Why PSM?

One of the most challenging tasks in developing and maintaining a system is to meet critical project cost, schedule, and technical objectives. With more complex capabilities in today's systems, effective management of development and maintenance efforts is a key factor in project success.

What is PSM?

Practical Software and Systems Measurement: A Foundation for Objective Project Management was developed to meet today's software and system technical and management challenges. It describes an information-driven measurement process that will address the unique technical and business goals of your organization. The guidance in PSM represents the best practices used by measurement professionals within the software and system acquisition and engineering communities.

★ PSM is sponsored by the Department of Defense and the US Army. The goal of the project is to provide project managers with the objective information needed to successfully meet cost, schedule, and technical objectives for programs and organizations.

★ PSM is based on actual measurement experience on DoD, Government and Industry programs. Measurement professionals from a wide variety of organizations participate in the project. PSM represents the best measurement practices used within the software and system acquisition and engineering communities.

★ PSM treats measurement as a flexible process - not a pre-defined list of graphs or reports. The process is adapted to address the specific software and system information needs, objectives, and constraints unique to each program. The PSM measurement process is defined by a set of nine best practices, called measurement principles.

★ PSM integrates the measurement requirements into the software and system processes. The measurement set is tailored for each program or organization to ensure that the measurement process is not only cost effective, but also that the measures provide meaningful and usable results.

★ PSM defines an information-driven analysis approach which helps managers make informed software and system decisions.

★ The PSM analysis approach incorporates the use of multiple measures and non-quantitative program data to identify and evaluate information needs, including issues, risks and problems.

★ PSM supports current software and system acquisition and measurement policy. PSM defines a non-prescriptive measurement approach as required by acquisition reform, and provides a mechanism for the objective communications necessary within an Integrated Product Team (IPT).

★ PSM provides a basis for enterprise level management. PSM is designed to help put measurement into practice at the project level, thereby providing the data required to address enterprise-level performance, process improvement, and business-related questions. PSM also supports Information Technology (IT) performance measurement requirements.

★ PSM is currently being used by DoD, Government, and Industry. The PSM methodology is also being adopted by government and industry organizations.

★ PSM is compatible with the ISO/IEC 15939 standard, *Software Engineering - Software Measurement Process*. This international standard defines a measurement process for software development and systems engineering.

PSM Services

PSM provides classes, workshops, and on-site consulting services for implementing the PSM process and the PSM Insight software tool.

★ *PSM Briefings*. Briefings can be presented to raise awareness and gain support for measurement in your organization. Executive-level briefings show how measurement can improve management planning and decision-making. Other briefings are available that provide participants with an overview of the PSM process.

★ *PSM Measurement Planning Workshops* help you tailor a measurement plan to your specific project or organization needs. The PSM Support Center staff will work with your program personnel to plan and conduct a one- to three-day, on-site workshop. During the workshop, software information needs are identified, prioritized, and documented. The measures needed to provide insight into the selected information needs are also identified, existing data is inventoried, and measurement data requirements are defined. Program personnel leave the workshop with a draft measurement plan and a well-defined list of activities necessary to implement the plan.

★ *PSM Training*. A two-day course which describes the PSM information-driven measurement process and includes practical "hands on" planning and performing exercises. This course teaches students the basic skills needed to select and apply measures at the program or organization level. Shorter versions of the course are also available. Choose from a publicly-offered class or a custom on-site session.

★ *PSM Consulting*. The PSM Support Team provides direct consulting services to help you implement measurement on your projects or within your organization.

★ *Training in PSM Insight–One Tool for a Comprehensive Measurement Program*. This is an intensive three-day course that consists of brief lectures, software demonstrations, hands-on exercises, and case study applications. The course is designed for you to master all the functions of PSM Insight; when you leave the class, you will be able to:
- Implement PSM Insight at your work place immediately
- Tailor your site-specific information needs to the tool
- Customize PSM templates to fit your project
- Select and specify relevant measures
- Create and analyze complex indicators
- Import data from other applications
- Apply PSM and ISO/IEC 15939 principles to your projects

★ *PSM Insight Consulting*. The PSM staff provides on-site consulting services to help you implement and tailor PSM Insight to your project-specific needs. A member of the PSM Insight design team will help you:
- Customize PSM templates, and define indicators
- Select and specify measures, and define attributes for your selected measures
- Define data import specifications
- Apply PSMI structures to your organization
- Create management information reports

Organizations and Companies currently using PSM Insight include the U.S. Army Armament Research Development Engineering Center (ARDEC), Northrop Grumman (Baltimore), Lockheed Martin (Valley Forge), and Computer Sciences Corporation (CSC).

Version 1.1

PRACTICAL SOFTWARE AND SYSTEMS MEASUREMENT

Calendar of Events

★ PSM 10th Annual Users' Group Conference, 24-28 July 2006, Vail, Colorado

★ Training Courses
  • Please check http://www.psmsc.com/Events.asp, for details.

More information and registration forms are available on the PSM web site.

Current Products

★ *PSM Published by Addison-Wesley*. *Practical Software Measurement: Objective Information for Decision Makers*, v5.
  • This book is the definitive guide to PSM, written by the leaders of the PSM development initiative and published by Addison-Wesley. It is updated with ISO/IEC 15939 terminology, new case studies, and an information model and definitions.
  • Chapters 1 and 2 are available on the PSM web site.
  • To purchase the book, visit http://www.psmsc.com/PSMBook.asp

★ *PSM Guidebook*. *Practical Software and Systems Measurement: A Foundation for Objective Project Management, v4.0c*.
  • This Guidebook to the PSM process addresses the unique technical and business goals of your organization.
  • The Guidebook is available on the PSM web site and through the PSM Support Center.

★ *PSM Insight*, v4.2.2. PSM Insight (PSMI) is a free software measurement tool that implements the complete PSM process.
  • It includes a Product Tour; User's Manual; a self-running, 20-minute demonstration of the software; and a 14-lesson Computer-Based Tutorial that teaches all the basic Insight functionality.
  • PSMI products are available on the PSM web site and through the PSM Support Center.

★ *PSM Training Material*, v5.0g, July 2004. Available for qualified instructors only.

★ *PSM: Measuring for Process Management and Improvement (MPM)*. This SEI-developed PSM:MPM guidebook describes the application of well-established principles and methods of evaluating and controlling process performance. PSM:MPM focuses on the issues that help organizations achieve technical goals and improve long-term profitability.

★ *RUP Plug-in for Practical Software & Systems Measurement*. The PSM initiative and the Rational Unified Process (RUP®) can be used to implement an effective measurement process. This plug-in integrates the measurement activities, artifacts, and concepts as described by PSM, replacing the measurement concepts provided by the Rational Unified Process base framework.

★ *Experience Reports*. PSM Members and Transition Organizations have developed and contributed several measurement experience reports (business cases) as models for PSM implementation.

Other Related Products

★ *ISO/IEC 15939, Software Engineering - Software Measurement Process*. This international standard describes the measurement process in terms of the purpose and outcomes of a compliant process, along with associated activities and tasks. This standard may be ordered via the PSM web site.

★ *Capability Maturity Model Integration (CMMI) Measurement and Analysis (M&A) Process Area*. The M&A process area provides a methodology for assessing whether a project's measurement program is compliant with the international standard, in addition to providing relevant information on CMMI-based process improvement activities.

PSM served as the base document for the development of the ISO/IEC 15939 standard. PSM provides additional details on the activities and tasks presented in ISO/IEC 15939, and provides detailed "how-to" guidance including sample measures, lessons learned, case studies, and implementation guidance. PSM, ISO/IEC 15939, and CMMI M&A contain consistent terminology and activities. The coordination of these documents means that the software and systems engineering communities have a consistent set of information-driven standards and guidance for implementing project and process measurement.

★ *ESx*. ES is a tool for collecting object-oriented design metrics from Java and C++, released by the NRC, and open-sourced under the GNU General Public License. The tool collects coupling, inheritance, and size metrics.

Technology Papers

★ *Measures for DoD Software Product Lines*. This paper is one of a series commissioned by the Department of the Undersecretary of Defense, Science and Technology (DUSD) (S&T) that characterizes the status of measurement associated with a particular aspect of software engineering. The specific focus of this paper is measures for software product lines.

★ *Measuring System Interoperability*. This paper is one of a series commissioned by the DoD that characterizes the status of measurement associated with a particular aspect of software engineering. The specific focus of this paper is on measures for interoperability.

★ *Object-Oriented Measurement*. This technical report summarizes the state of the practice for measurement of object-oriented (OO) software development projects. These reports are intended to help those software intensive projects that are employing new technologies and methods to establish effective measurement systems for project management purposes.

★ *Measures in Support of Evolutionary Acquisition*. The intent of this paper is to identify what measures are necessary to aid an acquisition agency and a contractor when it's decided that a program should follow an *evolutionary acquisition strateg*y. Evolutionary acquisition is a strategy that develops and deploys a core capability with the intent to field additional capabilities as stakeholder needs, expectations, constraints, and interfaces are better understood.

★ *Technical Measurement Guide.* This guidance is the result of a joint project that was conducted between the Practical Software and Systems Measurement (PSM) project office, the International Council On Systems Engineering (INCOSE), and various companies. This guide provides information on implementing technical measurement on a project, including Measures of Effectiveness (MOEs), Key Performance Parameters (KPPs), Measures of Performance (MOPs), and/or Technical Performance Measures (TPMs).

★ *Safety Measurement White Paper*. This White Paper is the result of work by the Safety & Security Technical Working Group of PSM, carried out during the period March - February 2004, and updated January 2006. The objective of this work has been to propose additions to the existing PSM guidance materials appropriate for organizations and projects developing safety- and security-critical products. It is expected that the proposals will be improved and extended following wider consideration by the specialist communities and project trials.

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★ *Security Measurement White Paper.* This White Paper reports on research on the application of measurement principles to the security properties of software-intensive systems. The work has the objective of integrating security measurement with the general measurement principles as developed by the PSM project and in accordance with the related standard ISO/IEC 15939:2002. It provides a rationale for security measurement recommendations issued by the PSM project in associated documentation. The application of measurement principles to security is a relatively new field and presents several challenges, explored in this paper.

★ *Measurement Guidance for Process Improvement, Joyce Statz.* This paper consolidates the output of several technical working group meetings addressing process improvement measurement. This material may be used with process improvement efforts of many different types and sizes: individual improvement projects, programs of projects, and small process improvement team activities. The paper identifies potential measures in the areas of (1) Anticipated value of the process improvement project, to justify doing the project, (2) Readiness of the organization for process improvement, and (3) Progress of the process improvement project including both progress to plan and progress in attaining the anticipated value or results.

Measurement-Related Papers & Articles

★ *"Applying PSM to Enterprise Measurement."* This report describes the application of the concepts of PSM to satisfy the information needs of enterprise measurement. In particular, it focuses on the relationship between PSM, an established approach for project measurement, and the Balanced Scorecard, an established approach for enterprise measurement. The key to integrating the two approaches lies in reconciling the two views of information needs.

★ *"Making Measurement Work,"* **CrossTalk, January 2003, Cheryl Jones.** Learn how a successful measurement program can become a way of doing business that allows people to make fact-based decisions. The PSM web site has a link to this article.

★ *"Measurement Tailoring Workshops," Insight –* **The Army's Software Metrics Office (ASMO) Newsletter, Spring & Summer 1999.** The first step in implementing an issue-driven measurement process is to define the project issues that will be addressed by the measurement program. A workshop is the best forum to achieve this objective. This article provides a roadmap to conduct an effective Measurement Tailoring Workshop, which is based on the guidance presented in the PSM Guidebook.

★ *"Tailoring and Implementing an Organization Measurement Process," Insight –* **The Army's Software Metrics Office (ASMO) Newsletter, Spring 2002.** In February 2002, the Software Enterprise of TACOM-ARDEC, Picatinny Arsenal, New Jersey, was the first U.S. government organization to successfully achieve a formal Level 3 assessment under the CMMI. This was the culmination of several years of organizational process improvement activities. The underlying, critical task was to define a set of measures that not only addressed the management goals of TACOM-ARDEC, but also supported the information needs of fourteen diverse projects within the Software Enterprise.

★ *Practical Software Measurement: A Status Report. November 2003.* This paper summarizes the basic concepts of PSM, explains the relationship to prior work, and describes the status of transition within a software industry.

Additional Information

★ The *Technical Working Group* participates in the development of PSM products. This is the primary group that creates PSM information products and services.

★ One of the primary goals of the PSM project is to transition measurement into day-to-day practice by working closely with *Transition Organizations* to deliver PSM products and services to our user base. Individuals affiliated with Transition Organizations can become qualified PSM Trainers to deliver basic PSM instruction and implementation guidance to other organizations nationwide. See the Transition Organization package.

★ The annual *PSM Users' Group Conference* and the *PSM Technical Working Group (TWG)* meetings gather international measurement professionals for workshops, studies, and information exchanges.

★ Visit our web site @ www.psmsc.com ★

Works in Progress

★ *Sample Measurement Specifications.* Model specifications are available for multiple PSM-recommended measurements. This area is under development. However, a template is currently available, and sample specifications will be added in the coming months. Contact the PSM Support Center to volunteer to write a measurement specification.*

★ *System of Systems Measurement White Paper (Draft),* **14 July 2003,** SoS implementations often take longer, cost more, and present greater challenges than anticipated. Although project-centric information needs are relevant, the SoS domain is sufficiently different to require new measurement constructs and measures to be developed, validated, and put into practice.

★ *Acquisition Measurement,* **Rita Creel, Joe Dean, Paul Janusz, & Cheryl Jones.** An acquisition organization needs to know how it is doing and what it needs to improve on at any given time in the acquisition process. Of course, measurement is the key to addressing these needs.

- **Where we are:** Work is continuing on:
  - » Developing acquisition measurement guidance.
  - » Building an acquisition-measurement specific ICM table (Information Need-Measurable Concept-Measures) and sample measurement specifications.
  - » Converting the Air Force Material Command's cost model into a generic model for use by any acquisition organization.
- **How you can get involved*:** If you have experience in the acquisition field, you may participate by:
  - » Sharing information on program office functions, experiences, and lessons learned in acquisition management.
  - » Sharing practical examples of acquisition measures that have been used within your organization.
  - » Volunteering to develop acquisition measurement specifications.
  - » Reviewing the draft ICM table, specifications, and the current cost model, which are available on the PSM web site, and sharing your ideas.
  - » Volunteering to test the model on pilot programs in the October to December 2005 timeframe, once suggested changes from the workshop have been incorporated.

Volunteers are always needed and greatly appreciated.

★ **Visit our web site @ www.psmsc.com ★**