Practical Measurement in the Rational Unified Process

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Agenda

- Why Measure?
- Attributes of a Successful Measurement Program
- Standards and Methodologies
- Capability Maturity Model Integration (CMMI)
- RUP Overview
- Proposed PSM Plug-in for RUP
- RUP Phases and Information Categories
- Measures within PSM/RUP
- Summary
Why do we measure?

- Communicate effectively
- Identify and correct problems early
- Make informed trade-offs
- Track specific project objectives
- Manage risks
- Defend and justify decisions
Attributes of a Successful Measurement Program

- Organizational commitment
- Organization uses the results
- Measurement process is well planned
- Measurement collection is automated
- Measures are objective and unambiguously defined
- Measurement process is continuously improved
- Results are communicated
PSM - Practical Software and Systems Measurement
ISO/IEC 15939 – Software Measurement Process
CMMI – Capability Maturity Model Integration – M & A
ISO 12207 – Software Life Cycle Process
ISO 15288 – System Life Cycle Process
ISO 14598 - Software Product Evaluation
ISO 15504 – Software Process Assessment
ISO 9126 – Software Product Quality
Capability Maturity Model Integration (CMMI)

- Models containing the essential elements of effective processes
  - CMMI is not a process!
- Provides guidance for improving processes and ability to manage development, acquisition and maintenance
- Assess at different levels of process maturity or capability
- Two Models
  - Staged Representation
  - Continuous Representation
CMMI Staged Representation

- Assess process maturity

Maturity Levels:

- Level 1: Initial
- Level 2: Managed
- Level 3: Defined
- Level 4: Quantitatively Managed
- Level 5: Optimizing

*Figure 1: CMMI Model Components [FM103_HDA101_T104]*
CMMI Continuous Representation

- Assess process capability

Capability Levels:

- Level 0  Incomplete
- Level 1  Performed
- Level 2  Managed
- Level 3  Defined
- Level 4  Quantitatively Managed
- Level 5  Optimizing

Figure 1: CMMI Model Components [FM103.HDA101.T03]
CMMI Level 2 (Staged) Key Process Areas

- Requirements Management
- Project Planning
- **Project Monitoring and Control**
- Supplier Agreement Management
- **Measurement and Analysis**
- Process and Product Quality Assurance
- Configuration Management
CMMI

Measurement & Analysis Process Area

► Specific Goal 1: Measurement objectives and practices are aligned with identified information needs

► Specific Goal 2: Measurement results that address identified needs and objectives are provided

Project Monitoring & Control Process Area

► Specific Goal 1 Actual performance and progress are monitored against the project plan
PSM Measurement Process Model

Diagram showing the PSM Measurement Process Model with the following components:

1. Technical and Management Processes
2. Core Measurement Process
   - Establish and Sustain Commitment
   - Plan Measurement
   - Perform Measurement
   - Evaluate Measurement

Establish and Sustain Commitment

Define Scope → Obtain Commitment → Communicate Commitment

Assign Responsibility → Commit Resources
Plan the Measurement Process

1. Identify Information Need
2. Select Measure
3. Define Collection, Analysis, Reporting Procedure
4. Define Criteria, Threshold for Evaluating Measure
5. Review Measurement Tasks
6. Acquire and Deploy Tools

Diagram:
- Identify Information Need
- Select Measure
- Define Collection, Analysis, Reporting Procedure
- Define Criteria, Threshold for Evaluating Measure
- Review Measurement Tasks
- Acquire and Deploy Tools
Perform the Measurement Process

Integrate Procedures → Collect Data → Analyze Data → Communicate Results
Evaluate Measurement

Evaluate Measures and Process → Identify Measurement Process Improvements
Six Best Practices

Best Practices
Process Made Practical

- Develop Iteratively
- Manage Requirements
- Use Component Architectures
- Model Visually (UML)
- Continuously Verify Quality
- Manage Change
The Rational Unified Process

RUP is an industry-wide process platform that provides you with software development knowledge, guidelines, templates, and examples for every member of your team.
The RUP® Process Platform

- Process Delivery Tools: Accessible guidance, available when you need it
- Configuration Tools: Just enough process for your project
- Process Authoring Tools: Build your own process
- Community/Marketplace: Exchange best practices & experiences with peers & experts
- Rational Unified Process®: Proven best practices

The Process
Configuration Tools: *Right-Size the Process Platform*

**Partners**
- Technology Plug-In
- Tool Plug-In
- Domain Plug-In

**Core RUP**
- Core Plug-In
- Core Plug-In

**Customers**
- Project Plug-In
- Company Plug-In

**RUP Configurations**
- RUP for PSM
- RUP for Systems Engineering
- RUP for .NET
- RUP for J2EE
- RUP for XP
- Etc...

*For a complete list of available Plug-Ins, see www.rational.com/products/rup*
Customization Tools: *Rational Process Workbench*

- Drag & drop functionality allows easy creation of Plug-Ins

- Open and extensible: Based on OMG SPEM (Software Process Engineering Meta Model)

- Automatically generates and packages Plug-Ins
Configuration Tools: *RUP Builder*

- Enables project managers to selectively “right-size” their project’s process
- Visually configure process
- Check consistency among Plug-Ins
- Generate new PSM RUP Configuration

**Add new Plug-Ins on Demand**

**“Right Size” via checkbox**

**Create Your Own Process Configurations**
RUP Plug-In Exchange allows uploading and downloading of Plug-Ins

RUP Knowledge Center and Discussion Forum Provide Targeted Content and Community
Additional Role – Measurement Analyst

**Role: Measurement Analyst**

[Begin describing the Measurement Analyst role responsibilities/purpose here]

**Topics**
- Description
- Related Information
- Staffing
- Further Reading

**Responsibility**

- Measurement Analysis and Recommendations
- Measurement Specification
- Measurement Plan

**Modification**

- Evaluation Measurements
- Perform Measurement
- Plan Measurement

- Project Measurements

**Description**

[Begin description here]
Measurement Analyst Activities

- Plan Measurement
- Perform Measurement
- Evaluate Measurements

Role: Measurement Analyst

[Begin describing the Measurement Analyst role responsibilities/purpose here]
Project Manager Discipline

Role: Project Manager

The Project Manager role plans, manages and allocates resources, shapes priorities, coordinates interactions with customers and users, and keeps the project team focused. The Project Manager also establishes a set of practices that ensure the integrity and quality of project artifacts.
Standards and Methodologies

- PSM - Practical Software and Systems Measurement
- ISO/IEC 15939 – Software Measurement Process
- CMMI – Capability Maturity Model Integration – M & A
- ISO 12207 – Software Life Cycle Process
- ISO 15288 – System Life Cycle Process
- ISO 14598 - Software Product Evaluation
- ISO 15504 – Software Process Assessment
- ISO 9126 – Software Product Quality
- RUP – Rational Unified Process
RUP Phases & Information Categories

- Schedule and Progress
- Resources and Cost
- Product Size and Stability
- Product Quality
- Process Performance
- Technology Effectiveness
- Customer Satisfaction
## RUP Phases & Information Categories

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<thead>
<tr>
<th>RUP Phases</th>
<th>PSM Information Categories</th>
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<td>Inception</td>
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Information Need May Vary During Lifecycle

- Pre-study/Inception
  - Monitoring requirements

- Feasability/Elaboration
  - Examine architecturally critical requirements
  - Examine progress in requirement’s level of detail
  - Use case progress

- Execution/Construction
  - Monitoring open defects
  - Status of change requests
  - Requirements churn
  - Test progress
  - Code churn
  - Tasks being completed on schedule (or earned value)

- Execution/Transition
  - Trend of open defects
  - Code churn
  - Number of tasks completed late
  - Customer reported defects
## Information Needs/Sample Measures

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<th>Prospective Measures</th>
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Next Steps

- **Formalize PSM Plug-In**
- **Make it available on IBM Rational Developer Network**
  - [http://www.rational.net](http://www.rational.net)
  - Free to IBM Rational users!
- **Solicit RUP users who practice PSM to use the plug-in**
References

  - http://www.therationaledge.com
  - The PSM book
  - http://www.psmsc.com
  - http://www.sei.cmu.edu
QUESTIONS
Thank You

Doug Ishigaki, IBM

John Riedener, U.S. Army & PSM

Cheryl Jones, U.S. Army & PSM

Bjorn Gustafsson, IBM