
# Practical Software and Systems Measurement (PSM)

## Methods of Operation

Draft Version 2.6
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## REVISION HISTORY

| Revision | Date | Description |
|---|---|---|
| 1.0 | 7/21/99 | Draft outline |
| 1.1, 1.2 | 8/99 | Updates after discussion |
| 1.3 | 1/22/00 | Updates from project history and general PSM experience |
| 2.0 | 5/1/01 | Update based on project changes |
| 2.1 | 6/29/01 | Update based on peer review<br>Add Transition Organizations, qualified trainers, and TWG members |
| 2.2 | 7/12/01 | Update based on peer review comments |
| 2.3 | 12/1/03 | Update based on project changes<br>Add new Transition Organizations, qualified trainers, and TWG members |
| 2.4 | 6/10/04 | Update based on peer review comments, and add new TWG members |

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| 2.5 | 8/1/04 | Update based on peer review comments, and add new TWG members |
| 2.5 | 10/26/04 | Minor updates based on new TWG members (did not update version number) |
| 2.6 | 02/05 | Updates based peer review comments |
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| 2.6 | 04/06 | Minor updates based on new TWG members (did not update version number) |
| 2.6 | 09/06 | Minor updates based on new TWG members (did not update version number) |
| 2.6 | 11/06 | Minor updates based on RUP Plug-In Version # (did not update version number) |

# 1. CHARTER OF THE PSM PROJECT

This section describes the mission and objectives of the Practical Software and Systems Measurement (PSM) project, its scope, structure, roles and responsibilities of people involved in the work, and how this project relates to other organizations and similar endeavors.

## 1.1 BACKGROUND AND OBJECTIVES OF THE PSM PROJECT

In 1993, the Joint Logistics Commanders Joint Group on Systems Engineering (JLC JGSE) established a measurement project to develop software measurement guidance and to transition that guidance into practice. In 1994, the project and guidance was named Practical Software Measurement (PSM). Initial measures focused on software project management. In 1996, additional product measures were added, and a PSM Support Center was established. In 1997, sponsorship transitioned to OSD. Also in 1997, an ISO project on software measurement was established, and PSM was used as the base document for the new international standard: ISO/IEC 15939. In 1998, a formal transition program for PSM was established, and the PSM Support Center moved to the US Army, ARDEC. In 1999, systems engineering and product engineering measurement was added to the guidance. The international standard, ISO/IEC 15939, Software Measurement Process, was published in 2001, and Addison-Wesley published *Practical Software Measurement* as a book in 2002.

The PSM project objectives are to:

- Establish a proven process to implement a tailored information-driven measurement process for software and systems engineering management
- Provide a basis for objective communication and informed decision making
- Establish a foundation for organizational and executive-level performance management

The PSM project has achieved these objectives by:

- Defining measurement as a process, not a pre-defined list of graphs or reports
- Establishing a flexible measurement process that may be adapted to meet specific program and organizational information needs and objectives
- Supporting organizations to integrate measurement requirements into their management and development processes

## 1.2 SCOPE AND PRODUCTS OF THE PSM PROJECT

PSM is a primary measurement and analysis process used by the DoD, government, and commercial programs. The PSM technology is based on actual experience. PSM's purpose is to 1) Develop effective measurement practices that address software and systems technical and management information needs, and 2) transition into general use an integrated measurement approach that results in performance improvements. The PSM project defines and transitions measurement practices in these areas:

- Software development and maintenance projects
- Systems development and maintenance projects
- Process improvement projects
- Project, organization, and enterprise performance measurement
- Risk management

Although PSM defines a measurement process that can support many types of projects, PSM is not intended to define specific procedures for all situations. PSM does not define all measurement procedures, such as those needed to address project-specific information needs, different software domains, or individual system technologies. The PSM guidance provides guidelines to allow a user to tailor the PSM process to specific information needs.

The PSM project offers services and products to support a fully integrated measurement approach. The PSM project technical team is highly qualified to provide direct project support. Products are developed and improved incrementally by a joint government, industry, and academic technical working group, and are based on implementation experiences. Products are updated based on the technical consensus of best practices. The following PSM products have either been published or are in final form. For a detailed list of products, as well as other related information, refer to the PSM Detailed Information included as Attachment 1.

**PSM Products Include:**

- Practical Software Measurement: Objective Information for Decision Makers, Addison-Wesley, 2002 (Version 5 of the guidance)
- Practical Software and Systems Measurement Guidebook
- PSM Insight

**PSM Services Include:**

- PSM Training
- PSM Briefings
- PSM Workshops
- PSM Overview Courses
- PSM Advanced Course
- PSM Consulting
- Training in PSM Insight-One Tool for a Comprehensive Measurement Program
- PSM Insight Consulting

**Other Related Products and Information Include:**

- Measurement-Related Papers and Articles:
  - Measures for DoD Software Product Lines
  - Measuring System Interoperability
  - Object-Oriented Measurement
  - Measures in Support of Evolutionary Acquistion
  - Applying PSM to Enterprise Measurement
  - Making Measurement Work
  - Measuring Tailoring Workshops

  - Tailoring and Implementing an Organization Measurement Process
- PSM Measuring for Process Management and Improvement (MPM), April 1997
- ESx - ES is a tool that collects coupling, maintenance, and size metrics
- Rational Unified Process (RUP) Plug-in for Practical Software and Systems Measurement
- ISO/IEC Standard 15939, Systems and Software Engineering-Software Measurement Process
- Experience Reports
- Sample Measurement Specifications
- Supporting materials (i.e., marketing materials)

In addition, the following products have been developed based on the PSM process:
- Applying PSM to Enterprise Measurement, March 2003
- The CMMI Measurement and Analysis (M&A) Process implements the PSM process

The PSM Guidebook, PSM Insight tool, training materials, workshop materials, and supporting materials are available on the PSM web site or distributed on CD-ROM. The PSM book is available on Addison-Wesley's web site: <http://www.awprofessional.com/>.

Other PSM products that are still in progress include:
- Safety and Security Measurement White Paper, v 2.0, 13 February 2004: safety section drafted; security section under development
- System of Systems Measurement White Paper (Draft), 8 July 2003
- Acquisition measurement - under development

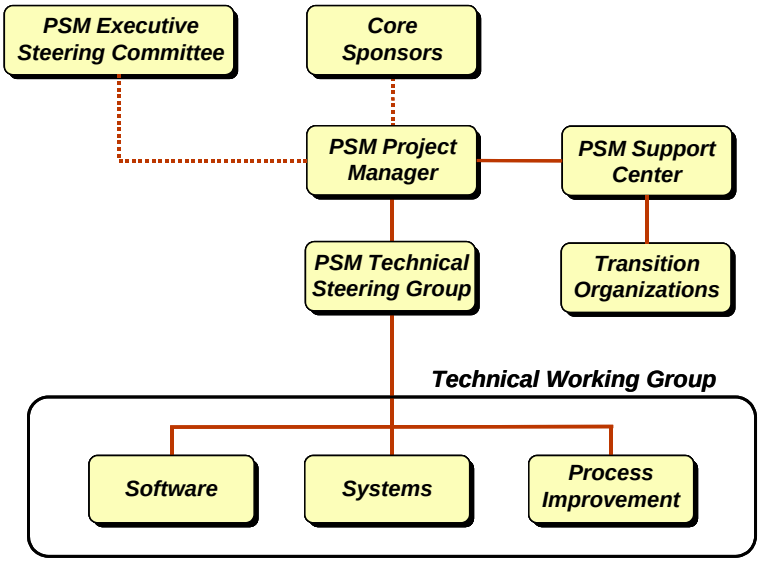
These PSM products and services are directed to:
- Project team members, project managers, and project measurement experts
- Program managers and organization managers of supplier organizations
- Process improvement specialists
- Project managers, acquisition specialists, and organization management in acquisition organizations

PSM products have also been developed for internal management of the PSM project:
- Annual task summary with cost and schedule
- PSM Methods of Operation (this document)
- Transition Organization Package
- Executive Steering Committee and Technical Steering Group meeting minutes
- Contractual documents (SOW, IGCE, technical evaluations)
- Research and technical experience presentations at the annual PSM working group and users' group conferences
- User input through the PSM web site
- PSM supporting materials (white papers, project summaries, etc.)

All products of the PSM project are version controlled and managed via a Data Management (DM) process.

## 1.3 Structure of the PSM Project

The PSM project consists of these key contributors:




## 1.4 Roles and Responsibilities in the PSM Project

The following table lists the primary responsibilities of the various roles within PSM. Current members of key groups are listed in Appendix A of the Methods of Operation.

| Role Names | Key Responsibilities |
|---|---|
| Executive Steering Committee (ESC) | This group oversees the management of the PSM project. The ESC:<br>• Ensures PSM activities are consistent with PSM goals and objectives<br>• Provides advice and evaluation of PSM management efforts for marketing, development, and transition of PSM products<br>• Provides strategic input on future project requirements |
| Technical Steering Group (TSG) | This group helps steer the technical work of the PSM project. The TSG:<br>• Provides advice and evaluation of PSM project technical efforts for marketing, development, and transition of PSM products<br>• Provides technical recommendations for product content<br>• Represents PSM to external initiatives related to measurement throughout the world<br>• Represents the interests of PSM organizations during decision-making sessions, such as writers' groups and study groups |

| Role Names | Key Responsibilities |
|---|---|
| Project Manager | Responsible for management of the PSM project and for its technical performance, including the following:<br>• Working with sponsors on funding, political issues, justification, special projects, and other matters as needed<br>• Planning and managing the PSM project approach, tasks, and schedule<br>• Managing the budget and finances for the PSM project<br>• Providing technical vision for PSM project work, and planning and reviewing the technical direction<br>• Participating in the development of PSM work products<br>• Providing interfaces from PSM to external organizations<br>• Managing the transition of PSM work products to users through the Transition Organizations<br>• Managing and performing technical tasks for developing and publishing PSM work products |
| Core Sponsors | • Provide funding to the PSM project<br>• Provide input on project requirements and review results |
| PSM Support Center (PSMSC) | Provides guidance materials for PSM and manages the interface to Transition Organizations and the PSM user community. Tasks include:<br>• Providing information as requested by users and prospects<br>• Maintaining the PSMSC web site and monitoring its use<br>• Managing and providing support to transition organizations<br>• Tracking PSM performance measures<br>• Managing the annual user conference and TWG meetings |
| Transition Organizations | • Provide PSM guidance, training, and support to users within specific domains after being qualified in formal train-the-trainer programs<br>• Participate regularly in technical activities of PSM<br>• Continue education on current measurement guidance |
| Technical Working Group (TWG) | • Provide technical inputs for development of PSM work products<br>• Share lessons learned in implementing measurement |
| Study Group | • A subgroup of the TWG that focuses on a particular area of work for an extended period of time in a volunteer capacity<br>• Examples include:<br>– Product Engineering (1996-1998)<br>– Systems Engineering (1997-current)<br>– Process Improvement (1998-current)<br>– Acquisition Measurement (2003-current) |
| Writers' Group | A subgroup of the TWG that develops PSM guidance and/or courseware |

## 1.5 RELATIONSHIP OF THE PSM PROJECT TO OTHER GROUPS

The PSM project's processes have been defined to ensure coordination between internal and external functions and projects. Internal coordination of PSM activities is established through the PSM Technical Working Group (TWG) and Transition Organizations. Representatives of these organizations participate, as appropriate, in establishing the project plan, schedule, and technical activities of the PSM project as described in the PSM Methods of Operation. Frequent communication and reviews are conducted with management and other project members to ensure everyone is involved and appropriately aware of the PSM project's status and plans.

External communication from the PSM project is conducted through the project staff, the PSM Support Center (PSMSC) web site, and the Transition Organizations. The Transition Organizations have agreed to abide by the terms and conditions that are established by the PSMSC for the use of all PSM products and services. In general, the PSMSC has the sole management control of all PSM products and services, and is the only agent authorized to modify those products and services. The Transition Organizations agree that all separately developed and delivered supporting guidance, products, and services that refer to any PSM products and services are consistent with the PSM technical approach and the PSM information-driven measurement process.

PSM maintains active involvement with a number of other professional organizations, standards associations, and funding agencies, including:

- **Office of the Secretary of Defense** - funded by the OSD, the project participates in coordinating activities with the various programs of OSD.
- **DoD Acquisition Policy - DoDD 5000.2R and the Interim Defense Acquisition Guidebook -** the revision to 5000 requires projects to implement measurement; PSM is the recommended approach in the guidance material.
- **Tri-Service Assessment Initiative** - the process architecture of the tri-service assessment initiative has been harmonized with the PSM information categories to ensure that both initiatives address key project information needs.
- **OSD Measurement Initiatives** - the PSM project is working with additional on-going measurement initiatives to ensure that the guidance provided is consistent with best practices. Initiatives addressed include the PA&E initiative to collect data for cost estimation purposes and the various NII measurement initiatives.
- **Performance Management Initiatives -** the PSM process is expanding to include performance management. The same process of information-driven measurement is used, with the addition of organizational and enterprise measures.
- **CMMI Integration Project** - the international standard, ISO/IEC 15939, was also used as the base document for the new Measurement and Analysis (M&A) Process Area in CMMI. This M&A process area describes how a measurement and analysis process may be evaluated.
- **Software Engineering Institute (SEI)** - members of the PSM community are also employees or resident affiliates of the SEI; as another organization funded by OSD, the SEI coordinates its measurement efforts with the PSMSC and the PSM Technical Steering Group (TSG).

- **ISO Standards Efforts** - as standards related to measurement are developed or modified, members of the PSM working groups and others working with the project participate in their areas of expertise; for example, some members contribute to the ISO/IEC 15939 measurement standard and others are contributing to the IEEE/ISO/IEC 16085 risk management standard.
- **Commercial Standards** - PSM is integrated with key IEEE and ISO/IEC SC7 (Software and Systems Engineering) standards, including ISO/IEC 12207 and 15288.
- **International Council on Systems Engineering (INCOSE)** - members of the PSM community are also members of INCOSE; the development of the systems engineering guidance was a joint effort between the INCOSE measurement working group and PSM.
- **Project Management Institute (PMI)** - several active members of the PSM community are members of PMI and work especially with its risk management subgroup.
- **International Function Point User Group (IFPUG)** - the PSM project maintains communication with IFPUG, especially with respect to project estimation.
- **American Society for Quality (ASQ), Software Division** - members of the PSM community are actively involved with the Software Division, and there are occasional joint meetings and conferences.

# 2. METHODS OF OPERATION OF THE EXECUTIVE STEERING COMMITTEE

The PSM Executive Steering Committee (ESC) was established in May 1999 to ensure that the PSM work program is consistent with PSM goals and objectives. The committee provides advice and recommendations on how to manage the project.

The PSM ESC periodically reviews the program's work plan to ensure that it is aligned with DoD, other government, and industry requirements. The PSM ESC is composed of cognizant senior officials representing the full breadth of the PSM end-user community. The ESC meets twice a year, or whenever it deems necessary, to receive briefings on program status and plans. It considers the proposed program priorities and fiscal plan, and either approves them or makes recommendations for change(s). The ESC provides formal endorsement of the finalized PSM Project Plan and proposed budget.

## 2.1 RESPONSIBILITIES

Specific responsibilities of the ESC include the following:

- Promote and coordinate strategic plans for use, evolution, and expansion of PSM products
- Identify areas of collaboration with other government and industry initiatives, including standards work, where PSM products may be leveraged
- Relate the work on PSM to past and current activities in quantitative measurement in government and industry to adequately represent PSM in discussions of other efforts
- Define financial and other support for the PSM program

- Review plans and accomplishments of the PSM project for marketing, development, and transition of PSM materials into use
- Review the PSM work program and resources available, prioritize the work, and provide guidance on effective use of resources
- Help resolve issues when there are conflicts between the needs and concerns of the PSM user communities within government and industry
- Provide strategic input on future project requirements (the TSG provides technical input)

## 2.2 MEETINGS

This committee formally meets twice per year, generally at the beginning of the calendar year and at the annual users' conference. Additional meetings are held as needed to fulfill its responsibilities and support the PSM project manager.

During PSM ESC meetings, any defects in the PSM products and/or processes are discussed, and solutions are recommended. The goal is to fix the defective part of the product and/or process to prevent future defects. Solutions are then implemented on future product developments or within existing work activities. Defects and solutions are identified in meeting minutes.

## 2.3 MEMBERSHIP AND LEADER

The PSM project manager designates the chair of the ESC. Other members of the group are selected from government and industry at the recommendation of the core sponsors, the PSM project manager, the TSG, and members of the existing ESC. Overall membership of the ESC reflects the interests of its users and funding sponsors, as well as the interests of the Transition Organizations working to transition PSM materials into the user community.

## 2.4 WORKING RELATIONSHIPS

The ESC regularly communicates the status and plans of PSM work with the core sponsors of the PSM work program. The ESC promotes PSM strategic business plans and objectives identified by senior DoD management, other core sponsors, and the TSG. The ESC facilitates working relationships between the sponsors, TSG, and PSM working groups. The ESC confers with sponsors to provide and maintain adequate resources for long-term improvement of the PSM process in government and industry.

The ESC reviews the efforts of the TSG in providing technical guidance to the PSM project and ensures that the TSG adheres to its Methods of Operation. The ESC meets as needed with the TSG and members of the PSM community to discuss strategy, to gather input on direction, and to deal with issues.

The ESC chair meets regularly with the PSM project manager to review current activities and to provide advice. It examines the PSM performance measures to monitor how well PSM is marketed and transitioned to meet the needs of the measurement community. It

evaluates user feedback on PSM products to ensure that the products are meeting the overall goals of the PSM program.

Current members of key groups are listed in Appendix A of the Methods of Operation.

### 2.5 DECISION MAKING

Decisions of the ESC are by consensus, with the chairperson of the committee resolving conflicts.

## 3. METHODS OF OPERATION OF THE TECHNICAL STEERING GROUP

The Technical Steering Group (TSG) provides technical guidance to the PSM project and the PSM project manager. The TSG represents the interests of the PSM users, the community of developers of PSM materials, and the Transition Organizations moving PSM into the user community.

### 3.1 RESPONSIBILITIES

Specific responsibilities of the TSG include the following:

- Recommend technical content for PSM processes and products, including tools
- Recommend procedures and resources to educate managers and users on the effective use of PSM materials
- Provide advice on and evaluation of the PSM project's technical efforts for marketing, developing, and transitioning PSM products
- Represent PSM at external initiatives related to measurement worldwide
- Represent the interests of PSM organizations during decision-making sessions, such as writers' groups and study groups

### 3.2 MEMBERSHIP

Members of the TSG include representatives of several Transition Organizations, representatives of user organizations, members of external initiatives with which PSM coordinates, and those who provide the ongoing development and improvement of the PSM materials.

In general, the TSG meets two times per year, with additional meetings held if necessary. Members of the TSG must attend or send a representative to at least one of the annual meetings of the TSG. If a member does not attend the required meetings during a given calendar year, he/she may be removed from the TSG, as determined by TSG members (May 1999 decision of the TSG).

### 3.3 TEAM LEADERSHIP

The PSM project manager chairs the TSG and creates the agenda for each TSG meeting with input from TSG members.

### 3.4 REPORTING METHODS

The PSM project manager or a designee takes the TSG meeting minutes and distributes them to the TSG as soon as possible after each meeting. Action items are assigned to TSG members during meetings and are monitored by the PSM project manager. Results are reported to the TSG upon completion of tasks and at TSG meetings.

### 3.5 DECISION MAKING

The TSG makes decisions by consensus at TSG meetings or by email for items considered between meetings.

## 4. METHODS OF OPERATION OF THE CORE SPONSORS

### 4.1 MEMBERSHIP

The group of core sponsors varies from year to year, depending on who provides resources to the PSM project. The PSM project manager seeks sponsors based on the project's needs.

## 5. METHODS OF OPERATION OF THE PSM PROJECT MANAGER

As described in the table of responsibilities in Section 1.4, the PSM project manager handles the day-to-day management of the PSM project. Additionally, project management is responsible for tracking risks (described in Appendix C) and analyzing measurement data (described in Appendix D).

The PSM project manager uses the following methods to perform duties.

### 5.1 REPORTING METHODS

Status reporting is accomplished via a presentation at each TWG and Users' Group Conference. Additional information is provided in sponsor, ESC, and TSG forums.

#### 5.1.1 Biannual Status Reporting to Sponsors and ESC

- Accomplishments section - addresses products, activities, and impacts
- Performance Measurement section
  - Includes development, transition, impact measures
  - Used for justification, marketing, and effective management
- Annual prospective task list (developed based on ESC inputs and reviewed by TSG)

#### 5.1.2 Reporting to the TSG and Transition Organizations

- Data is collected from each Transition Organization on a quarterly basis

- Input is summarized and is sent back to each Transition Organization and to the TSG on at least a biannual basis
- Information from ESC reporting is summarized and reviewed by the TSG

### 5.1.3 Financial Management

The PSM project is ongoing. Project tasks are defined on a yearly basis according to project requirements, sponsor requests, funding availability, and volunteer activity. With each task, a defined budget and schedule is identified. PSM financial management criteria are:

- Funds are limited and carefully allocated and monitored
- Plans for PSM development funds are reviewed with specific sponsors (their funding status) and ARDEC management (all funding)
- Spending is reported for each funded task

## 5.2 DECISION MAKING

The PSM project manager makes day-to-day decisions. Items that require major budget modifications are reviewed with the ESC or sponsors as necessary.

Each year, a PSM task list is prepared with potential tasks to be accomplished and associated timeframes. This PSM project manager generates the task list based on recommendations from the ESC, and the TSG reviews the task list. The potential task list and review process ensure that the PSM products and services meet the needs of the services and organizations that use the PSM products. Once the potential list is generated, sponsors are identified and solicited.

Only those tasks that are sponsored and funded are addressed. While most tasks require direct funding, some are accomplished by volunteer effort. Tasks using volunteer effort are formally managed, although the schedule is less critically managed since volunteer effort is dependent on the availability of resources. When a task is funded, a detailed work plan, schedule, effort, and cost profile are generated and tracked. The PSM project manager tracks the detailed work plans for fiscal year tasks that have been funded to date.

The PSM project's Work Breakdown Structure (WBS) is defined in the potential task list. Task lists are organized using the WBS structure.

# 6. METHODS OF OPERATION OF THE PSM SUPPORT CENTER

The primary responsibilities of PSM Support Center (PSMSC) staff include:

- Answering phone calls and emails
- Sending marketing material, training course information, and other information to those who request it
- Maintaining databases of PSM users and PSM activities
- Managing the Internet web site and monitoring its use
- Acting as primary contact and support for training course instructors

- Coordinating and managing train-the-trainer sessions to train instructors
- Gathering information from and providing materials to transition organizations
- Tracking PSM performance measures
- Planning and managing the annual conference and meetings of the PSM community

### 6.1 TRAINING SUPPORT

The PSMSC provides the primary point of contact for PSM instructors. It distributes training materials, gathers course attendee information from instructors, and creates completion certificates for course attendees. Training course statistics are entered into the Performance Measurement database.

### 6.2 DATABASE SUPPORT AND REPORTING

The PSMSC maintains two databases:

- Contacts database - names, addresses, and other information for any person who has worked with or made an inquiry on the PSM project
- Performance Measurement database - training course statistics and other records that are used to create performance reports

### 6.3 ARRANGE MEETINGS

The PSMSC staff is responsible for the majority of the planning and managing of the Annual PSM Users' Group Conference and Technical Working Group meetings. These meetings are funded through attendee fees, with no cost to the government.

## 7. METHODS OF OPERATION OF THE TECHNICAL WORKING GROUP

A Technical Working Group (TWG) is a collection of individuals who participate in development of PSM work products. Members of this group also generally participate in study groups, writing groups, or other special efforts that generate PSM materials. Current TWG members are listed in Appendix B of the Methods of Operation.

### 7.1 MEETINGS

The PSM community meets with the TWG twice a year, once in the first quarter of the calendar year and once at the annual PSM Users' Group Conference. During the meetings, progress on PSM work efforts is reported and workshops focus on developing or evaluating additional PSM materials. The PSM project manager chairs the twice-yearly TWG meetings.

Individual groups may meet between these sessions to make progress on a specific work area. The material generated during these meetings is circulated to the full TWG for review and comment. The PSM project manager must review any significant changes to the approved work program.

During TWG meetings, any defects in the PSM products and/or processes are discussed and solutions are recommended. The goal is to fix the defective part of the product and/or process to prevent future defects. Solutions are then implemented on future product developments or within existing work activities. Defects and solutions are identified in the meeting minutes.

### 7.2 TEAM LEADERSHIP

Each working group has a designated chair (or team of co-chairs). Generally, the PSM project manager appoints the chair; sometimes, the team elects the chair.

### 7.3 REPORTING METHODS

When a working group is active, progress is reported to the PSM project manager on a regular basis. Reporting is required immediately after a working session, at times designated for major deliverables, and at the twice-yearly TWG meetings. If a working group is inactive, it is the responsibility of the PSM project manager to appoint a new working group chair to revitalize the group or to dissolve the working group.

### 7.4 TEAM COMMUNICATION

The working group handles internal communication as needed, generally via email, teleconferences, and/or small group meetings. The working group chair organizes activities at the twice-yearly TWG meetings, communicating plans and expectations to the PSM community through the PSM project manager.

### 7.5 DECISION MAKING

Decisions of the working group are made by consensus. When consensus cannot be reached, the working group chair recommends a course of action to the PSM project manager, who is responsible for resolving the issue. If the decision is of significant impact to the PSM products or to the PSM community, the TSG may be asked to resolve the issue.

### 7.6 OTHER ITEMS

Members of a working group are encouraged to share the considerations of the group with others in the technical community. However, they must represent their work as draft or as work in progress to protect the integrity of the PSM project.

## 8. METHODS OF OPERATION FOR TRANSITION ORGANIZATIONS

Transition Organizations are responsible for providing training and support to PSM users. There are well-defined methods for how an organization becomes a Transition Organization, how it remains a Transition Organization, and how a Transition Organization works with the PSM Support Center to serve its PSM users. Refer to the Transition Organization Package for more information.

# 9. DECISIONS OF THE PSM PROJECT

This section documents decisions that are anticipated to be useful for future reference by one or more of the PSM groups using this Methods of Operation. As key decisions are made, a short summary will be added in this section.

## 9.1 HANDLING CHANGES TO COURSE MATERIAL

Adopted 9/23/98 [TSG Meeting; report of a subgroup on 9/17/98; adopted by the TSG 9/23/98]

**Topic**

- What PSM materials may requesters change, and what rights do Transition Organizations have to significant changes they have made?

**Definitions**

- Writer - someone authorized by the PSM project manager to update the content of official PSM documents
- Transition Organization – an organization that has agreed to the Transition Organization requirements and employs at least one person who has completed the train-the-trainer (TTT) process
- Reviewer - a member of the TSG who is authorized by the PSM project manager to evaluate and authorize proposed changes to official PSM content
- Requester - member of the Transition Organization who has completed the TTT process and is following the Elements of the Special Change Process [see below]

**Considerations**

Changes need to be consistent with the goals of the PSM community and:

- Promote the use of PSM for measurement [i.e., reward those who do]
- Preserve the quality of the PSM content

**Materials that may change**

- PSM Guidebook updates may only be made by writers authorized to make changes (those authorized by the PSM project manger)
- Portions of the Guidebook that appear in the course material may not be changed by anyone except writers, especially graphics and key lists of various types
- Training elements may be modified with examples from the students' environment since students better understand text specifically tailored to their organization
- Course material areas that are most likely to change include:
  - Front sections that introduce key concepts and applicability to the industry segment, government area, or specific organization
  - Case studies
  - Extended examples used throughout the course

  - Individual examples that illustrate the process at key points
- The PSM format needs to be preserved in the presentation, including the PSM logo and the order of materials. Those making significant changes (if approved by the PSMSC) may also include their own organization logo on the materials they create
- The PSM title should be kept in the presentation, with a subtitle that's specific to the course being taught

**Elements of the Special Change Process**

- Only qualified trainers may access and make changes to the PSM materials
- Requester proposes a set of changes, gets PSM project manager approval (or denial), and both agree on the reviewer(s) who will examine the changes
- Reviewer(s) is a TSG member from a Transition Organization other than the reviewer(s)
- For specific business reasons, requester may restrict which TSG members may be reviewers
- Requester negotiates edits/changes with reviewer
- Requester makes approved changes
- Requester provides a copy of the changes to the reviewer(s), with a courtesy copy to the PSM project manager
- Requester provides changes to the PSMSC for use in future content updates if they wish, but they may retain ownership on significant changes
- Requester agrees to revise the PSM Guidebook content and official course material with the approved changes when these materials are updated

The subgroup expects that after this process is done several times, it will be clear which areas of the course material should be separated out as modules that people may tailor.

## 9.2 CRITERIA FOR NEW SYSTEMS AND SOFTWARE MEASURES AND INDICATORS

Adopted April 1999 [PSM Guidance workshop April 1999]

a. For a measure to be added to the PSM guidance, it must meet the following criteria:
   (1) Track Record
      (a) Has been used successfully by several organizations
      (b) Continues to be used
      (c) Success is documented
   (2) Flexible Application Base
      (a) Useful in more than one application domain
      (b) Can be applied in different management and organizational arrangements
      (c) Not dependent on specific product development methods
   (3) Scope
      (a) Systems and software engineering focus
      (b) Organization or enterprise
      (c) Process improvement
   (4) Well-Defined - data is specific and measurable

(5) Unique - does not duplicate another measure
(6) Suitable for Historical Baselines - retains value and meaning for future comparison or estimation

b. For an indicator to be added to the PSM Guidance, it must meet the following criteria:
   (1) Same as Measure Criteria
      (a) Track Record
      (b) Flexible Application Base
   (2) Clearly addresses its associated information needs
   (3) Can be derived from its measure or measures' suggested data specifications
   (4) Straightforward to interpret

## 9.3 USE OF PSM LOGO BY TSG MEMBERS AND TRANSITION ORGANIZATIONS

Adopted May 1999 [TSG Meeting May 1999]

A question was raised as to whether TSG members and Transition Organizations may use the PSM logo. The decision was that TSG members and TOs may use the PSM logo in their presentations when they are using PSM materials. If they make any changes to the material (and the changes are approved), the TOs should use both the PSM logo and their own.

## APPENDIX A - MEMBERS OF PSM GROUPS

(As of February 2005)

| | |
|---|---|
| Project Manager | • Cheryl Jones |
| Core Sponsors | • US Army ARDEC (1999-current)<br>• Naval Air Systems Command (2004-current)<br>• OUSD DDR&E/S&T (2003-current)<br>• OSD-NII (2003-current)<br>• OUSD AT&L (1997-2003)<br>• US Army ATEC-ASMO (1995-2003)<br>• US Air Force CRSIP Program (1998-2002)<br>• Federal Aviation Administration (1998-2001)<br>• Naval Undersea Warfare Center (1993-1998)<br>• JLC Joint Group on Systems Engineering (1993-1997) |
| Executive Steering Committee | • US Army - Alison Ferraro<br>• US Navy - Tom Conrad (Chair)<br>• US Air Force - Bruce Allgood<br>• OSD - Joe Jarzombek<br>• DCMA - Guy Mercurio<br>• Industry - Dennis Ahern<br>• FAA - Roger Cooley<br>• IEEE/ISO - TBD<br>• PSM Project Manager - Cheryl Jones<br>• Secretary - Fred Hall |
| Technical Steering Group | • Cheryl Jones, ARDEC (PSM Support Center), PSM Project Manager<br>• John McGarry, ARDEC (PSM Support Center)<br>• Fred Hall, Assurance Engineering (Writer, Tool Developer)<br>• Betsy Bailey Clark (alternate Brad Clark), SMI (Writer)<br>• Dave Card, Q-Labs (Writer)<br>• Beth Layman, TeraQuest Metrics (Writer)<br>• Garry Roedler, Lockheed Martin and INCOSE (Systems Engineering Study Group)<br>• Joe Dean, Tecolote (Writer)<br>• Dave Zubrow, SEI (SEI Interface)<br>• Bob Charette, ITABHI (Risk Interface)<br>• Keith Kratzert, FAA (FAA Interface)<br>• Bruce Allgood, USAF STSC (Writer)<br>• Paul Janusz, ARDEC (RGM Interface)<br>• Guy Mercurio, DCMA (DCMA Interface)<br>• Joyce Statz, Borland TeraQuest (Transition Organization Representative)<br>• Terry Rout (Australian Representative)<br>• Ray Irvine (Australian DoD Representative)<br>• Paul Caseley (UK Representative) |

| | |
|---|---|
| Technical Working Group | • See Appendix B |
| PSM Support Center | • Fred Hall<br>• Dave Morris<br>• Denise VanBuren<br>• Jeannie Hall |
| Transition Organizations | • Refer to Transition Organization Package |

## APPENDIX B - TECHNICAL WORKING GROUP MEMBERS

### ***DoD and Government***

- US Air Force Materiel Command (AFMC)
- US Air Force Space System Support Group (SSSG)
- US Air Force Strategic Command (STRATCOM)
- US Air Force Software Technology Support Center (STSC)
- US Army CERDEC & Engineering Center
- US Army Communications-Electronics Command (CECOM)
- US Army Material Command (AMC)
- US Army Research, Development and Engineering Command (RDECOM) - Armament Research, Development and Engineering Center (ARDEC)
- US Army SAALT
- US Army Space and Missile Defense Command (SMDC)
- US Marine Corps Tactical System Support Activity (MCTSSA)
- US Navy Arnold Engineering Development Center (AEDC)
- US Navy Fleet Material Support Office (FMSO)
- US Naval Air Systems Command (NAVAIR)
- US Naval Air Warfare Center (NAWC)
- US Naval Sea Systems Command (NAVSEA)
- US Navy Operational Test & Evaluation Force (OPTEVFOR)
- US Navy Research Lab (NRL)
- US Navy Surface Warfare Center (NSWC)
- US Navy Undersea Warfare Center (NUWC)
- Assistant Secretary of the Navy (ASN) Research Development & Acquisition (RD&A)
- Office of the Secretary of Defense (OSD) National Information Infrastructure (NII)
- Office of the Secretary of Defense (OSD) Program Analysis & Evaluation (PA&E)
- Office of the Under Secretary of Defense (OUSD) Science & Technology (S&T)
- Aerospace Corporation
- Central Intelligence Agency
- Defense Acquisition University (DAU) - Defense Systems Management College (DSMC)
- Defense Contract Management Agency (DCMA)
- Defense Finance and Accounting Service (DFAS)
- Defense Information Systems Agency (DISA)
- Defense Logistics Agency (DLA)
- Department of Homeland Security
  US Customs and Border Protection
- Federal Aviation Administration (FAA)

- Institute for Defense Analyses (IDA)
- MITRE Corporation
- National Aeronautics and Space Administration (NASA)
- Sandia National Lab
- Social Security Administration (SSA)
- Software Engineering Institute (SEI)

***Industry***

- ACS GSG
- Accenture, Quality and Process Improvement
- Alion Science and Technology
- American System Corporation
- Ameritrade Corporation
- Apptis
- Argon Engineering Associates
- Assurance Engineering
- BAE Systems
- Bank of America
- Bloodworth Int. Tech.
- Boeing
- Booz Allen Hamilton
- Borland TeraQuest
- Center for Systems Management
- CMIS
- Computer Technology Associates (CTA)
- Countrywide
- Carnegie Mellon University
- Computer Sciences Corporation (CSC)
- David Consulting Group
- Distributive Software
- Federal Reserve Bank
- First Line Partners
- FMI Solutions
- Fraunhofer Center for Experimental Software Engineering
- GTE
- Galorath, Inc.
- General Dynamics
- General Scientific Corporation
- Graeme & Garland
- Harris Corporation
- Hawaiian Electric
- International Business Machines (IBM)
- IEEE
- International Function Point Users Group (IFPUG)
- IIT Research Institute (IITRI)
- International Council on Systems Engineering (INCOSE)
- ITABHI
- Independent Engineering, Inc.
- Jacobs Sverdrup
- James Gregory Associates

- Kodak Health Imaging
- L-3 Communications
- Lexmark Intenational
- Lockheed Martin
- Management-By-Measurement, LLC
- National Renewable Energy Laboratory
- Northrop Grumman
- OAO Corporation
- Paraswift, Inc.
- Pragma Systems Corporation
- PRICE Systems, LLC
- Q-Labs
- Quantitative Software Management
- Quality Plus Technologies, Inc.
- Raytheon
- Reifer Consultants
- Robbins Gioia, LLC
- Rockwell Collins
- Science Applications International Corporation (SAIC)
- Sallie Mae
- Sentel
- Softstar Systems
- Software Engineering Associates, Inc.
- Software Management Solutions
- Software Metrics, Inc.
- Systems and Software Consortium, Inc (SSCI)
- Technomics
- Tecolote Research, Inc.
- Texas Guaranteed Student Loan Corporation
- Titan Corporation
- Tivoli
- Tybrin Corporation
- United Defense
- University of Southern CA
- UpStart Systems, LLC
- User Trust Network
- US West
- VisiTech, Ltd.
- Virginia Polytechnic Institute and State University
- West Virginia High Tech. Consortium
- West Virginia University
- Whittaker Group
- Wind River Systems

- Xcel Energy

## ***International***

- ADI Limited (*Australia*)
- Amdocs *(Israel)*
- Australian Defence Force Academy (ADFA) (*Australia*)
- Australia SoC Technology Centre (*Australia*)
- BAE Systems (Australia)
- Centro de Investigacion en Matematicas (CIMAT) (*Mexico*)
- Defence Science and Technology Labs (*UK*)
- Defence Material Organisation - Australian DoD (*Australia*)
- EMBRAER (Brazil)
- Ericsson Espana SA (*Spain*)
- General Dynamics (*Canada*)
- Government of Israel, Ministry of Defense *(Israel)*
- Jacobs Sverdrup (*Australia*)
- Kozo Keikaku Engineering, Inc. *(Japan)*
- LiveWare I.S.S.A (*Argentina*)
- MEADS International (U.S, Germany, Italy)
- MS SPI Solutions (Mexico)
- National Research Council of Canada (*Canada*)
- S-3 Consulting Pty. Ltd. (*Australia*)
- Saab Systems Pty. Ltd. (*Australia*)
- Software Improvements Pty. Ltd. (*Australia*)
- Software Quality Institute (*Australia*)
- Tangram Hi-Tech Solutions (*Israel*)
- Tenix ESD (*Australia*)
- ti Metricas (*Brazil*)
- UK Ministry of Defence (*UK*)
- University of York/YorkMetrics Ltd. (*UK*)

# APPENDIX C - PSM RISK MANAGEMENT PLAN

## C.1 Introduction

The purpose of risk management planning is to define the resources and strategies that ensure PSM project risks are identified and managed in a consistent, systematic manner.

This Risk Management Plan defines how risk management activities are implemented and supported as a continuing PSM project management activity. The objective of risk management is to reduce or eliminate risks prior to them becoming a threat to successful achievement of PSM goals and objectives.

This Risk Management Plan serves as the mechanism for implementing the PSM project risk management.

## C.2 Plan Scope

The scope of this Risk Management Plan covers developing, documenting, and implementing a risk management process for the PSM project.

The scope of risk management includes the development of PSM products, consultation support to ARDEC and external customers, and project management activities.

## C.3 Risk Management Process Description

The risk management process described in the ARDEC Software Enterprise CP-103 is applied to this project, except as otherwise specified.

### C.3.1. Risk Management Strategy

The basic risk management strategy is to identify critical areas and risk events/situations, both technical and non-technical, and take the necessary action to investigate and resolve them before they adversely affect cost, schedule, or performance. The strategy for managing risks on the PSM project is to focus on the following criteria that highlight top risks:

- High risk exposure
- Timing more likely to cause risk occurrence
- Great potential for organizational impact
- Great chance that risks may be linked/coupled to other risks
- Low data confidence

### C.3.2. Risk Sources and Categories

The PSM project activities are reviewed against the Risk Sources identified in the PSM Guidebook. The sources are then evaluated in terms of the risk to each particular activity. Information needs that provide sources of risk for the PSM project are identified using the Information Category-Measurable Concept Measure (ICM) table in the PSM book. The information needs are then correlated to the list of PSM activities required. The risk sources are then correlated with the initial set of risk-related categories. Finally,

the list of PSM activities is correlated to the set of categories, and the associated risks or obstacles are identified.

### C.3.3. Risk Management Context and Risk Identification

The objectives of the PSM project are described in the PSM Methods of Operation, Section 1.1.

Assumptions of the PSM project are:

- Personnel assigned to PSM tasks are available as needed

Constraints on the PSM project are:

- Funding is a major constraint - tasks are planned within available funding

The purpose of this activity is to identify risks and develop a risk profile for the PSM project. The list of current top-rated risks is contained in the PSM Project Risk Profile, Attachment C-1 to this Appendix. This risk profile creates a consistent, current, and historical view of the risks present in the PSM project, along with their priority ranking and treatment, so that the risks may be communicated fully and succinctly to relevant stakeholders. The PSM risk profile will be maintained throughout the project's life cycle.

### C.3.4. Risk Parameters

The risk criteria and parameters are those identified in CP-103, with the following additions.

The following approval levels were defined for the selection and approval of risk treatment alternatives.

- **High**: PSM TSG
- **Moderate**: PSM project manager
- **Low**: PSM project manager

### C.3.5. Risk Monitoring

This project utilizes project-level measures IAW the Project Measurement Plan, Appendix D, as a basis for monitoring those risks. See the risk measures section of each risk for specific measures used.

## C.4 Risk Management Process Evaluation

The risk management process described in CP-103 is applied to this project, except as noted below.

### C.4.1. Capturing Risk Information

Risk information is documented in the PSM TSG meeting minutes.

### C.4.2. Assessing the Risk Management Process

Suggestions for improving risk management procedures, process, or policies are submitted through an Organizational Change Request (OCR).

### C.4.3. Generating Lessons Learned

Information on the risks identified, their treatments, and the success of the treatments will be reviewed during PSM TSG meetings by the stakeholders and other parties to identify systemic organizational risks. Project risks are also reviewed at the PSM TSG meetings, and individual project lessons learned may be collected to aid in identifying systemic project risks. Lessons learned are submitted and processed.

## C.5 Risk Communication

### C.5.1. Process Documentation and Reporting

Risk action requests are used to document risk-related treatments, actions, decisions, and status.

### C.5.2. Coordinating Risk Management with Stakeholders

The results of the risk management activities are reported at all TSGs or whenever risk threshold breaches occur.

### C.5.3. Coordinating Risk Management with Interested Parties

The results of the PSM risk management activities are reported to stakeholders during regularly scheduled meetings.

## ATTACHMENT C-1 - PSM PROJECT RISK PROFILE

Current PSM project risks are identified in this section.

**Risk 1: No long-term sponsor for PSM**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 1
**Risk Level:** High
**Probability:** High (3) Impact: High (3) Risk Exposure (9)

**Risk Description:** PSM project sponsorship has changed several times as previous sponsors were reorganized out of existence and personnel changes have occurred. This has caused delays in receipt of funding, changing requirements, and priorities. There is a continued risk that the sponsors may change.

PSM is a tri-service initiative with product development funding provided by various Army, OSD, and other government organizations. Each year, an estimated task plan is prepared with estimates of the funding requirements. Writers are generally paid, but Technical Working Group (TWG) members volunteer their time to the project. The PSM Executive Steering Committee (ESC) approves the task plan based on the identified needs of the DoD and industry users.

The actual tasking that is accomplished each year depends on identifying a sponsor for a particular task or on identifying a volunteer to lead a task without funding. Funding for an activity must be available at least one month prior to the start of the activity.

**Risk Measures and Threshold:** The PSM task plan is updated when sponsor funding is received in house. Any funding received is either allocated to in-house personnel or to support contractors. The threshold is exceeded when any expected funding is more than one month late.

**Risk Action Requests:** None

**Contingency Plans:** The PSM ESC reviews tasking at its biannual meetings. At these meetings, priorities are re-evaluated, any required adjustments to the project plan are identified, and additional potential sponsors are identified. In addition, the PSM project manager reviews this information on at least a quarterly basis to evaluate new plans. This risk may be:

- Avoided by matching requirements on SOWs to available funding
- Controlled by identifying additional funding sources and sponsors
- Controlled by soliciting volunteer effort for support identified tasks
- Monitored to re-evaluate availability of funding

**Risk 2: Schedule deviations for funded tasks**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 3
**Risk Level:** Moderate
**Probability:** Medium (2) Impact: Medium (2) Risk Exposure (4)

**Risk Description:** This risk applies to PSM funded tasks related to product development activities. PSM product development is heavily dependent on both funding (see risk #1) and availability of TWG members from many diverse organizations that work on PSM product development. A detailed schedule is developed prior to the start of any task based on availability of funding and resources. Deviations from this schedule are monitored.

**Risk Measures and Threshold:** A task list containing schedule activities for the PSM products is used to measure this risk. This measure falls within Schedule and Progress in the ICM table. The threshold is exceeded whenever a product is more than 20 percent over schedule.

**Risk Action Requests:** None

**Contingency Plans:** In order to reduce the occurrence of apparent schedule slips, schedules are not defined until funding is available, available resources have committed to each task, and any required contractual mechanisms are in place.

When the schedule cannot be maintained, alternatives are evaluated. This risk may be:

- Avoided by revising the schedule based on funding availability
- Controlled by changing the resources (personnel or amount of funding) applied to the tasks
- Controlled by changing the scope of work to reflect revised requirements

**Risk 3: Resource limitations - external personnel**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 2
**Risk Level:** Moderate
**Probability:** High (3) Impact: Medium (2) Risk Exposure (6)

**Risk Description:** There are limitations for the personnel available to support the project. There are very few personnel who work on the PSM project full time. Most participate in many other activities within their organization in addition to their work on PSM. As a result, resources are not always available as scheduled. This has a large impact on schedule milestones. This is especially true for volunteer activities.

**Risk Measures and Threshold:** The informal task list is used to track the PSM project's contracted efforts. This measure falls within Resources and Cost in the ICM table. Volunteer efforts are tracked informally. This is more difficult to control since it is a volunteer effort.

**Risk Action Requests:** None

**Contingency Plans:** When schedule cannot be maintained, alternatives are evaluated. This may involve:

- Revising the schedule based on resource availability
- Changing the resources (personnel) applied to the task
- Changing the scope of work to reflect available resources

**Risk 4: Resource limitations - RDECOM-ARDEC personnel**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 5
**Risk Level:** Moderate
**Probability:** Low (1) Impact: High (3) Risk Exposure (3)

**Risk Description:** ARDEC SWISE personnel are working on PSM development and management tasks, ARDEC process improvement activities (helping projects to implement the M&A, risk, and estimation procedures, as well as developing project plans for selected projects), an FMS case, and supporting several external organizations. Resources must be constantly prioritized to meet PSM and other requirements.

**Risk Measures and Threshold:** This is monitored via the informal task list.

**Risk Action Requests:** None

**Contingency Plans:** This risk may be:

- Avoided by adding additional SWISE resources, either through contractual support or additional internal resources
- Controlled by continuously reevaluating priorities to focus on the most important task

**Risk 5: Unauthorized and inappropriate use of the PSM name, process, or products**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 6
**Risk Level:** Moderate
**Probability:** Low (1) Impact: Medium (2) Risk Exposure (2)

**Risk Description:** There have been instances where individuals that are not associated with PSM have used the PSM logo or claimed to be authors of PSM material.

**Risk Measures and Threshold:** Subjective judgment

**Risk Action Requests:** None

**Contingency Plans:** This risk may be:

- Avoided by listing references to PSM and by clearing documentation usage requirements
- Monitored by reviewing PSM uses
- Controlled by contacting any individual or oganization who uses PSM in an unwarranted manner
- Controlled by posting mateirals on the web site in the most secure format possible

**Risk 6: Unexpected changes or termination of software COTS products that are used in the PSM Insight Tool**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 4
**Risk Level:** Moderate
**Probability:** Medium (2) Impact: Medium (2) Risk Exposure (4)

**Risk Description:** The PSM Insight tool contains many COTS products as part of the delivered code. If any of these tools are changed or if the software is no longer supported, it impacts the PSM Insight code. This has already occurred with several components. When this occurs, the components have to be replaced or the functionality has to be (re)developed.

**Risk Measures and Threshold:** The threshold is a binary one: either a component is available and is supported or it is not.

**Risk Action Requests:** None

**Contingency Plans:** When a component is changed and can no longer be used or if it is no longer supported, a trade study is conducted to determine if a feasible alternative is available. The trade study considers required functionality, costs, and whether the functionality can be developed. In addition, the tool developers periodically review available components for potential inclusion in the PSM Insight code.

**Risk 7: Loss of technical consistency**

**Expected Phase:** All
**Status:** Monitor
**Date:** 15 May 2001
**Priority:** 7
**Risk Level:** Moderate
**Probability:** Medium (2) Impact: Low (1) Risk Exposure (2)

**Risk Description:** PSM guidance is referenced in multiple technical standards and DoD/service policies and regulations. As these policies and regulations change, PSM may need to make changes to coordinate with these documents. There is also a potential that changes to PSM may require changes to documents that reference PSM.

**Risk Measures and Threshold:** All changes to PSM guidance are evaluated subjectively to determine whether other documents that reference PSM need to be changed. Additionally, changes to documents that reference PSM are also evaluated subjectively to determine whether PSM guidance needs to be changed.

**Risk Action Requests:** None

**Contingency Plans:** Depending on the extent of the change, several possibilities exist:

- The PSM guidance may be changed to reflect policy or standard changes
- Recommendations for changes to other documents may be made
- A white paper mapping PSM to other documents may be created

# APPENDIX D - PSM MEASUREMENT PLAN

## D.1 Introduction

### D.1.1. Purpose

This PSM Measurement Plan describes the specific details of implementing the software measurement process to provide feedback on PSM project-specific information needs. It helps project and technical managers meet cost, schedule, and technical objectives.

### D.1.2. Objectives of the PSM Project

The objectives of the PSM project are described in the PSM Methods of Operation, Section 1.1.

### D.1.3. Scope of PSM Project Measurement

The scope of the PSM project and of its associated products may be found in the PSM Methods of Operation, Section 1.2.

PSM describes an information-driven measurement process that may be applied to the types of projects described in the PSM guidance. For clarification, the measures described in this plan refer to the information needs related to the PSM project itself and its associated products. It does not address the project measures for the projects that apply the PSM process.

## D.2 Project Description

### D.2.1. Project Management Characteristics

The PSM organizational structure is described in the PSM Methods of Operation, Section 1.3. Roles and responsibilities for each of these key contributors are identified in the Methods of Operation, Section 1.4. Current PSM group members are identified in the Methods of Operation, Appendix A.

## D.3 Measurement Approach

### D.3.1. Measurement Roles and Responsibilities

Roles and responsibilities for each of these key contributors are identified in the PSM Methods of Operation, Section 1.4. Current PSM group members are identified in the Methods of Operation, Appendix A.

### D.3.2. Communications and Interfaces

Communications and interfaces among the PSM project manager, PSM organizational structure, and its internal and external interfaces are discussed in Sections 3.4, 5.1, and 7.3 of the PSM Methods of Operation.

### D.3.3. Tools and Databases

As identified in the PSM Project Plan, several automated tools are used in the development and management of the PSM project. These include:

- PSM Insight for storage and analysis of the measurement data
- Various cost estimating tools, including SLIM Estimate, SLIM Control, SEER-SEM, and COCOMO II for generating and evaluating project estimates
- Microsoft Excel and other components of the Microsoft Office Suite for analysis of the measurement data

### D.3.4. PSM Project Measurement Objectives

PSM project measurement objectives are to:

- Provide a proven measurement process to identify and address information needs, issues, and risks
- Monitor the transition of PSM products and services into the measurement community
- Evaluate the performance of PSM products and services
- Provide a basis for objective communication, informed decision making, and allocation of PSM project resources

### D.3.5. Measurement Implementation Strategy

The PSM project measurement process has been implemented over time, starting with the establishment of the PSM Support Center in 1996. Measures currently provide feedback on its objectives, services, and products. The measures were chosen based on the history of the PSM project, its current objectives, information needs, risks, and customer priorities. The measures are updated periodically to reflect new information needs, lessons learned, and the next phase of the measurement strategy.

Measures collected include the following:

| Indicators | Reference | Currently Collected? |
|---|---|---|
| PSM Presentations | P1 | Yes |
| PSM Courses | P2 | Yes |
| PSM Guidance | P3 | Yes |
| PSM Insight | P4 | Yes |
| Course Ratings | P5 | Yes |
| Schedule | Modified from Org 1 | Yes |
| Effort | Modified from Org 6 | Yes |
| Cost | Modified from Org 9 | Yes |

### D.3.6. Evaluation Criteria

Prior to conducting the measurement process evaluation activities, evaluation criteria are established for each of the measures to determine the effectiveness and benefit of the measures previously chosen for implementation. Criteria for evaluating the utility of the analyses and results and for conducting Measurement and Analysis (M&A) activities are established. These items include:

- **Measurement product use** - the extent to which the measure is used
- **Confidence in measurement results** - the level of confidence the user has in the measurement results
- **Measurement results' fitness for purpose** - the extent to which the measures and indicators provide feedback on the information need they were meant to report on, and the extent to which predictive measures and indicators demonstrate the ability to forecast
- **Understandability of measurement results** - the extent the user can understand and properly interpret the results
- **Satisfaction with the assumptions of an indicator model** - are the assumptions of the indicator satisfactory
- **Measurement accuracy** - was the measure implemented according to its measurement specification, and are the results different from what was intended
- **Measurement reliability** - are the results repeatable and reproduceable

The PSM project measurement process is evaluated from three perspectives:

- **Performance** - measuring the inputs, outputs, and effects of the measurement process - performance is evaluated against timeliness, efficiency, defect containment, and customer satisfaction
- **Conformance** - comparing the process to a description of its intended use - each of the measurement process activities of Plan Measurement, Perform Measurement, Evaluate Measurement, and Obtain and Sustain Commitment is audited for compliance

- **Capability** - comparing the process to an external benchmark of process maturity - capability is compared to the Capability Maturity Model, Integrated (CMMI) Level 3 criteria

Additional guidance for the evaluating measures and the measurement process are found in PSM Guidebook Version 4.0b, Part 7.

### D.3.7. Measurement Investment

A measurement analyst has been identified for the PSM project. Funding has been allocated and provided as part of the PSM project management process tasks. The PSM project manager requires measurement support to implement and evaluate the measurement process. PSM project members who implement the measurement process provide this support as part of their day-to-day activities and tasks, and it is not delineated as a separate line item or WBS element.

### D.3.8. Measurement Activities

Planned measurement activities and deliverables are aligned with the current PSM Project Plan, scheduled milestones, meetings and reviews, and the other PSM project processes. For example, targeted measurement activities in 2004 included update of service, product, and performance measures prior to the annual PSM Users' Group Conference.

### D.3.9. Measurement Training

Any new project personnel assigned to a measurement-related role will require training in the M&A procedure.

## D.4 Description of PSM Project Information needs

### D.4.1. Prioritized List of PSM Project Information Needs, Issues, and Risks

The PSM project prioritized list of information needs is identified in the PSM Measurement Specification. These needs stem from past performance on the PSM project, current activities, organizational and customer needs, and the subsequent assessment and evaluation of risks and issues for this project.

## D.5 PSM Project Measurement Specifications and Indicators

For each of the prioritized information needs identified, one or more candidate measures and indicators have been identified to provide feedback on each information need in the PSM Measurement Specification.

## D.6 PSM Project Aggregation Structures

The PSM project uses the WBS aggregation structure. The PSM project's WBS is defined in "PSM FY01 Potential Tasks and Timeframes."

## D.7 Indicators

Current indicators used on the PSM project are described in the PSM Measurement Specification.

## D.8 Reporting

### D.8.1. Collecting and Reporting Mechanisms

The project measures are reported to the PSM project manager and within the PSM organization as described in Methods of Operation document.

### D.8.2. PSM Organizational Structure

Reporting mechanisms for the PSM Organizational Structure is discussed in the PSM Methods of Operation.

### D.8.3. Contents of Reports

Results from the analysis of measures are compared to their corresponding risk, issues, and information needs. Specific details for the measures are contained within the Measurement Specification. Formats for presentations to the PSM project manager vary according to the review being presented.

### D.8.4. Storage and Repository

In performing their day-to-day activities, each PSM project member collects measurement data as described in Part 5, Measurement Specification, and Part 8, Data Collection and Reporting Mechanisms. The data collected is stored in the engineering notebooks and automated tools noted in the measurement specification. The PSM project members, the measurement analyst, and the PSM project manager upload appropriate reports, findings, briefings, and other measurement products as defined in the procedure.