Practical Software and Systems Measurement

A foundation for objective project management

Report from the
Acquisition Measurement Working Group

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News

- *Working Group White Paper Released And On Website!*
  - *Acquisition Measurement Guidance*
  - *WBS of acquisition activities*
  - Information *Category – Measurable Concept – Measure (ICM) Table*

Outline

- *Working Group Overview & Participants*
- *Definition and Scope*
- *What's in the White Paper*
- *Our Expectations for its Use*
- *What's Next!*

Working Group Overview

- Why
  - Interest in measurement's role in software acquisition process improvement, stimulated by Public Law, Section 804, Software Acquisition Process Improvement (2003)
  - Continuing need to improve acquisition performance
- How
  - Workshops 2-3 times/year 2004-2007
  - Iteratively developed general guidance, an acquisition work breakdown structure (WBS), and an Issue-Category-Measure (ICM) table
- Intent
  - Introduce measurement in the context of an acquisition program or enterprise
    - Bring to life information need-driven measurement of *acquirers' own* activities, products, resources, plans
    - Note: activities acquirers need to perform in communicating information needs to suppliers and analyzing suppliers' quantitative data are covered in existing PSM materials

Participants

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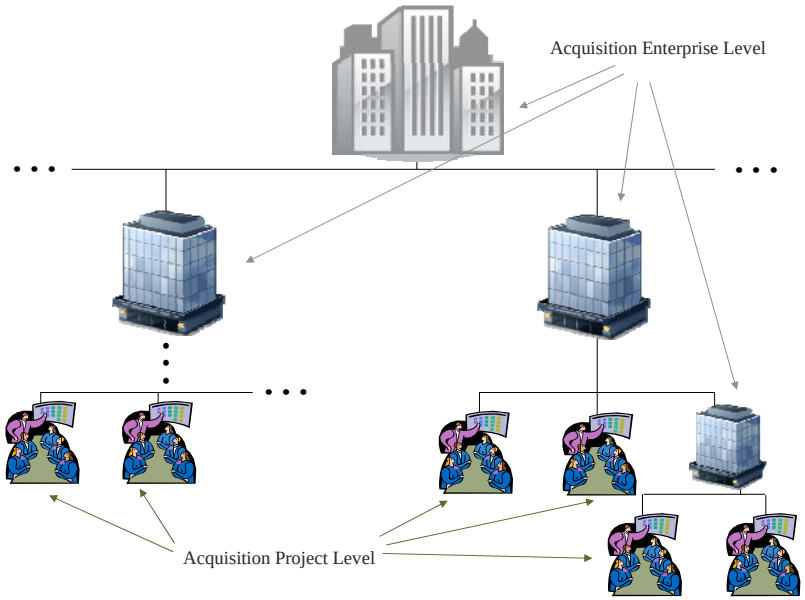
Working Group Definition

Acquisition Measurement

The process an acquirer uses to obtain, analyze, and apply data to make informed decisions on the activities, processes, products, and resources needed to conduct acquisition.



Acquisition Measurement Scope

ACQUIRER SUPPLIER

ENTERPRISE

Acquisition Enterprise Measurement Uses (e.g.)
- Acquisition Project Portfolio Management
- Enterprise Business/Mission Goal Assessment
- Acquisition Process Improvement
- Acquisition Financial Management

Supplier Enterprise Measurement Uses (e.g.)
- Investment Analysis
- Enterprise Business/Mission Goal Assessment
- Process Improvement
- Financial Management

Measures *Information Needs* *Information Needs* *Measures*

PROJECT

Acquisition Project Measurement Uses (e.g.)
- Requirements Development Progress & Quality Assessment
- Staffing Profiles for Capabilities Definition
- Cycle Time/Effectiveness of Supplier Work Product Review
- O&M cost analysis

Information Needs

Measures
Use to Assess Supplier's Technical, Cost, Schedule, Quality, and Process Performance

Supplier Project Measurement Uses (e.g.)
- Project Monitoring and Control
- Statistical Process Control of Engineering & Manufacturing Practices
- Cost vs. Benefit Design Trade Analyses

White Paper Scope (emphasis on acquisition project)

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What's In The White Paper (Highlights)

1. Introduction
   - *Why acquisition measurement?*
   - *Relating acquisition activities and products to successful outcomes*
2. Acquisition Measurement Building Blocks
   - *Process, infrastructure, roles & responsibilities, relationships*
3. Measurement at the Acquisition Project Level
   - *Identifying project-level information needs and measures - examples*
4. Measurement at the Acquisition Enterprise Level
   - *Identifying project-level information needs and measures - examples*
5. The Big Picture
   - *Acquisition measurement in context*
   - *Keys to success*

Appendix A: Definitions
Appendix B: Acquisition Work Breakdown Structure
Appendix C: Summary Acquisition ICM Table
Appendix D: Sample Measurement Plan Outline
Appendix E: References

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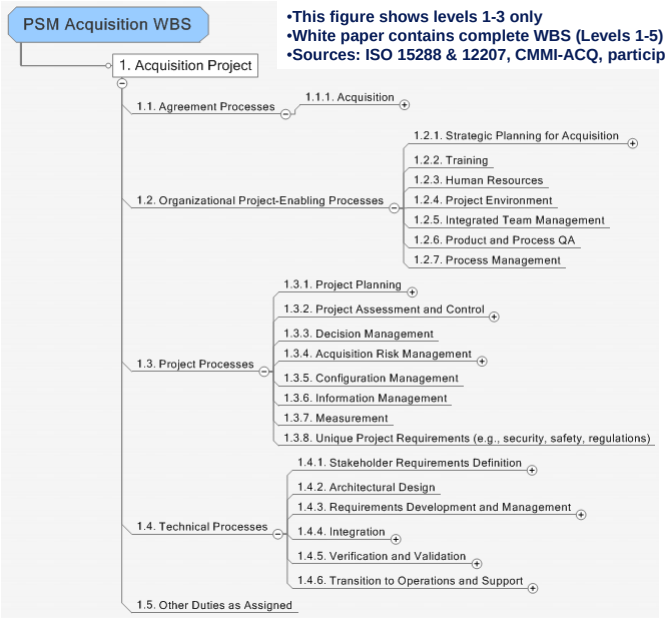

- This figure shows levels 1-3 only
- White paper contains complete WBS (Levels 1-5)
- Sources: ISO 15288 & 12207, CMMI-ACQ, participant experiences

ICM Table – Enterprise Level - 1

Information Categories	Questions Addressed	Measurable Concepts	Measures
Schedule & Progress	Are the projects within this enterprise on track?	Milestone Completion	Milestone Progress Interim Progress Trend
	What is the degree of risk associated with each project? Which projects are most at risk?	Risk Status	Risk Likelihood and Impact
	What is the enterprise work backlog? What should be scheduled next?	Work Backlog	Open Defects Enhancements Needs
Resources & Cost	Does the enterprise budget and funding process support the financial needs of the projects?	Financial Adequacy	Obligation Rates Disbursement Rates Funding Availability
Resources & Cost, Cont'd	Within the enterprise, are there sufficient qualified resources (people)?	Personnel Effort	Effort Experience Level Staff Turnover Workforce Age Profiles Education/Training Profiles
Product Size & Stability	How many systems are in development? How big are they? How many systems are being maintained? How big are they? What are the trends over time?	Physical Size and Stability Functional Size and Stability	Interfaces Interface Complexity Lines of Code Requirements
	Are requirements (needs) and architecture elements stable?	Functional Size and Stability	Requirements Volatility Architecture Elements Volatility

ICM Table – Enterprise Level - 2

Information Categories	Questions Addressed	Measurable Concepts	Measures
Process Performance	Are known problems being resolved?	Functional Correctness	Defects Resolved
	Are the processes sufficient to operate efficiently in support of the acquisition activities	Process Effectiveness	Process Capability Process Adherence
	What are enterprise norms for completing acquisition activities (schedule, cost, productivity)?	Process Efficiency	Cycle Time Effort Productivity
	What are enterprise norms for completing development activities (schedule, cost, productivity)?	Process Efficiency	Cycle Time Effort Productivity
Technology Effectiveness	Does the enterprise have sufficient technology insertion plans and implementations?	Technology Adoption	Needs Met by Technology Insertion Technology Refresh Rate
Customer Satisfaction	Are user needs / concerns being met? Is the enterprise delivering the products that are needed with sufficient functionality and performance for the mission?	Customer Feedback Customer Support	Satisfaction Ratings Requests for Support

ICM Table – Project Level - 1

Information Categories	Questions Addressed	Measurable Concepts	Measures
Schedule & Progress	Are acquisition activities and commitments completed as scheduled?	Milestone Completion Work Unit Progress	Milestone Dates Test Cases Attempted and Passed Requirements Documented and Reviewed Requirements Traced and Tested Reviews Completed Action Items Closed
	What is the degree of risk associated the project? What are the highest risks?	Risk Status	Risk Status
Schedule & Progress Resources & Cost	Has the acquisition office established realistic cost and schedule parameters for the system and for acquisition activities? Have the system proposals been evaluated for realistic cost and schedule projections?	Schedule Feasibility Cost Feasibility	Schedule Probability Cost Probability
	Are the development schedule and cost realistic?	Schedule Feasibility Cost Feasibility	Schedule Probability Cost Probability
Resources & Cost	Does the project have sufficient money to conduct acquisition activities on this project?	Financial Performance	Cost BCWS, BCWP, ACWP
	Does the project have sufficient qualified resources to conduct acquisition activities on this project?	Personnel Effort	Effort Experience Level Staff Turnover
	Does the project have sufficient resources / infrastructure to conduct acquisition activities on this project?	Environmental and Support Resources	Quantity Needed and Available Time Available and Used

ICM Table – Project Level - 2

Information Categories	Questions Addressed	Measurable Concepts	Measures
Product Size & Stability	Are the user needs / top-level requirements and architectures stable? What is the impact of changes?	Functional Size and Stability	Needs Volatility Architecture Volatility
	How many external interfaces exist in a program? Are all external interfaces clearly identified? Are the interfaces stable? Are external interfaces developed and tested as planned?	Functional Size and Stability	External Interface Volatility
Product Quality	Is the project delivering quality products that meet performance requirements?	Functional Correctness Dependability-Reliability	Needs Tested Successfully Defect Density Defect Escapes TPMs Components Accepted Mean Time to Failure
	How many defects are found in the acquisition work products? How much rework is required?	Functional Correctness Process Effectiveness	Defects Rework Effort Rework Components
	How difficult is the product to maintain? How much will it cost? How many people are required for a certain level of support?	Maintainability Financial Performance Personnel Effort	Cost Staff Level
	Have you adequately budgeted, planned, and executed requirements for safety? What is the residual safety risk of the system?	Safety	Safety Risk Incidents Incurred Cost per Incident
	Have you adequately budgeted, planned, and executed requirements for security?	Security	IT Security Cost Physical Security Cost

ICM Table – Project Level - 3

Information Categories	Questions Addressed	Measurable Concepts	Measures
Process Performance	How effective & efficient is the acquisition office in identifying defects in system products?	Process Effectiveness	Defect Escapes
	How much time & effort is spent on various acquisition office activities?	Process Efficiency	Productivity
Technology Effectiveness	Does the project have sufficient technology insertion plans and implementations?	Technology Adoption	Needs Met by Technology Insertion Technology Refresh Rate
Customer Satisfaction	Is the end user satisfied with the acquisition office activities and interactions? Is there sufficient user involvement? Are user action items recorded and completed?	Customer Feedback Customer Support	Satisfaction Ratings Action Items Opened and Completed

Our Expectations for its Use

Introduction to measurement for acquirers and those supporting them

- ***General guidance, presented in the context of acquisition***
- ***Examples relating measurement to acquirer products, processes, and resources***
- ***Foundation for applying measurement in emerging environments (e.g., acquisition in a SOA or SoS context)***

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Next Steps

- Use the information in the white paper to support our own acquisition activities
- Solicit, develop, and post acquisition measurement specifications to the PSM web site – we have a couple in the works, which will be posted to www.psmsc.com/SampleMeasures.asp
- Obtain suggestions for future topics in acquisition measurement – send to psm@psmsc.com