



DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
2000 NAVY PENTAGON  
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

PR-05-05  
SER 814/ 3U638518  
10 Mar 03

MEMORANDUM FOR DISTRIBUTION

Subj: PR-05 PERFORMANCE/PRICING MODEL VERIFICATION, VALIDATION,  
AND ACCREDITATION (VV&A)

Ref: (a) CNO memorandum of February 5, 2003 - Navy Program  
Development Procedures for Program Review (PR05)  
(b) ASECNAV (FM&C) Memorandum of January 31, 2003 -  
Guidance for the Preparation and Submission of FY 2005  
Program/Budget Estimates for the DON Program/Budget  
Review  
(c) SECNAV Memorandum of November 26, 2002 - FY 2005  
Resource Management Process  
(d) SECNAVINST 5200.40 of April 19, 1999 - VV&A of  
Modeling & Simulation (M&S)

Encl: (1) Accreditation Plan  
(2) Acceptability Criteria for Accreditation  
(3) V&V Plan Components  
(4) Performance/Pricing Model Key POCs

1. Purpose. To provide guidance and procedures to VV&A candidate performance and pricing models identified in references (a) through (c), for Fiscal Years 2005-2009 Program Review (PR-05).

2. Background. In order to meet the President's Management Agenda goal of integrating performance and the budget, the Department, where applicable, will use models in order to link performance with resources. Coupled with aligning resource management to the level directly responsible and accountable for results (e.g. - Fleet), performance models will be employed to determine near-term operating resource requirements for the Department. To meet this goal, all existing performance/pricing models associated with the programs identified in reference (b) will be subjected to a VV&A process in accordance with references (c) and (d). This is a rapidly evolving process, changes and new serials will be issued as appropriate.

3. Definitions:

a. Model - A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.

b. Performance model - a model that determines requirements for a specific program that is based on CNO-approved output metrics and established performance goals.

Subj: PR-05 PERFORMANCE/PRICING MODEL VERIFICATION, VALIDATION,  
AND ACCREDITATION (VV&A)

c. Pricing model - a model that prices resources by input metrics vice performance objectives. It may incorporate output of performance models as a partial input source.

d. Performance goal - a goal expressed in an objective, quantifiable, and measurable form that defines the target level of performance to be achieved by a program activity.

e. Verification - the process of determining that a model or simulation implementation accurately represents the developer's conceptual description and specifications. (Was the model built right?)

f. Validation - the process of determining the degree to which a model or simulation is an accurate representation of the real world from the perspective of the intended uses. (Was the right model built?)

g. Accreditation - the official determination that a model or simulation is acceptable to use for a specific purpose. (Should we use the model?)

4. Verification, Validation, and Accreditation (VV&A) Process. The VV&A process is used to establish credibility and confidence in model and simulation applications before using results to make investment decisions. Another important aspect of VV&A is model data. The VV&A process should address how data is being obtained and used, whether or not the data will be evaluated, and if the results of one model feed into another model.

a. Roles and responsibilities. N8 will assume overall coordination and scheduling responsibilities for the VV&A of performance/pricing models. Specific responsibilities are as follows:

(1) N81 - Responsible for developing an accreditation plan, issuing acceptability criteria, and performing the accreditation assessment of each model. The accreditation plan/schedule and acceptability criteria are in enclosures (1) and (2), respectively. For models impacting USMC resources, USMC(P&R) and N81 will jointly perform model accreditation.

(2) Model Proponent/Owner/Manager - Responsible for overall model verification and validation (V&V) process to include establishing CNO-approved performance goals for each model and the development and implementation of related configuration management plans. The proponent/owner is also responsible to ensure that the all new models and simulations are verified, validated, and submitted for accreditation prior to use. The Model proponent is responsible for the development and execution of the V&V plan. As such they are responsible for documenting the findings and results in all V&V related reports. At the conclusion of the V&V process, a V&V report shall be prepared and submitted to the accreditation authority (N81)

Subj: PR-05 PERFORMANCE/PRICING MODEL VERIFICATION, VALIDATION,  
AND ACCREDITATION (VV&A)

for evaluation and assessment.

(3) Models users - The individual, group, or organization that uses the M&S results or products as developed for specific application. Model users shall participate in the V&V process. The model users determine the M&S requirements and provide feedback to a model proponent for any changes, modifications, and updates.

(4) V&V agent - The organization designated by the model proponent to perform V&V. Use of agents is optional.

b. Documentation. The Navy Modeling and Simulation Management Office (NAVMSMO) has developed a VV&A documentation tool. A copy of the first release of this software will be provided by N81 to model proponents to assist in the documentation of the VV&A process. The VV&A Documentation Tool closely follows the VV&A processes outlined in the DON VV&A Implementation Handbook. The Tool incorporates common key practices and processes that are being used by many programs to assist in standardizing VV&A information. Documentation required for accreditation includes all verification and validation documents, model development documents, and a configuration management plan.

c. V&V Plan. The model proponent is responsible for submitting a V&V plan by the date prescribed in enclosure (1). V&V plan components are provided in enclosure (3).

5. Points of Contact. Specific performance/pricing model points of contact are in enclosure (4). Any questions concerning this effort should be directed to Captain Dale Scheffs, N814E, 703-614-2239.



MICHAEL G. MULLEN  
Vice Admiral, U.S. Navy  
Deputy Chief Naval Operations  
(Resources, Requirements and  
Assessments)

Subj: PR-05 PERFORMANCE/PRICING MODEL VERIFICATION, VALIDATION,  
AND ACCREDITATION (VV&A)

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N769, N771, N772, N779, N78C, N78R, N78W, N780, N781, N782, N785,  
N789, N091M, N911, N931, N958, N960)

Subj: PR-05 PERFORMANCE/PRICING MODEL VERIFICATION, VALIDATION,  
AND ACCREDITATION (VV&A)

**ACCREDITATION PLAN FOR PERFORMANCE/PRICING MODELS**

March 14, 2003

Initial assessment to establish preliminary confidence levels for PR-05 Investment Strategy.

March 18, 2003

Interim model managers submit V&V plans to N81 for review.

March 25, 2003

N81 brief performance model VV&A process and overall plan to the 3 Star Board of Directors (BOD).

March 28, 2003

N81 complete review of V&V plans.

March 31, 2003 thru November 14, 2003

Interim model managers execute individual V&V plans. Upon completion of V&V, N81 begins accreditation phase. **See Note 1.**

April 30, 2003 thru October 31, 2003

Interim model managers submit end-of-month V&V status report to N81. N81 submits summary report, including accreditation efforts to date to N8. Accreditation results briefed to BOD by N81 upon completion.

November 14, 2003

Validation and Verification for all models complete.

December 31, 2003

Accreditation assessment of all models complete.

**Note 1: Interim model managers are to complete the verification and validation phase as accurately and quickly as possible.**

**ACCEPTABILITY CRITERIA FOR ACCREDITATION**

The following is a general list of accreditation criteria. Model-specific criteria may be provided by separate correspondence.

- A. Is there linkage to CNO-approved output metrics. Is there a CNO-approved performance goal based on the output metrics?**
- B. Program Components Modeled**
1. How well the model components are designed and developed? Provide design, test, and V&V documents?
  2. Are there critical models that are essential for decision-making? As incorrect formulation or result from these models will have an adverse impact on overall system, it is important that critical models are addressed in the V&V documents.
- C. Assumptions Documented & Valid**
1. Does the V&V address how the assumptions were developed, their validity, and decision-making process behind their acceptance?
- D. Linkage to Assumption & Policies.**
1. How well does the models comply to DoD, SECNAV, OPNAV, N81 Serial, or other policy documents required by N81 or required by model developers?
- E. Model Understandable and User Friendly.**
1. Is the model designed and developed for the level of competency of the user for its intended application?
  2. Are there supporting documents such as user's manual, technical manual, and/or reference guide?
- F. Output Reliability and Scope (Requirement Fully Defined).**
1. Are the model systems and underline components requirements clearly stated?
  2. What test procedure will be used to demonstrate Model compliance to requirements? Is this demonstration documented anywhere?
  3. Has the output been subjected to continuous or periodic reviews and validation?

**G. Support Resource Allocation Decision**

1. Does the model provide information relevant to resource allocations?
2. How susceptible is output to manipulation during the budget process?
3. How susceptible is the output to fluctuations across models/tools within and outside the system?

**H. How well does the model fit the process?**

1. Is there a sound model development process that is supported by a solid V&V process.

**I. Configuration Management (CM) Plan**

1. Is there a documented CM plan? Is it adequate?
2. Are there methodologies to ensure changes are tracked and version control is observed?

**J. Model Management**

1. What is the life cycle support of the model?
2. Is there solid foundation in which the models are developed and managed?
3. Are there internal checks and balances as well as an organizational structure to support the V&V efforts?
4. Are there requirements management to ensure improvements and modifications are made according to the priority of the requirements?
5. Is there a sound documentation process?
6. Is risk management established to ensure success of the program?
7. Have resources been identified and allocated?

**K. Data availability & validity**

1. Is there an evaluation method to ensure the data are accurate, correct and appropriate for the model application? What is the Data V&V process?
2. If data collection is required, how will the data be collected?
3. Will authoritative data sources and/or other Authoritative Data Sources defined by DoN be used?

**L. Supporting documentation to include:**

1. Test reports
2. Risk management plan (if applicable).
3. M&S support plan.
4. Data verification/validation evaluation.

**VERIFICATION AND VALIDATION (V&V) PLAN COMPONENTS**

- A. Briefly describe model or simulation.
- B. State whether this is an initial V&V plan for this M&S or an existing M&S.
- C. Summarize aspects of past V&V and/or past M&S use that may impact accreditation.
- D. Provide schedule for the following primary V&V events:

**1) Conceptual model validation/activities** - Describe overall approach for validating the M&S conceptual model. Correlate specific segments of the conceptual model to the accreditation acceptance criteria. Identify people and resources that will be used to establish validity including subject matter experts, reference documents, data, and assumptions. Activities may include the following:

- Determine M&S requirements are valid for the intended use
- Check the soundness of M&S approach based on architecture framework, algorithms, and assumptions
- Determine data used are appropriate and correct.
- Identify authoritative data needed to validate the M&S data.
- Identify major assumptions and key drivers.
- Document

**2) Data Verification and Validation/activities**

Data Verification is selection of input data that are most appropriate for the M&S application and properly prepared for use in M&S. The Data Validation ensures the data accurately represent aspects of the real world to be simulated. Activities:

- Document the evaluation approach
- Define types of data

**3) System verification/activities**

Translation of the conceptual model to performance requirements in terms of technical performance and mission requirements/capabilities. Systems verification also includes integration, testing, and review of M&S and related data as a total system.

Activities:

- Determine systems' performance characteristics support intended use
- Demonstrate the M&S system accurately represents the M&S design
- Verify systems configuration such as integration of hardware, software, human in the loop, behavioral, etc.

Subj: PR-05 PERFORMANCE/PRICING MODEL VERIFICATION, VALIDATION,  
AND ACCREDITATION (VV&A)

- Verify interoperability of components and data transfer and transition.

**4) Functional verification/activities**

Blueprint that translates the M&S system specification into a design used to build the M&S components, describes overall approach for verifying the M&S functional design. Activities:

- Perform design walk through
- Establish consistency and faithfulness of functional design to the validated conceptual model, acceptability criteria, and M&S requirements.
- Translate system requirements to component requirement.
- Ensure required features, functions, behaviors, algorithms, and interactions are correctly and completely represented.

**5) Results validation/activities**

Result validation is to determine an extent the M&S addresses requirements to identify how realistic the outputs are and to document how well the simulation fits the intended use. Activities:

- Identify scenarios, validation data and expected results
- Compare M&S results (outputs) to real world data
- Adjudicate errors
- Document

**6) Complete V&V and accreditation reports.**

- E. Identify key V&V individuals or groups involved in the process. Include name, title, organization, business address, phone, fax, and e-mail. This should include model proponent, users, subject matter experts, and V&V agent (if applicable).
- Each M&S will have its own unique set organization to support their V&V process. The determination of the V&V organizational structure will remain with the M&S program, however it is important to understand the line of responsibilities and communication.
- F. The M&S Program is responsible for determining the V&V methodologies. The process and methodologies determined by the M&S programs will be one of the drivers of the V&V cost.

**PERFORMANCE/PRICING MODEL KEY POCS**

PROGRAMS ASSOCIATED WITH PERFORMANCE/ PRICING MODELS	Interim Model Manager	Target Model Manager	N81	N80	N82
<b>Primary Performance Models</b>					
Flying Hour Program	N78 Ms. Fowler (703) 604-7719	COMNAVAIRFOR	CDR Giardino (703) 614-0186	CAPT Lili (703) 692-6071 / LCDR Epps (703) 692-5434	Ms. Kern (FMB1) (703) 697-0995 Denise Hansen (FMB3) (703) 692-1665
Ship Operations	N43 CDR Hawkins (703) 601-1648	COMNAVSURFOR COMNAVSUBFOR COMNAVAIRFOR	CDR Desroches (703) 614-0205	CAPT Lili (703) 692-6071 / LCDR Epps (703) 692-5434	CDR McLean (FMB1) (703) 697-0993 Denise Hansen (FMB3) (703) 692-1665
Ship Maintenance	N43 CDR Holsten (703) 601-1659	COMNAVSURFOR COMNAVSUBFOR COMNAVAIRFOR	CDR Desroches (703) 614-0205	CDR Baker (703) 614-8825	CDR Phillips (FMB1) (703) 697-0907 Shari Ritter (FMB3) (703) 692-1664
Aviation Maintenance	N78 CDR Scott (airframes) (703) 604-7748 LCDR Nolte (engines) 703-604-7755	COMNAVAIRSYSCOM	LCDR Pasch (703) 614-0206	LCDR Epps (703) 692-5434	Mr. Sokolowski (FMB1) (703) 697-0994 Shari Ritter (FMB3) (703) 692-1664
USMC Operations	HQMC Mr. Stringer	HQMC	CDR Giardino (703) 614-0186	LCOL Deforge	Gary Cohen (FMB1) (703) 614-0059 Frankie Moran (FMB3) (703) 695-1012
Spares	N41/HQMC CDR Spicer (703) 604-9936	COMNAVSUPSYSCOM	CDR Harmon (703) 614-0177	CAPT Lili (703) 692-6071 / LCDR Epps (703) 692-5434	CDR Borrebach (FMB4) (703) 692-4842 Shari Ritter (FMB3) (703) 692-1664
Facilities SRM	N46/HQMC CDR Branch (703) 601-1614	CNI HQMC	CDR Fahey (703) 614-0129	CDR Cariello (703) 692-5433	CDR Stich (FMB1) (703) 697-1344 Denise Hansen (FMB3) (703) 692-1665
Base Operating Support	N46 Mr. Bird 703-601-1633	CNI HQMC	CDR Fahey (703) 614-0129	CDR Cariello (703) 692-5433	CDR Stich (FMB1) (703) 697-1344 Denise Hansen (FMB3) (703) 692-1665

**PERFORMANCE/PRICING MODEL, KEY POCS**

PROGRAMS ASSOCIATED WITH PERFORMANCE/ PRICING MODELS	Interim Model Manager	Target Model Manager	N81	N80	N82
<b>Primary Performance Models - continued -</b>					
Family Housing	N46 LCDR Allen 703-601-1618	CNI HQMC	CDR Fahey (703) 614-0129	CDR Caniello (703) 692-5433	CDR Stich (FMB1) (703) 697-1344 Denise Hansen (FMB3) (703) 692-1665
Force Inactivation	N43 Mr. Michaluk (703) 601-1074	COMNAVAIRSYSCOM COMNAVSEASYSKOM	CDR Desroches (703) 614-0205	CDR Harris (Force Structure Changes) (703) 692-5623 / CDR Baker (OMN Inactivation) (703) 614-8825	Ms. Sparks (FMB1) Frankie Moran (FMB3) (703) 695-1012
USMC Depot Maintenance	HQMC	HQMC	LCDR Pasch (703) 614-0206	CAPT Lili (703) 692-6071 / LCDR Epps (703) 692-5434	Mr. Sokolowski (FMB1) (Aviation) (703) 697-0994 / Mr. Cohen (FMB1)(Other) (703) 614-0059 Shari Ritter (FMB3) (703) 692-1664
Training Workload	N1/N00T Mr. Martin (N00T) (703) 602-5167	NETC	CDR Boyles (703) 693-9411	LCDR Hilderbrand (703) 614-8711	Frankie Moran (FMB3) (703) 695-1012 Percival Jacobs (703-697-1014
<b>Secondary Pricing Models</b>					
Military Personnel	N1/HQMC Mr. Cain (703) 614-2029	CNP/HQMC	CDR Chapman (703)693-9130	LCDR Hilderbrand (703) 614-8711	Ms. Elliot (FMB1)(AD) (703) 614-5529/ CDR Murach (FMB1) (Res) (703) 614-5528 Stafford Lang (FMB3) (703) 695-6598
CIVPERS	FMB	FMB	CDR Chapman (703)693-9130	LCDR Hilderbrand (703) 614-8711	Ms. Vernon (FMB4) (703) 692-4824 Stafford Lang (FMB3) (703) 695-6598
NMCI (OMN/R)	N6 CDR Weitzel (703) 604-8389 LT Levine (703) 604-6679	Dir, NMCI	CAPT Scheffs (703) 614-2239	Ms. Schug (703) 614-8705	Frankie Moran (FMB3) (703) 695-1012

MEMORANDUM FOR DEPUTY CHIEF OF NAVAL OPERATIONS (RESOURCES, REQUIREMENTS AND ASSESSMENTS) (N8)

FROM: RADM L. W. Crenshaw, Jr., USN  
Director, Assessments Division (N81)  
Prepared by: CAPT D. K. Scheffs, N814E (703) 614-2239

SUBJECT: PR-05 Performance/Pricing Model Serial - Action Memorandum

PURPOSE: To issue guidance to Navy Staff on Performance/Pricing Model procedures for PR-05.

DISCUSSION:

- The Serial describes the procedures to conduct verification, validation, and accreditation (VV&A) of performance and pricing models for PR-05.
- As a result of the baseline review of the models associated with the Flying Hour Program on 28 Feb 03, we have modified the Serial to address your concerns with the overall effort:
  - o The schedule has been expanded to detail the sub-tasks associated with the VV&A effort. Enclosure (2) to attachment 1.
  - o Interim model managers have been tasked with identifying the major change drivers and assumptions associated with their models and personnel (including the subject matter experts) to participate in the VV&A effort. Enclosure (3) to attachment 1.
  - o The accreditation criteria includes a requirement for models to be linked to CNO-approved output metrics and established performance goals in order to achieve full accreditation.

RECOMMENDATION: Approve/sign the draft Serial.

ATTACHMENTS:

1. Draft Serial, PR-05 Performance Model Verification, Validation, and Accreditation (VV&A).

CHOP							
DATE							