Practical Measurement in the Rational Unified Process

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Rational. software

Agenda

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

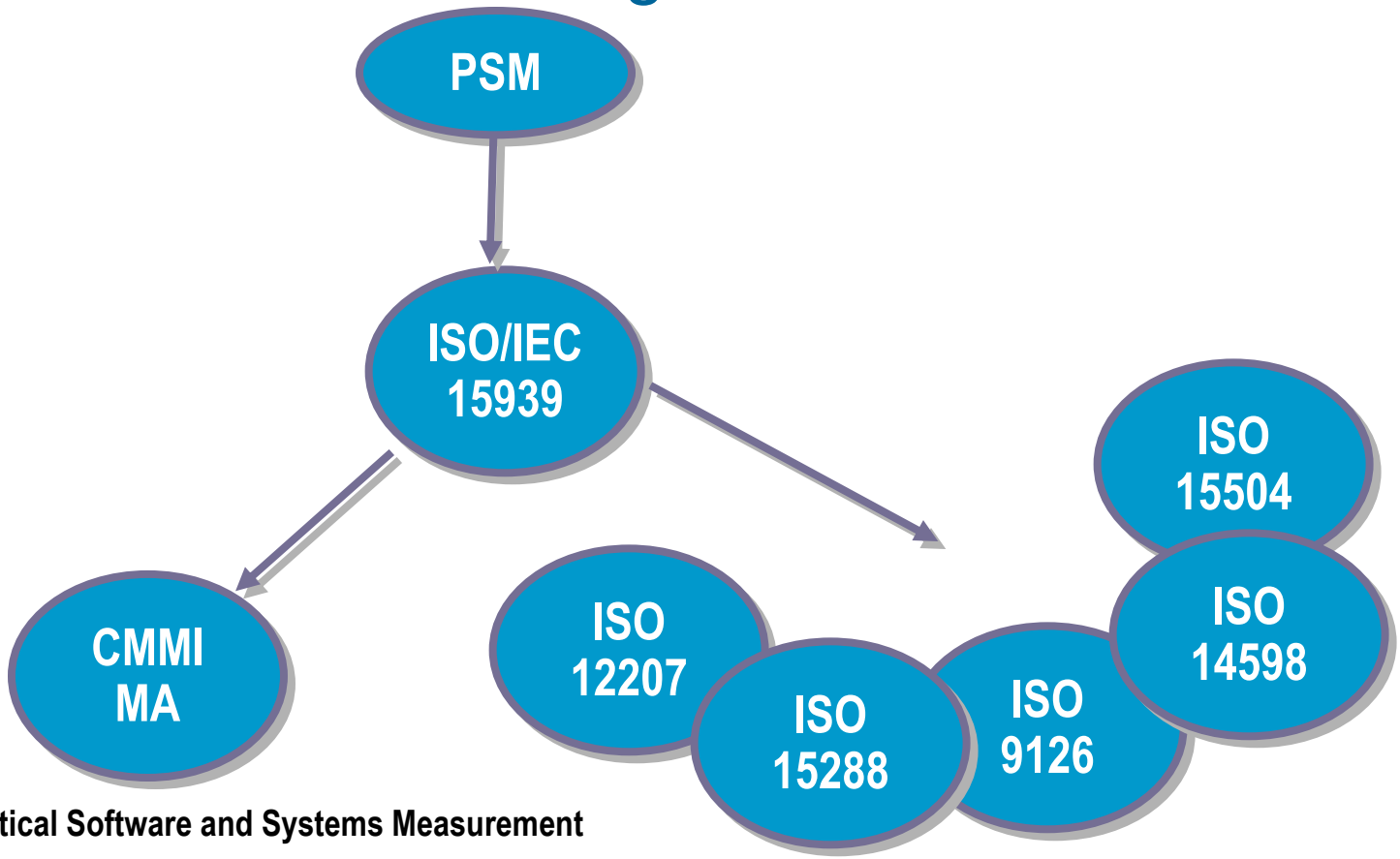
Why do we measure?

- 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

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

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

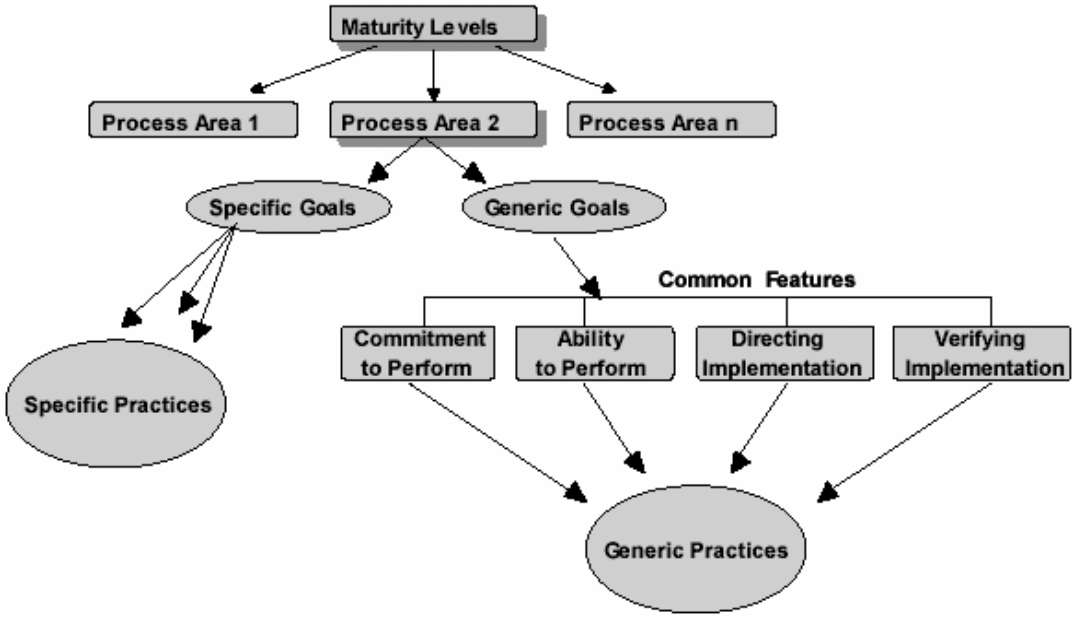


Figure 1: CMMI Model Components [FM103.HDA101.T104]

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

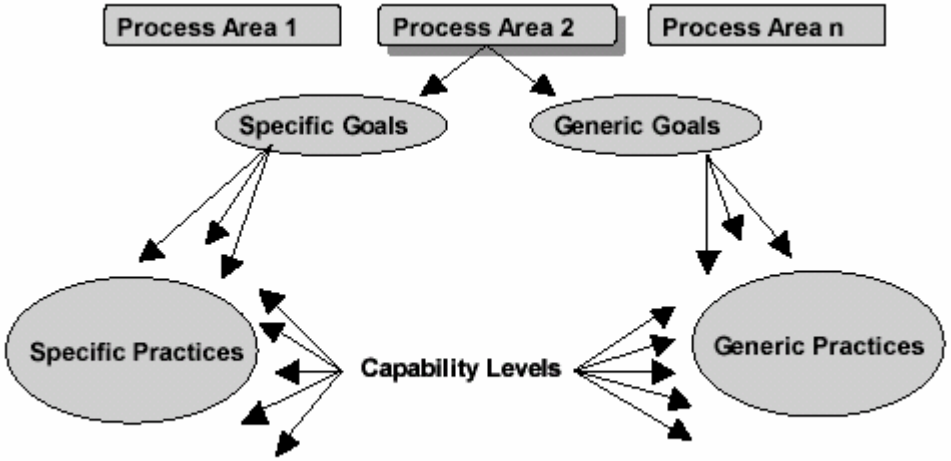


Figure 1: CMMI Model Components [FM103.HDA101.T103]

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

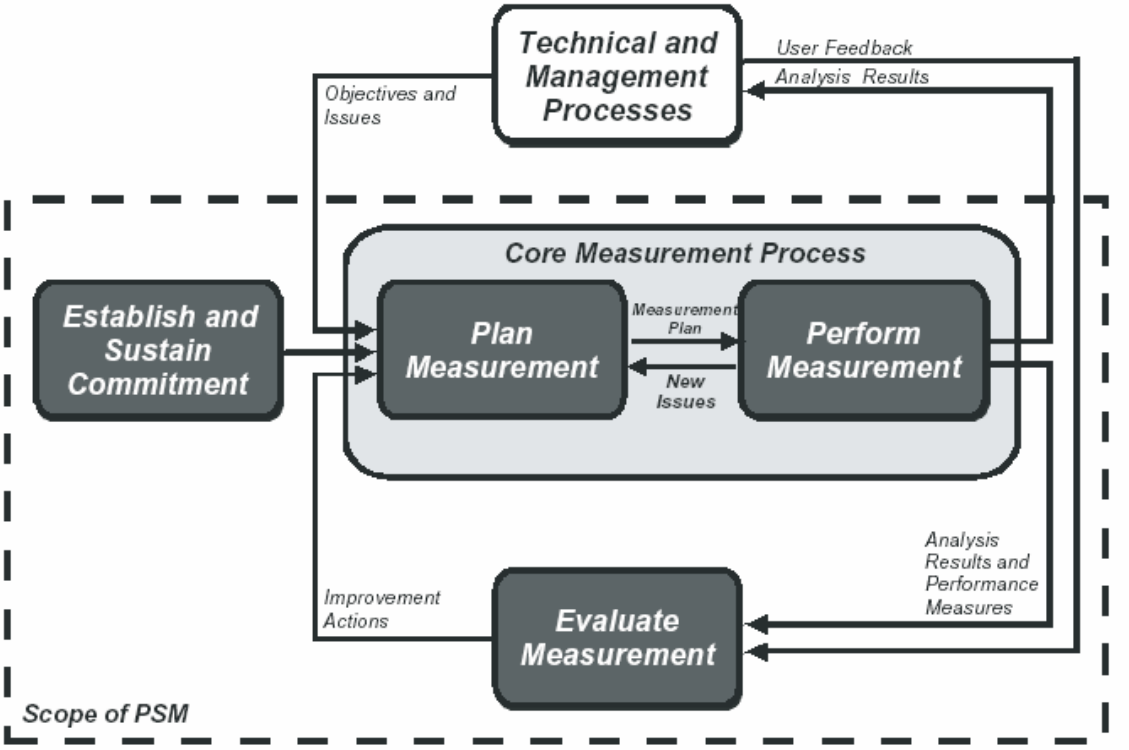
Measurement & Analysis Process Area

- 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

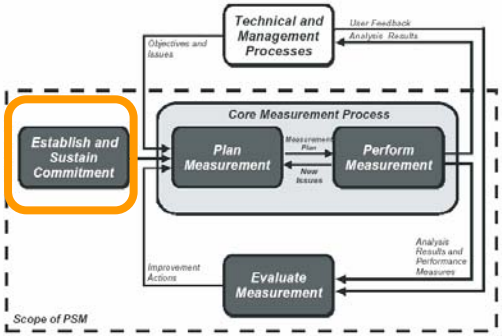
Project Monitoring & Control Process Area

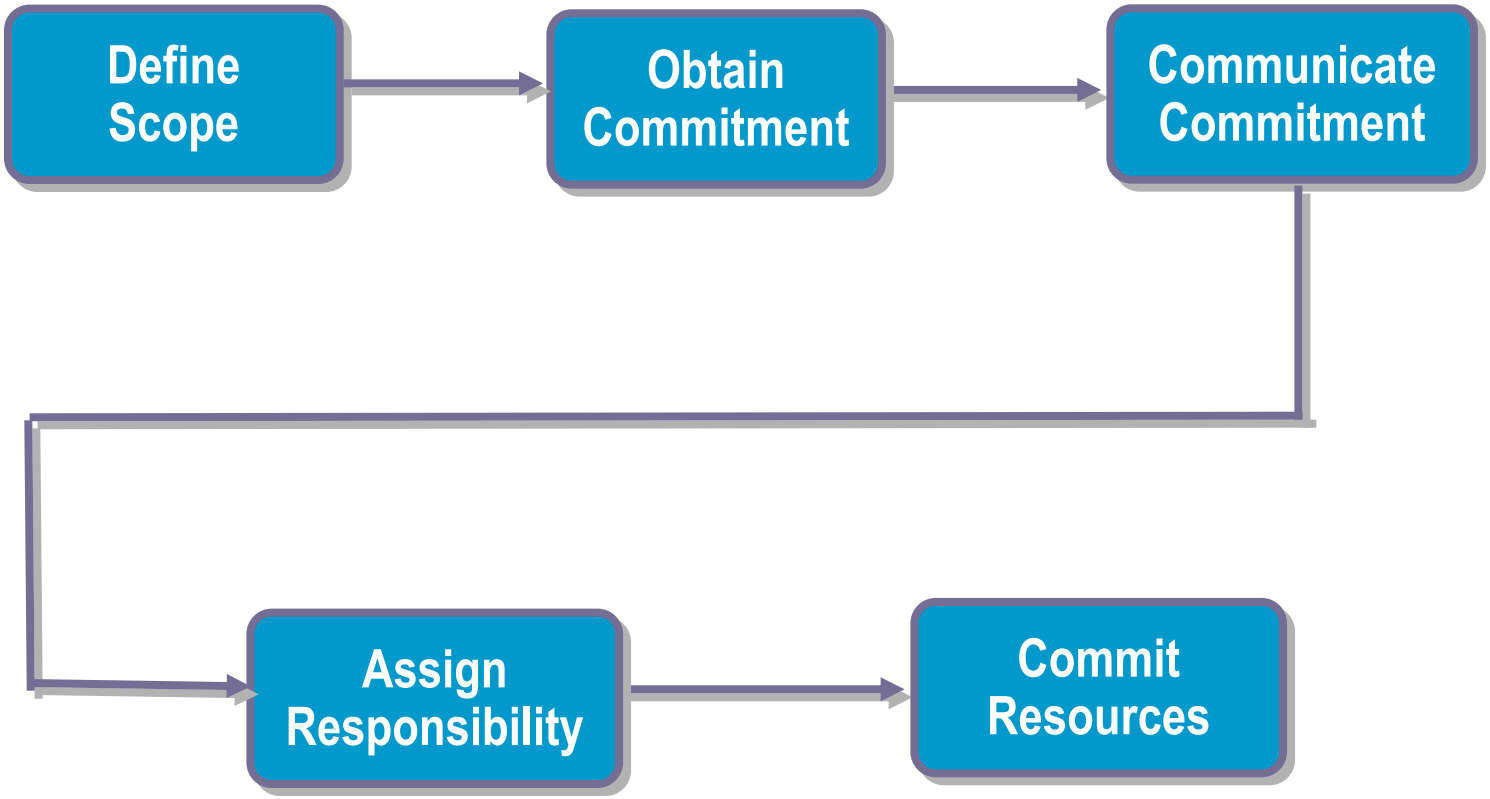
- Specific Goal 1 Actual performance and progress are monitored against the project plan

PSM Measurement Process Model

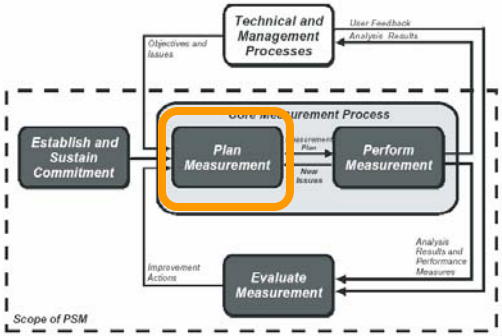


Establish and Sustain Commitment





Plan the Measurement Process



Identify Information Need

Select Measure

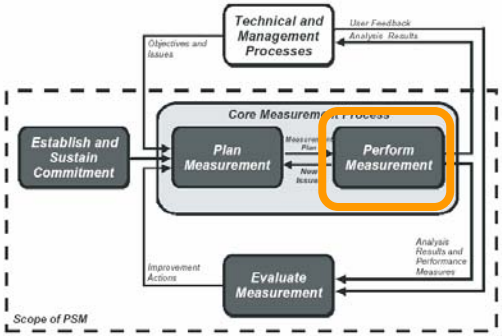
Define Collection, Analysis, Reporting Procedure

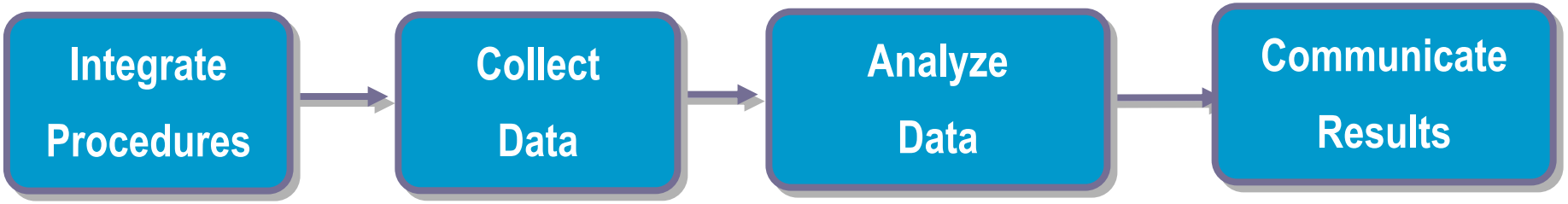
Define Criteria, Threshold for Evaluating Measure

Review Measurement Tasks

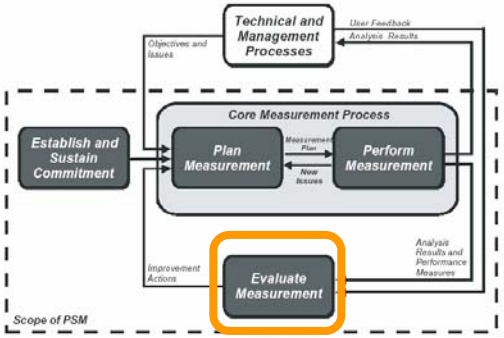
Acquire and Deploy Tools

Perform the Measurement Process





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

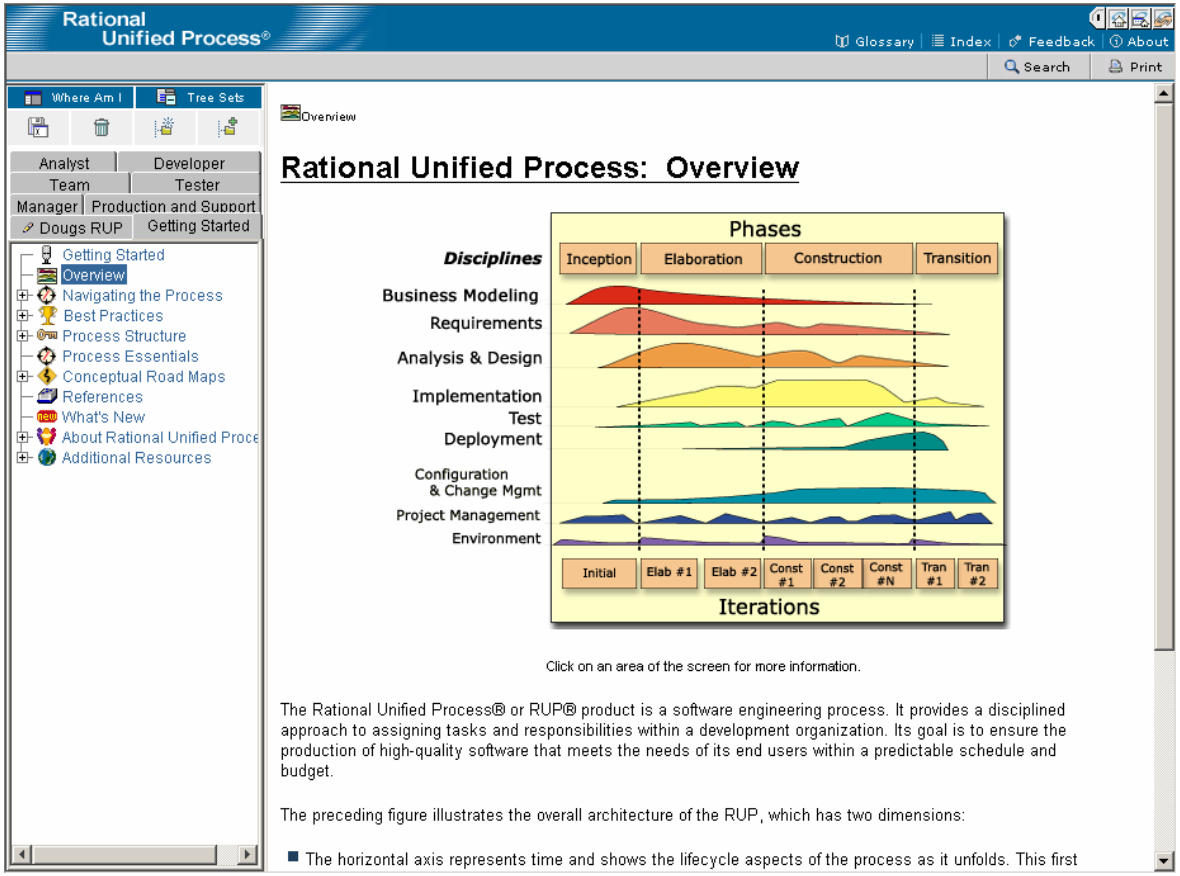
Model Visually (UML)

Continuously Verify Quality

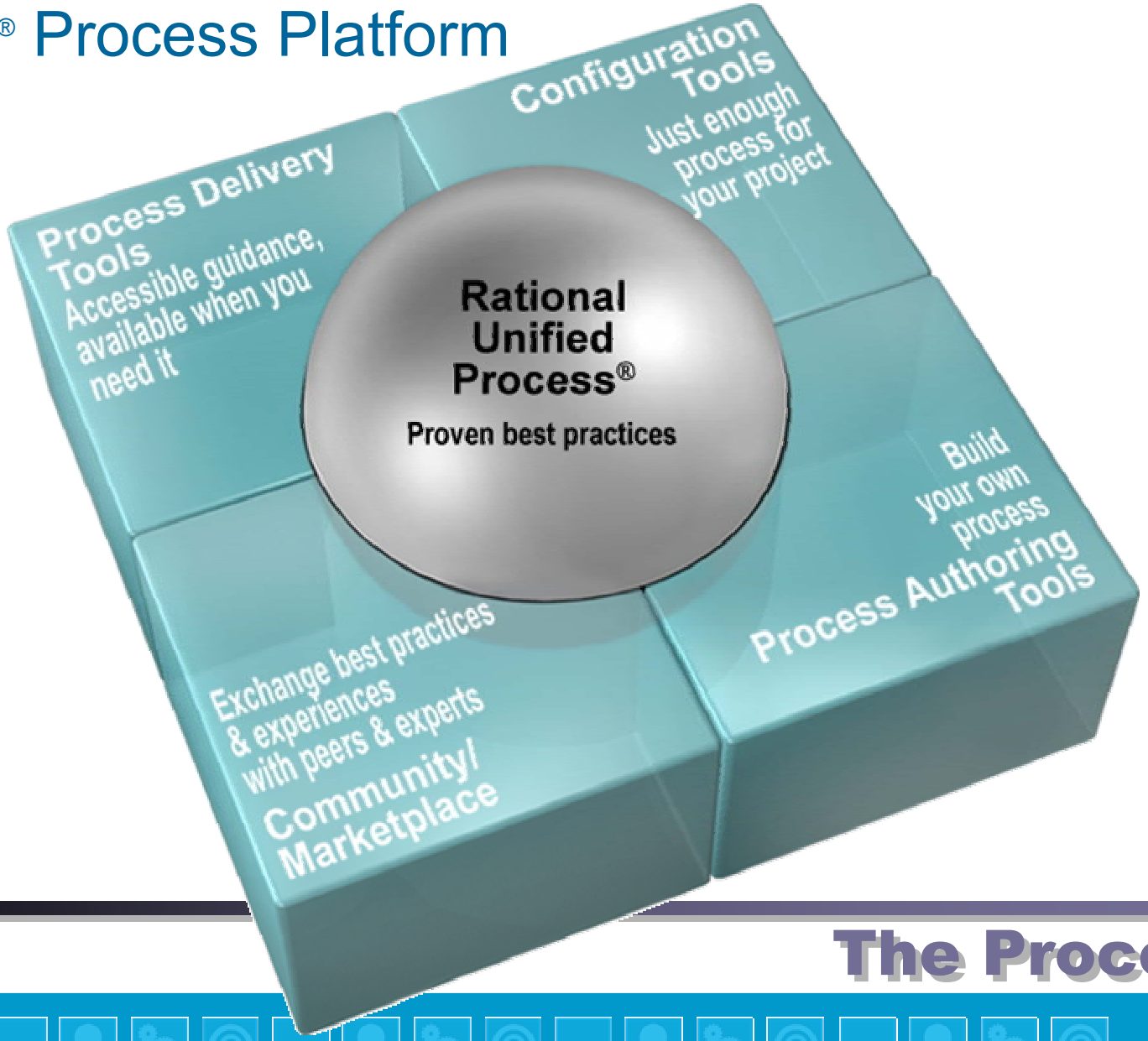
Manage Change

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.

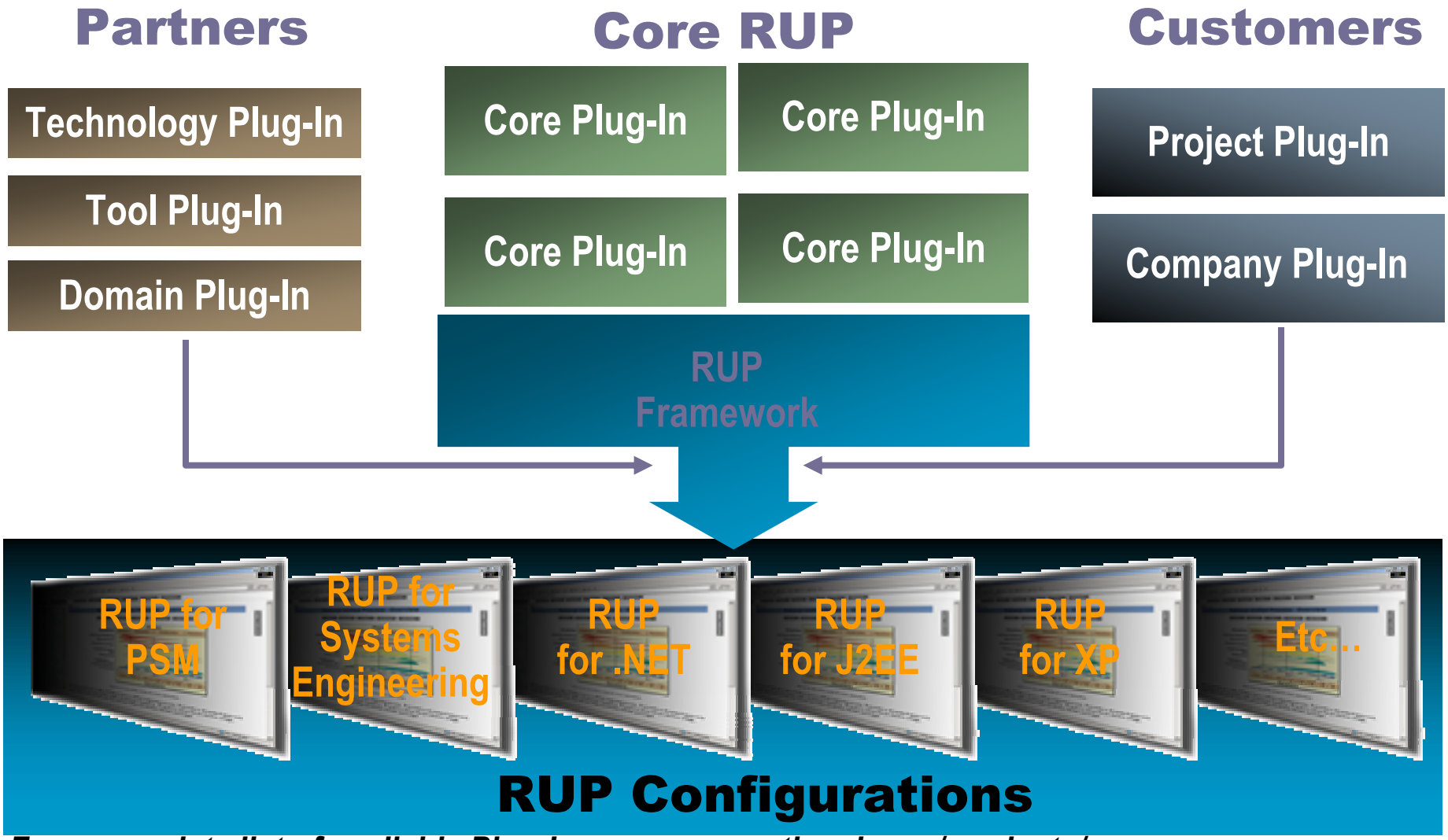


The RUP® Process Platform



The Process

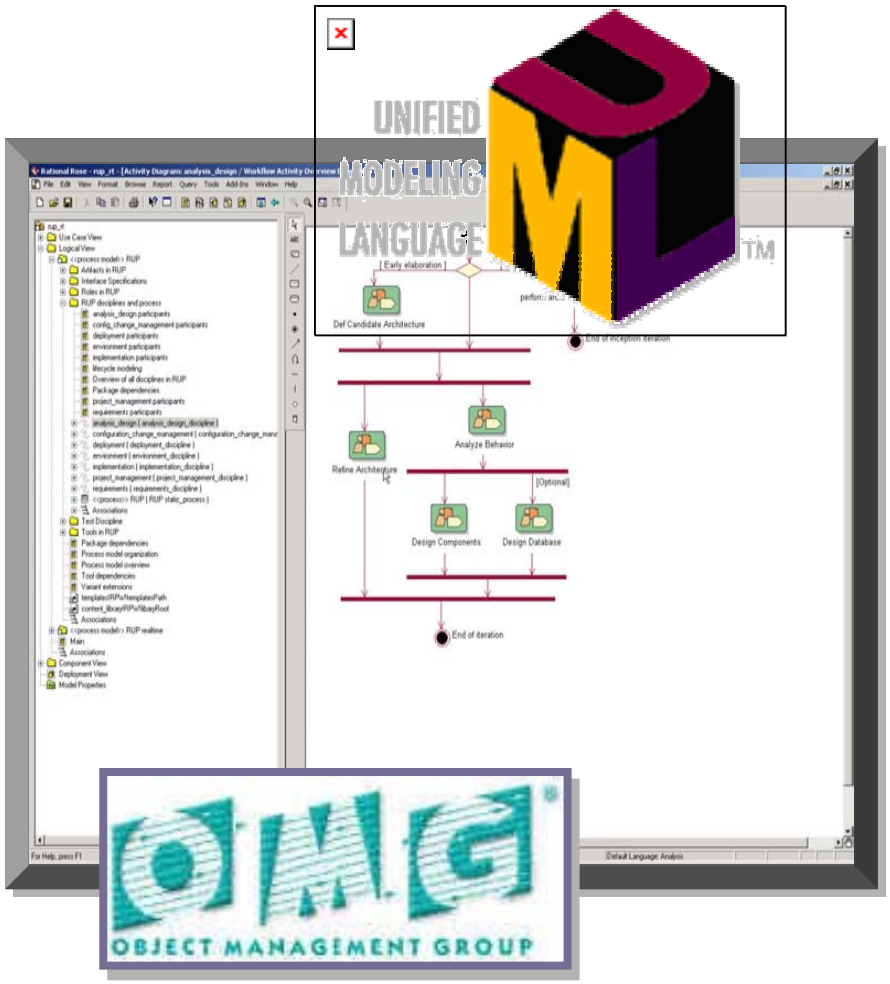
Configuration Tools: *Right-Size the Process Platform*

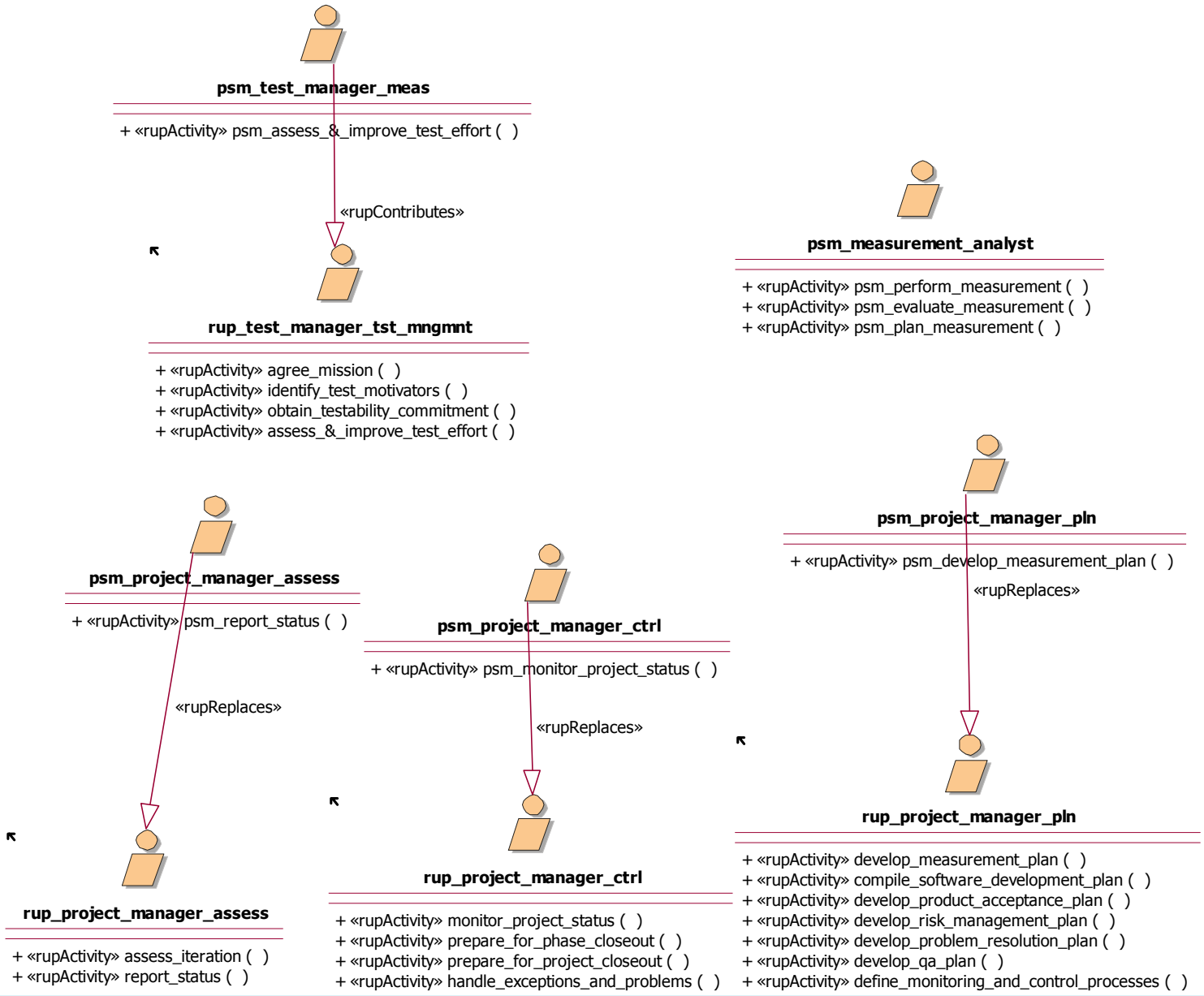


For a complete list of available Plug-Ins, see www.rational.com/products/rup

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

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+ «rupActivity» identify_test_motivators ( )
+ «rupActivity» obtain_testability_commitment ( )
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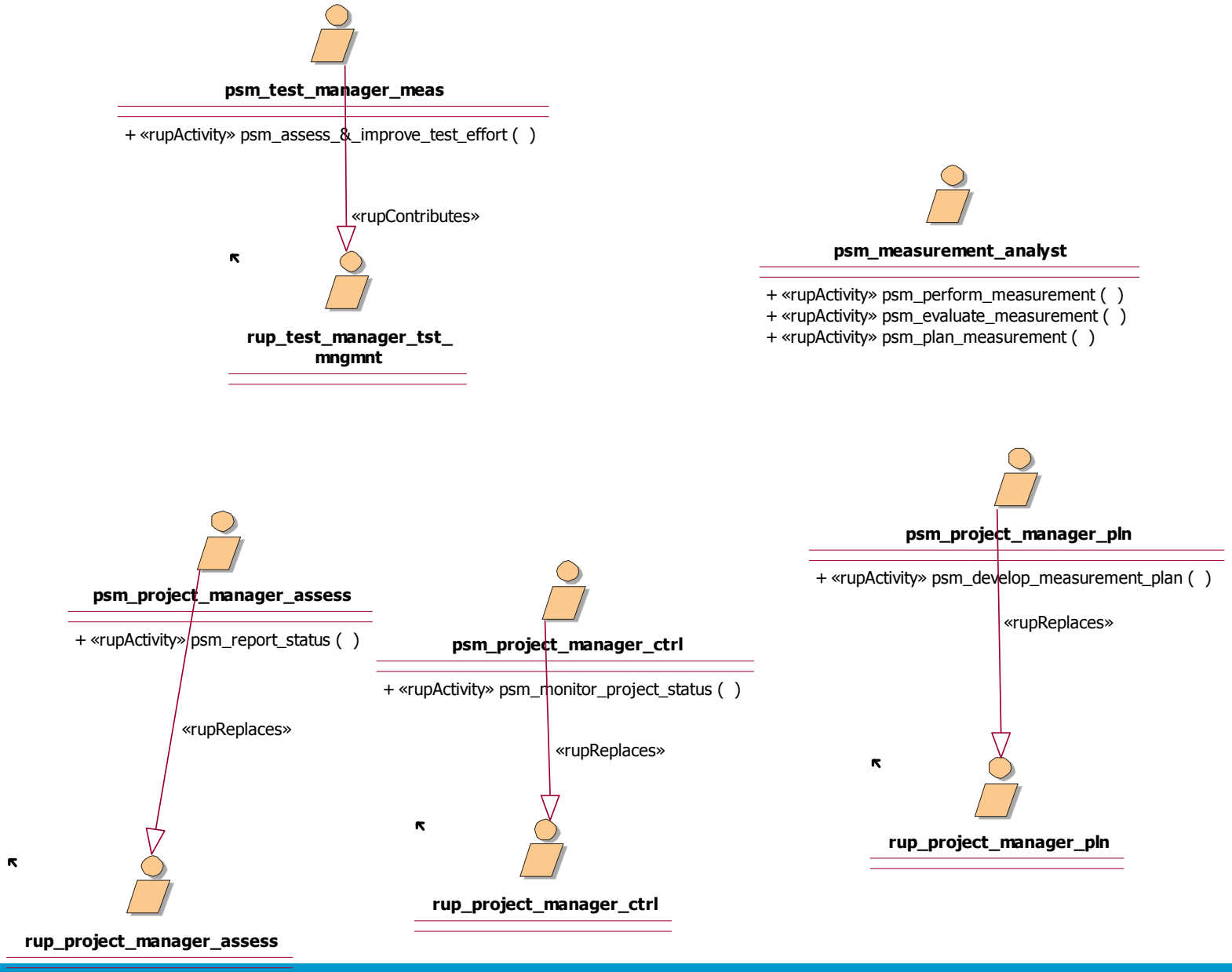
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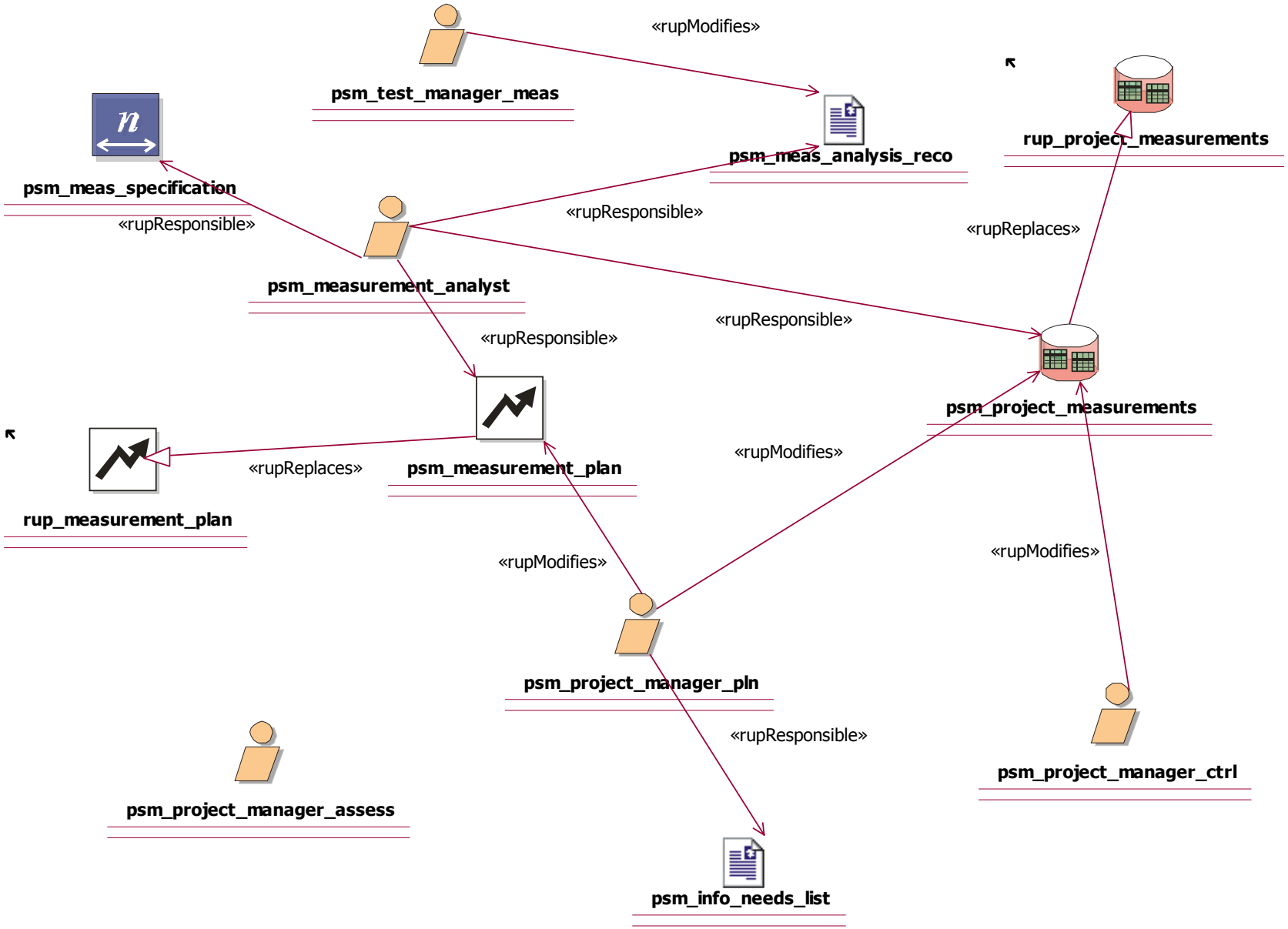
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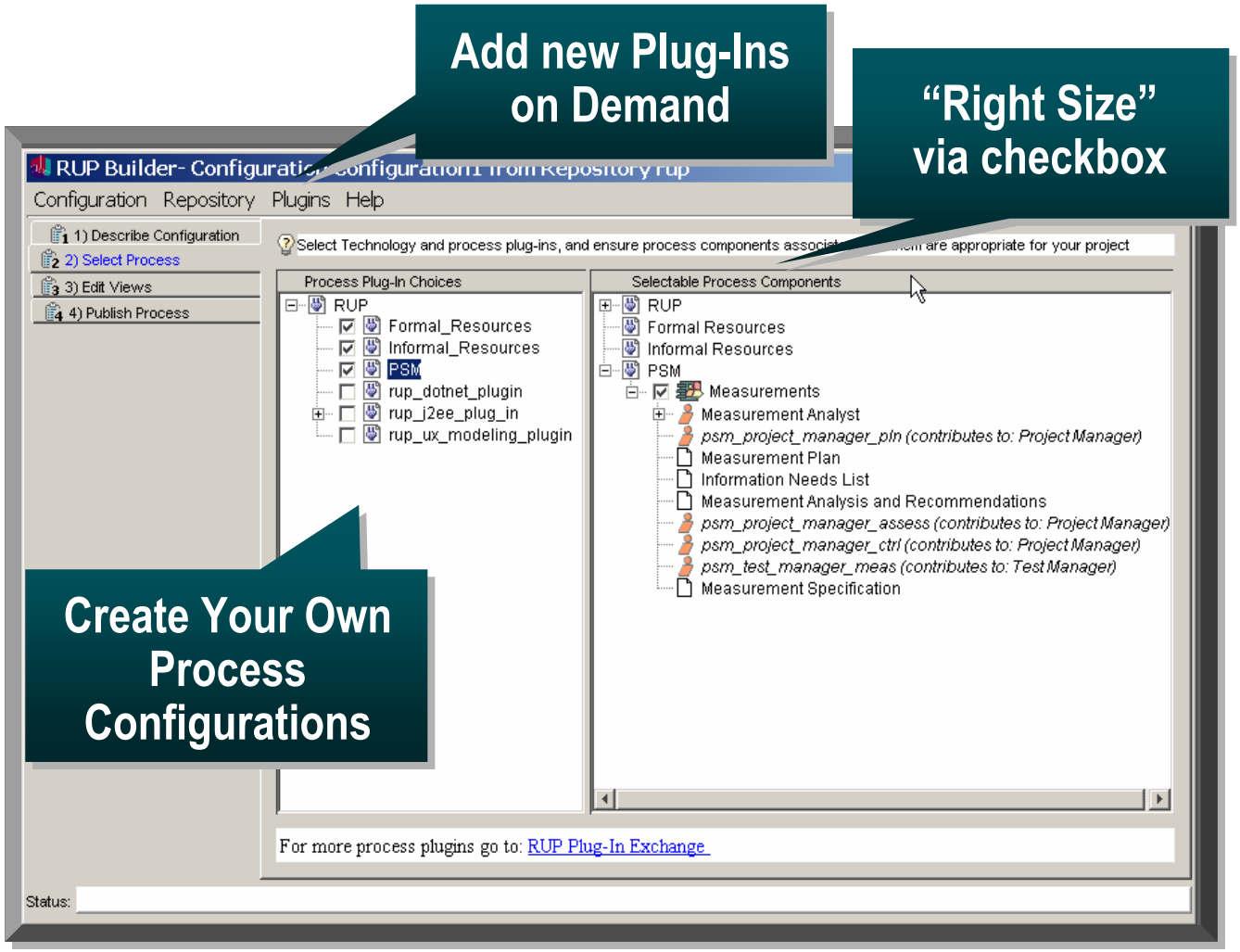
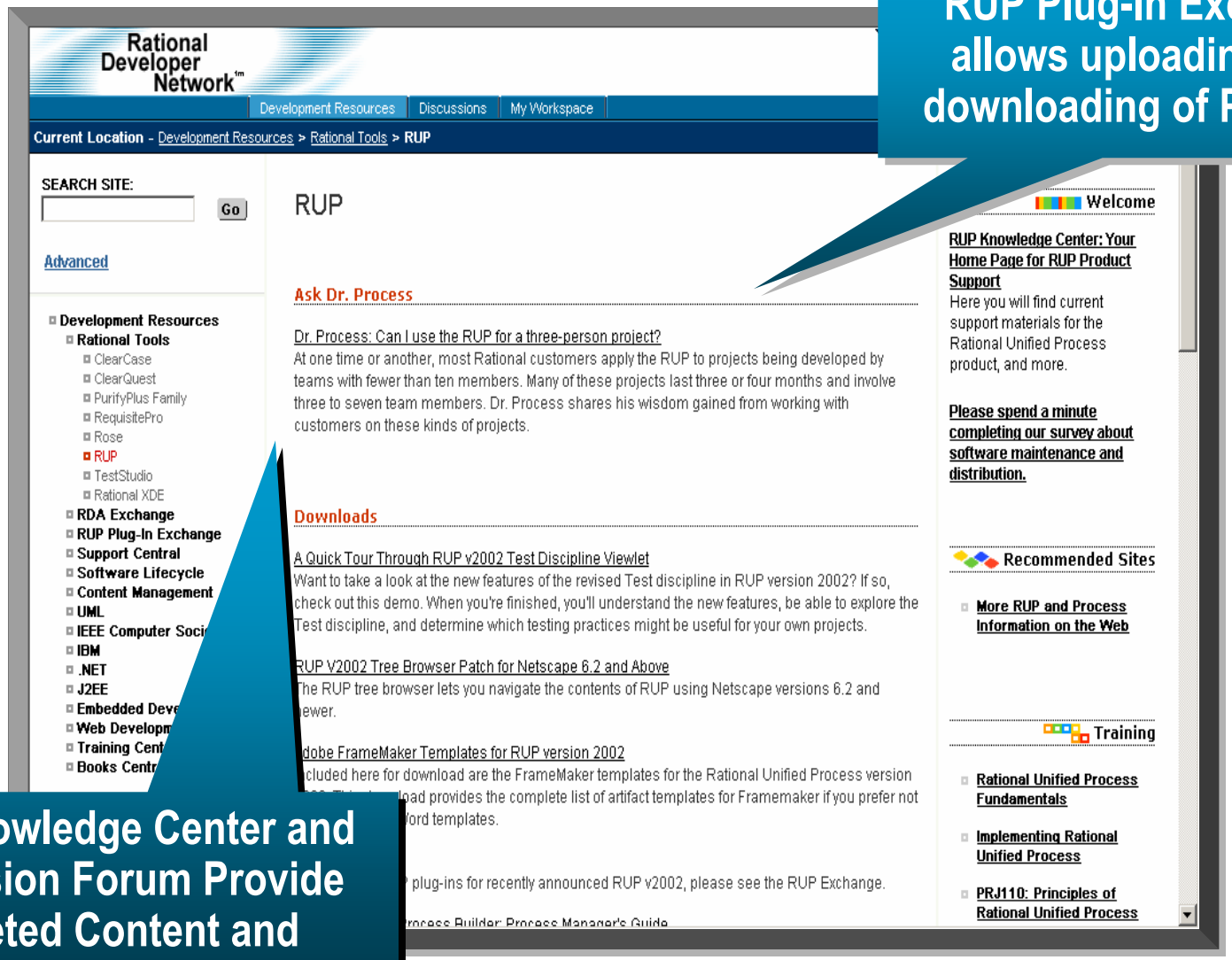
psm_project_manager_ctrl
«rupResponsible»
psm_project_manager_assess
psm_info_needs_list

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



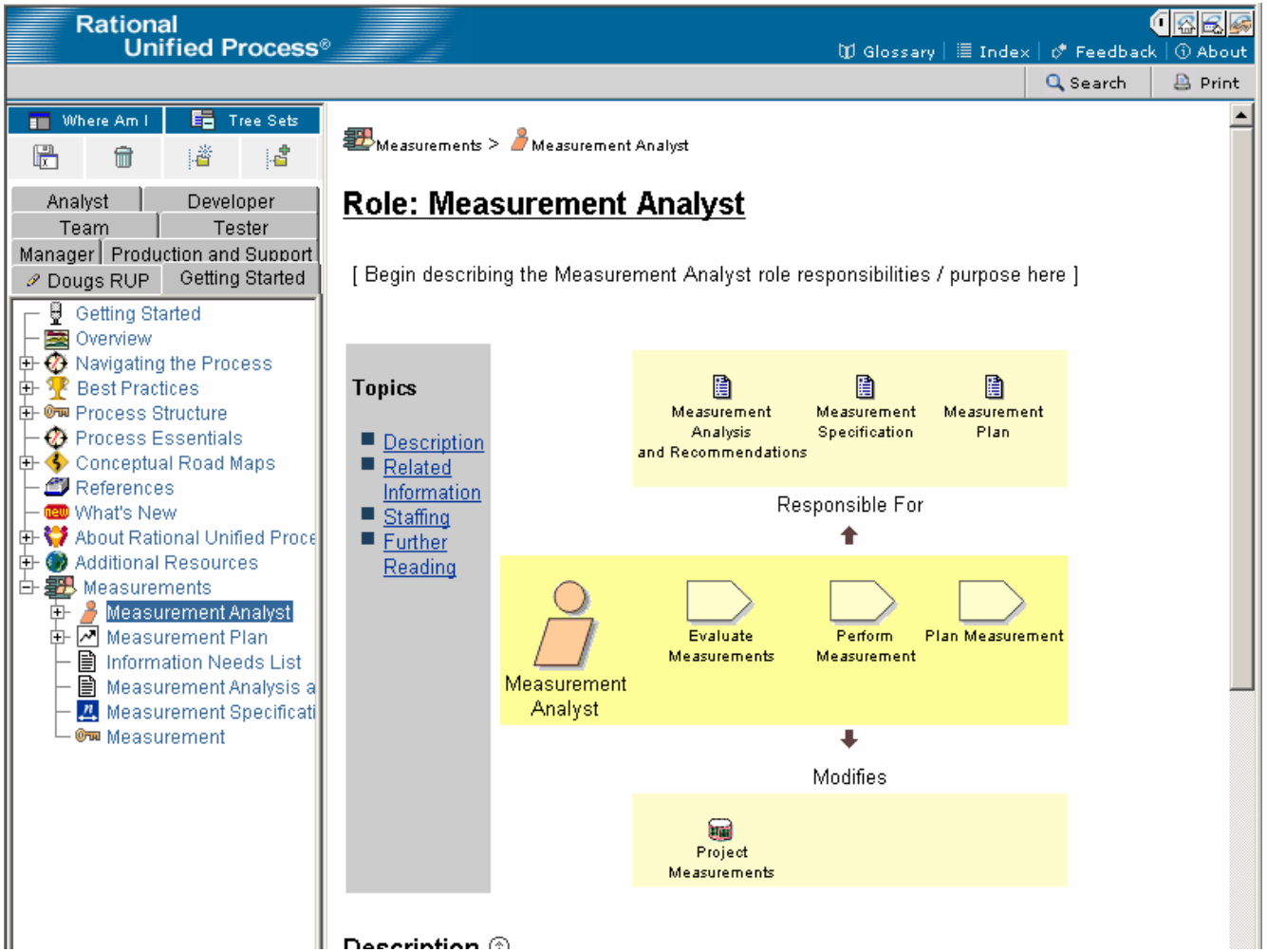
Community/Marketplace: *Rational Develope*



RUP Plug-In Exchange allows uploading and downloading of Plug-Ins

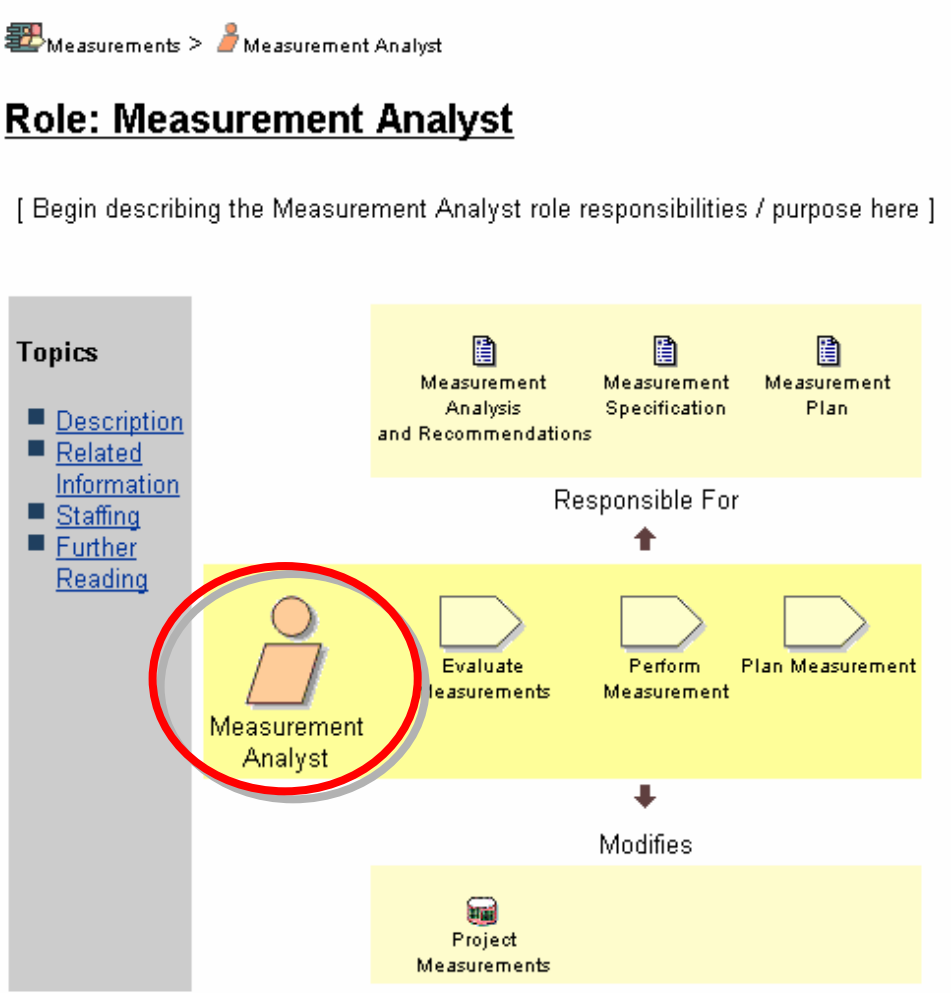
RUP Knowledge Center and Discussion Forum Provide Targeted Content and Community

Additional Role – Measurement Analyst

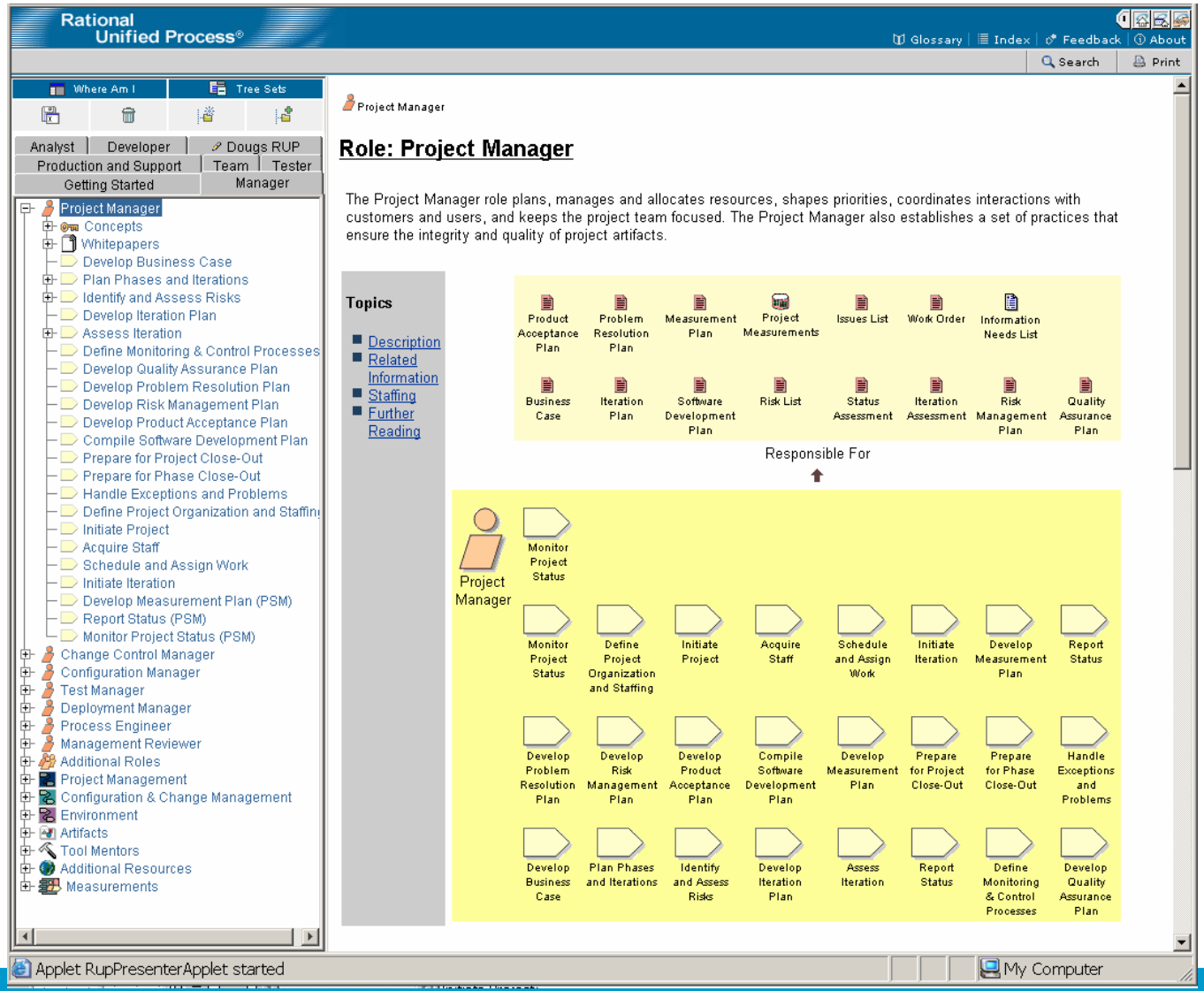


Measurement Analyst Activities

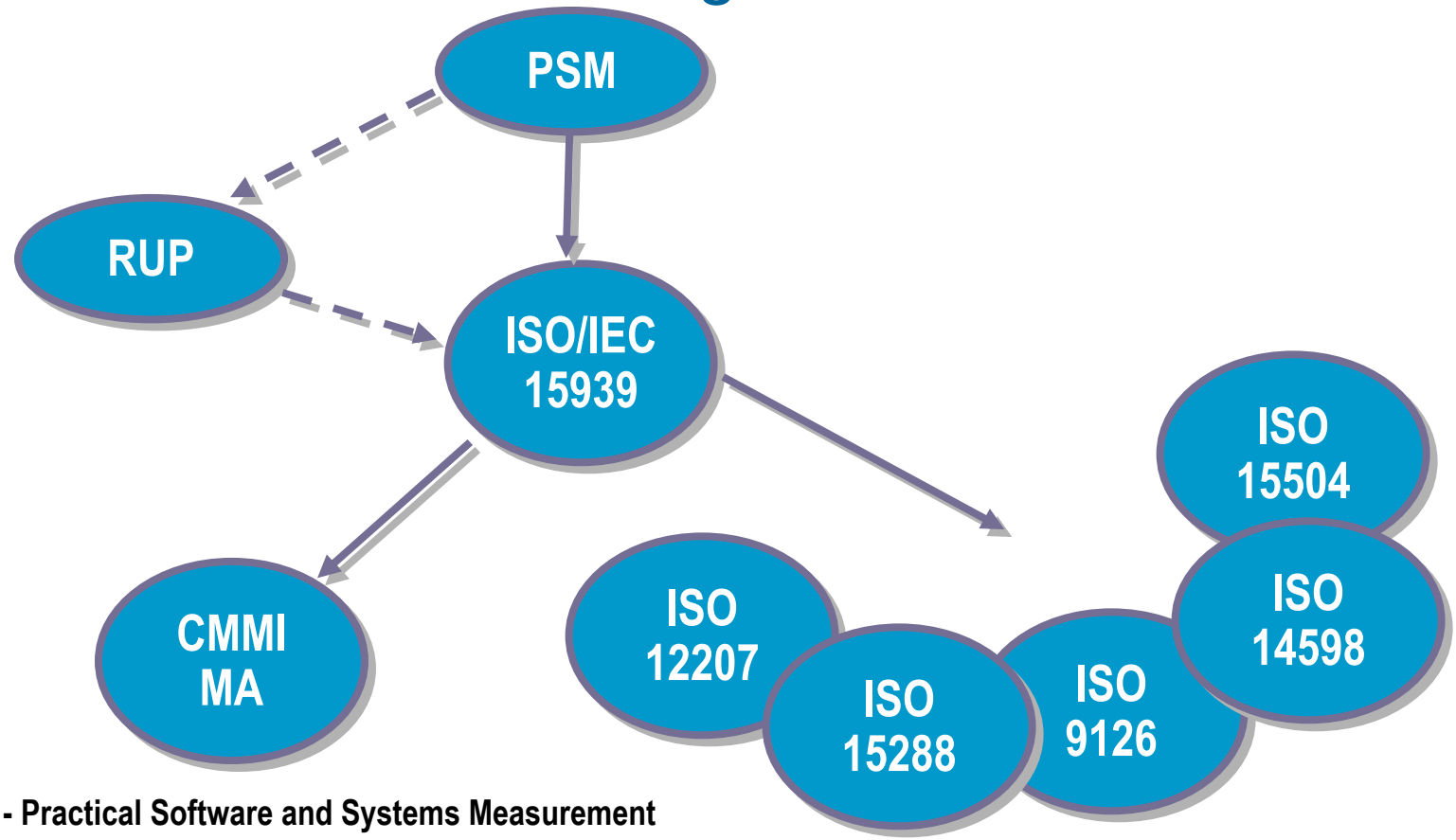
- Plan Measurement
- Perform Measurement
- Evaluate Measurements



Project Manager Discipline



Standards and Methodologies



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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

RUP Phases	PSM Information Categories	
Inception	▶Schedule and Progress ▶Resources and Cost	▶Process Performance
Elaboration	▶Schedule and Progress ▶Resources and Cost ▶Product Size and Stability	▶Product Quality ▶Process Performance ▶Technology Effectiveness
Construction	▶Schedule and Progress ▶Resources and Cost ▶Product Size and Stability ▶Product Quality	▶Process Performance ▶Technology Effectiveness ▶Customer Satisfaction
Transition	▶Schedule and Progress ▶Resources and Cost ▶Product Quality	▶Customer Satisfaction

Information Need May Vary During Lifecycle

- Pre-study/Inception
  - Monitoring requirements
- Feasability/Elaboration
  - Examine architecurally 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

Information Category	Information Category	Prospective Measures
Inception	Schedule and Progress	Task Completion Requirements Status Business Use-Case Model Status Use-Case Model Status Design Model Status
	Resources and Cost	Staff Level, Turnover Earned Value – BCWS, BCWP, ACWP, SPI, CPI, SV, CV
	Process Performance	Requirements-Design Traceability Requirements-Test Case Traceability Model Elements (e.g., Activity, Diagrams)
Elaboration	Schedule and Progress	Task Completion Requirements Status Requirements Tested Use-Case Model Status Design Model Status Units Designed, Coded, Tested Test Cases Attempted, Passed, Failed
	Resources and Cost	Staff Level, Turnover Earned Value – BCWS, BCWP, ACWP, SPI, CPI, SV, CV
	Product Size and Stability	Requirements Lines of Code Function Points Components Interfaces
	Product Quality	Defects
	Process Performance	Requirements/Model Traceability Requirements/Test Case Traceability
	Technology Effectiveness	Requirements Coverage

Information Needs/Sample Measures

Information Category	Information Category	Prospective Measures
Construction	Schedule and Progress	Task Completion Change Requests Opened, Resolved Units Designed, Coded, Tested Test Cases Attempted, Passed, Failed
	Resources and Cost	Staff Level, Turnover Earned Value – BCWS, BCWP, ACWP, SPI, CPI, SV, CV
	Product Size and Stability	Requirements Lines of Code Function Points Components Interfaces
	Product Quality	Defects Age of Defects Cyclomatic Complexity Mean-Time-to-Failure
	Process Performance	Defects Contained Defects Escaping Scrap, Rework Effort Requirements/Model Traceability Requirements/Test Case Traceability Change Request/Test Case Traceability
	Technology Effectiveness	Requirements Coverage
	Customer Satisfaction	Customer Reported Defects
Transition	Schedule and Progress	Task Completion Change Requests Opened, Resolved Test Case Progress
	Resources and Cost	Earned Value – BCWS, BCWP, ACWP, SPI, CPI, SV, CV
	Product Quality	Defects
	Customer Satisfaction	Customer Reported Defects


demo

Next Steps

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

References

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RATIONAL USER CONFERENCE 2003

FROM ideas TO results

QUESTIONS

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FROM ideas TO results

Thank You

Doug Ishigaki, IBM

John Riedener, U.S. Army & PSM

Cheryl Jones, U.S. Army & PSM

Bjorn Gustafsson, IBM