



Practical Software and Systems Measurement (PSM)

Transition Organization Package

Draft Version 3.3
September 2006



Transition Organizations

Program Overview • PSM Instructor's Agreement • Transition Organizations

Executive Summary

One of the primary goals of the Practical Software and Systems Measurement (PSM) project is to transition the information-driven measurement process into everyday practice. This includes delivering all PSM products and services to a diverse customer base and helping to establish measurement practices for a variety of individual projects and organizations.

A number of government and industry partners are participating in these efforts by becoming PSM Transition Organizations. Transition Organizations help bring PSM products and services to a wider audience, while bringing the benefits of extended PSM expertise to their own organizations and clients. Your organization and its designated contact person(s) will establish and extend their measurement expertise by:

- Participating in meetings and sharing ideas through workshops
- Participating in the latest in PSM training
- Serving as qualified PSM instructors
- Receiving regular updates of official PSM materials, including measurement guidance, training materials, presentation slides, and PSM Insight software
- Helping to shape PSM products and services
- Using the PSM logo
- Reproducing and distributing official PSM products and materials
- Applying PSM expertise within your own or other organizations
- Providing PSM products to your customers (on a cost-recovery basis only)
- Marketing PSM services for profit (i.e. training, workshops, on-site support)

To maintain the quality of the PSM products and services, Transition Organizations agree to the commitments outlined in the PSM Transition Organization package. In general, the Support Center agrees to provide up-to-date materials; including training course updates, PSM Briefings, and workshop support packages. In return, the Transition Organization agrees to regular participation in training, teaching, Users' Group and Technical Working Group meetings, and the development of official PSM products and services. Instructors must also sign a written agreement that specifies the general and course-specific instructor requirements.

If you are interested in becoming a PSM Transition Organization, please review this complete document and/or contact the PSM Support Center at (410) 647-9284, ext.1 or psm@pica.army.mil.



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Program Overview

Introduction

One of the primary goals of the Practical Software and Systems Measurement (PSM) project is to transition the information-driven measurement process into everyday practice. This includes delivering all PSM products and services to a diverse customer base and helping to establish measurement practices for a variety of individual projects and organizations.

A number of government and industry partners are participating in these efforts by becoming PSM Transition Organizations. Transition Organizations help bring PSM products and services to a wider audience, while bringing the benefits of extended PSM expertise to their own organizations and clients.

Key goals in the Transition Organization program are the continuous development of qualified PSM instructors and the wide dispersion of PSM methodology while steadfastly maintaining the quality and integrity of all PSM products and services. To achieve this, the PSM Support Center asks each Transition Organization to agree to the commitments outlined in this Transition Organization Package. In general, the Support Center agrees to provide opportunities for meaningful feedback and up-to-date materials; including training course updates, PSM Briefings, and workshop support packages. In return, the Transition Organization agrees to regular participation in training, teaching, Users' Group and Technical Working Group meetings, and the development of official PSM products and services.

The purpose of this package is to detail the benefits of becoming a PSM Transition Organization, as well as the commitments made between the participating organization and the PSM Support Center. Appendix A and Appendix B, respectively, provide the PSM Instructor's Agreement Form and a list of participating organizations and their qualified PSM instructors.

The Role of the Transition Organization

A PSM Transition Organization partnership can benefit your organization in several ways. Your organization and its designated contact person(s) will establish and extend their measurement expertise by:

- Participating in the latest in PSM training
- Serving as qualified PSM instructors
- Receiving regular updates of official PSM materials, including measurement guidance, training materials, presentation slides, and workshop support packages
- Helping to shape PSM products and services, including requirements for new releases of the PSM Insight tool
- Using the PSM logo



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- Reproducing and distributing official PSM products and materials
- Applying PSM expertise within your own or other organizations
- Providing PSM products to your customers (on a cost-recovery basis only)
- Marketing PSM services for profit (i.e. training, workshops, on-site support)

In return, your organization makes specific commitments to the PSM Support Center and the quality of the overall PSM program. These commitments include adhering to PSM methodology, meeting the requirements and cost-recovery fees of PSM products, as well as maintaining the form and content of all official PSM materials and products (although supplemental materials are welcome). *See Table 1 below and Appendix A, the PSM Instructor's Agreement, for a full list of Transition Organization commitments.*

TABLE 1. TRANSITION ORGANIZATION PRIVILEGES & COMMITMENTS

TRANSITION ORGANIZATIONS MAY:	
(1)	Use the PSM logo.
(2)	Reproduce and distribute official PSM products and materials (within defined quality/format guidelines).
(3)	Apply PSM within their organization or other organizations.
(4)	Provide PSM products to others (on a cost-recovery basis only).
(5)	Market PSM services for profit (i.e. training, workshops, on-site support).
TRANSITION ORGANIZATIONS AGREE TO:	
(1)	Provide input and comments to the PSM Support Center with respect to PSM strategic plans, decisions, and the definition of future PSM products and services through input to the PSM Technical Steering Group.
(2)	Abide by the terms and conditions set forth for the use of all products and services provided by the PSM Support Center. In general, the Support Center is the sole manager of all PSM products and services and is the only one authorized to modify them. Proper use of the PSMSC products and services includes: <ul style="list-style-type: none"> (a) Agreeing to not change baseline PSM materials and products. (Additional materials may be added for tailoring or supplemental purposes.); (b) Ensuring that all guidance, products, and services that refer to PSM and are separately developed and delivered by the Transition Organization are consistent with the PSM technical approach and the PSM information-driven measurement process. A courtesy copy of additional materials shall be forwarded the Support Center so that they can be reviewed. These materials will remain the property of the Transition Organization and will not be distributed; (c) Prohibiting distribution of PSM training materials beyond the qualified instructors, except for those training materials that are designated for distribution to students. (d) Reference all materials from PSM as such (clearly indicate those developed separately).
(3)	Acknowledge that the reputation of the PSM project is an important asset that must be protected and considered throughout the Transition Organization's association with the PSM Support Center. Specific protection of the reputation of the PSM project includes: <ul style="list-style-type: none"> (a) Supporting and following the PSM project approach that is based on cooperation and openness; (b) Providing proper and professional attribution in the use of PSM material, products, and services; and
	(c) Maintaining the quality and consistency of PSM products and services by following the PSM quality standards and maintaining the integrity of PSM product baselines.



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<p>(4) Provide PSM instructors and facilitators by identifying appropriate personnel, ensuring that those personnel satisfy the PSM training qualification requirements, and ensuring that personnel stay current with PSM guidance and participate in PSM activities. PSM-qualified individuals must attend a train-the-trainer course. Afterwards, they must teach one session of the appropriate PSM course with another qualified instructor who has been designated by the PSM Support Center as an observer for that course, within 12 months of their TTT course. The Support Center will conduct train-the-trainer courses to support the establishment and maintenance of individual qualifications. The cost of train-the-trainer courses will be on a fee-for-service basis. Specific support from Transition Organizations to provide instructors and facilitators includes:</p> <ul style="list-style-type: none">(a) Identifying and maintaining at least one PSM-qualified individual;(b) Ensuring that instructors and workshop facilitators meet the qualification requirements for each PSM course or workshop that is conducted by the Transition Organization;(c) Ensuring that instructors attend at least one Users' Group or Technical Working Group per year;(d) Providing resources for initial PSM qualification and qualification updates for identified individuals;(e) Ensuring that instructors and workshop facilitators maintain qualifications by attending refresher training, if required;(f) Agreeing to not independently qualify PSM instructors and workshop facilitators; and(g) Paying for any services required to ensure that designated individuals are qualified to provide the PSM products and services (courses, workshops, tools, observers, etc.).
<p>(5) Maintain a management and technical structure to deliver the PSM products and services to appropriate customers. This includes:</p> <ul style="list-style-type: none">(a) Identifying a primary technical point of contact to work with the PSM Support Center; and(b) Referring back to the PSM Support Center any follow-on work (project-transition activity, course, or workshop) that arises from a contact in which the Support Center requested and used the support of a Transition Organization. (If the Transition Organization initiates an activity, any follow-on work remains with the Transition Organization.)
<p>(6) Provide input and comments to support the development of PSM products and services and review PSM work products before release. Review and evaluation of PSM products and services includes:</p> <ul style="list-style-type: none">(a) Participating, on a consistent basis, in the development of PSM products and the delivery of PSM services;(b) Providing support to develop PSM guidance and product; including, at a minimum, providing personnel to review and comment on designated PSM products;(c) Participating in PSM tool beta-test programs and providing timely feedback; and(d) Supporting development of PSM course, workshop, and train-the-trainer products through the payment of qualification fees established for each event (fees will be based on the cost of each event and will be evenly distributed among the attending Transition Organizations).
<p>(7) Provide performance measurement data and statistics to the PSM project on a periodic basis, including the identification of organizations and projects that have been supported. As a minimum, monthly reports must be submitted that include a description of the PSM courses provided, the number of students in attendance, and student evaluations (if statistics are submitted for each course as required, this requirement is met).</p>
<p>(8) Ensure that a designated organization representative(s) attends and participates in at least one PSM Technical Working Group (TWG) meeting per year. TWG meetings are held two times a year and are generally two to four days in length. The annual PSM Users' Group Conference is considered to be one of the TWG meetings.</p>



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| (9) If the organization is selected as a member of the Technical Steering Group, ensure that a designated organization representative(s) attend and participate in the PSM Technical Steering Group. These meetings take place two to four times per year and are usually between four hours to one day in length. Two of the meetings are held in conjunction with the TWG meetings. Representatives from three Transition Organizations will be selected for membership on the PSM Technical Steering Group. |
| (10) Return all PSM materials if the organization wishes to conclude its participation as a Transition Organization. |

The Role of the PSM Support Center

The PSM Support Center benefits from the Transition Organization partnership by reaching a wider audience and further developing a quality PSM program with a broad base of qualified professionals. In return, the PSM Support Center commits to providing an organized structure for the development and timely dissemination of PSM products, services, and training. Key components include referring opportunities to appropriate Transition Organizations (without restricting domains), ensuring that transition requirements are maintained and applied consistently to all Transition Organizations, and soliciting and considering Transition Organization views in making decisions, setting direction, and defining future products and services. See *Table 2 below for a full list of PSM Support Center commitments.*

TABLE 2. PSM SUPPORT CENTER COMMITMENTS

The PSM Support Center Agrees To:
(1) Implement and maintain a PSM Transition Organization support structure.
(2) Make PSM products and services available, and ensure they are up-to-date. Products may be provided on a cost-recovery basis only, as appropriate (TO's can profit on PSM services such as training, workshops, and on-site support. This includes providing a short subset of slides (approximately 55) that can be used by anyone for short briefings. These slides will be in Portable Document Format (PDF) and may be used for marketing, overviews, short descriptions, etc.
(3) Provide periodic updates to slides, instructor notes, etc., as appropriate (on a cost-recovery basis). This includes: <ul style="list-style-type: none"> (a) Providing all qualified instructors with PSM presentation materials in PDF. The presentation will be updated on a periodic basis, at least semi-annually. (b) Providing instructors with a summary of course changes each time materials are revised. (c) Providing all qualified instructors with a set of miscellaneous and additional briefing slides as a separate PDF file.
(4) Develop and maintain training and qualification requirements to support PSM Transition Organizations.
(5) Maintain a master transition schedule.
(6) Maintain performance measurement on all PSM products, services, courses, workshops, etc. Data will be summarized and available to all Transition Organizations.
(7) Evaluate and qualify individual PSM instructors and facilitators.
(8) Refer transition opportunities to the appropriate organization or provider.
(9) Conduct periodic PSM Technical Working Group and Technical Steering Group meetings.



(10) Solicit and record Transition Organization views in making decisions, setting direction, and defining future products and services, via inputs to the PSM Technical Steering Group.
(11) Provide a single source of information for all products and services, including individual status summaries.
(12) Ensure that PSM products and services remain consistent with other related sponsor policy and standards.
(13) Ensure transition requirements are maintained and applied consistently to all Transition Organizations.
(14) Maintain a list of approved Transition Organizations and qualified individuals. This data will be available from the PSM web site.
(15) Maintain a list of core instructors who can observe and qualify new instructors.
(16) Publish Transition Organization requirements.
(17) Continue to provide transition support. If the program is ever disbanded, allow the Transition Organizations to propose a revised transition plan.
(18) Avoid restricting domains.
(19) Provide the PSM pricing guidelines as information to requesting organizations.
The PSM Support Center May:
(1) Remove anyone who has not taught within 12 months from the qualified instructor's list.
(2) Remove anyone who has not attended a PSM meeting (TWG or Users' Group) within the past year from the qualified instructor's list.
(3) Remove an instructor who leaves a Transition Organization from the qualified instructor's list. If that qualified instructor is employed or sponsored by a new organization and wishes to continue, the new organization must meet the qualifications of a Transition Organization.
(4) Remove anyone who has not attended required refresher training from the qualified instructor's list.

Qualifications for PSM Course Observers

In order to qualify as a PSM observer, you must:

- Have taught at least five courses in the last two years
- Average a rating of 3.75 for the previous 2 years of teaching (the rating is generated in the statistics file, using information from student evaluations)
- Be actively involved in the PSM Technical Working Group, and attend at least one meeting per year (either the TWG meeting or the PSM Users' Group Conference)
- Contribute to ongoing PSM projects
- Request your desire to become an observer (at a TSG meeting), and be approved by 2/3 of the TSG members

As of 20 March 2006, the following individuals are qualified observers: Dave Card, Betsy Clark, Fumiko Fujiwara (Japan), Fred Hall, Cheryl Jones, Dave Morris, Jack McGarry, Chris Miller, Pascal Rabbath, and Garry Roedler



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Appendix A: PSM Instructor's Agreement

This agreement specifies the requirements for conducting training that is sponsored by Practical Software and Systems Measurement. These requirements are intended to help ensure the consistency and quality of training. Signatories agree to conform to the requirements listed below. Each PSM instructor or training candidate within a Transition Organization must sign this agreement.

Instructor's Responsibilities

All qualified PSM instructors shall:

- Be affiliated with an approved PSM Transition Organization. If an instructor or facilitator leaves a Transition Organization, the PSM Support Center will remove that person from the qualified instructor's list. If the instructor or facilitator is employed or sponsored by a new organization and wishes to continue as a PSM instructor, the new organization must be a full participant in the Transition Organization program.
- Attend a three-day, train-the-trainer course, and pay the fee to cover development and delivery of this course. Conduct at least one training session of the appropriate PSM course with another qualified instructor whom the PSM Support Center has designated as an observer for that course. (This course may be one arranged by the PSM Support Center or by the Transition Organization.) The Transition Organization pays labor and travel expenses for the observer.
- Have an in-depth, working knowledge of PSM and all associated products and services, a working knowledge of PSM Insight, and applied measurement experience.
- Attend at least one PSM meeting (TWG or Users' Group) per year. If not, the PSM Support Center will remove that person from the qualified instructor's list.
- Maintain qualified instructor status by staying current with PSM guidance via refresher courses provided by the PSM Support Center.
- Provide the PSMSC with up-to-date instructor contact information, including mailing address, phone and fax numbers, and email address.
- Conduct at least one training session per year. If not, the PSM Support Center will remove that person from the qualified instructor's list.
- Use the official, up-to-date PSM course materials (including student handout masters, course slides, forms, etc.) provided by the PSM Support Center.
- Agree not to alter any of the official PSM course materials, but supplement them with other appropriate slides if desired. (Any subset of the PSM course slides may be used if instructors wish to delete PSM course slides from a specific presentation.)
- Agree to display the PSM logo on all slides.



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- Notify the PSMSC of all scheduled courses prior to their delivery via the “Courses Schedule Form.” Requests for instructor or material support should be coordinated with the PSMSC.
- When additional course materials are required, submit a materials request in time for preparation of the materials and coordination of requirements.
- Prepare copies of course materials for students.
- Send copies of the course evaluation forms and sign-up sheets to the PSMSC following each presentation of the course.
- Provide the PSMSC with written recommendations for improvements for improvements to the PSM course materials.
- Do not transfer PSM training materials to another party.
- Return all PSM training materials to the PSM Support Center if and when a Transition Organization concludes its participation in the Transition Organization program.
- Sign this PSM Instructor’s Agreement.

I _____ (printed name) agree to comply with the Instructor’s Responsibilities specified in this agreement.

Signature

Organization

Date

Note to Instructors: Please fax the two-page PSM Instructor’s Agreement (Appendix A) to Jeannie Hall @ 866-385-1407 (no cover sheet needed)



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Appendix B: PSM Transition Organizations, Qualified Instructors, &* TWG Members

**Not all of the TWG members from the organization are listed. Those listed have been significantly involved with the PSM project in last 2 years and/or have been qualified to teach previous versions of PSM.*

DOD AND GOVERNMENT TRANSITION ORGANIZATIONS:

Practical Software and Systems Measurement (PSM) Support Center

Representative Address	Cheryl Jones PSM Support Center US Army ARDEC AMSRD-AAR-QES-A Building 62 Picatinny Arsenal, NJ 07806
Phone	(973) 724-2644, DSN 880
Fax	(973) 724-2382
Email	psm@pica.army.mil
Web Site	http://www.psmcsc.com

Qualified Instructors V5: Molly Campbell, Joe Dean, Fred Hall, Paul Janusz, Cheryl Jones, Jack McGarry, Dave Morris

Instructors in Training V5:
TWG Members:

Practical Software and Systems Measurement (PSM) is sponsored by the Department of Defense and the US Army (see Appendix A of the PSM Methods of Operation for all current sponsors). The goal of the project is to provide project managers with the objective information needed to successfully meet cost, schedule, and technical objectives on complex programs, and measure organizational performance. PSM is based on actual measurement experience from Department of Defense, government, and industry projects and organizations. Measurement professionals from a wide variety of organizations participate in the project. PSM represents the best measurement practices used within the 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 management information needs, objectives, and information requirements unique to each project and organization.

Related Products and Services

PSM incorporates a family of products intended to help transition information-driven measurement into practice within both government and industry. PSM documents and the PSM Insight tool are available at no charge (except for a small production fee for multiple copies). The following PSM products have either been published or are in final form. For a detailed list of products, works in progress, and other related information, refer to the PSM Marketing document, <http://www.psmcsc.com/Products.asp>

PSM Products

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



- Practical Software and Systems Measurement Guidebook, Version 4.0c
- PSM Insight tool
- PSM Training Material
- PSM: Measuring for Process Management and Improvement (MPM)
- Rational Unified Process (RUP) Plug-in for Practical Software and Systems Measurement
- Experience Reports

PSM Services

- PSM Briefings
- PSM Measurement Planning Workshops
- PSM Training
- PSM Consulting
- Training in PSM Insight-One Tool for a Comprehensive Measurement Program
- PSM Insight Consulting

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)

Other Related Products and Information

- ISO/IEC Standard 15939, Systems and Software Engineering-Software Measurement Process
- Capability Maturity Model Integration (CMMI) Measurement and Analysis (M&A) Process Area
- ESx - ES is a tool that collects coupling, maintenance, and size metrics
- Technology Papers (available on the PSM web site) include:
 - Measures for DoD Software Product Lines (April 2001 - final)
 - Measuring System Interoperability (Updated March 2001)
 - Object Oriented Measurement (Updated March 2001)
 - Measures in Support of Evolutionary Acquisition (Updated March 2001)
 - Technical Measurement Guide V1.0 (27 December 2005)
 - Security Measurement Draft White Paper V3.0 (13 January 2006)
 - Safety Measurement White Paper V3.0 (23 January 2006)
 - Measurement Guidance for Process Improvement V1.0 (4 September 2005)
- Measurement-Related Papers and Articles (available on the PSM web site) include:
 - Applying PSM to Enterprise Measurement
 - Making Measurement Work
 - Measurement Tailoring Workshops
 - Tailoring and Implementing an Organizational Measurement Process
 - Practical Software Measurement: A Status Report
- Sample Measurement Specifications

The PSM Guidebook, PSM Insight tool, training materials/workshop materials (available for qualified instructors only), 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/>>.



US Air Force Software Technology Support Center (STSC) Measurement Team

Representative Brent Baxter
Address OO-ALC/MASEA
Bldg 1238, 6022 Fir Avenue
Hill AFB, UT 84056-5713

Phone

Fax

Email brent.baxter@hill.af.mil

Qualified Instructors V5: Bruce Allgood, Kevin Richins

Instructors in Training V5:

TWG Members:

The Software Technology Support Center (STSC) Measurement Team helps software organizations identify, evaluate, and adopt measurement technologies that improve software product quality, production efficiency, and predictability. These technologies include measurement system infrastructure, Practical Software and Systems measurement, and measurement capability evaluations. The Measurement Team focuses on field-proven technologies that will benefit your organization. They go beyond identification and evaluation of technologies by providing hands-on help in exploiting and incorporating these technologies into your organization.

Related Products and Services

The Measurement Team provides three main services to its customers:

- **Measurement System Infrastructure.** The infrastructure required for an organizational measurement system consists of goal-based measurements, a measurement collection and reporting process, and an information-driven culture for decision making. The STSC Measurement Team can help your organization begin building the required infrastructure by facilitating strategic planning and determining the organizational goals that a measurement system will monitor. The team then works with your organization to determine what measurements are required to ensure you meet these goals. The team can also help develop an organizational process to collect, analyze, and report the necessary information. To pull everything together, the STSC Measurement Team can provide insight into how to establish a culture that relies on information to make decisions. Included in this service is information on core measurements, earned value (cost schedule and control system criteria), and measurements related to the Capability Maturity Model.
- **Practical Software and Systems Measurement (PSM).** The STSC is helping develop PSM and is certified to help your organization understand how PSM can be used to help manage a software-intensive program, understand the characteristics of an effective software measurement process, and understand how to use the PSM Guidebook.
- **Measurement Capability Evaluation.** The STSC Measurement Team includes personnel experienced in evaluating measurement programs. The team has published an accepted method and format to evaluate existing measurement practices that have been successfully used with several organizations. This evaluation assesses how well an organization develops, documents, supports, and uses measurement to manage and control project performance, product quality, and process implementation and improvement. Once the evaluation is complete, each evaluated team will receive a detailed findings and recommendations report on their measurement maturity. Management will receive a summary report of the findings and recommendations. These findings then can be used as a baseline to develop and implement a measurement program in your organization.



US Naval Air Systems Command

Representative Rick Holcomb
Address Department of the Navy
4.1.11 Software Engineering Division
22347 Cedar Point Road
Patuxent River, MD 20670

Phone 301-995-7657
Fax 301-342-2149
Email rick.holcomb@navy.mil

Qualified Instructors V5: Gary Graton, Rick Holcomb, Paula Strawser, Barbara Williams
Instructors in Training V5:
TWG Members:

US Naval Undersea Warfare Center

Representative Mallory Davis
Address NUWC-Division Newport
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Newport, RI 02840-1708

Phone (401) 832-7376
Fax (401) 832-2130
Email davismd@npt.nuwc.navy.mil

Qualified Instructors V5: Mallory Davis
Instructors in Training V5:
TWG Members:



The Aerospace Corporation

Representative	Frances E. Anderson
Address	15049 Conference Center Drive CH3-320 Chantilly, VA 20151
Phone	(703) 324-8805
Fax	(703) 653-8643
Email	frances.e.anderson@aero.org
Web Site	www.aero.org

Qualified Instructors V5: Linda Ableson, Timmie McArthur
Instructors in Training V5: Frances Anderson
TWG Members:

The Aerospace Corporation a federally funded research and development center (FFRDC), sponsored by the Department of Defense, that provides objective technical analyses and assessments for space programs that serve the national interest. We provide specific skills, specialized facilities, and the continuity of effort required for programs that often take decades to complete. This end-to-end involvement minimizes development risks, reduces costs, and assures a high probability of mission success.

Related Products and Services

For over 40 years, The Aerospace Corporation has provided world-class leadership in software engineering. Our experts are involved in the full range of software lifecycle activities, providing objective, state-of-the-art support and training to customers across the following process and product areas:

- Software System Acquisition
- Software Process Assessment and Improvement
- Software Measurement
- Software Risk Assessment and Evaluation
- Software System Development Support
- Computer Forensic Analysis

In addition to providing technical assistance and training in the above areas, our work has included research. In Software Measurement, our publications have included, among others,

Abelson, Linda. 2002. *Object-Oriented Metrics*. El Segundo, California: The Aerospace Corporation. Aerospace Technical Report TR-2002(8550)-1.

Costello, R. J. and D. Liu. 1995. **Metrics for Requirements Engineering**. *Journal of Systems and Software*, Vol. 29, No. 1, pp. 39-63. New York: Elsevier Science.

- Hoting, Sharon K. and Rita J. Costello. 1996. *Computer Systems Division Software System Metrics Approach, Revision 1*. El Segundo, California: The Aerospace Corporation. Aerospace Technical Report TR-96(8617)-1.



Defense Acquisition University (DAU) - Defense Systems Management College (DSMC)

Representative	Bob Skertic
Address	Technology and Engineering Department Ft. Belvoir, VA 22060-5565
Phone	(703) 805-5281, DSN 655
Fax	(703) 805-5082
Email	bob.skertic@dau.mil
Qualified Instructors V5:	Joseph Cooke, Pamela Knight, Tom McMannes
Instructors in Training V5:	Bob Skertic
TWG Members:	



Defense Contract Management Agency (DCMA)

Representative	Guy Mercurio
Address	Defense Contract Management Agency Boston 495 Summer Street Boston, MA 02210
Phone	(617) 753-4122
Fax	(617) 753-4189
Email	guy.mercurio@dcma.mil

Qualified Instructors V5: John Eget
Instructors in Training V5: Jan Janigian, Guy Mercurio, Dana Van Orman
TWG Members:

The DCMA Software Center provides real-time assistance to Contract Administration Offices in meeting Department of Defense objectives for effective software acquisition. Assistance includes proactive software surveillance, sharing of benchmarking information, continuous process management, and the continuing education and development of the DCMA software community. The Software Center is the Command's single point of contact to external customers in support of unique software acquisition life cycle activities.

Related Products and Services

The following are the DCMA Software Center activities related to software measurement, software measurement to support system risk management, the use of measurement in software process improvement, and software measurement training.

- **Department of Defense/Industry Software Performance Measurement** provides external and internal customer support (i.e., DCMA/DCMDs/CAOs/Service agencies/industry/academia, etc.). This activity is the focal point for tracking and analyzing Department of Defense contractor software development performance (in early contract administration support and post-award mode) across DCMA and efficiently providing information to external and internal DCMA customers.
- **Tools and Special Projects** provide external and internal customer support (i.e., DCMA/DCMDs/CAOs/Service agencies/industry/academia, etc.). This activity is the focal point for identifying, evaluating, developing, standardizing, modifying, maintaining, making available, or obtaining rights to software automation and mission support tools and techniques that are useful to the DCMA software surveillance professional community and potentially throughout the Department of Defense.
- **DCMA - CAS Software Performance Measurement** provides internal customer support (i.e., DCMA/DCMDs/CAOs, etc.). This activity is the focal point for tracking and analyzing DCMA's performance in carrying out the mission relative to software surveillance.
- **DCMA Competence & Training** provides internal customer support (i.e., DCMA/DCMDs/CAOs, etc.). This activity is the focal point for managing and identifying specialized, mission-related training required throughout DCMA, including technical evaluation of existing training and identification of necessary changes in the Software Professional Development Program policy.



Federal Aviation Administration (FAA)

Representative Roger Cooley
Address FAA
800 Independence Avenue, SW
Room #601, AIO-200
Washington, DC 20591
Phone (202) 267-9966
Fax (202)
Email roger.cooley@faa.gov
Web Site <http://www.faa.gov>

Qualified Instructors V5: Keith Kratzert, Amos Rohrer
Instructors in Training V5:
TWG Members: Joe Caravello, Natalie Reed

MITRE Corporation

Representative Harpal Dhama
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El Segundo, CA 90245
Phone (310) 297-8350
Fax (310) 297-8333
Email Harpal.dhama@losangeles.af.mil

Qualified Instructors V5: Harpal Dhama, Don Gantzer
Instructors in Training V5:
TWG Members: Ken Stranc



Software Engineering Measurement and Analysis (SEMA), Software Engineering Institute

Representative(s)	Dave Zubrow	Rita Creel
Address	3118 SEI 4500 Fifth Avenue Pittsburgh, PA 15213	4301 Wilson Blvd. Arlington, VA 22203
Phone	(412) 268-5243	(703) 908-8206
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SEMA is a technical initiative at the SEI that provides guidance and expertise in the field of software measurement and analysis. SEMA techniques have helped numerous Department of Defense (DoD) and commercial organizations improve software processes, better predict costs and schedules, and track organizational performance. SEMA provides development and analysis guidance, information resources, and practices that assist the DoD and industry suppliers of software-intensive systems in quantitatively managing and improving their projects, processes, and organizations.

Related Products and Services

SEMA members are leading the way in applying Statistical Process Control, Six Sigma, Goal-Driven Software Measurement, and other useful measurement techniques. SEMA also provides support for the measurement and analysis process areas of the CMMI[®] models.

To accomplish this mission, SEMA produces technical reports, tutorials, courses, and online resources related to software measurement. SEMA also collaborates with organizations that wish to establish or improve their measurement activities, investigate the use of innovative analytical techniques on their data, and study the effects of process and technology innovations on software engineering performance.

SEMA courses and workshops include:

- **Implementing Goal-Driven Software Measurement:** This course teaches managers and practitioners to define and use goal-driven measures to manage and improve software projects, products, and processes.
- **Managing Software Projects with Metrics:** This course shows project managers how measurement can be used to dynamically plan and manage projects.
- **Statistical Process Control (SPC) for Software:** This course provides a practical understanding of SPC and the steps associated with effectively implementing and using it to manage and improve software processes.
- **Organizational Performance Measurement:** This half-day tutorial introduces managers and executives to software measurement concepts.

For further reading about SEMA's work, please see:

- http://www.pearsonptg.com/book_detail/0,3771,020174158X,00.html
- <http://www.sei.cmu.edu/publications/documents/01.reports/01tn026.html>
- <http://www.sei.cmu.edu/publications/documents/96.reports/96.hb.002.html>

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Borland Software Corporation provides a range of products and services to the software industry, with solutions that address technology, process, and people development. Working from a strong history of software developer tools, Borland has expanded its offerings to cover the entire application life cycle over the last several years. With its recent acquisition of TeraQuest, it also now addresses the process development and improvement capabilities into its offerings in a solutions-focused integration. With respect to measurement, the Borland standard services include:

- Workshops using PSM, to train organizations in measurement
- Workshops using PSM, to help organizations or projects to develop measures and measurement plans to address specific needs
- Assistance with developing, reviewing, or improving measurement programs
- Mini Assessments and formal assessments based on the Capability Maturity Models® of the Software Engineering Institute (SEI)
- Training, mentoring, and support in all areas of software process improvement
- Assistance with developing processes and process sets that leverage industry models including the Capability Maturity Model, the Project Management Institute's Project Management Body of Knowledge (PMBOK), COBIT, ISO 9001:2000, ITIL, and others

Related Products and Services

- *Measurement and Analysis Workshop*, a 3 day workshop to teach a team how to use the PSM approach to meet information needs of an organization, program, or project.
- *Measurement Planning Workshop*, a 5 day workshop tailored to the needs of teams who are developing a set of measures and/or a measurement program to meet particular needs of an organization, program, or project.
- *Delphi Estimation Techniques Workshop* – 1-2 day workshop in using Wideband Delphi estimation techniques. In the 2-day offering, participants use provided examples and templates to tailor their own estimation process.
- *Consulting Support for Measurement* – This service provides guidance and mentoring to help the client establish or use measurement in their organization.
- *Readiness Analysis for Level 4* – This analysis provides an objective determination of an organization's readiness to transition to Level 4, as well as guidance on actions to take.
- *Customized Launch Workshops for Level 4 or Level 5* - modular, just-in-time workshops to introduce specific quantitative management techniques of high maturity
- *Level 3 to level 4 Transition Workshop* - 3 day workshop that provides students with an understanding of how to prepare their organization for high maturity improvements by implementing more robust and consistent practices at Level 3.
- *Level 4 Quantitative Techniques Workshop* – 3 day workshop on implementing quantitative management, based on concepts of CMM and CMMI Level 4
- *Level 5 Improvement Techniques Workshop* – 3 day workshop on how to implement CMM and CMMI Level 5 practices



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Related Products and Services

The David Consulting Group (DCG), a SEI CMMI® Approved Transition Partner, supports software development organizations in achieving software excellence with a metric-centered approach. DCG supports a diverse client mix by providing consulting services and training that satisfy organizational business objectives. Insights into successful software practices are enabled through their database of over 7,400 recently completed (2000-2003) projects and 4,300 maintenance support applications.

DCG Services include:

Software Process Improvement

SEI CMM®, CMMI®, CBA/IPI and SCAMPI Assessments; Procedure Templates for Peer Reviews, Testing, Lifecycle, SQA, Requirements Management, Estimating and Project Management; Training and Mentoring in all Level 2 and Level 3 Process Areas.

Software Application Development and Maintenance (AD/M) Measurement

Functional Sizing, Performance Baselining, Industry Benchmark Comparisons, Maintenance Portfolio Evaluation, IT Scorecards, Measurement Program Development; Training and Mentoring in Function Point Analysis, Estimation and PSM.

Outsourcing Metrics and Governance

Establishing & Monitoring Service Levels, Vendor Selection, Offshore Development Governance

The principals, David Garmus and David Herron, are acknowledged authorities in the measurement, estimation and management of AD/M activities. They authored *Measuring The Software Process; A Practical Guide to Functional Measurements* (Prentice Hall) and *Function Point Analysis: Measurement Practices for Successful Software Projects* (Addison-Wesley).



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Distributive Software is the leading provider of measurement solutions and software to Fortune 500 companies for use in project management and process improvement across the enterprise. Distributive Software's clients include Accenture, Aetna, Boeing, EDS, Hewlett Packard, The Aerospace Corporation, Medtronic, Lockheed Martin, SAIC, and TRW. Distributive Software's MetricCenter and DataDrill products are used across defense, government, telecommunications, aerospace, and information technology industries to improve insight into critical business processes. Distributive Software's products are the most widely adopted commercial measurement tools for CMM and CMMI organizations, rated at levels 3 and higher by the SEI. For more information about Distributive Software and its products visit the web site at <http://www.distributive.com>.



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The International Council on Systems Engineering is a not-for-profit membership organization founded in 1990 to develop, nurture and enhance the system engineering approach to multi-disciplinary system product development to enable the realization of successful systems. Through its Process and Improvement Technical Committee and Measurement Working Group (MWG), INCOSE has been a leader in the development and transition of Systems Engineering Measurement guidance. The MWG promotes a shared understanding and advancement of systems engineering measures, measurement practices, measurement tools/support, and the overall measurement process. It focuses on:

- Unification of Measurement Guidance
- Publication in Systems Measurement
- Real-life, Proven, and Validated Experience
- Research In Measurement
- Industry Association Collaboration
- Practical Software and Systems Measurement (PSM)
- Training and Tools for Systems Measurement
- Integrate Measurement into INCOSE Product Line

Related Products and Services

INCOSE provides the following products and services that aid measurement of systems and SE:

- *SE Measurement Primer* and *Metrics Guidebook for Integrated Systems and Product Development*.
- INCOSE International Symposium includes a measurement track (proceedings available).
- Jointly sponsored conferences with other technical/professional organizations, including PSM. INCOSE is a co-sponsor of the PSM Users' Conference.
- Quarterly *INCOSE Insight* newsletter contains a regular column on Frequently Asked Questions about SE measurement. Two past issues have been focused entirely on measurement.
- Quarterly "*Systems Engineering: The Journal of the International Council on Systems Engineering*" often contains leading edge applications or research that is measurement related.
- Measurement tool requirements to support the INCOSE and PSM measurement approach.
- Tools database with current information on measurement tool capabilities versus tool requirements.
- SE Speaker's Bureau to provide qualified speakers, including SE Measurement.
- Participation in the development and review of SE and measurement related standards.
- Key contributor to USC's development of a SE cost estimation tool called COSYSMO.
- Papers/panels on measurement (risk, small projects, effectiveness assessment, and requirements in standards & models).
- Standard SE Measurement Process briefing with presenter and tailoring notes.
- Current work in measurement of technical products, risk, and small projects; reusable measurement products; a measurement process scenario for standard AP233; an update to the SE Measurement Primer; and an evaluation of measurement state-of-the-practice.



Lockheed Martin

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Lockheed Martin is an international corporation with headquarters in Bethesda, Maryland. It has annualized sales of \$26.9 billion and employs approximately 182,000 people worldwide. Lockheed Martin is a strategic leader in the federal/defense industry. It is the primary contractor to the US Department of Defense, Department of Energy, and the National Aeronautics and Space Administration (NASA), and it is one of the leading contractors for the Internal Revenue Services and Justice Department.

Lockheed Martin is a recognized leader in information technology services; intelligent transportation systems; electronics; command, control, communications and intelligence (C3I) systems; targeting and navigation systems; ballistic missile defense; and advanced tactical aircraft and space transportation systems.

Related Products and Services

Lockheed Martin provides software quality and performance improvement services to internal companies as well to commercial and government software organizations, including those within the Department of Defense. Over the years, Lockheed Martin has found that generic process improvement approaches do not always deliver the focused business results organizations desire. The Lockheed Martin team can:

- Assess your performance relative to business needs
- Plan a performance improvement program
- Provide training so that your staff can implement the program
- Guide your staff in implementing the program
- Select and integrate appropriate tools to support your management/measurement process.

We provide training, workshops, and consulting in:

- Project Measurement and Management
- Enterprise Measurement for CIOs
- Measurement for CMM Level 4
- CMM-Based Process Reviews and Appraisals
- Process Definition and Improvement



Northrop Grumman

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Northrop Grumman Corporation is a \$27 billion global technology company headquartered in Los Angeles, California. Northrop Grumman currently employs 120 thousand people in 50 states and 25 countries.

Northrop Grumman leads the nation as the largest provider of civilian information technology services to the federal government and is a premier integrator of complex systems across land, air, sea, and space.

Specializing in government and defense enterprises, Northrop Grumman also leads the nation as the largest military shipbuilder, the top supplier of radar and electronic warfare systems, the third-largest space and missile defense contractor, and a premier homeland security contractor.

Related Products and Services

Northrop Grumman provides quality and performance improvement services both internally as well to government organizations.

We provide training, workshops, implementation, assessments or appraisals, and consulting in:

- CMM / CMMI / ISO 9001
- Capital Asset Planning
- Change Management
- Enterprise Architecture
- Enterprise Resource Planning
- Exhibit 300 Business Case Development
- Process Re-engineering
- Project Management & Measurement
- Risk Management
- Six Sigma

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Q-Labs, a member of the DNV Group, is a leading international company in Systems and Software Process Improvement. Q-Labs' clients are companies in which software and systems constitute a critical aspect of the product. Q-Labs' clients represent a broad sector spectrum such as Aerospace, Automotive, Defense, Finance, Information Technology, Health, Manufacturing, Systems Integrators, Telecom and OEMs/Suppliers.

As a Partner of the Software Engineering Institute, we help clients of all sizes and across markets transform business critical software and systems to competitive advantage by shaping processes for improved reliability, functionality, time to market and cost reduction. For sixteen years, our consultants have brought industry best practice experience to implementing Process Improvement with quantifiable Return on Investment.

Q-Labs Offers:

- Process Improvement Consulting
- Project Management Support
- Quality Engineering Support
- Independent Appraisals
- Training and Workshops
- Measurement, Analysis, and Estimation Support

The process improvement strategies we support include CMM/CMMI, Lean, Six Sigma, ISO 9001, and ISO 15504/SPICE.

Q-Labs is ISO 9001 certified for professional services.



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Quality Plus Technologies, Inc. is an official Transition Organization for Practical Software Measurement and includes the Practical Systems and Software Measurement workshop in our workshop offerings. Quality Plus Technologies is an acknowledged industry leader in Software Measurement and Management Consulting services. We specialize in Project Planning services in the following areas: fact-based management consulting, measurement program implementation and software quality and process improvement, estimation and project management, application development and maintenance benchmarking, outsourcing, integrated requirements management.

Related Products and Services

We also offer IFPUG Certified Function Point (FP) training, mentoring, consulting and, IFPUG Certified Function Point Analysis (IFPUG 4.1 rules), Quality Plus is licensed reseller of quality estimating and project management tools. Volumes 1 and 2 of our FP Counting & CFPS Preparation Guide are now available. Quality Plus consultant's most recent article 'Using Metrics to (Mis) Manage' has been published in IEEE IT Professional.



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Robbins-Gioia's fresh approach to program management consulting helps our clients drive projects to completion effectively and efficiently.

Our over 600 professionals work side-by-side with clients all across North America and in locations as diverse as Brazil, England, and the Pacific Rim, developing and implementing the processes, infrastructure and management technology that help organizations achieve their goals. Our practitioners leverage the company's 25 years of experience and custom program management methodologies to successfully deliver projects on budget and on time while managing significant change, optimizing business processes, and achieving a sustainable competitive advantage.

Robbins-Gioia provides business results to non-profit organizations, large government agencies, and major commercial companies. Top past and present clients include the U.S. Department of Homeland Security, American Red Cross, U.S. Army, Defense Logistics Agency, General Motors, Merrill Lynch, Verizon, and more.

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Systems and Software Consortium, Inc (SSCI) (previously Software Productivity Consortium), a non-profit organization of more than 100 companies, government agencies, and universities, develops processes, methods, tools, and supporting services that help its members and affiliates to build high-integrity, software-intensive systems. Consortium products and services support the entire development lifecycle, from requirements analysis and systems design through component-based development, automated testing, and the integration of object-oriented and commercial off-the-shelf (COTS) technologies.

The Consortium program integrates systems and software process improvement and measurement activities with proven lifecycle development and management methods for systems and software engineering. We are the leading providers of CMM®- and CMMISM-based assessments and evaluations of software *and* systems engineering maturity, and increasingly help our members to leverage their investments in these frameworks to also comply with ISO, Six Sigma, and other quality guidelines.

The Consortium's measurement products and services provide guidance and support to organizations involved in measurement programs at all levels of process maturity. From the initial stages of defining and collecting cost and schedule metrics to the establishment of a quantitative management and ROI assessment program, the Consortium can provide technologies, training, and consulting expertise to help organizations achieve business objectives through a robust measurement program.

Related Products and Services

The Consortium offers a broad range of measurement products and services, including:

- *Integrated Measurement Series: Measurement and Analysis Guidebook*
- *Quantitative Management Guidebook*
- *Estimation and Tracking Approaches for Object-Oriented Software Development Projects*
- *Software Error Estimation Program (SWEEP)*
- *Practical Software and Systems Measurement Course*
- *Quantitative Management Course*
- *Statistical Process Control and Quality Management*
- *Introduction to Using Software Estimation Techniques and Tools*
- *Practical Software and Systems Measurement Workshop*
- *Quantitative Management Planning Workshop*
- *Systems Engineering Measurement Course*
- *Introduction to an Integrated Six Sigma and CMMI Approach to Process Improvement*

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The Center for Research in Mathematics (CIMAT) is a federally funded national research institute whose mission involves research, education, and technology transfer in the areas of Mathematics, Statistics, and Computer Science. CIMAT produces scientific and applied research, offers academic programs (PhDs and Masters), and work on R&D projects with industry and government.

CIMAT is a partner organization of the Software Engineering Institute (SEI). The Software Engineering Group at CIMAT has a skilled staff for delivering training and services in PSM and SEI technologies. CIMAT's PSM and SEI authorized people hold a PhD in Computer Science and are fluent in Spanish and English. They have plenty of teaching and implementation experience in both, academic and industrial settings. Moreover, they conduct research in software engineering, in particular, in Software Process Improvement, Statistical Process Control, Quality Assurance, and Software Processes.

Related Products and Services

The services that CIMAT offers include consulting, training and R&D on Software Process Improvement and Quality Assurance based on the following technologies:

- SEI Technologies
 - PSP
 - TSP
 - CMMI/SCAMPI
- ISO 9001-2000
- Six Sigma

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MS SPI Solutions provides Integrated Software Process Improvement Solutions to its customers. Our solutions address Technology, Process, and People development. Our areas of expertise include Statistical Process Control (SPC), Measurements, and Software Process Improvement (SPI). Our experienced personnel provide SPI Solutions to the Software and Systems Industry in Spanish and English Languages.

Related Products and Services

The services that we offer include Appraisals, Consulting, and Training on Software Process Improvement as well as Process Implementation, based on the following technologies:

- Software Engineering Institute (SEI)
 - PSP (Personal Software Process)
 - TSP (Team Software Process)
 - CMMI / SCAMPI
- Practical Software and Systems Measurement (PSM)
- Other
 - Statistical Process Control
 - Six Sigma for Software
 - Measurements
 - ISO/IEC 15504 (SPICE)
 - ISO 9000

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