CMMI and IBM Rational Unified Process

A practical route to greater development maturity


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Introduction

CMMI

RUP Overview

Tool Support

Conclusions
Introduction

- Purpose of this presentation
  - Describe a context in which CMMI and RUP can be used together pragmatically
  - Summarise the Rational Unified Process
    - Show how RUP can implement areas of CMMI...
    - ... and CMMI can guide RUP roll-outs
  - Highlight the wide tool support to assist adoption

- Note: Focus mainly on CMMI for Development
Introduction

CMMI

RUP Overview

Tool Support

Conclusions
CMMI: Key Points

- CMMI defines proven approaches in a structure that helps an organization:
  - Appraise its organizational maturity
  - Establish priorities for improvement
  - Implement the improvements

- CMMI is not in itself a process description
  - It describes the characteristics of a good process
    - Based on proven experience
  - It recommends how to assess current processes
    - e.g. SCAMPI
  - Gives guidance on how to increase maturity
CMMI: Addressing Business Goals for Software Development

- Business Goals for Software Development
  - CMMI Assessment as an end in itself
  - Business goals, such as
    - Quality
    - Productivity
    - Time-to-market
    - …….
Business goals can be mapped to CMMI Goals

Examples:

- “There must be an audit trail for changes to all work products”
  - Configuration Management SG 2 Track and Control Changes “Changes to the work products under configuration management are tracked and controlled.”
  - ...
- “Warranty costs need to be reduced”
  - Causal Analysis SG 2 - Address Causes of Defects “Root causes of defects and other problems are systematically addressed to prevent their future occurrence. “
  - Verification SG 1 Prepare for Verification “Preparation for verification is conducted.”
    - SP 1.1 Select Work Products for Verification “Select the work products to be verified and the verification methods that will be used for each.”
  - Verification SG 3 Verify Selected Work Products “Selected work products are verified against their specified requirements.”
    - SP 3.1 Perform Verification ”Perform verification on the selected work products”
    - ....
CMMI: Practices and Work Products

Links from CMMI Goals to Practices and Work Products

- Verification SG 1 Prepare for Verification “Preparation for verification is conducted.”
  - SP 1.1 Select Work Products for Verification “Select the work products to be verified and the verification methods that will be used for each.”

- Verification SG 3 Verify Selected Work Products “Selected work products are verified against their specified requirements.”
  - SP 3.1 Perform Verification “Perform verification on the selected work products”
  - ………
Use CMMI:

- To locate other practices not directly linked to Business goals
- Maturity Levels which create balanced programmes for improvement

... but for we can go further

- How do we do verification? Configuration Management?
Introduction

CMMI

RUP Overview

Tool Support

Conclusions
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History of the Rational Unified Process

Objectory Process
- OMT
- Booch
- UML 1.0

Rational Approach
- Requirements
- Test Process
- UI Design
- Data Engineering
- UML 1.1

1996
- Performance Testing
- Business Modeling
- Configuration and Change Mgt

1997
- Rational Process Workbench
- Major addition of content

1998
- Project Management
- UML 1.3
- RealTime

1999
- Improved Process for independent testing

2000
- Introduction of RUP Platform providing a configurable process framework

2001
- Major addition of tool mentors

2002
- Terminology changes
- Introduction of RUP Base Concepts
- Key Principles for Business-Driven Development
- Delivery processes

2003
- Tree browser upgraded for enhanced capabilities of creating customized My RUP tree

2005
Business-Driven Development: Key Principles

- Adapt the process
- Balance stakeholder priorities
- Collaborate across teams
- Demonstrate value iteratively
- Elevate the level of abstraction
- Focus continuously on quality
RUP: A Risk Driven, A Use-Case Based, Architecture-Centric, Iterative, Configurable Software Development Process
Major Milestones: Business Decision Points

- **Inception**
  - Scope and Business Case agreement

- **Elaboration**
  - Architecture baselined
  - Product sufficiently mature for customers

- **Construction**
  - Initial Operational Capability Milestone

- **Transition**
  - Customer acceptance or end of life

**Time**

- Lifecycle Objective Milestone
- Lifecycle Architecture Milestone
- Product Release
Key RUP Elements: Roles, Activities, Work Products
RUP Example: Test Workflow
RUP Example: Test Strategy Work Product
Support for Many Project Types

Out-of-the-box processes and configurations

- RUP for Small Projects (Small co-located teams)
- RUP for Medium-sized Projects (Distributed teams)
- RUP for Large Projects (Large distributed teams)
- RUP for Service-Oriented Architecture (SOA),
- RUP for COTS / Packaged Application Development
- RUP for Systems Engineering
- RUP for Maintenance
  - RUP for Compliance Management
- RUP for DoD Architecture Framework
- RUP for J2EE
- RUP for .NET
- RUP for User experience
- RUP for Creative Web design
- RUP for Legacy evolution
- RUP for Practical Software and Systems Measurement (PSM)
- RUP for Business Modeling
- RUP for Asset-Based Development
- RUP for Websphere Business Modeler (beta)
Example: MDD Maturity Model

- Model Driven Development/Architecture (OMG)
- MDD Maturity Model produced by EU-funded Modelware project
- 5-level model as per CMMI:
Content for the Enterprise

- **Portfolio Management**
  - Assess portfolios and projects, manage business cases, take continue / discontinue decisions

- **SOA Governance**
  - Addresses issues that, if left unattended, may be inhibitors to gaining the flexibility and time-to-market benefits associated with SOA.

- **Program (Management) Mobilization**
  - Mobilize and plan large to very large program efforts

- **Business Engineering**
  - Model business goals, existing and future business processes and organizational structure.
  - Simulation of business process and link to existing or future software assets.

- **RUP for Systems Engineering**
  - Develop systems that consists of a combination of software, hardware, and people

- **RUP for Asset-Based Development**
  - Asset production, asset consumption and asset portfolio management

- **IBM Tivoli Unified Process (ITUP)**
  - A prescriptive approach to IT Service Management for clients and partners. Details how IT Service Management can be achieved through the use of current management applications and the integration of new process oriented products.
Introduction

CMMI

RUP Overview

Tool Support

- Rational Method Composer
- Rational Portfolio Manager

Conclusions
Your process should fit your business

- Determine business goals
- Map business goals to CMMI goals
- Map CMMI Goals and practices to RUP Roles/Processes/Work Products
- Tailor RUP to your process
- but there process challenges
  - Process is adopted but it never really meets the needs of the individual project
  - Organizations have difficulty changing their process to adopt best practices across an organization
  - Process is difficult to roll out

.... Rational Method Composer
A Better Approach

Standardize representation and manage libraries of reusable Method Content

- Content on agile development
- Content on managing iterative development
- Guidance on serialized java beans

JUnit user guidance

Content on J2EE

Configuration mgmt guidelines

Develop and manage Processes for performing projects

- Lessons learnt from previous project and iteration
- Corporate guidelines on compliance
- Process assets patterns
- Standard or reference processes
- Project plan templates

Configure a cohesive process framework customized for my project needs

Create project plan templates for Enactment of process in the context of my project and Process Advisor for tools
What Is IBM Rational Method Composer (RMC)?

- The next generation of process solution from IBM
  - Includes the entire Rational Unified Process
- Rational Method Composer is a configurable process platform that helps solve development challenges facing:
  - Project Managers
    - Adapt the process to the unique needs of your project
    - Templates for project management tools such as Rational Portfolio Manager
  - Practitioners
    - Get the guidance to get the job done.
    - Personalize the process to address the specific development challenges, technologies and tools you face.
Tool support: Rational Method Composer

<table>
<thead>
<tr>
<th>New commercial process product that supports business-driven development</th>
<th>Includes all Rational Unified Process content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support a broad set of project types</td>
<td>Small, Medium-sized, and Large Projects (Classic RUP)</td>
</tr>
<tr>
<td></td>
<td>Service-Oriented Architecture (SOA), COTS / Packaged Application Development, Maintenance</td>
</tr>
<tr>
<td>Addresses enterprise needs</td>
<td>Project, Program, and Portfolio Management</td>
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<tr>
<td></td>
<td>SOA Governance, Business, Process, and Systems Engineering, Asset-Based Development, IT Service Management</td>
</tr>
<tr>
<td>New easy-to-use form-based tools for authoring, configuring, and viewing the process</td>
<td>Integrates with Rational Portfolio Manager and Microsoft Project for process execution</td>
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</tbody>
</table>
Eclipse Process Framework (EPF) Project

An open source process framework that can serve as a foundation for an evolving software development process ecosystem

Provides tooling, a unified metamodel, and content that can be used as the foundation for a large variety of processes to address IT needs

Uses the Eclipse community to gain wide acceptance of the framework

Rational Method Composer is built on top of EPF
What Is the Open Unified Process (OpenUP)

A process framework united by a set of core principles

- Application of an **iterative lifecycle** that mitigates risk early and often, and shows results early and often (**evolve**)
- Focus on the **collaboration** within a development team including the product stakeholders to maximize results (**collaborate**)
- Management of **requirements** in a form that represents stakeholder value and drives the development process (**balance**)
- Cognizance of **architecture** as a means to increase quality and technical understandability (**focus**)

OpenUP consists of

- A base process - OpenUP/Basic
- Extensions to this base process, such as MDA content
### Executive Overview

**CMMI-2/3 (staged) Process Areas in relation to the RUP and IBM Rational Tools**

<table>
<thead>
<tr>
<th>CMMI (staged) Process Area</th>
<th>Rational Unified Process (RUP)</th>
<th>Rational Tool Automation</th>
<th>Most Applicable IBM Rational Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>REQM Requirements Management</td>
<td></td>
<td></td>
<td>RUP, ReqPro, RSA/RSM</td>
</tr>
<tr>
<td>PP Project Planning</td>
<td></td>
<td></td>
<td>RUP, RPM, ReqPro, SoDA, ClearQuest</td>
</tr>
<tr>
<td>SAM Supplier Agreement</td>
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<td></td>
<td>RUP, COTS Plug-in, ReqPro, CQ, TestMgr</td>
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<tr>
<td>CM Configuration Management</td>
<td></td>
<td></td>
<td>RUP, ClearCase, ClearQuest, UCM</td>
</tr>
<tr>
<td>PMC Project Monitoring and Control</td>
<td></td>
<td></td>
<td>RUP, RPM, ProjectConsole, CQ, TestMgr</td>
</tr>
<tr>
<td>PPQA Process/Product QA</td>
<td></td>
<td></td>
<td>RUP, ClearQuest, ReqPro</td>
</tr>
<tr>
<td>MA Measurement/Analysis</td>
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<td></td>
<td>RUP, ProjectConsole, CQ, ReqPro</td>
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<tr>
<td>VER Verification</td>
<td></td>
<td></td>
<td>RUP, Purify, TestManager, ReqPro</td>
</tr>
<tr>
<td>OPF Organizational Process Focus</td>
<td></td>
<td></td>
<td>RUP, RUP Builder, ClearQuest, ReqPro</td>
</tr>
<tr>
<td>OPD Organizational Process Definition</td>
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<td></td>
<td>RUP, RUP Builder/Modeler, ProjectConsole</td>
</tr>
<tr>
<td>OT Organizational Training</td>
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<td></td>
<td>RUP, Rational University, Req Pro, CQ, PJC</td>
</tr>
<tr>
<td>IPM Integrated Project Management</td>
<td></td>
<td></td>
<td>RUP, ReqPro, ClearCase/Quest, ProjCon</td>
</tr>
<tr>
<td>IT Integrated Teaming</td>
<td></td>
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<td>RUP, ReqPro, ClearCase/Quest, ProjCon</td>
</tr>
<tr>
<td>RD Requirements Development</td>
<td></td>
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<td>RUP, Use Cases, ReqPro, RSM</td>
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<tr>
<td>TS Technical Solution</td>
<td></td>
<td></td>
<td>RUP, RSA/RAD, ClearCase</td>
</tr>
<tr>
<td>PI Product Integration</td>
<td></td>
<td></td>
<td>RUP, RSA/RAD, ClearCase, ClearQuest</td>
</tr>
<tr>
<td>VAL Validation</td>
<td></td>
<td></td>
<td>RUP, ReqPro, ClearQuest, TestManager</td>
</tr>
<tr>
<td>DAR Decision Analysis and Resolution</td>
<td></td>
<td></td>
<td>RUP, ReqPro, ClearQuest</td>
</tr>
<tr>
<td>RSKM Risk Management</td>
<td></td>
<td></td>
<td>RUP, ClearQuest, ReqPro, SoDA</td>
</tr>
<tr>
<td>OEI Org Environment for Integration</td>
<td></td>
<td></td>
<td>RUP, ReqPro, ClearCase/Quest, ProjCon</td>
</tr>
</tbody>
</table>

- **Fully realized by implementing Rational RUP/Tools**
- **Mostly supported, additional technologies may be necessary**
- **Limited applicability by Rational RUP/Tools**
- **Process Area not supported directly by Rational technology**

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**CMMI Maturity Level**

- **INITIAL (1)**: Process unpredictable, Poorly controlled, reactive
- **QUALITATIVE MANAGED (2)**: Process characterized For projects, often reactive
- **DEFINED (3)**: Process characterized For organization, is proactive
- **QUANTITATIVELY MANAGED (4)**: Process measured and controlled
- **OPTIMIZING (5)**: Focus on process improvement

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Tool Support: Project Portfolio Management
Support for CMMI: Project Planning, Project Monitoring and Control, Quantitative Project Management,

- Key Capabilities
  - Integrations with:
    - Rational Method Composer
    - Rational ClearQuest
    - Rational ProjectConsole
  - Portfolio analytics
    - Financial, schedule, resource and quality trends.
Rational Portfolio Management
Focus on providing Business Value
RPM Screenshots: Portfolio WBS
RPM Screenshots: Portfolio Monitoring
Introduction

CMMI

RUP Overview

Tool Support

Conclusions
CMMI and RUP

- CMMI helps:
  - Get from business goals to proven practices
  - Focuses attention on key areas
  - Gives a basis for assessment and improvement

- The Rational Unified Process:
  - Maps to many CMMI Process Areas
  - Gives details of roles, activities, work products to support many areas of development

- Rational tools:
  - Allow processes to be tailored and published to the Web, Project Management tools as project templates, and development tools and Process Advisors
  - Support a wide range of process areas
More information

- Leveraging RUP and CMMI for Real-World Successes
- RUP and Rational Method Composer
- Portfolio management: Overview of new IBM Rational methods
- Rational Portfolio Manager