suite (MAIS)	OPTEC Hung Nguyen STRICOM	Instrumentation system forTest and Training of new weapon systems and doctrine	ARMY	LIVE	T&E
#2	Individual Combatant Simulation System (ICSS)	DMSO Joe Santilli NAWC-TSD	Insert individual soldiers (combatants and maintenance technicians) into a DIS compliant virtual environment	ARMY NAVY USAF	VIRTUAL	EDUCATION TRAINING MIL OPS
#3	Advanced Amphibious Assault Vehicle	USMC Dr. James Eridon General Dynamics	Develop a DIS-compliant crew station simulator, as well as Semi-Automated Forces which can exercise the vehicle in platoon-level formations.	USMC	CONSTRUCTIVE VIRTUAL	EDUCATION TRAINING MIL OPS
#4	A Multimodeling Framwork for Complex Multi-Agent Systems	USAF Dr. Paul Fishwick University of Florida	To construct a multimodeling capability as part of the MOOSE (Multimodeling Object Oriented Simulation Environment)	USAF	CONSTRUCTIVE	R&D
#5	Integrating Stochastic and Simulation-Based Models into CCCI Automated Planning Tasks	USAF Dr. Paul Fishwick University of Florida	To construct a simulation-based capability as part of the MOOSE (Multimodeling Object Oriented Simulation Environment)	USAF	CONSTRUCTIVE	R&D
#6	Foreign Ground Forces Characteristics and Performance Database	National Ground Intelligence Center Janet Marrow	Database of DIA-validated foreign ground equipment	OSD	CONSTRUCTIVE	EDUCATION TRAINING MIL OPS
#7	Joint Theater Missile Defense (JTMD) Attack Operations Joint Test Force (JTF)	OSD (DDT&E) Maj Jeff Simmers JTMD	Examine the application of national and service owned sensors, C4I systems, and attack systems using CINC approved architectures and tactics, techniques, and procedures for selected regions.	OSD	CONSTRUCTIVE	EDUCATION TRAINING MIL OPS ANALYSIS T&E
#8	Joint Theater Level Simulation (JTLS)	Joint Warfare Fighting Center (JWFC) Lt Col Bolling	JTLS is an interactive, multi-sided, joint (air, land, sea, SOF) and combined (coalition warfare) model. JTLS models conflict (combat operations, pre-combat, and post-combat) with tactical fidelity.	OSD	CONSTRUCTIVE	R&D

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#9	M&S for Countermine	CECOM RDEC NVL Pamela Jacobs NVL	We are develping CASTFOREM and DIS representations of all our individual systems both fielded and developmental. For DIS we are developing workstation simulators for the tech base systems and mines, and ModSAF additions for the fielded systems.	ARMY	CONSTRUCTIVE VIRTUAL	R&D T&E
#10	Synthetic Theater of War - Synthetic Environments (STOW-SE)	ARPA , DMSO TEC Juan Perez TEC	The STOW Program seeks to demonstrate technologies enabling the integration of war-fighting with (1) live instrumented simulation ranges; (2) manned virtual simulators; and (3) constructive simulations into a common synthetic battlespace.	ARMY	LIVE VIRTUAL CONSTRUCTIVE	T&E EDUCATION TRAINING MIL OPS
#11	F-16 Taiwan	OSD (FMS) Mike Osgood BGM-LINK	2 Full Mission Trainers (FMT) and 5 Unit Level Trainers (ULT) networked via DIS on a Local Area Network.	OSD	VIRTUAL	R&D
#12	A DIS Model for a Multisensor Airborne Surveillance Platform	MITRE John SantaPietro	The purpose of this project is the development of a DIS-compliant model for a UAV carrying an MTI radar, a SAR, and a second generation FLIR. This model is bundled into a ModSAF environment.	ARMY	CONSTRUCTIVE	R&D
#13	JRTC Objective Instrumentation System (JRTC-IS)	ATSC Ft. Eustis VA John Wright	The instrumented JRTC will provide the automated capability to collect and record exercise events for battlefield replay and analysis to support training conducted at the JRTC.	ARMY	LIVE	ANALYSIS
#14	NTC-Objective Instrumentation System (NTC-IS)	ATSC Ft. Eustis VA John Wright	The NTC-IS will be an integrated system to accomplish training performance feedback and analysis for rotational units and other Army components.	ARMY	LIVE	ANALYSIS

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#15	Combat Maneuver Training Center-Instrumentation System (CMTC-IS), Hohenfels, Germany	ATSC Ft. Eustis VA John Wright	The instrumented CMTC-IS will provide the automated capability to collect and record exercise events for battlefield replay and analysis to support training.	ARMY	LIVE	ANALSIS
#16	VETRONICS Simulation Facility	TARDEC Detroit MI John Brabbs	The VSF's capabilities allow TARDEC Virtual Prototype process to run secure in-house simulation exercises and/or long haul networked simulation.	ARMY	VIRTUAL	P&L
#17	IV&V of the Joint Countermine Operations Simulation (JCOS)	DMSO JCOS Larry Staudmeister Illgen Simulation Technologies	A prototype application of the DMSO-sponsored VV&A Technical Working Group 9-step DIS Exercise (VV&A) Methodology	NAVY ARMY	CONSTRUCTIVE	EDUCATION TRAINING MIL OPS R&D
#18	Weapons Effects and Environments Modeling and Simulation (WEEMS)	DNA Ron Defranco Applied Data Technology	The WEEMS program, a concept called the Virtual Interactive Target (VIT), is a set of visual models and associated phenomenology algorithms that provide ground-based targets in DIS.	OSD	VIRTUAL CONSTRUCTIVE	R&D
#19	Anti Armor Advanced Technology Demonstration (A2 ATD)	AMC Wil Brooks ARL	Demonstrate DIS as an evaluation tool and verify, validate, and accredit simulators used in A2 ATD experiments, semi automated forces, and BDS-D simulation.	ARMY	VIRTURAL LIVE	R&D
#20	Joint Advanced Distributed Simulation (JADS) JT&E Program	OSD USD(A) Col Mark Smith AFOTEC	The JADS JT&E program is an OSD Joint-Service effort to determine how well Advanced Distributed Simulation (ADS) can support test and evaluation activities.	USAF	LIVE VIRTUAL CONSTRUCTIVE	T&E

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#21	Master Environmental Library	OSD DMSO Paul Foley	The Master Environmental Library project provides the basis for detailed, consistent, natural environment in a common format in representing the natural environment in which all service M&S users must operate.	JOINT	VIRTUAL	EDUCATION TRAINING MIL OPS
#22	Advanced Simulation and Training Initiatives (ASTI)	Northrop Grumman IR&D David B. Fruchey	A portable test and training range system that combines live, virtual, and constructive players in a DIS environment.	NAVY	LIVE VIRTUAL CONSTRUCTIVE	T&E
#23	Rapid Force Projection Initiative Simulation (RFPI)	US ARMY MICOM Greg B. Tackett	To increase lethality, survivability, and tempo for early entry forces through the use of a Hunter Standoff-Killer concept.	ARMY	LIVE VIRTUAL	T&E EDUCATION TRAINING
#24	Outrider Distributed Simulation Project	ARMY STINGRAY Ron Kashmar	The Outrider Distributed Simulation Project is a virtual prototyping experiment which involves the development of software and integration of hardware to simulate a HMMWV with adjunct weapon systems on a virtual battlefield	ARMY	VIRTUAL CONSTRUCTIVE	T&E
#25	Night for BDS-D Development	ARMY NVL Larry Bramlette NVESD	Integration and development of tool sets to support DIS displays and real-time display of infrared scenes during DIS exercises	ARMY	VIRTUAL CONSTRUCTIVE	EDCUCATION TRAINING MIL OPS
#26	XMDEWS Support	Los Alamos National Lab Jim Hodges	Integration of aircraft and air defense system simulators in a Distributed Interactive Simulation	ARMY	CONSTRUCTIVE VIRTUAL	T&E MIL OPS
#27	Stingray	Los Alamos National Lab Jim Hodges	Support of real-time and after action data analysis using information from simulation network traffic	ARMY	LIVE VIRTUAL CONSTRUCTIVE	EDUCATION TRAINING MIL OPS

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#28	Defense Airborne Reconnaissance Effort (DARO)	USAF ROME LAB Deborah Amodio	Use of a DARO exercise CONOPS architecture definitions and data input and analysis for both constructive and DIS-based M&S efforts.	USAF	CONSTRUCTIVE	ANALYSIS
#29	DIS/GPS Optimal Virtual Range (DISGOVR)	USAF TRW TASC	The DIS GPS Optimal Virtual Range Applications (DISGOVR) project is to enable an optimal mix of live and simulated range assets for more efficient and effective DoD range interoperable test and training.	USAF	LIVE VIRTUAL	T&E
#30	The Joint Precision Strike Demonstration (JPSD) Integration and Evaluation Center (IEC) Systems	ARMY TEC Kathleen Suduiko Raytheon	Integration of live weapon systems, man-in-the-loop simulators, and simulated entities/Utilization of ARPA War Breaker SimCore	ARMY	VIRTUAL CONSTRUCTIVE	T&E
#31	Tri-service Advanced Countermeasures and Threats Integrated Combat Simulation (TACTICS)	ARMY TACOM Dale Pement	The focus of TACTICS is to develop an infrastructure that will enable the integration of existing and new high fidelity simulations for assessing ground combat vehicle survivability and development of next generation survivability systems.	ARMY NAVY AIR FORCE	VIRTUAL CONSTRUCTIVE	EDCUCATION TRAINING MIL OPS
#32	Integrated Computer Generated Forces Terrain Database (ICTDB)	OSD ARPA George Lukes	Developing the architecture and software that offer a new capability in terrain database representation - the Integrated Computer Generated Forces (CGF) Terrain Database	OSD	VIRTUAL CONSTRUCTIVE	ANALYSIS
#33	ReconfigurableTactical Operations Simulator (RTOS) DIS Program	ARMY AADAS DMSO John Armendariz	Provides a high-fidelity and flexible simulator necessary to evaluate air defense systems within diverse environments. RTOS is a modular, soldier-in-the-loop, real-time, (DIS) compliant computer simulation	ARMY	VIRTUAL CONSTRUCTIVE	ANALYSIS EDUCATION TRAINING MIL OPS

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#34	Interactive Survivability Simulation	ARMY CECOM NVESD Joe Aletta	Provide EW training capability to Test Beds over DIS Evaluate/Demonstrate EW ATD hardware w/Testbeds. Develop and Validate EW Simulation Models	ARMY	CONSTRUCTIVE	T&E
#35	Interoperability of Dissimilar Visual Systems, An Enhanced DIS Scene Manager	STRICOM Dr. Eytan Pollak Lockheed Martin	Monitor and predict Simulator Load and Interoperability characteristics for Simulators on a DIS network.	ARMY	VIRTUAL	ANALYSIS
#36	Joint Interoperability Test and Training Experiment	TECOM 1Lt Mark Tedrow TACCSF Kirtland AFB	JISTTE is an experiment linking live training exercises at the National Test Center (NTC) at Ft Irwin, CA, and large scale constructive simulation at White Sands Missile Range (WSMR).	ARMY	LIVE CONSTRUCTIVE	T&E
#37	Warfighter 95 (WF95)	USAFAWC Maj Ron Wiegand TACCSF Kirtland AFB	WF95 will provide a portal into a large training exercise for the CSAF and CSA during the Warfighter talks taking place on 5 Dec 95 at Hurlburt AFB, FL.	USAF	LIVE CONSTRUCTIVE VIRTUAL	EDUCATION TRAINING MIL OPS
#38	ARPA Reconfigurable Simulation Initiative (ARSI)	ARPA (ASTO) COL Randy Krug ARPA	Full-crew vehicle simulators for deployment at Army National Guard armories for collective training for tactics and maneuver training at Section, Platoon, and Company levels.	ARMY	VIRTUAL	EDUCATION TRAINING MIL OPS
#39	Force XXI Training Program - Limited Reconfigurable Simulator Evaluation	STRICOM PM-DIS Guy Richards	Assessment of the potential of reconfigurable man-in-the-loop vehicle simulators to support Battalion and higher training exercises and warfighting experiments.	ARMY	VIRTUAL	EDUCATION TRAINING MIL OPS
#40	GENEric Smart Indirect fire Simulatiion (GENESIS-DIS)	ARDEC, AMSTA-AR-FSS Bob Webster	GENESIS-DIS will be the DIS-compliant version of GENESIS allowing smart munitions to be played at the entity level in DIS excercises.	ARMY	CONSTRUCTIVE	ANALYSIS EDUCATION TRAINING MIL OPS

	PROGRAM TITLE	SPONSOR/POC	PROGRAM OBJECTIVE	SERVICE	SIMULATION TYPE	FUNCTIONALITY
#41	The SINCGARS Radio Model (SRM)	CECOM/CAC2 Larry Goldberg	Provide realistic communications (including terrain and propagation effects), with ability to integrate live and virtual radio nets, while remaining DIS compliant.	ARMY	LIVE VIRTUAL	EDUCATION TRAINING MIL OPS
#42	SYNTRAIN: Development of Advanced Training Technologies for Distributed Interactive Simulation (DIS) Systems	STRICOM, AMC; TSM CATT, TRADOC; DMSO, ARPA, and DMDC Dr. Steven Goldberg ARI	Optimize the cost and training effectiveness of DIS. An ARI-developed Unit Performance Assessment System (UPAS) provides the basis for development of methods for measuring performance and providing training feedback in networked simulators.	ARMY	CONSTRUCTIVE LIVE	ANALYSIS EDUCATION TRAINING MIL OPS
#43	MOSES: Military Operational Simulation and Evaluation Systems	ARMY TRADOC Dr. Frank Moses ARI	To design and demonstrate decision support methodologies for use by brigade and above headquarters for planning training programs that may involve DIS or other current technologies.	ARMY	CONSTRUCTIVE	ANALYSIS EDUCATION TRAINING MIL OPS
#44	STRONGARM: Strategies for Training and Assessing Armor CommandersÆ Performance with Devices and Simulations	U.S. Army Armor School, TRADOC Dr. Barbara Black ARI	To provide an empirical foundation for designing armor training strategies to assess the tasks and skills that can be best trained with gunnery and maneuver training aids, devices, simulators, and simulations (TADSS).	ARMY	CONSTRUCTIVE	ANALYSIS EDUCATION TRAINING MIL OPS