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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE June 2001	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3						R-1 ITEM NOMENCLATURE Joint Wargaming Simulation Management Office PE 0603832D8Z				
COST (<i>In Millions</i>)	FY2000	FY2001	FY2002						Cost to Complete	Total Cost
Total Program Element (PE) Cost	66.616	62.390	45.065						Continuing	Continuing
JSM/P476	66.616	62.390	45.065						Continuing	Continuing

(U) **A. Mission Description and Budget Item Justification**

(U) **BRIEF DESCRIPTION OF ELEMENT**

The Defense Modeling and Simulation Office has corporate-level responsibility for the cooperation and synergism of modeling and simulation (M&S) activities within the Department of Defense. M&S has demonstrated the capability to revolutionize the way in which the Department makes decisions and conducts its operations. Working as a system of systems, M&S can support a full range of applications (e.g. joint training, doctrine development, formulation and assessment of operational plans, mission rehearsal, force structuring and the acquisition of new systems). To ensure effective and efficient use of M&S, the Department has developed a strategy fostering interoperability and re-use, embodied in the Department of Defense Modeling and Simulation Master Plan, which serves as the basis for execution of this program. The major element of the strategy is development of a common technical framework (CTF) for M&S consisting of three components: the High Level Architecture; Functional Descriptions of the Mission Space (FDMS); and Data Standardization. Supporting these is a broad range of shared common services which include environmental representations; human and organizational behavioral representation; verification, validation and accreditation of simulations; a modeling and simulation resource repository; a modeling and simulation information analysis center; and outreach and education initiatives to ensure standardized and timely implementation of the plan. All aspects of these efforts are focused on the Warfighters of today and tomorrow through a rigorous and ongoing process of capturing and addressing Warfighting customer needs and requirements. As a result of this effort, the Department will be able to lead, integrate and leverage M&S technologies for the Warfighter and thus improve readiness, enhance mission rehearsal, optimize investment decisions, and achieve cost-effective acquisitions.

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(U) **Project Number and Title: P476 JSM**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY 2000 Accomplishments:**

(U) Three operational builds of the High Level Architecture (HLA) Runtime Infrastructure (RTI) 1.3 NG (Next Generation) were completed. The HLA Federation Management Tool, Federation Verification Tool and Data Collection Tool were upgraded in concert with new RTI versions.

(U) Developed and delivered FDMS (formerly CMMS) Data Interchange Format (FDMS-DIF version 2.0) as an XML-based knowledge exchange representation for military operations descriptions. Developed and deployed two knowledge acquisition tools (DoD Capture version 1.0 and FDP-KAT version 3.3). Developed and deployed the fifth operational build of the FDMS Model Library (version 5.0) to fully support FDMS-DIF version 2.0. Developed and delivered UOB Toolset version 3.0) as a DoD Data Dictionary System (DDDS) based knowledge exchange representation for units, personnel, and equipment. Provide Functional Data Administration for M&S in accordance with DoDD 8320.1.

UNCLASSIFIED

UNCLASSIFIED

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(U) Completed the definition of the SEDRIS data interchange mechanism to include establishing an initial set of data access and data transmittal review software tools. Successfully initiated development of six standards based on SEDRIS technologies under the International Standards Organization and the International Electro-technical Commission. SEDRIS technology inserted into the Close Combat Tactical Trainer (CCTT), USSOCOM Database Generation Facility and Joint Simulation System (JSIMS). DMSO integrated environmental technologies supported database preparation and use in Virtual Emergency Response Training System, the Joint Strike Fighter Program, Navy Global 2000 and Fleet Battle Experiments, and use through the Joint Warfare System in preparation for the Quadrennial Defense Review. Environmental Scenario Generation capability generated weather scenarios for use by simulation developers and exercise planners providing consistent and correlated scenarios for analysis, testing, and training simulations. Executed an end-to-end demonstration of the Integrated Natural Environment (INE) Process -- a timely, scenario-driven physically-consistent, cross-domain authoritative "ground truth" of the natural environment based upon user requirements -- to a simulation federation.

(U) Human Behavior Representation needs for M&S communities in Training and Analysis were identified and prioritized resulting in three efforts under research and development: Next Generation Synthetic Forces, Common Modeling Development Environment, and a Decision Model not based on optimization techniques.

(U) M&S Verification Validation & Accreditation guidance on-line with dynamic and interactive capabilities; prototyped VV&A tool and concepts.

(U) The M&S Resource Repository delivered two software releases enabling the ability to search DMSO, service, BMDO, and C4ISR DSC repositories simultaneously; and better catalog resources by creating more diverse resource types, and permitting users to link any resource to multiple documents, located locally or on the internet. Developed and deployed preliminary controlled vocabulary (flat key word list).

(U) The M&S Information Analysis Center (MSIAC) supported 1562 M&S customers resulting in millions of dollars of cost avoidance value. Supported M&S exercises in the areas of experimentation and technology development. Established Special Interest Areas in training, acquisition, weapons of mass destruction, operations other than war, M&S community needs, and simulation-based acquisition.

UNCLASSIFIED

UNCLASSIFIED

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(U) Refined and updated existing M&S education courses to ensure they reflect current DoD programs, initiatives and changes and presented them to over 2000 customers and users. Commenced effort to develop and distribute new courses through electronic technologies.

(U) Established the process to select and cooperatively develop science and technology projects with high payoff to the Department's M&S program.

(U) Identified C4I-to-simulation requirements within the Defense Information Infrastructure (DII) Common Operating Environment (COE), and coordinated implementation of common solutions for interface capabilities. Demonstrated the ability to re-use Global Command and Control System (GCCS) C4I-to-simulation interfaces across variety of simulations and domains.
(\$ 75.416 million)

(U) **FY 2001 Plans:**

(U)(U) The High Level Architecture (HLA) program will focus on the implementation of the new Institute of Electrical and Electronics Engineers (IEEE) specification (1516). A new IEEE 1516 Runtime Infrastructure (RTI) will be developed, tested, fielded and optimized. HLA Tools, including the Object Model Development Tool, Federation Execution Planner's Workbook Tool, Federation Verification Tool, Federation Management Tool and Data Collection Tool will be upgraded to the new specification. Experimentation with and performance of the RTI will be preformed and measured in consonance with acquisition programs technical requirements.

UNCLASSIFIED

UNCLASSIFIED

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(U) Begin bayan integration research. Integrate Functional Descriptions of the Mission Space (FDMS) Data Interchange Format (DIF) version 2, the C4ISR Architecture Data Model (CADM) version 2, and selected portions of the Synthetic Environment Data Representation and Interchange Specification (SEDRIS) to produce version 1 of the Military Domain Representation Framework (MDRF) knowledge exchange representation. Adapt FDMS products to employ the M&S Resource Repository Authorization and Authentication (A&A) product. Adapt the knowledge acquisition tools (DoD Capture version and FDP-KAT) to support WarSim Behavior Representation Language, TRADOC Transformation of the Army, and OneSAF. Develop and deploy FDMS Model Library version 6.0 to provide scripted workflow procedures and to support round trip data exchange with CADM version 2.0.; Continue to provide Functional Data Administration for M&S in accordance with DoDD 8320.1.

(U) Begin development of the Electronic Order of Battle (EOB) Toolset and Task Organization Toolset (TOTL). Begin transition of the Joint Munitions Effectiveness Manual (JMEM) to the Joint Munitions Effectiveness Toolset (JMET). Integrate the ADS Library into the Modeling and Simulation Resource Repository (MSRR). Adapt the UOB Toolsets to employ the MSRR Authorization and Authentication (A&A) product. Complete development of UOB Toolset by deploying version 4.0. Develop and deploy the Data Verification Interactive Editor (DAVIE) version 2.0 to support XML-based data structures.

(U) Complete environmental interchange mechanism definition and full technical documentation. Expand software tools for Synthetic Environment Data Representation and Interchange Specification (SEDRIS) transmittal generation, verification, and consumption. Complete atmosphere and ocean common data model development and promote captured requirements within the M&S and operational data provider communities. Evaluate sources and procedures for the use of alternate sources for database generation, to include commercial options. Provide additional tools, reference data sets, policies and procedures for the generation of integrated databases expanding existing terrain and ocean capabilities and integrating atmosphere and space data and effects. Initiate development of the key technical components of an INE Authoritative Representation Process to facilitate the scenario composition and generation of consistent environmental representations. Expand operational capability for Master Environmental Library with both Internet and SIPRNET capability. Complete meta-data specification and implementation in access and resource site software. Continue a series of periodic end-to-end experiments/demonstrations to assess and validate the progress of technical development.

UNCLASSIFIED

UNCLASSIFIED

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(U) Initiate the development of technologies and tools to support incorporation of authoritative representations of human and organizational behavior into DoD simulations. Continue development of efforts in: Next Generation Synthetic Forces, Common Modeling Development Environment, and a Decision Model not based on optimization techniques.

(U) Initiate Verification, Validation, and Accreditation (VV&A) studies: fidelity, specifications for reuse, and conceptual framework model coverage. Perform technical analysis of human behavior models with respect to VV&A practices and methods. Assess on going tool developments.

(U) Restructure M&S Resource Repository (MSRR) registration database to more robust form. Develop and deploy classified software version with appropriate markings and classified administrative functions. Develop a true controlled vocabulary across all nodes, and a cross node key word search to support the controlled vocabulary. Develop an application programmer interface (API) to support interchange with other systems. Enhance interoperability to include use of a common syntax of logical operators in cross system searches. Incorporate all joint authoritative data sources into the MSRR.

(U) Utilize the M&S Information Analysis Center for core-level M&S services.

(U) Continue to provide support to the Warfighter by establishing the right mix of M&S courses targeted specifically toward warfighting activities and to those new to M&S; Establish the right mix of resident and on-line (Advanced Distributed Learning (ADL)) courses. Develop and present new courses that focus on the M&S Functional Areas (FA) and the requirements of the Warfighter, the trainer, the analyst, and those working in the field of experimentation. Commence the incorporation of critical M&S education into service academies, service schools and staff colleges, both resident and ADL.

(U) Continue to select and cooperatively develop science and technology projects with high payoff to the Department`s M&S program.

UNCLASSIFIED

UNCLASSIFIED

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(U) Refine C4I-to-simulation requirements within the Defense Information Infrastructure (DII) Common Operating Environment (COE), to develop a comprehensive System Requirements Specification. Complete segmentation of HLA RTI within DII COE. Complete development of JTLS-GCCS federation and demonstrate capabilities in a Joint training exercise.
(\$ 56.390 million)

(U) Congressional add as follows: (\$6.000 million)
Synthetic Range Study (\$3.0 million)
WMD Attack-Effects-Response Assessment capability at USJFCOM (\$3.0 million)

(U) **FY 2002 Plans:**

(U) The High Level Architecture (HLA) program will continue to address performance issues to insure that technical requirements are met for the JSIMS IOC. The RTI development will continue as needed to support IEEE 1516 implementation. Federation development tool support efforts will continue to address the needs of new federations during initial implementation of the HLA. The RTI Verification and Federate Compliance Testing continue as new simulations become HLA compliant.

(U) Continue bayan integration research. Develop and disseminate initial bayan integration procedure. Develop and deploy MDRF knowledge exchange representation version 2 to add initial system of system representation. Adapt the knowledge acquisition tools to support selected JMASS representation requirements. Develop and deploy FDMS Model Library version 7.0 to provide initial capability for distributed data repositories.; Continue to provide Functional Data Administration for M&S in accordance with DoDD 8320.1.

(U) Begin Materiel Configuration Toolset (MCT) development. Continue Electronic Order of Battle (EOB) Toolset and Task Organization Toolset (TOTL) development by deploying version 1 of each toolset. Complete JMEM transition to JMET. Complete development of DAVIE development by deploying version 3.0.

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UNCLASSIFIED

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(U) Complete SEDRIS standardization and guidance product development. Expand user-defined interchange experiments. Continue INEARP critical enabling technology development. Continue to expand library services listings to include model and algorithm coverage for all environmental domains. Continue a series of periodic end-to-end experiments/demonstrations to assess and validate the progress of technical development. Modify warfighting simulations as needed to react appropriately to environmental factors. Instrument the federation to derive appropriate metrics on cost/effort required to utilize existing environmental servers.

(U) Continue development of technologies and tools to support incorporation of authoritative representations of human and organizational behavior into DoD simulations. Complete development of efforts in: Common Modeling Development Environment, and a Decision Model not based on optimization techniques. Continue development of Next Generation Synthetic Forces simulation capability.

(U) Complete Verification, Validation, and Accreditation (VV&A) studies: fidelity, specifications for reuse, and conceptual framework model coverage. Perform VV&A experiments regarding human and organizational behavior models to assess VV&A practices and methods.

(U) Conclude interoperability experiment with CMMS Toolset and Library; deploy the capability. Develop follow-on plan to build similar interoperability with other M&S programs that do not use the M&S Resource Repository (MSRR) as their primary repository. Develop ability to replace password encryption key. Develop ability to support true controlled vocabulary within MSRR, and across other, cooperating systems. Modify front end software based on user requirements, interoperability requirements, and software evolution requirements. Replace front end software to provide a broader knowledge management capability. Develop capability to record an audit trail of all transactions.

(U) Utilize the M&S Information Analysis Center for core-level M&S services.

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(U) Develop and present new M&S education courses in support of Test & Evaluation and other areas of the acquisition community. Develop focused courses on M&S in support of Validation, Verification, and Accreditation, Logistics, Transportation, and Intelligence. Develop familiarization and implementation courses to educate Joint Warfare System (JWARS) and Joint Simulation System (JSIMS) users prior to Initial Operational Capability (IOC). Continue to work with the Experimentation community and develop new products to support them, as needed. Continue to develop and deliver the right mix of resident and on-line courses. Continue to incorporate M&S education courses into ADL. Incorporate DMSO M&S education courses in all service M&S specialty education and training. Continue incorporation of M&S education into Service academies, Service schools and Staff Colleges, both resident and ADL.

(U) Continue to select and cooperatively develop science and technology projects with high payoff to the Department's M&S program.

(U) Continue to refine C4I-to-simulation requirements within the Defense Information Infrastructure (DII) Common Operating Environment (COE), to develop a comprehensive System Requirements Specification. Examine the re-use of interfaces developed in federations to C4I systems for other M&S domains (training, acquisition, and analysis).
(\$ 45.065 million)

UNCLASSIFIED

UNCLASSIFIED

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(U) <u>B. Program Change Summary</u>	<u>FY2000</u>	<u>FY2001</u>	<u>FY2002</u>	<u>Total Cost</u>
Previous President's Budget Submit	66.967	56.971	59.286	Continuing
Appropriated Value	68.684	62.971	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	0.000	-0.441	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0.000	0.000	0.000	
c. Other	-2.068	-0.140	-14.221	
Current President's Budget	66.616	62.390	45.065	Continuing

Change Summary Explanation

(U) **Funding:** FY 2000 funding changes were the result of below threshold reprogrammings. FY 2001 reductions reflect Section 8086 adjustments.

(U) **Schedule:** N/A

(U) **Technical:** N/A.

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(U) C. Other Program Funding Summary Cost N/A

(U) D. Acquisition Strategy: N/A

(U) E. Schedule Profile: N/A

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