

# Practical Software and Systems Measurement

A Foundation for Objective Project Management



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Department of Defense and US Army

**Practical Software and Systems Measurement**  
**A Foundation for Objective Project Management**

**In Memory of:**

**Sharyn Tolochko 1965 - 1997**

**Jeff Heimberger 1958 - 1998**

## Foreword

One of the most challenging tasks in developing and maintaining systems is to meet critical project cost, schedule, and technical objectives. Today's systems are increasingly complex and contain many interacting hardware, software, and human components. Management of development and operations and maintenance efforts has therefore become a key factor in project success.

The changing software and systems engineering and acquisition environments in both the government and industry sectors require more effective management techniques. More than ever, project and technical managers need objective information to make day-to-day decisions, identify project issues, correct existing problems, and manage prospective risks. This same information must also provide a basis for evaluating organizational and enterprise-level performance, and assessing the impact of policy and investment decisions.

***Practical Software and Systems Measurement: A Foundation for Objective Project Management*** was developed to help meet today's management challenges. *Practical Software and Systems Measurement* describes how to provide objective information to address project issues by integrating measurement with existing risk management and financial performance management disciplines.

The guidance in *Practical Software and Systems Measurement* is based on actual measurement experience on government and industry projects. It represents the best practices used by measurement professionals within the software and systems acquisition and engineering communities.

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# **Measurement Principles**

***Use issues and objectives to drive the measurement requirements***

***Define and collect measures based on the technical and management processes***

***Collect and analyze data at a level of detail sufficient to identify and isolate problems***

***Implement an independent analysis capability***

***Use a systematic analysis process to trace the measures to the decisions***

***Interpret the measurement results in the context of other project information***

***Integrate measurement into the project management process throughout the life cycle***

***Use the measurement process as a basis for objective communications***

***Focus initially on project - level analysis***

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## Scope and Structure of the Guide

*Practical Software and Systems Measurement: A Foundation for Objective Project Management* describes how to define and implement a measurement program to support the information needs of software and system acquirer and supplier organizations. The Practical Software and Systems Measurement (PSM) Guide is intended for use by:

- **Project and technical managers** - to gain a better understanding of the use of measurement to manage their software and system projects
- **Project technical staff** - to help implement measurement in a project environment
- **Enterprise managers** - to understand the requirements associated with implementing measurement within their organizations

The Guide is written for both government and industry organizations responsible for acquiring, developing, and maintaining software and system projects.

Although primarily focused on the project level, the issue-driven measurement process described in the Guide can be extended to address performance measurement requirements at the organization and enterprise levels.

Quantitative project management includes the disciplines of measurement, risk management, and financial performance management. PSM focuses on the measurement process, but discusses the key interfaces with risk and financial management. The Guide addresses four major activities in the measurement process:

- **Tailoring** the software measures to address specific project issues
- **Applying** software measures to convert the measurement data into useable information
- **Implementing** a measurement process
- **Evaluating** a measurement program

The Guide is organized into ten parts that provide increasingly detailed treatments of the four key measurement topics of tailoring, applying, implementing, and evaluating.

The ten parts of the Guide are as follows:

- **Part 1, The Measurement Process**, describes the measurement process at a summary level and provides an overview of measurement tailoring, application, implementation, and evaluation. Part 1 explains what is required to implement the measurement process on a project.
- **Part 2, Tailor Measures**, describes how to identify project issues, select appropriate measures, and define a project measurement plan.
- **Part 3, Measurement Selection and Specification Tables**, provides a series of tables that help the user select the measures that best address the project's issues. These tables support the detailed tailoring guidance of Part 2.
- **Part 4, Apply Measures**, describes how to collect and process data, analyze the measurement results, and use the information to make informed project decisions.

- **Part 5, Measurement Analysis and Indicator Examples**, provides examples of measurement indicators and associated interpretations.
- **Part 6, Implement Process**, describes the tasks necessary to establish the measurement process within an organization.
- **Part 7, Evaluate Measurement**, identifies assessment and improvement tasks for the measurement program as a whole.
- **Part 8, Measurement Case Studies**, provides three different case studies that illustrate many of the key points made throughout the Guide. The case studies address the implementation of a measurement process on a DoD weapons system, an information system, and a government system in the operations and maintenance life-cycle phase.
- **Part 9, Supplemental Information** - contains a glossary, list of acronyms, bibliography, PSM project information, and a comment form.

Parts 1-7 were updated and finalized in October 2000. Parts 8 and 9 were finalized in March 2003.

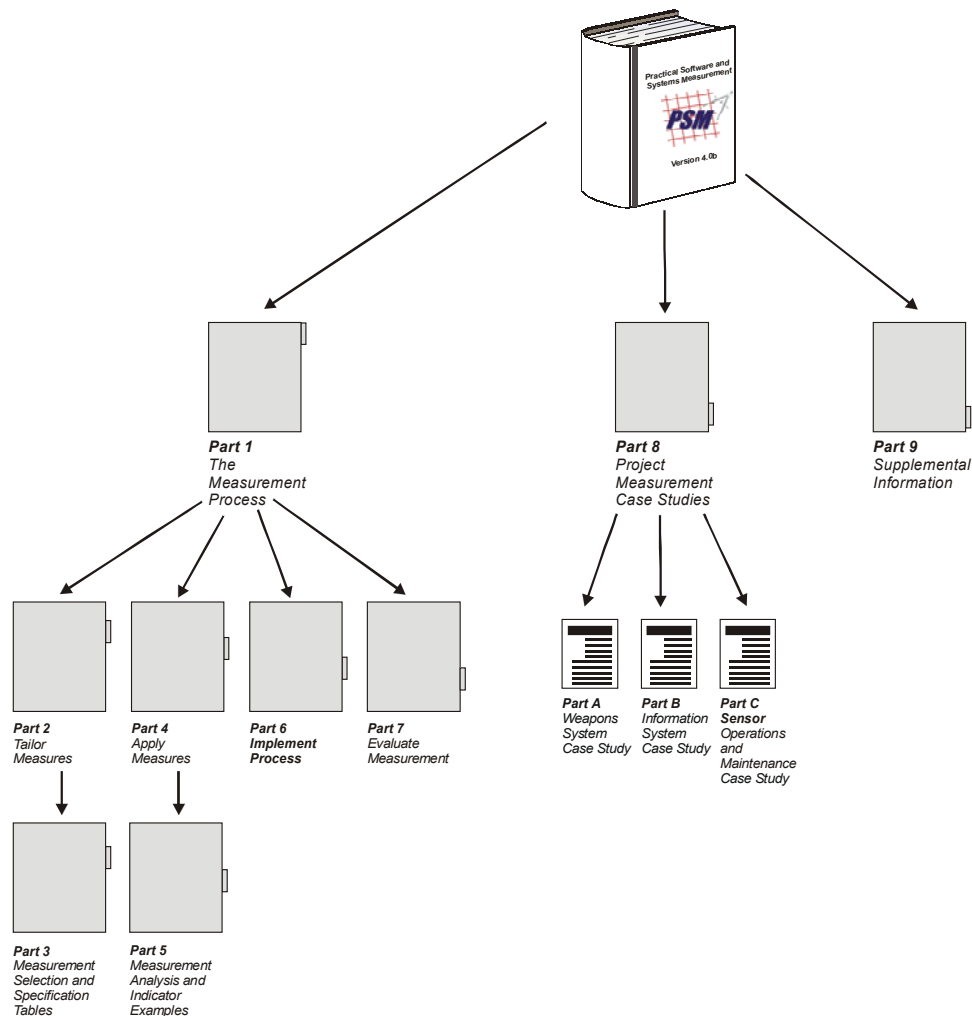
All sections are version 4.0b, except for the front material, which was updated to version 4.0c to reflect the finalization of the remaining sections.

## How to Use the Guide

This Guide is not intended to be read from cover to cover. Figure 1 shows the relationship among the various parts of the Guide. Part 1 introduces the basic concepts, principles, and terminology of PSM. Everyone should read this part of the Guide. The other parts are intended for consultation as needed.

Parts 2 through 7 serve as detailed references to help project personnel implement the measurement process. Readers should become familiar with the contents and organization of these sections, but need not read them in detail until performing the corresponding function.

Readers should review the case study in Part 8 that most closely approximates their type of project. Part 9 is supplemental reference information.



**Figure 1. Structure of the PSM Guidebook**

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