FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2

BA: 07 PROGRAM ELEMENT: 0308601N
PROGRAM ELEMENT TITLE: Modeling and Simulation Support

COST: (Dollars in Thousands)

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R2222 Modeling & Simulation	7,417	6,948	7,262	7,564	8,653	8,807	8,972
R2810 ENHANCED M&S INITIATIVES	2,038	6,527	0	0	0	0	0
Totals	9,455	13,475	7,262	7,564	8,653	8,807	8,972

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Funds the efforts of the Navy Modeling and Simulation (M&S) Management Office. Supports technical and management initiatives directed by Congress, Department of Defense (DoD) and Secretary of the Navy (SECNAV) with the aim of bringing organization and focus to the development and use of M&S tools throughout Navy and DoD. It provides a central agency for the formulation and implementation of policy and guidance in M&S; represents Navy interests in Joint/other Agencies. Funds efforts to define and coordinate execution of a Navy M&S program to evolve an interoperable and reusable core M&S capability consistent with the M&S technical framework prescribed by DoD. Efforts are organized around four product areas: (1) Engineering Studies and Analysis, to research and define the feasibility and applicability of proposed standards to Navy and to investigate Service-unique requirements for standards or guidance; (2) Products and Services, to develop the policy, standards, technologies, and common tools and services necessary to guide more efficient development and use of M&S across Navy; this includes development and management of the Navy Modeling and Simulation Information System (NMSIS), (Navy counterpart to the DOD M&S Resource Repository), to provide a central M&S information resource to reduce stove-piped development, promote tool reuse and support informed M&S investment decisions; (3) M&S Quality Assurance Program, to establish and manage a disciplined process of model verification, validation and accreditation (VV&A) required by current directives; (4) Simulation Experiments, to test distributive simulation technology in fleet exercises, experiments, and to pilot efforts which demonstrate and examine the value and limitations of proposed standards (such as High Level Architecture (HLA) and Simulation Based Acquisition (SBA)) to mission and program requirements.

FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2

BA: 07 PROGRAM ELEMENT: 0308601N
PROGRAM ELEMENT TITLE: Modeling and Simulation Support

PROGRAM CHANGE SUMMARY:

	FY 2003	FY 2004	FY 2005
FY 2004-2005 President's Budget Submission	9,612	7,044	8,248
Cong. Rescissions/Adjustments/Undist.Reductions	0	-161	0
Congressional Actions	0	6,600	0
Execution Adjustment	-75	0	0
Inflation Savings	0	0	-27
Rate Adjustments	0	-8	-6
SBIR Assessment	-82	0	0
Technical Adjustments	0	0	-953
FY 2005 President's Budget Submission	9,455	13,475	7,262

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Not applicable.

Schedule: Not applicable.

FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2a

BA: 07 PROGRAM ELEMENT: 0308601N PROGRAM ELEMENT TITLE: Modeling and Simulation Support
PROJECT NUMBER: R2222 PROJECT TITLE: Modeling & Simulation

COST: (Dollars in Thousands)

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R2222 Modeling & Simulation	7,417	6,948	7,262	7,564	8,653	8,807	8,972

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project specifically provides critical coordination of Navy Modeling and Simulation (M&S) efforts, integrates individual programs into a coherent whole, promotes reuse of resources, and aligns Navy efforts with Joint programs. Develops and maintains a comprehensive repository of models, simulations and authoritative data to support broad-based Navy requirements. Promotes reusability through the Quality Assurance process for models, simulations and data. Enhances interoperability by coordinating and reviewing Navy's transition to Department of Defense (DoD) mandated High Level Architecture (HLA) for distributed simulations. Participates in fleet exercise experiments, distributive simulations and demonstrations (such as Fleet Battle Experiments-I, Virtual at Sea Training (VAST), and Virtual Missile Range (VMR)).

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2003	FY 2004	FY 2005
Engineering Studies and Analysis	1,260	1,196	1,075

This activity conducts engineering studies and analyses aimed at determining the feasibility and applicability of proposed standards or technical approaches to Navy Modeling and Simulation, and at investigating Service-unique requirements for standards or guidance. Individual efforts will focus on developing or evaluating approaches to optimize training, assessments and acquisition functional/mission objectives through more efficient development and use of Modeling and Simulation (M&S). This activity develops methodologies and standards that will result in model and data reusability and interoperability through the formulation of a technical framework. These standards will support the full range of architecture and engineering design and analysis requirements across the Navy. This effort also provides an M&S degree program through the Naval Postgraduate School, Modeling Virtual Environments and Simulation (MOVES) curriculum.

FY 2003 Accomplishments:

- Demonstrated the capability of collecting network data for local and wide area networks at Navy Computer Telecommunications Area Masters Station (NCTAMS) Wahiawa.
- Performed communication burden analysis at a Joint Task Force (JTF).
- Provided capabilities to optimize deployed communication plans.
- Determined impact of new modeling and simulation and visualization technologies on Battle Group operations.
- Developed a center for the Study of Potential Outcomes that leverages the expertise and technology developed by faculty of the MOVES Institute at the Naval Postgraduate School.
- Provided interoperability links between Command, Control Communications, Computers, and Intelligence (C4I) systems and internal simulations as the means to integrate existing Defense Information Infrastructure (DII) Common Operating Environment (COE) services and applications into simulations.

FY 2004 Plans:

- Develop a prototype network Information Assurance (IA) assessment tool to support evaluation of network performance (throughput, delay, network overhead, packet loss and related network Quality of Service metrics), the effects of countermeasures, IA security policies and to identify potential network vulnerabilities.
- The MOVES Institute will work in tandem with the MOVES degree program to provide military relevant thesis topics for research.
- Design additional common simulation “building-block” functions required within DII COE based C4I systems to support simulation development.
- Demonstrate the Embedded Simulation Infrastructure requirements and capability to develop robust simulations within the DII COE and the Global Command and Control System Maritime (GCCS/M).

FY 2005 Plans:

- Segment the Embedded Simulation Infrastructure and the two Mission Applications and prepare the documentation for test and release in Global Command and Control System (GCCS) and GCCS/M.
- Continue to develop a set of standards for communications modeling and simulation for the US Navy.
- The MOVES Institute will continue to work in tandem with the MOVES degree program to provide military relevant thesis topics for research.

	FY 2003	FY 2004	FY 2005
Products and Services	2,522	2,392	2,150

This activity supports development of common services, tools, databases and standards to ensure the integration and connectivity of modeling and simulation (M&S) products employed in Naval assessments, in training and acquisition, and among operational communities. It manages and maintains the Navy Modeling and Simulations Information System (NMSIS), as a central M&S information resource to support informed M&S investment decision making across Navy. It provides essential planning and coordination of M&S efforts with other Services, the Office of Secretary of Defense (OSD), the Joint Staff, and other agencies to develop policies and procedures necessary for M&S standardization within the Navy. It provides annual updates to the Naval M&S Catalog, Master Plan, and Investment Strategy.

FY 2003 Accomplishments:

- Staffed an updated Navy Modeling and Simulation Master Plan.
- Promoted and enhanced the state-of-practice and technology within the Navy M&S community.
- Organized a series of Navy M&S Technical Interchange Meetings to bring together the Navy M&S community for a direct interchange of M&S requirements, technology, standards and experience.
- Initiated development, via NMSIS, of a centralized M&S website for M&S users, managers, working groups, and developers to learn about and gain access to existing M&S resources, information and events, and to function as the Navy's Modeling and Simulation Resource Repository (MSRR) in accordance with the DoD Directive 5000.59, SECNAVINST 5200.38, and OPNAVINST 5200.34.
- Assisted development of the Navy's response to new requirements and policy governing High Level Architecture (HLA) compliance.
- Continued to foster and develop the Navy M&S Standards Process that draws M&S experts from the acquisition, training, operational communities, and industry.

FY 2004 Plans:

- Implement the requirements to perform as the Functional Data Manager for M&S as submitted by Department of Navy (DoN) Chief Information Officer (CIO) and defined by SECNAVINST 5000.36.
- Promote and enhance the state-of-practice and technology within the Navy M&S community.
- Continue the development, servicing and use of NMSIS as directed under applicable DoD DIR, SECNAVINST, and OPNAVINST.
- Organize and facilitate a continuing series of quarterly Navy M&S Technical Interchange Meetings to bring together the Navy M&S community for a direct interchange of M&S requirements, technology, standards and

experience.
• Continue to foster and develop the Navy M&S Standards Process that draws M&S experts from the acquisition, training, operational communities, and industry.

FY 2005 Plans:

• Promote and enhance the state-of-practice and technology within the Navy M&S community.
• Continue the development, servicing and use of NMSIS as directed under applicable DoD DIR, SECNAVINST, and OPNAVINST.
• Organize and facilitate a series of Navy M&S Technical Interchange Meetings to bring together the Navy M&S community for a direct interchange of M&S requirements, technology, standards and experience. This will occur quarterly as part of policy.
• Continue to foster and develop the Navy M&S Standards Process that draws M&S experts from the acquisition, training, operational communities, and industry.

	FY 2003	FY 2004	FY 2005
M&S Quality Assurance Program	742	704	633

Continue to implement and manage the Modeling and Simulation (M&S) Quality Assurance development of the verification, validation and accreditation (VV&A) process and guidelines for modeling, simulation, and data. Continue to review both new and legacy M&S VV&A plans and reports. Develop and maintain the Naval M&S VV&A repository. Establish and implement a VV&A training curriculum for developers and accreditors. Provide annual VV&A assessment to the Chief of Naval Operations (CNO).

FY 2003 Accomplishments:

• Developed the VV&A Architecture within the VV&A Handbook.
• Developed the draft Navy Instruction update for VV&A.
• Developed a Department of Navy (DoN) M&S VV&A Annual Assessment Report.
• Developed an initial version of a Navy VV&A Documentation Tool.
• Developed training/education modules for accreditors and verification and validation (V&V) practitioners.

FY 2004 Plans:

• Develop the Details of Architecture Implementation within the VV&A Handbook.

- Develop a prototype cost model for estimating the V&V costs.
- Tailor VV&A awareness training for Program Managers.
- Research and identify formal statistical methods that could be used, or are used, to validate M&S to establish credibility beyond the real world boundaries.
- Research and provide M&S acquisition and development guidance.

FY 2005 Plans:

- Develop Case Studies within the VV&A Handbook.
- Incorporate information developed for training/education into the VV&A Handbook.
- Coordinate with DoD and Services to identify new data entry fields for VV&A common to all Modeling and Simulation Resource Repositories.
- Coordinate with the NMSIS effort to update VV&A data entry fields and Beta test new data entry fields as required.
- Research and develop methodology for evaluating commercial off the shelf (COTS) tools used to develop valid M&S.

	FY 2003	FY 2004	FY 2005
Simulation Experiments	2,893	2,656	3,404

This activity supports Fleet exercises and experiments through the application of distributed simulations across a wide variety of warfighting and supporting communities. Specifically, it develops and integrates appropriate models and simulations into the Fleet Battle Experiments (FBE), and develops simulation efforts to test and evolve the standards for models, interfaces, and data. It supports development of tools necessary to enable the seamless access and use of operationally relevant Modeling and Simulation (M&S) products to support Navy training, warfare assessments and acquisition requirements.

FY 2003 Accomplishments:

- Reviewed metrics required to understand the benefits of modeling and simulation in the training environment as used during the Inter-Deployment Training Cycle (IDTC) for intermediate and advanced phase training.
- Participated in all aspects of planning and conducting the synthetic portion of Joint training events, as directed by Commander Second Fleet (COMSECONDFLT).
- Researched and defined Fleet training requirements (per TYCOMs), delivery (school houses), and execution (Numbered Fleet and Battle Groups) to increase the efficiency and effectiveness of intermediate phase training

employing the use of M&S.

- Used the fleet battle experimentation process to provide insight to future Navy efforts, organizations and technologies required to carry the Navy into the end of this decade and the next. Efforts represented a synergetic Modeling and Simulation approach that will benefit Battle Fleet Tactical Training (BFTT), Virtual Training Range, FBE-J and Millennium Challenge (MC02).
- Focused on development of standardized M&S capabilities, including the Probability of Raid Annihilation (PRA) simulation testbed, PRA Federation Object Model, and improved modeling of threats and the natural environment. These activities will foster and facilitate the development of common capabilities, services, and simulation components that can be re-used across ship classes and Program Executive Offices (PEOs).
- Through Maritime Virtual Environmental Data Specification (MARVEDS), continued developing and promulgating standards for representing the natural environment for distributed simulations. Standards include data representations, grids structures for providing data at the appropriate spatial resolutions, serving practices for delivering data at intervals that account for the natural dynamism of the environment and best practices for developing a common understanding of the data (effects models).
- Conducted Virtual Missile Range (VMR) development supporting the capability for operational ships to detect realistic, synthetically generated targets as real threats, and "fire" virtual missiles residing at weapons laboratories. The initial VMR capability has a virtual TRACKEX for the Evolved SeaSparrow Missile (ESSM) system enabling complete virtual missile engagements with the North Atlantic Treaty Organization (NATO) SeaSparrow Missile System (NSSMS).

FY 2004 Plans:

- Continue to define Fleet training initiatives and M&S enhancements.
- Perform FBE-K using a synergetic Modeling and Simulation approach.
- Continue to develop the Probability of Raid Annihilation (PRA) Simulation Testbed demonstrations.
- Define the Landing Platform Dock (LPD 17) Amphibious Ship Use Case Environment Concept Model.
- Continue to develop PRA Federation Object Model.
- Continue development of Virtual at Sea Training Deployable Prototype (VAST DP) to exercise Naval Surface Fire Support (NSFS) missions. Support inclusion of tactical aircraft (TacAir) in the VAST training system to complete the combined arms team training capability.
- Continue development of a Virtual at Sea Training – Aviation Component (VAST-AC) to allow USN/USMC TacAir to participate in mission specific training to include amphibious or urban operations training by providing close air support (CAS) services against synthetic targets within a synthetic environment.
- MARVEDS will focus on the standard environmental data as distributed to multiple PEOs.
- The Virtual Missile Range (VMR) will expand its capability to include the NATO SeaSparrow Missile System and upgraded threats.

FY 2005 Plans:

- Continue to define Fleet training initiatives and M&S enhancements.
- Perform FBE-L and the Olympic Challenge series of Joint experimentations using a synergetic M&S approach.
- Complete a VAST range system that provides the capability to conduct training in a virtual environment that would normally require a training range, and would otherwise be cost or schedule prohibitive.
- Document the elements of the maritime virtual environment and effects models that can be used effectively to enable reuse in Naval simulations – best practices where standards are not yet feasible.
- VMR will continue to upgrade its virtual threat capabilities.

C. OTHER PROGRAM FUNDING SUMMARY:

RELATED RDT&E:

PE 0603235N (Common Picture Advanced Technology)

NON-NAVY RELATED RDT&E:

Not applicable

D. ACQUISITION STRATEGY:

Not applicable

CONGRESSIONAL PLUS-UPS:

R2810	FY 2003	FY 2004
ENHANCED M&S INITIATIVES	2,038	0

FY 03: This effort supported the development and enhancement of technologies that support fleet training, distributed simulation and production engineering. Provided the Naval Tool Interoperability and Risk Assessment (NTIRA) tool-kit, to enhance Maritime Battle Center Joint Semi-Automated Forces (MBDJSAF). Demonstrated the capability to test Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (CR4ISR) application in a multi-ship environment at sea using existing Systems Integration Environment (SIE). Enhanced production engineering simulation capabilities with the Virtual Shipboard and Lab Facilitator (VSLF).

R2810	FY 2003	FY 2004
NAVAL MODELING AND SIMULATION	0	6,527

FY 04: This program provides for development and enhancement of technologies that support fleet training, distributed simulation, and production engineering. The progam will support Modeling & Simulation initiatives in architecture assessment, command and control assessment, model development to support network/communications analysis, and production engineering and training, to include the development of composability standards for simulations architectures.