Barriers to Measurement
Understanding & addressing what gets in the way of enablers to effective measurement

Findings and Follow-up from workshop at PSM Technical Working Group March 5-7, 2002

Facilitated by Joe Jarzombek, PMP
Steak, Sex & Stats

“Human behavior is governed by three basic requirements: the need to eat, the need to procreate, and the need to measure stuff.”

– From July 2002 issue of Inc Magazine,
The InfoPosse reports each month on what’s notable in the world of corporate information
Barriers to Measurement

Objectives:

1. Identify barriers to effective use of measurement
   • Address what needs to be done
   • Identify perceived challenges

2. Address what needs to be done to enable the use of measurement
   • Identify counter-arguments to challenges
   • Identify enablers for effective measurement
   • Identify steps to overcoming challenges
Workshop Participants

- Joe Jarzombek
- Tom Majewski
- Bik Adepu
- Rita Creel
- Mia Henderson
- Luis Henriquez
- Paul Januz
- Howard Blackstone
- Bruce Allgood

- Ruth Buys
- David Magidson
- Guy Mercurio
- Lisa Roberts
- Ron Torezan
- Tom Coonce
- John Bailey
- Renee Schreiber
**General Discussion**

- Review of ISO 15939: goal is to get a consensus that there is a match between elements of the standard and the Measurement and Analysis Process Area of the CMMI; scope includes acquirer and supplier.

- New PMs want to develop their own processes; there is a feeling they have too little time on the program to spend it documenting processes, but high turnover is an argument for documentation, not against it.

- Top management doesn’t see pay-off; doesn’t see what’s in it for them.

- The evidence comes from the monitoring and control practice; this is where higher maturity organizations get the benefits.

- Perception is that it’s just another Government requirement and that it won’t benefit them.

- Business CFOs need ROI from measurement programs to justify the investment.
  - Motorola, as a non-defense contractor, has an example presentation showing ROI that was given at the NDIA-SEI co-sponsored CMMI Tech Conference and Users Group; it should be available on their web site.

- There is a general lack of sufficient education about measures and their value.
General Discussion

• Need to be able to show there will be good results if you start a measurement program

• There seems to be a problem with how to actually make a measurement program happen; management should:
  – be asking ‘what are my information needs?’ and
  – provide enabling mechanisms, such as ‘measurement in contracts’

• Need to get agreement between supplier & acquisition organization on the information needs, then the acquisition organization needs to ask for those measures at the reviews

• Contract should specify that measurement will be done and what issues are expected to be addressed; the proposal should provide the measurement plan

• Problem is there are no CDRLs or DIDs for software measurement

• Need to know how to interpret measures and change based on the results

• Government entities often don’t want to pay for the measurement programs, then when things go wrong, Government ignores the warning signs
**Barriers to Measurement**

**Objectives:**

1. **Identify barriers to effective use of measurement**
   - Address what needs to be done
   - Identify perceived challenges

2. **Address what needs to be done to enable the use of measurement**
   - Identify counter-arguments to challenges
   - Identify enablers for effective measurement
   - Identify steps to overcoming challenges
Significance of Measurement

• Integral to basic management activities
  – Regardless of discipline

• Characterizes mature organizations
  – Objective, performance based management
  – Project management focused on cost and milestone completion
  – Augmented by sophisticated analyses of process, product quality, and change management
  – Measurement integrated into life cycle processes
    • Supports management and technical decision making
    • Helps quantitatively guide improvement of products & services, as well as the processes used to develop them
Measure for Success *

- Key characteristics of measurement in top-performing organizations
  - Highly integrated into management and technical processes
  - Supported by the corporate culture

- Indications of success
  - Data collection is natural and automatic
  - Data is widely available
  - People seek data as a basis for decision making
  - Failure leads to understanding rather than blame
  - Objectives are accompanied by rational plans
  - Improvements are made regularly to the measurement process

* From PSM book, chapter 8
What Is Typically Missing?

• Collaboration & coordination
  – So the right stuff gets measured …
  – And we end up with useful, actionable guidance to inform business and technical decisions

• Measurement expertise alone won’t always address the right business and technical issues
  – That requires good business perspective & deep knowledge of application domain & technology
  – Yet … a collaborative approach to measurement may itself help clarify the business objectives and information needs it is asked to address
What Managers Need to Know

• Is there really a problem?
• How big is the problem
• What is the scope of the problem?
• What is causing the problem?
• Are there related problems?
• Can I trust the data?
• What should I expect; what will happen?
• What are my alternatives?
• What is the recommended course of action?
• When can I expect to see results?
Measurement: A Key Support Process

• Almost no other implemented process has such a wide variety of interfaces and integration.
• Measurement activities can provide a common language among business functions.
• Measurement is one of the few processes that impacts almost every critical business function, and hence it is a technically challenging process.
  – Measurement users require that the process have a high level of precision, timeliness and utility.
  – Typical measurement process implementation requires integration with cost data, labor data, planning data, TPMs, technical processes and associated tools, network computers and intranet/internet resources.
ISO 15939 Measurement Process

- Establish Commitment
- Plan
- Perform
- Evaluate

Core Measurement Process

- Measurement Requirements
- User Feedback
- Information Needs
- Analysis Results
- Experience Base
- Improvement Actions
- Database

Scope of Standard
CMMI Measurement & Analysis / ISO 15939

- Establish & sustain measurement capability
- Align measurement with business needs & objectives
- Perform & provide measurement results
- Evaluate & improve measurement

Scope of ISO 15939 & CMMI MA
**Core CMMI Measurement & Analysis Practices**

**M&A Specific Goals:**

1. Measurement objectives and practices are aligned with identified information needs and objectives
   - SP 1.1 Establish measurement objectives
   - SP 1.2 Specify measures
   - SP 1.3 Specify data collection & storage procedures
   - SP 1.4 Specify analysis procedures

**Performance & Provide Results:**

2. Measurement results that address identified information needs and objectives are provided
   - SP 2.1 Collect measurement data
   - SP 2.2 Analyze measurement data
   - SP 2.3 Store data & results
   - SP 2.4 Communicate results

**GP 1.1** Perform base Practices
Maturing Measurement - Generic Practices

- Establish & Sustain Process
  - GP 2.1 Establish an organizational policy
  - GP 2.3 Provide resources
  - GP 2.4 Assign responsibility
  - GP 2.5 Train people
- Align with Needs & Objectives
  - GP 2.2 Plan the process
  - GP 3.1 Establish defined process
  - GP 4.1 Establish quality objectives
  - GP 5.1 Ensure continuous process improvement
- Perform & Provide Results
  - GP 2.6 Manage configurations
  - GP 2.7 Identify & involve relevant stakeholders
  - GP 4.2 Stabilize sub-process performance
- Evaluate & Improve
  - GP 2.8 Monitor & control
  - GP 2.9 Objectively Evaluate adherence
  - GP 2.10 Review status with higher level management
  - GP 3.2 Collect improvement information
  - GP 5.2 Correct common cause of problems
Barriers to Measurement

Objectives:

1. **Identify barriers to effective use of measurement**
   - Address what needs to be done
   - Identify perceived challenges

2. **Address what needs to be done to enable the use of measurement**
   - Identify counter-arguments to challenges
   - Identify enablers for effective measurement
   - Identify steps to overcoming challenges
Barriers To Measurement

- Lack of understanding of how measurement can help
- Perceptions of how measurement data will be misused
- Implementation viewed as “too hard” or “too expensive”
- Disconnect between measures and information needs
- Limitations for presentation of measurement analysis
- Time & expense required to integrate data sources
- Pilot implementation difficult to roll-out & support
- No short-term benefit – questionable validity of metrics
- Lack of assistance or guidance in reaching conclusions from the data that exists in the measurement repository
- Infrastructure requirements for IT people
- Changes in corporate culture and workforce habits
- etc.
Enablers to Measurement

Objectives:

1. Identify barriers to effective use of measurement
   • Address what needs to be done
   • Identify perceived challenges

2. Address what needs to be done to enable the use of measurement
   • Identify counter-arguments to challenges
   • Identify enablers for effective measurement
   • Identify steps to overcoming challenges
Enablers To Measurement

Environment Enablers

- Documented Processes
- Corporate Culture
- Enterprise Management
  - IT Infrastructure (systems & technical architectures)
  - Reporting Mechanisms (operational architecture)
  - Contracts and Inter-organizational Agreements
- Etc
Enablers To Measurement

Enabling Technology

• Use of the web/intranet helps
  – Organizations which use web technology tend to be more successful in measurement than those that do not.

• Use of tools, that fit within the workflow of practitioners, support the automated collection and analysis of data.
Objectives:

1. **Identify barriers to effective use of measurement**
   - Address what needs to be done
   - Identify perceived challenges

2. **Address what needs to be done to enable the use of measurement**
   - Identify enablers for effective measurement
   - Identify counter-arguments to challenges
   - Identify steps to overcoming challenges
Enabling Measurement

• Identify counter-arguments to challenges
  – Articulate applicable business case
    • Return on Investment (ROI),
    • timely information to support decisions
    • etc
  – List alternative strategies
    • Time phasing,
    • Resource sharing,
    • etc

• Identify steps to overcoming challenges
  – Group “like” solutions
  – Recommendations for PSM follow-up
Follow-up Action Items

• Define what objective criteria could be used to determine incentive and award fees (such as finish early + good quality = award fee)

• Research language to use to get the objective criteria written into contract language, and then provide PSM chapter on “Putting Measurement on Contract”

• Look into a case study to determine cost of setting up and sustaining a measurement program

• Work with Defense Acquisition University (DAU) on revising course material to increase measurement content, via courses for PM, SE, SAM, T&E, etc that address monitor and control

• Provide workshop to translate information needs down through indicators and derived measures to base measures
  – Include, in translating Information Needs into Base Measures, a component on potential for multiple use of base measures and formats for presentation
Follow-up Action Items

- Need to provide guidance on how to use existing data to be more predictive
- Prepare article on legal requirements for measurement (FAR, Clinger-Cohen Act/ITMRA); have article reviewed by legal staff before publication
- Prepare article on measurement success stories and pointers to URLs for others
- PSM to brief the Software-Intensive Systems (SIS) Steering Group
- Measurement to be included in a presentation at the PEOSysCom
- Schedule DoD Measurement Initiatives and PSM brief to OSD C3I, OUSD(AT&L)ARA, & DISA; show synergy among initiatives
- DoD Measurement Initiative Group team to send input to Measures Intro and Benefits Brief
- For DoD Measurement Initiative, review, revise Measures Intro and Benefits Brief; include specific actions expected from attendees
Summary

- Barriers to measurement can be countered with enablers
- Consensus was to proceed with several action items
- Follow-up actions are being taken
- More follow-up is still needed
Contact Information

Joe Jarzombek, PMP
Deputy Director for Software Intensive Systems
Acquisition Resources and Analysis Directorate
Office of the Secretary of Defense (AT&L)

Crystal Mall 3, Suite 104
1931 Jefferson Davis Highway
Crystal City, Arlington VA 22202

Business Ph (703) 602-0851, Ext 105
Mobile Cell Ph (703) 627-4644
Fax: (703) 602-3560

Joe.Jarzombek@osd.mil

Practical Software and Systems Measurement

Providing enablers for measurement

Software Intensive Systems
Measurement Thread:

• Level 2
  – Establish performance baselines:
    • M&A PA specific practices (activities),
    • Generic Practices (common features),
    • Project Planning PA & Project Monitoring & Control PA
  – Essential preparation for accomplishing level 4 & 5 PAs

• Level 3
  – Measurement practices are matured through Generic Practices
  – Measurement data is stored in repositories available for organization-wide use
    • Organizational Process Definition (OPD) PA specific practice (activity), “Establish and maintain the organization's measurement repository.”
  – Organizational Process Focus - provides the evaluation and improvement practice to complete the correspondence of CMMI measurement with ISO 15939
  – Analysis focuses on explicit comparisons among projects / organization roll-ups

• Level 4 & 5
  – Measurement establishes crucial baselines for comparisons made among projects and across the organization
  – More sophisticated quantitative analysis is used, such as statistical process control, structured modeling, or multivariate statistical methods