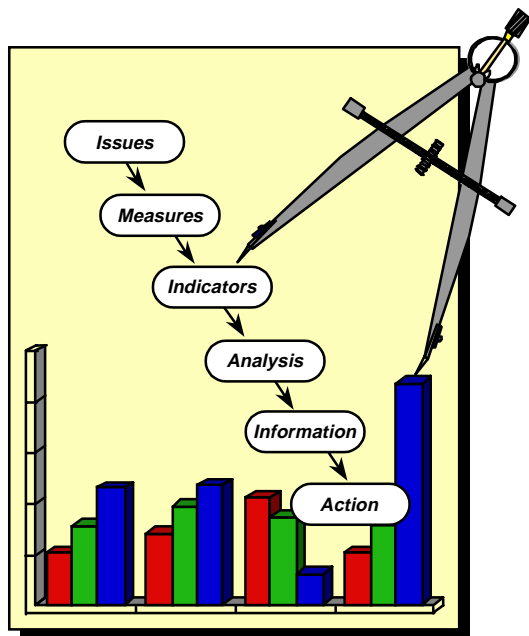# Practical Software Measurement
A guide to objective program insight

PSM Project Update

July 21, 1997

Joint Logistics Commanders
Joint Group on Systems Engineering

Office of the Under Secretary of Defense
Acquisition and Technology

Presentation Overview

- ### *PSM Project Overview*
  Project participants, objectives, and strategy

- ### *PSM Technical Concepts and Approach*
  Software measurement best practices

- ### *PSM User Support*
  Transitioning measurement into practice

PSM Project Overview
Project participants, objectives, and strategy

PSM Project Overview

- *PSM Has Two Primary DoD Sponsors*
  - *Joint Logistics Commanders Joint Group on Systems Engineering*
  - *Office of the Under Secretary of Defense for Acquisition and Technology*

- *PSM Guidance is Developed by Measurement Professionals from Many Organizations*

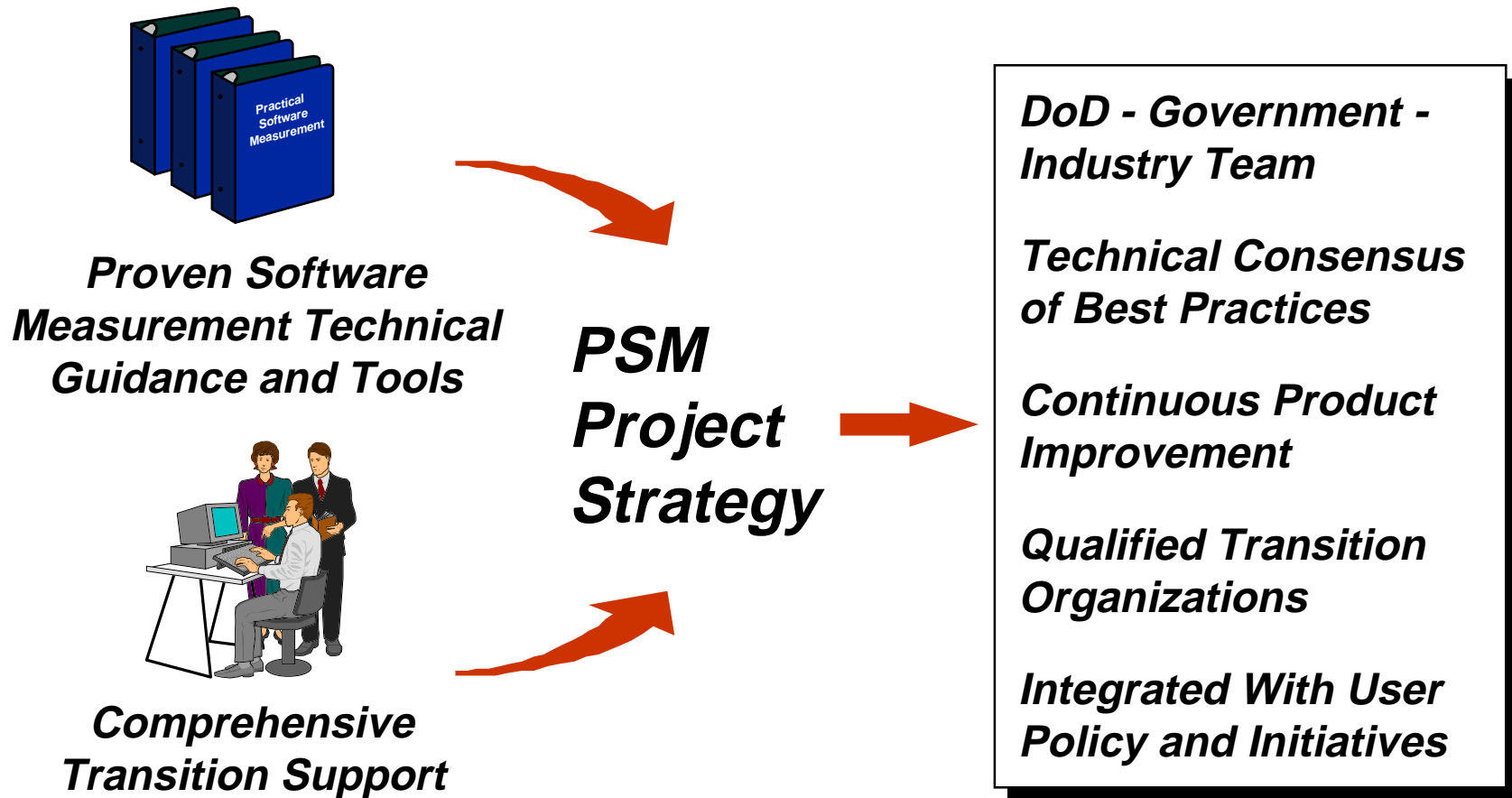- *PSM Supports DoD, Government, and Industry Software Acquisition and Measurement Initiatives*

PSM Project Team

- *US Air Force AFMC*
- *US Air Force STSC*
- *US Air Force ESIP*
- *US Air Force STRATCOM*
- *US Army AMC*
- *US Army ARDEC*
- *US Army CECOM*
- *US Army OPTEC*
- *US Army PEO STAMIS*
- *US Army ISSC*
- *US Navy NAVAIR*
- *US Navy NAWC*
- *US Navy NSWC*
- *US Navy NUWC*
- *US Navy NCCA*

- *US Navy OPTEVFOR*
- *US Navy PEO(CU)*
- *US Navy SPAWAR*
- *USMC MCTSSA*
- *DON NISMC*
- *DLA*
- *DISA*
- *DSMC*
- *NDU IRM College*
- *OUSD - A&T*
- *FAA*
- *NASA SATC - GSFC*
- *National Park Service*
- *BDM*
- *BOEING*

- *GTE*
- *Hughes Aircraft Co.*
- *IDA*
- *INCOSE*
- *Independent Engineering*
- *Logicon*
- *Lockheed Martin*
- *MITRE*
- *Tecolote Research*
- *SEI*
- *SPC*
- *SPS*
- *TRW*
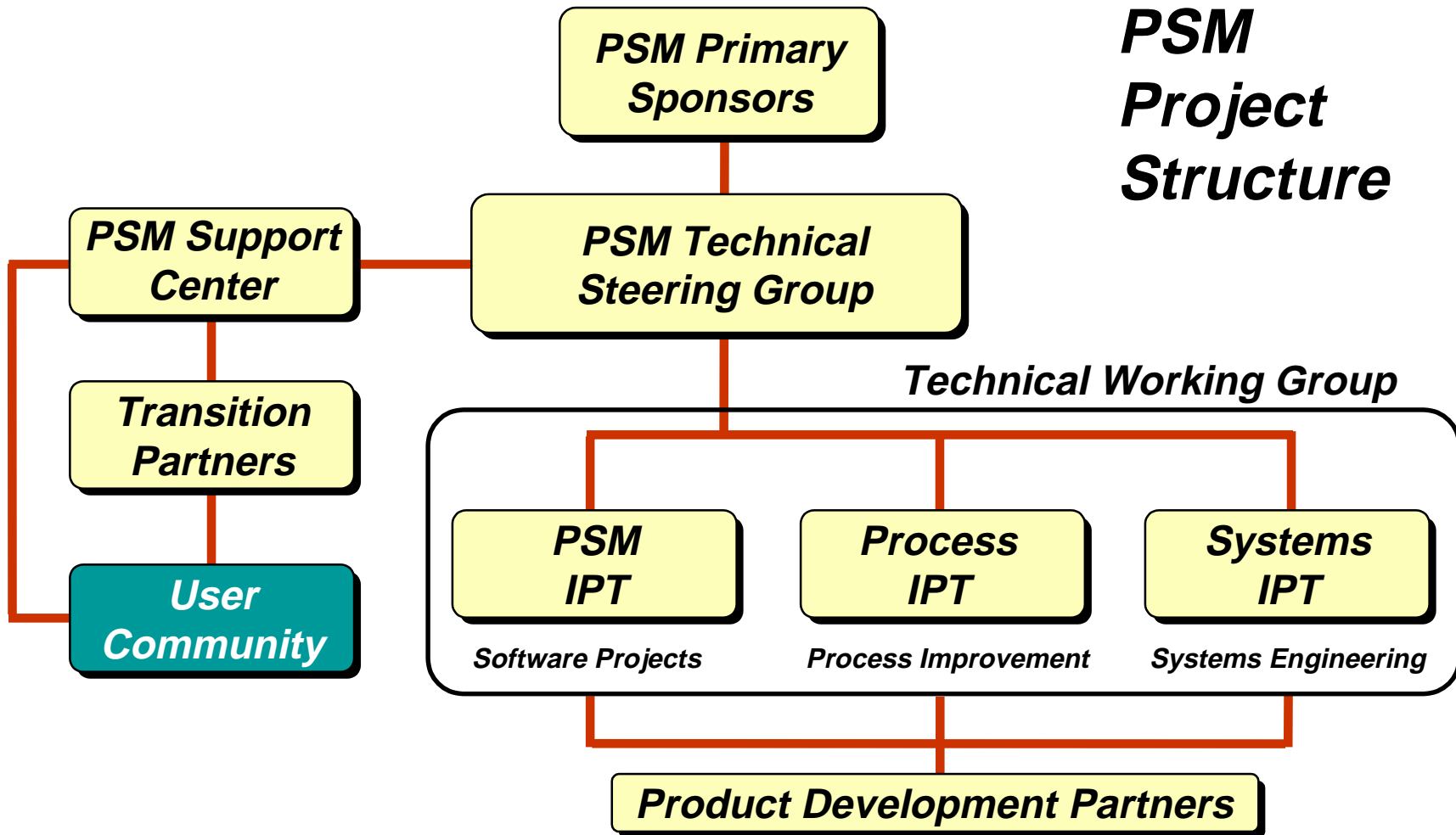- *VPI - State University*
- *West Virginia University*

Practical Software Measurement Project Objectives

- *Help Program and Technical Managers Meet Software Cost, Schedule, and Technical Objectives*

- *Provide a Basis for Objective Communication and Informed Decision Making*

- *Establish a Foundation for Executive Level Software Performance Measurement*

PSM Project Strategy

Proven Software Measurement Technical Guidance and Tools

Comprehensive Transition Support

PSM Project Strategy

DoD - Government - Industry Team

Technical Consensus of Best Practices

Continuous Product Improvement

Qualified Transition Organizations

Integrated With User Policy and Initiatives

PSM Project Structure

PSM Primary Sponsors

PSM Support Center

PSM Technical Steering Group

Transition Partners

Technical Working Group

User Community

PSM IPT

Software Projects

Process IPT

Process Improvement

Systems IPT

Systems Engineering

Product Development Partners

System
Engineering

Software Process
Improvement

Measurement Tools

Measurement Practices

Measurement Tools

Measurement Practices

PSM
SOFTWARE
MEASUREMENT
PROCESS

Measurement Practices

Measurement Tools

Software Program
Management and Engineering

PSM Technical Concepts and Approach

Software measurement best practices

Software Development Schedule

Activity	1994 J A J O	1995 J A J O	1996 J A J O	1997 J A J O	1998 J A J

Requirements
- 5/16 — 11/8
- 5/1 — 10/1
- 9 — 7

Design
- 9/27 — 4/24
- 1/17 — 5/4
- 6/20

Implementation
- 6/16 — 9/18
- 12/15 — 12/28
- 3/7
- 2/28

Integration and Test
- 3/12 — 1/17
- 1/1 — 10/28
- 3/10
- 4/13
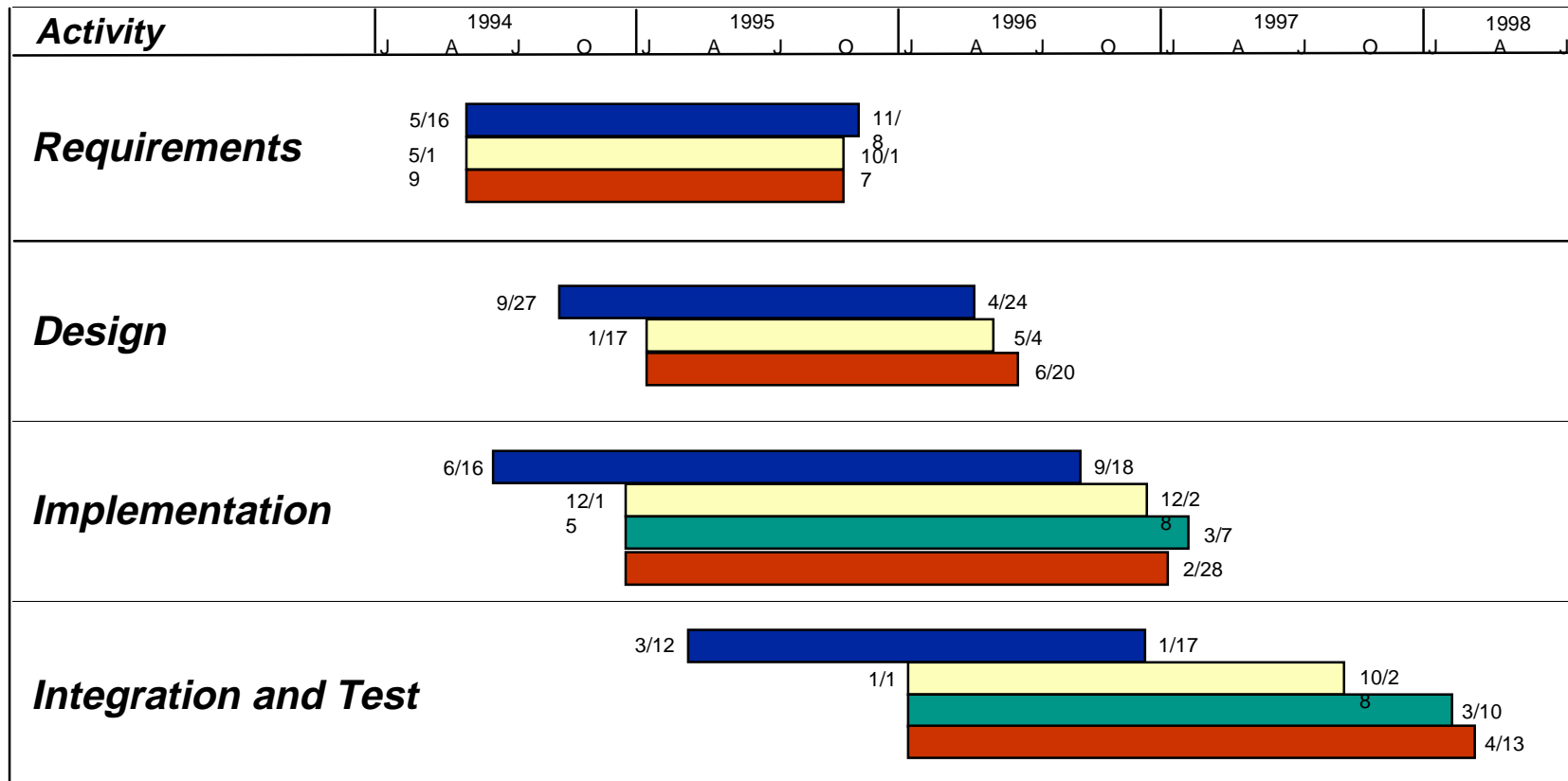
Are We Managing or Reacting?

- *Add More People*
- *Build Software Components In Parallel*
- *Ignore Development Dependencies*
- *Reschedule "Backwards" From Delivery Date*
- *Incrementally Defer Functionality*
- *Relax Process Requirements*
- *Postpone Rework*
- *Minimize Functional Testing*
- *Ease Exit Criteria*
- *Reduce Requirements*

Quantitative Software Management

Analyze Risks

Tailor Measures

Establish Budgets

Risk Plan

Measurement Plan

Performance Plan
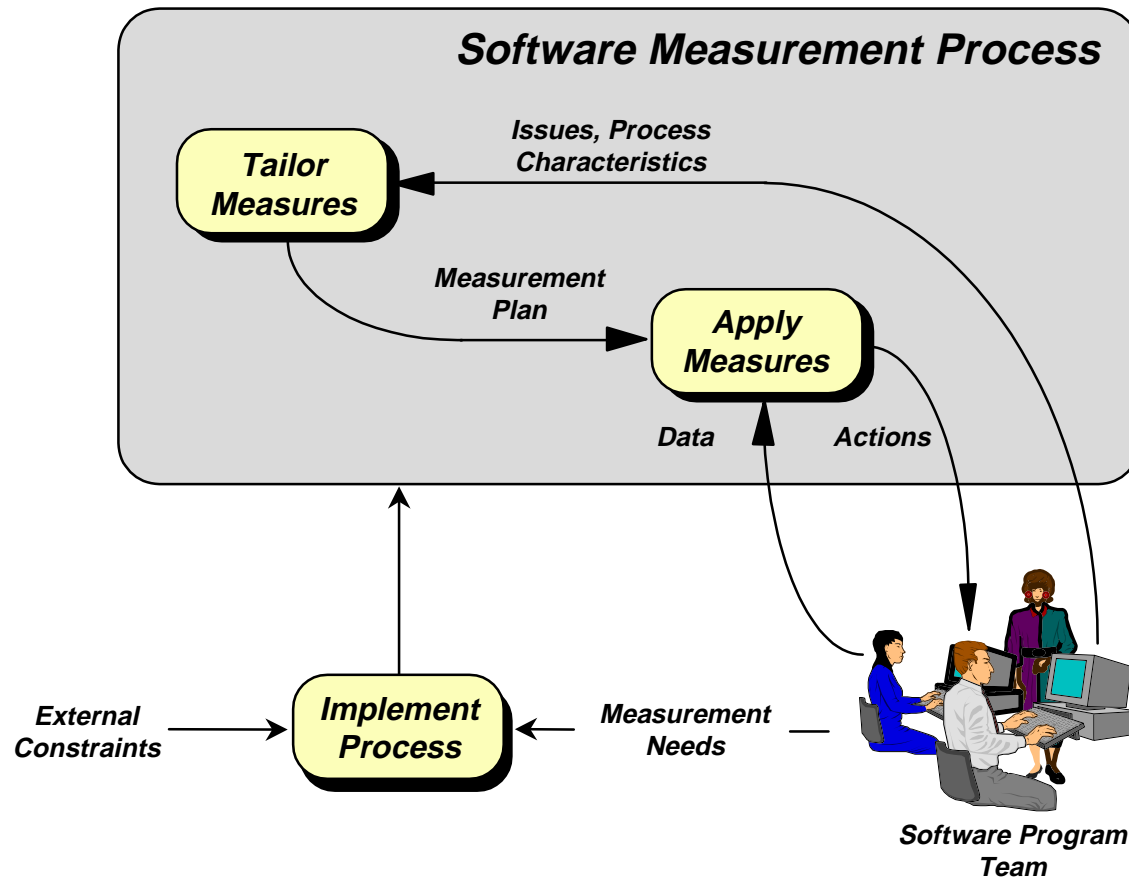
Manage Risks

Apply Measures

Evaluate Performance
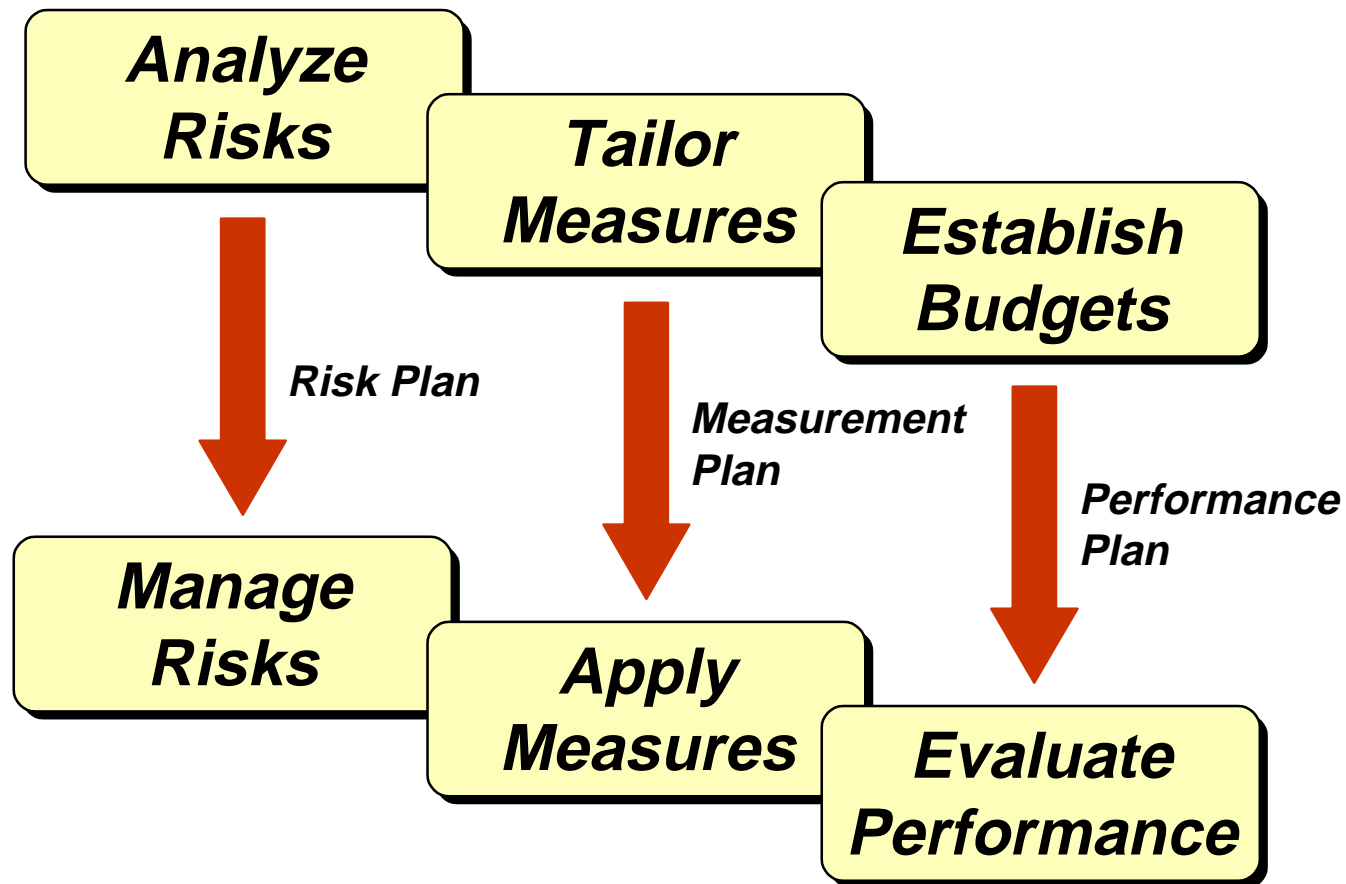
Practical Software Measurement Key Concepts

- *Software Measurement is a Process - Not a Pre-Defined List of Graphs or Reports*

- *The Measurement Process is Flexible - Adapted To Meet Specific Program Risks, Issues, and Objectives*

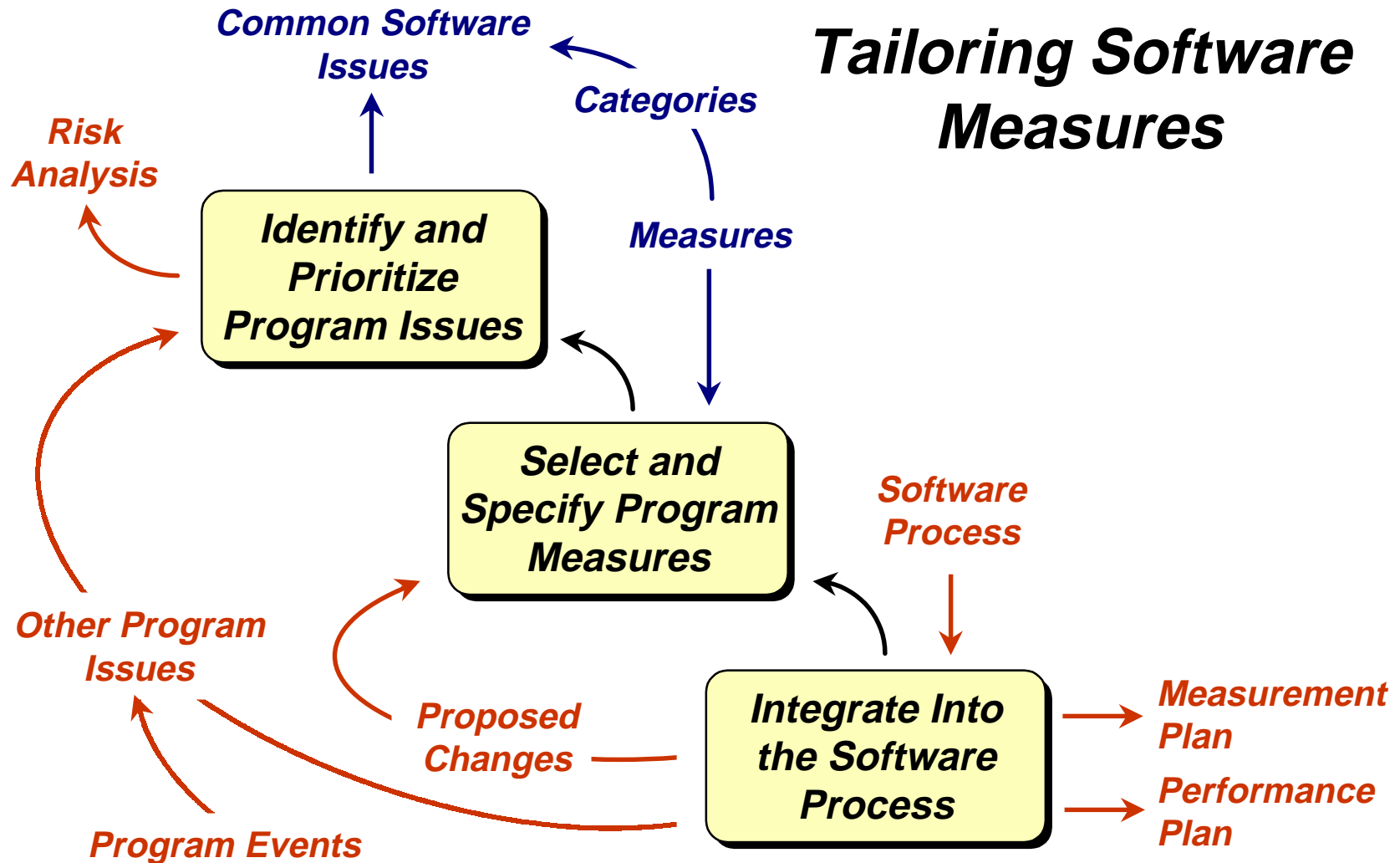- *The Measurement Requirements are Integrated Into the Developer's Software Process*

Software Measurement Principles

- *Program Risks, Issues, and Objectives Drive the Measurement Requirements*

- *The Developer's Process Defines How the Software is Actually Measured*

- *Collect and Analyze Data at a Level of Detail Sufficient to Identify and Isolate Software Problems*

- *Implement an Independent Analysis Capability*

- *Use a Structured Analysis Process to Trace the Measures to the Decisions*

- *Interpret the Measurement Results In the Context of Other Program Information*

- *Integrate Software Measurement Into the Program Management Process Throughout the Life-Cycle*

- *Use the Measurement Process as a Basis for Objective Communications*
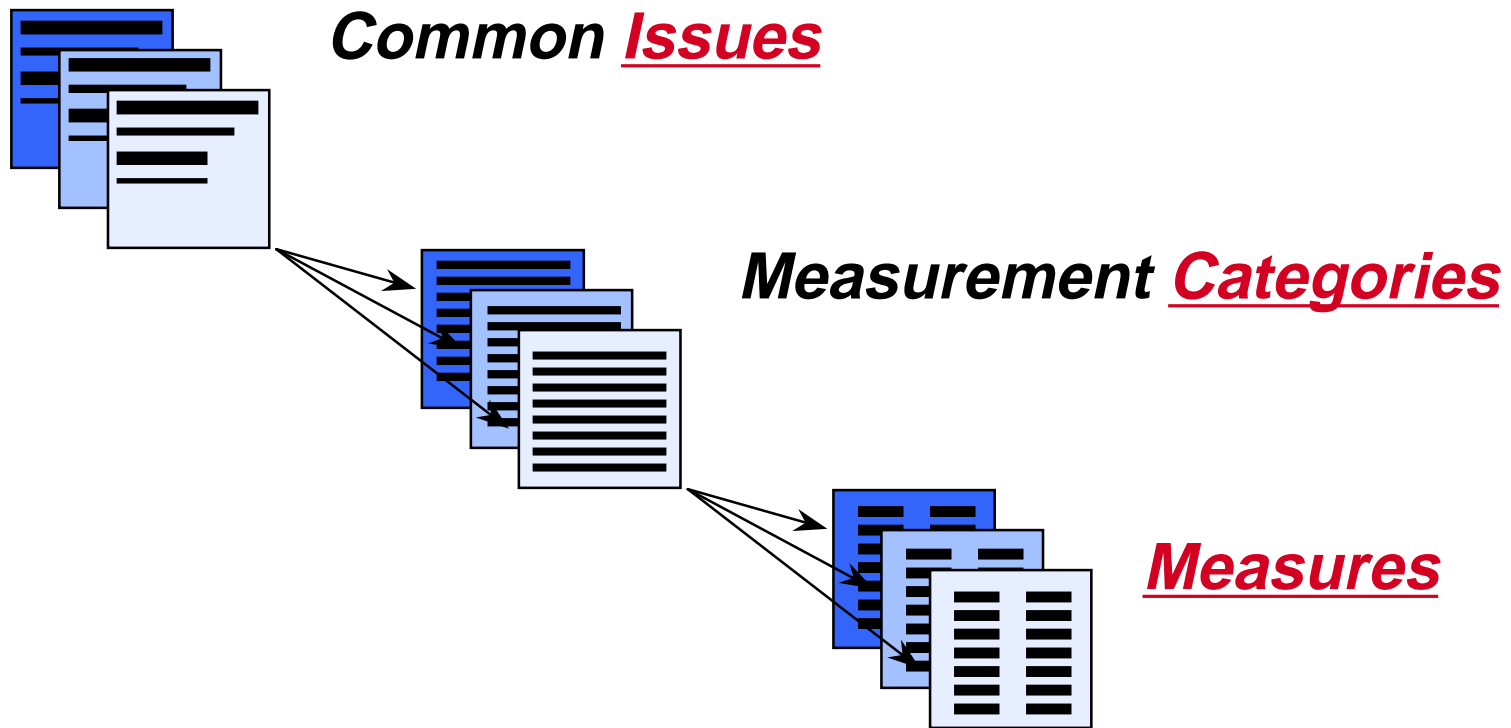
- *Focus Initially on Single Program Analysis*

Software Measurement Activities

Software Measurement Process

Tailor Measures

Issues, Process Characteristics

Measurement Plan

Apply Measures

Data   Actions

Implement Process

External Constraints

Measurement Needs

Software Program Team

Tailoring Software Measures

Common Software
Issues

Categories

Risk
Analysis

**Identify and
Prioritize
Program Issues**

Measures

**Select and
Specify Program
Measures**

Software
Process

Other Program
Issues

Proposed
Changes

**Integrate Into
the Software
Process**

Measurement
Plan

Performance
Plan

Program Events

PSM Measurement Tailoring "Mechanisms"

Common *Issues*

Measurement *Categories*

Measures

Common Issues - Measurement Categories

Schedule and Progress
- Milestone Performance
- Work Unit Progress
- Schedule Performance
- Incremental Capability

Growth and Stability
- Product Size and Stability
- Functional Size and Stability
- Target Computer Resource Utilization

Product Quality
- Defect Profile
- Complexity

Resources and Cost
- Effort Profile
- Staff Profile
- Cost Performance
- Environment Availability

Development Performance
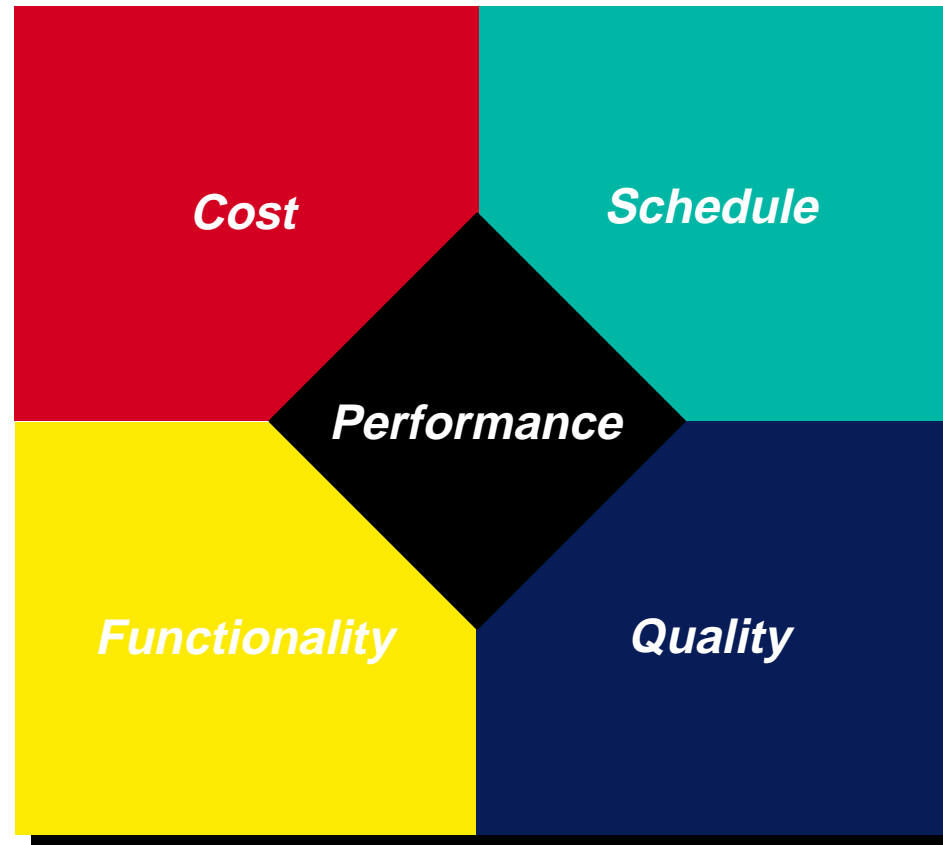- Process Maturity
- Productivity
- Rework

Technical Adequacy
- Technology Impacts

Applying Software Measures

Measurement Plan

Collect And Process Data

Data

Analyze Issues

Derived Issues

Other Program Information

Questions

Information

Make Decisions

Actions
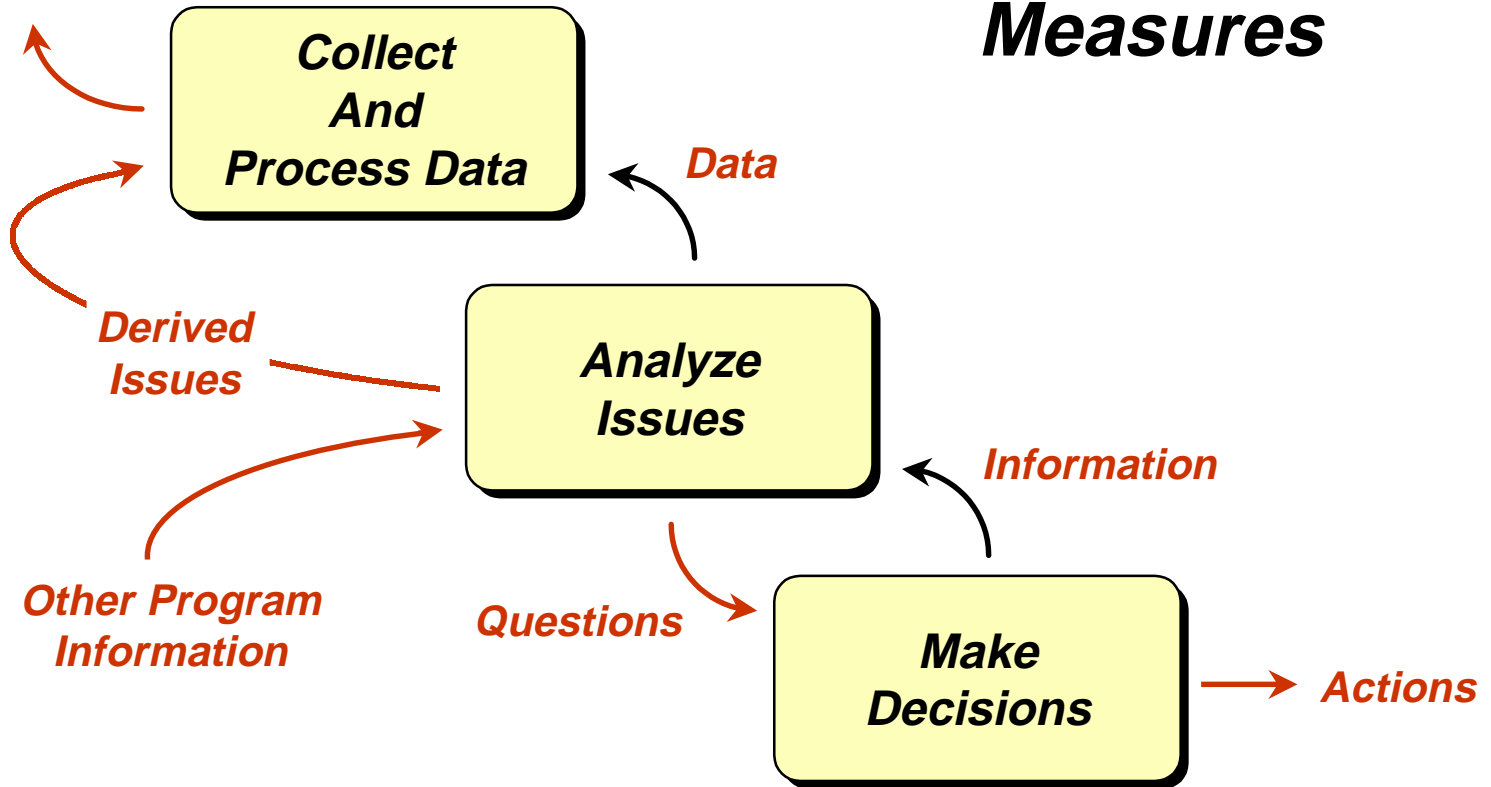
Primary Software Tradeoffs

Types of Measurement Analysis

Estimation

Performance Analysis

Feasibility Analysis

Cost

Schedule

Performance

Functionality

Quality
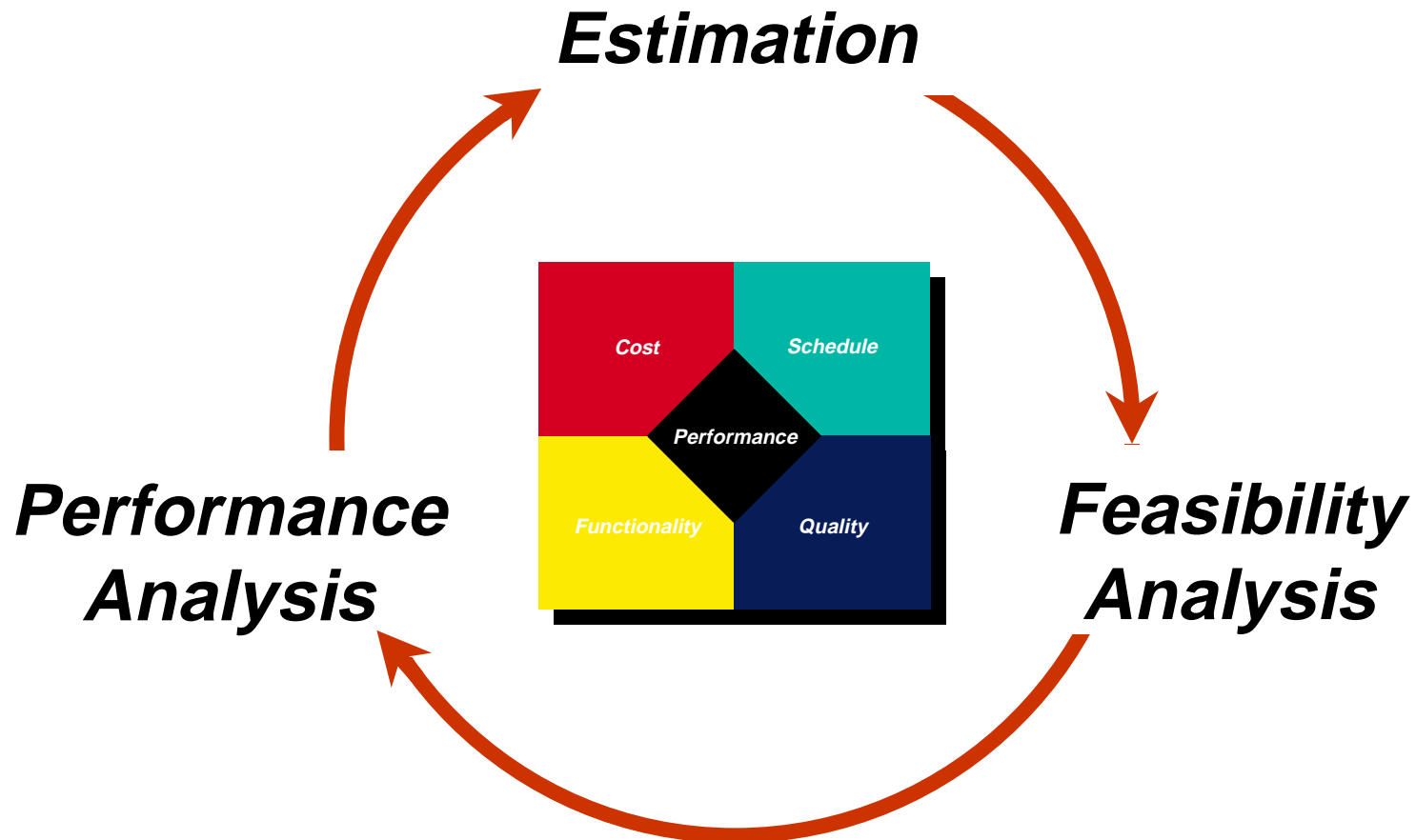
PSM Version 3.0

- ## *Risk Management*

- ## *Performance Management*

- ## *Software Estimation*

- ## *Software Analysis Model*

- ## *Software Maintenance*

- ## *General Guidance Update*

PSM User Support
Transitioning measurement into practice

Transitioning Measurement Into Practice

- ## *PSM Support Center*
  - *Naval Undersea Warfare Center*

- ## *PSM Transition Partners*
  - *Army Software Metrics Office*
  - *USAF Software Technology Support Center*
  - *Lockheed Martin*
  - *Defense Logistics Agency*
  - *Federal Aviation Administration*
  - *Software Productivity Consortium*

Practical Software Measurement

PSM
Products

Technical Guidance

Measurement Workstation

Training Courses

Program Support
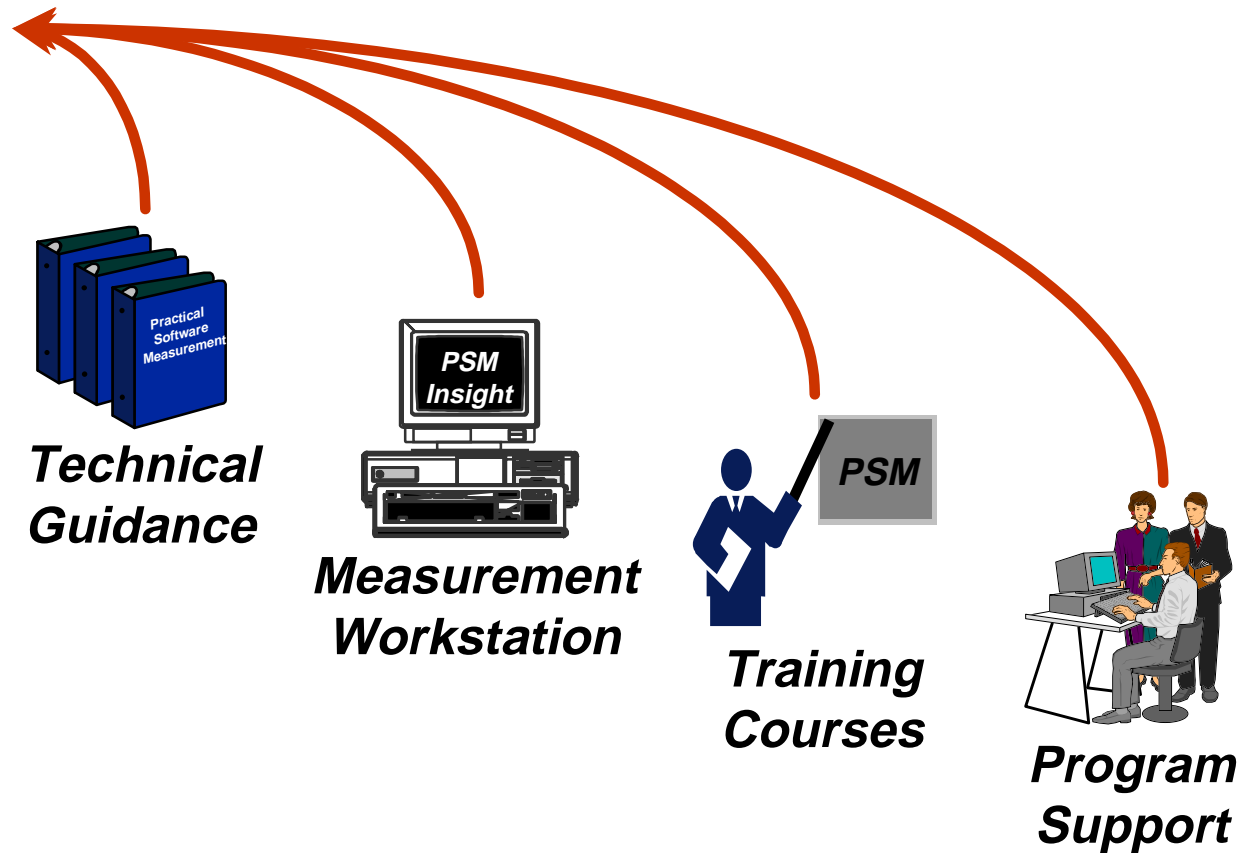
PSM Product Plan

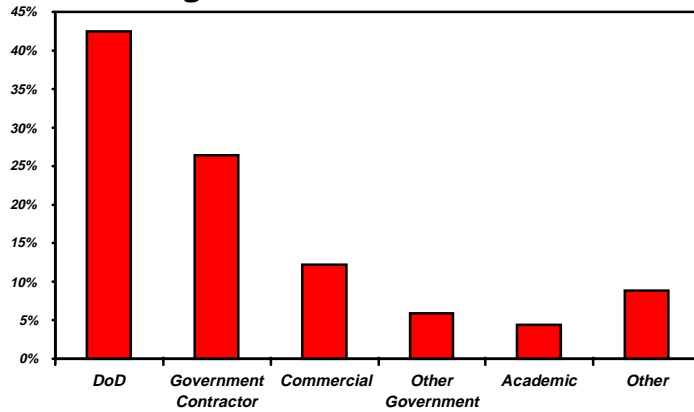- ## *Practical Software Measurement*
    - *Ver 3.0, Risk Management - Estimation (10/97)*
    - *Ver 4.0, Product Engineering (10/98)*
    - *PSM Insight Measurement Workstation (7/97)*

- ## *Practical Systems Measurement (10/98)*

- ## *PSM - Measurement for Software Process Management and Improvement (TBD)*

- ## *Guides, Tools, Courses, Program Support*
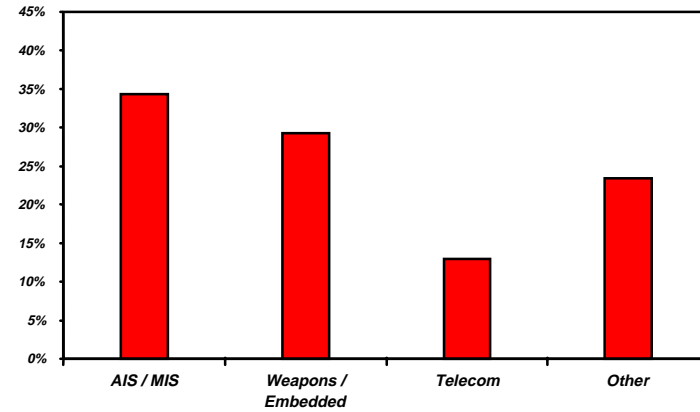
Direct Program Measurement Support

- ## *Sponsored by OUSD - A&T*

- ## *PSM Transition Efforts*
    - *Measurement Process Implementation*
    - *Initial Measurement Training*
    - *Measurement Tool Development*
    - *Product Characterization*

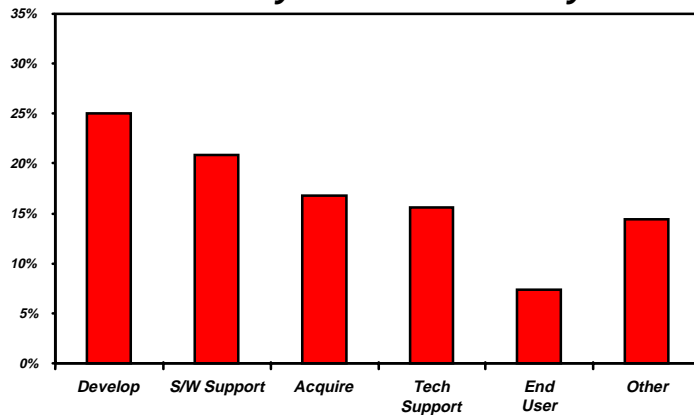- ## *Integated With Other DoD Sponsored Software Initiatives*

PSM User Survey Summary
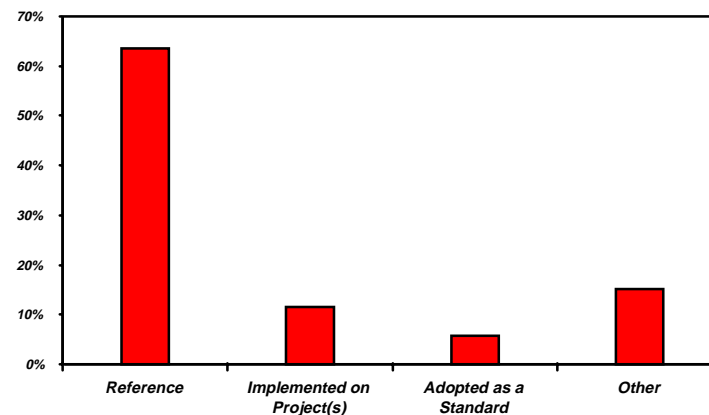

Organization Characteristics

Domain Characteristics

Primary Software Activity

Guidance Utilization

PRACTICAL SOFTWARE MEASUREMENT
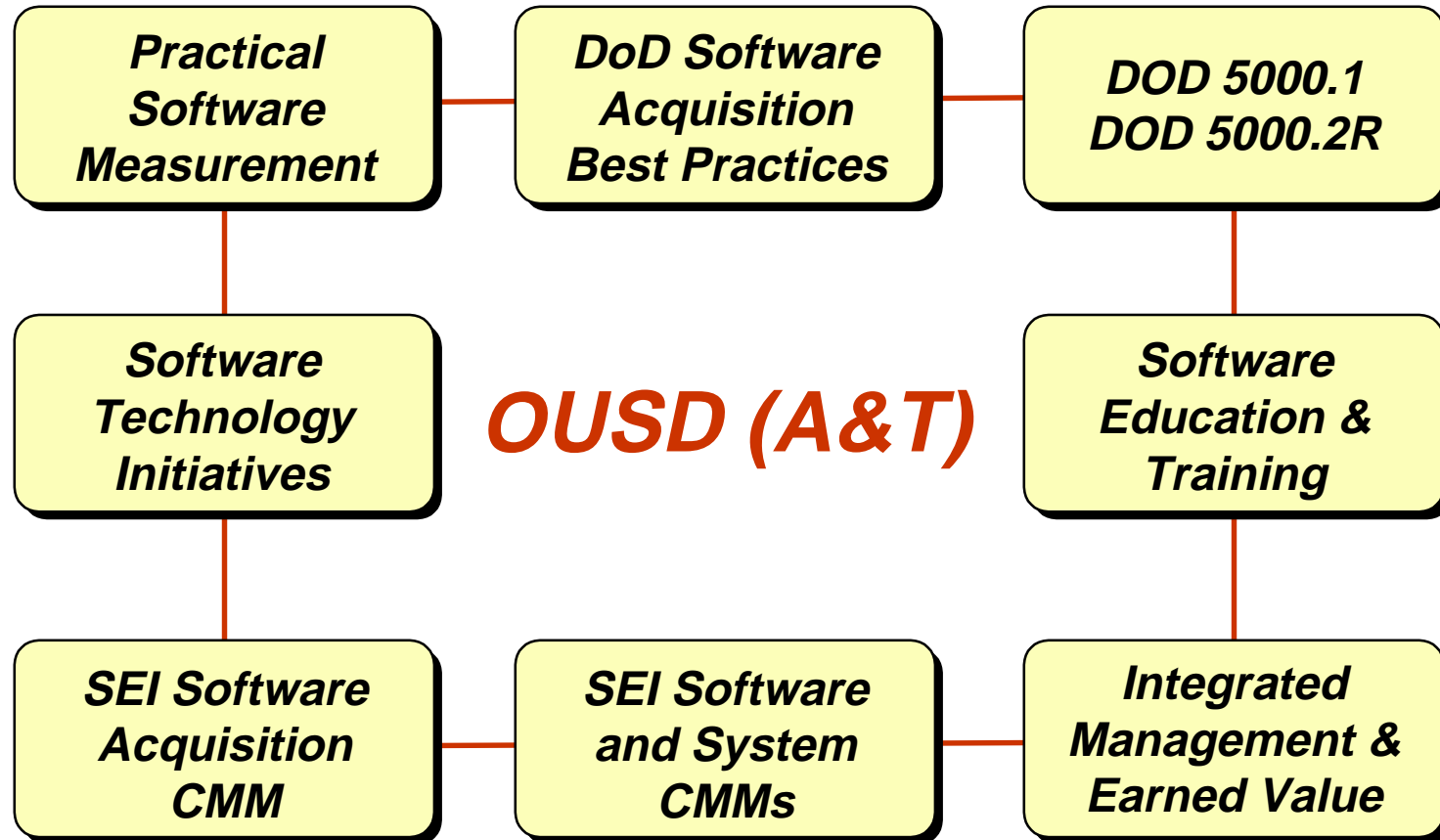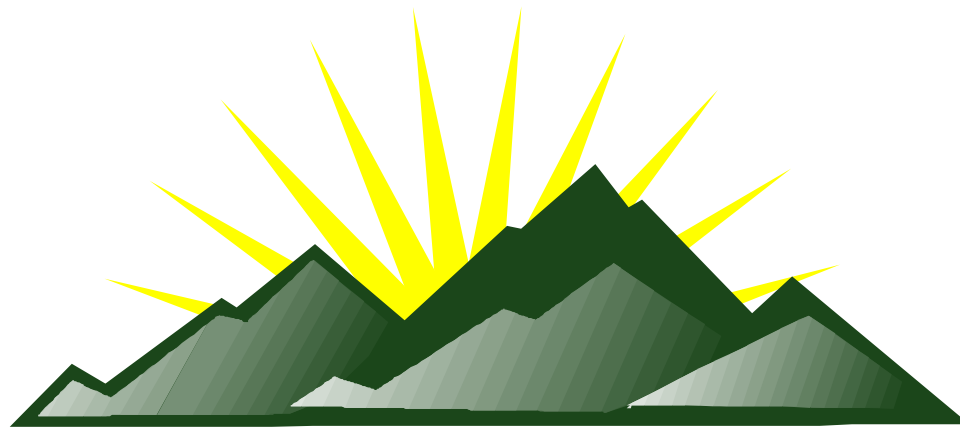
PSM Applications

- *Government and University Software Engineering Courses*

- *U.S. and International Commercial Software Process Measurement Standards*

- *Government Acquisition and Measurement Initiatives*

- *Government and Industry Program Measurement Implementations*

Integrating Software Initiatives

Practical Software Measurement	**DoD Software Acquisition Best Practices**	**DOD 5000.1 DOD 5000.2R**
Software Technology Initiatives	**OUSD (A&T)**	**Software Education & Training**
SEI Software Acquisition CMM	**SEI Software and System CMMs**	**Integrated Management & Earned Value**

Welcome to the 1997 Practical Software Measurement User's Group Conference

Why Are We Doing This?

- ## *To Make the PSM Products Better*

- ## *To Find Out How We Can Better Support the PSM Users*

Why Are We Here?

- *To Learn*

- *To Contribute*

- *To Meet People Who Can Help*

- *To Share Experiences and Ideas*

- *To Make New Friends*

Conference Hilights

- ### *Your Feedback and Input*
- ### *Current Software Topics*
- ### *User Experiences with PSM*
- ### *PSM Version 3.0 Changes*
- ### *PSM Insight*
- ### *New PSM Initiatives*
    - *Software Product Engineering*
    - *Systems Engineering*

List of Banned Words
(B-Words)

- **Infrastructure**
- **Paradigm**
- **Vision**
- **Leverage**
- **Stakeholder**
- **Overarching**
- **Taxonomy**
- **Meta - Anything**
- **Business Process Reengineering**

- **Seamless**
- **Ideate**
- **TQM**
- **Disambiguate**
- **Disaggregate**
- **Processcentric**
- **Object Oriented**
- **Year 2000**
- **Better-Faster-Cheaper**
- **Acluistic**