



**MKS**

# **Incorporate CMMI with Corporate Governance Using Enterprise Software Change Management Solutions**

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MKS Software Inc.

*4<sup>th</sup> Annual CMMI Technology Conference, Denver CO*

## **Before We Get Started...**

- 15 years in process engineering and configuration management
  - Helped create in-house CM system at GE Information Services
  - Helped move GEIS to level 2 CMM
  - Led global CMM Process Improvement effort at Ford Motor Company
  - 3 years developing and directing an enterprise configuration management practice for a national consulting organization
  - Frequent speaker on SCM and process improvement, including 2004 ACDM conference and 2003 & 2002 National SEPG conferences
  - Reviewer / Contributor for SPIBOK (Software Process Improvement Book of Knowledge)
-

## **Agenda**

- Current Governance Climate
  - Relationship Between Governance and Process Improvement Frameworks
  - How CMMI Compliments IT Control Objectives
  - Sarbanes-Oxley Requirements & IT Control Objectives
  - The Role of Enterprise Software Change Management in Supporting CMMI & IT Control Objectives
  - Summary
  - Q & A
-

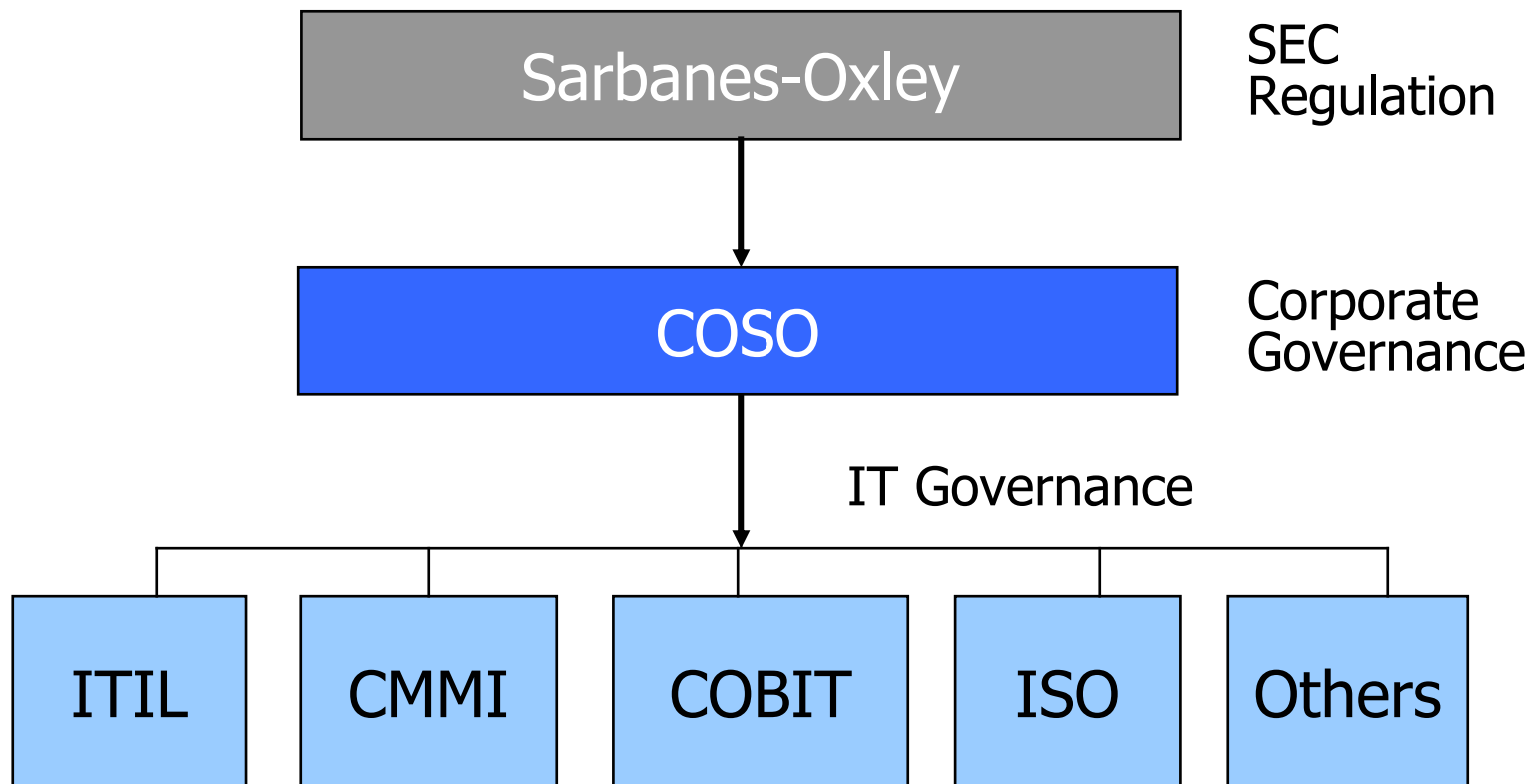
## **Current Governance Climate**

- 93% of business leaders recognize that IT is important for delivering business strategy
- 93% of organizations suffer some sort of IT operational problems
- 40% cite inadequate performance/risk management
- 80% recognize that better governance, if even through a partial solution, is needed

**IT Governance Global Status Report, IT Governance Institute and  
PriceWaterHouseCoopers, 2004, ISBN 1-893209-32-6**

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# Governance Frameworks, Models and Regulations



## **Governance Frameworks, Models and Regulations**

- Overlap exists between quality frameworks, however, in most cases they do not conflict
- For example, IBM uses ISO 9000, CMM, ITIL, Six Sigma and homegrown quality programs simultaneously

**"Quality Model Mania", Computerworld, Gary H. Anthes, March 8, 2004**

**<http://www.computerworld.com/printthis/2004/0,4814,90797,00.html>**

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# Governance Frameworks, Models and Regulations – CobiT (Control Objectives for Information Technology)

- Strengths:
  - Good checklist for IT - enables IT to address risks not explicitly addressed by other frameworks and to pass audits
  - Can work well with other quality frameworks
- Limitations:
  - Says what to do but not how to do it
  - Does not deal directly with software development or IT services
  - Does not provide a roadmap for continuous improvement
- ***Therefore...***

"Quality Model Mania", Computerworld, Gary H. Anthes, March 8, 2004  
<http://www.computerworld.com/printthis/2004/0,4814,90797,00.html>

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# Governance Frameworks, Models and Regulations – CMMI

- ***Therefore...*** CMMI is the perfect complement to CobiT
- CobiT pinpoints the need for certain controls and CMMI puts them into place
- Auditors questions can often be satisfied by pointing to aspects of CMMI
  - CMMI is very detailed and geared mostly to software development
  - Focuses on continuous improvement
  - Can be used for self-assessment

"Quality Model Mania", Computerworld, Gary H. Anthes, March 8, 2004  
<http://www.computerworld.com/printthis/2004/0,4814,90797,00.html>



## **Sarbanes-Oxley Requirements**

- Report to shareholders that the financial results are accurate
  - Establish and document internal controls over processes and systems that produce financial statements
  - Prove to auditors that the controls are in place and working as designed
  - Report to shareholders that the above is the case
-

## **10 Threats to Sarbanes-Oxley Compliance**

1. Lack of an enterprise-wide, executive-driven internal control management program
2. Lack of a formal enterprise risk management program
3. Inadequate controls associated with the recording of non-routine, complex, and unusual transactions
4. Ineffectively controlled post-merger integration
5. Lack of effective controls over the IT environment
6. Ineffective financial reporting and disclosure preparation process
7. Lack of formal controls over the financial closing processes
8. Lack of current, consistent, complete and documented accounting policies and procedures
9. Inability to evaluate and test controls over outsourced processes
10. Inadequate board and audit committee understanding of risk and control

\* According to Deloitte – “10 Threats to Sarbanes-Oxley Compliance”

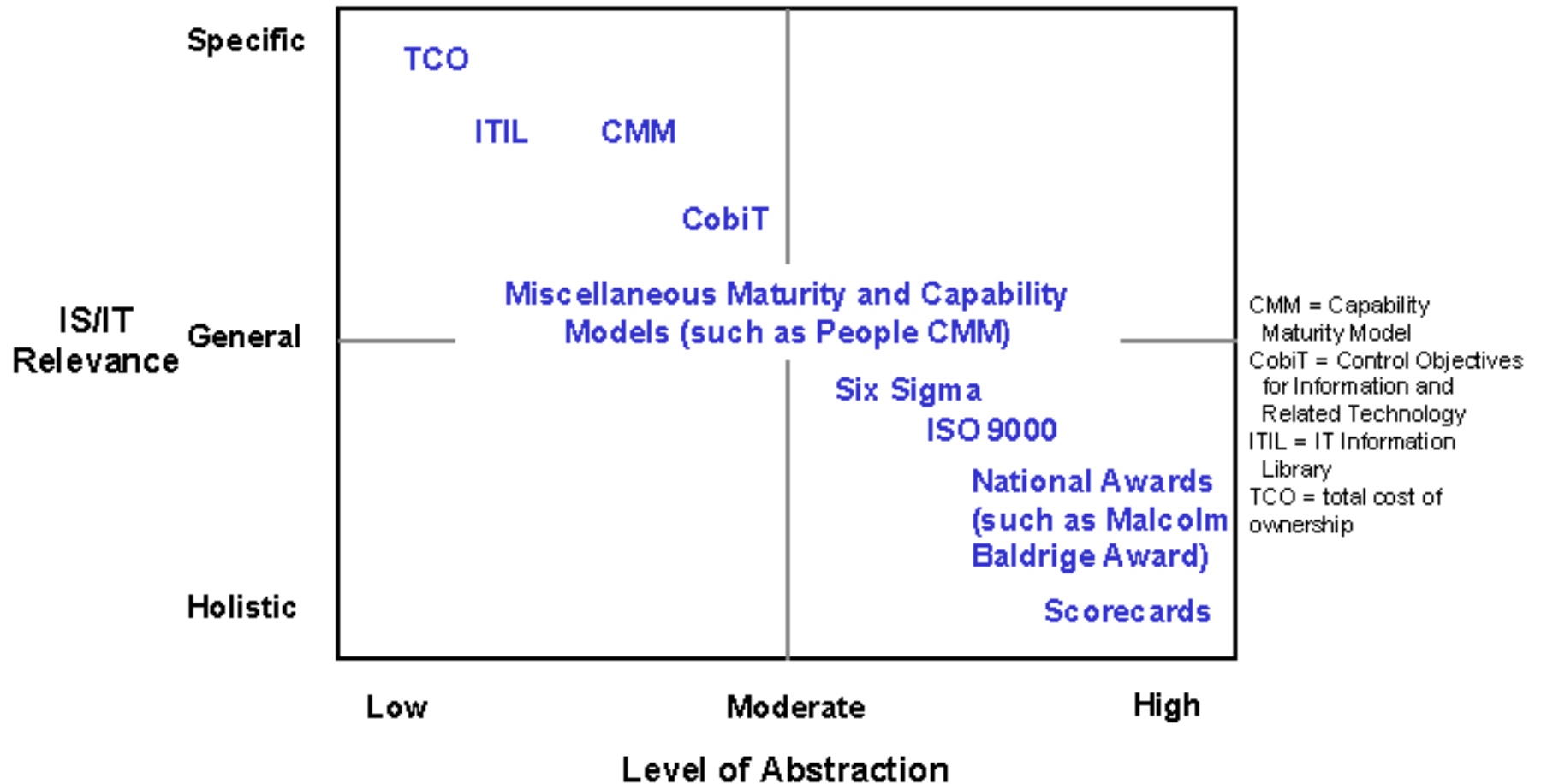
## **12 Key IT Control Objectives**

1. Complete secure versioning & audit history of software, process, policy, and processes change
  2. Developing a formal systems development methodology
  3. Requirements management with user and IT approvals
  4. Maintenance and versioning of project documentation
    - Systems requirement definition
  5. System acquisition and change approach addressing:
    - Security risks
    - Data conversion
  6. Ensuring separation of development from production activities
-

## **12 Key IT Control Objectives**

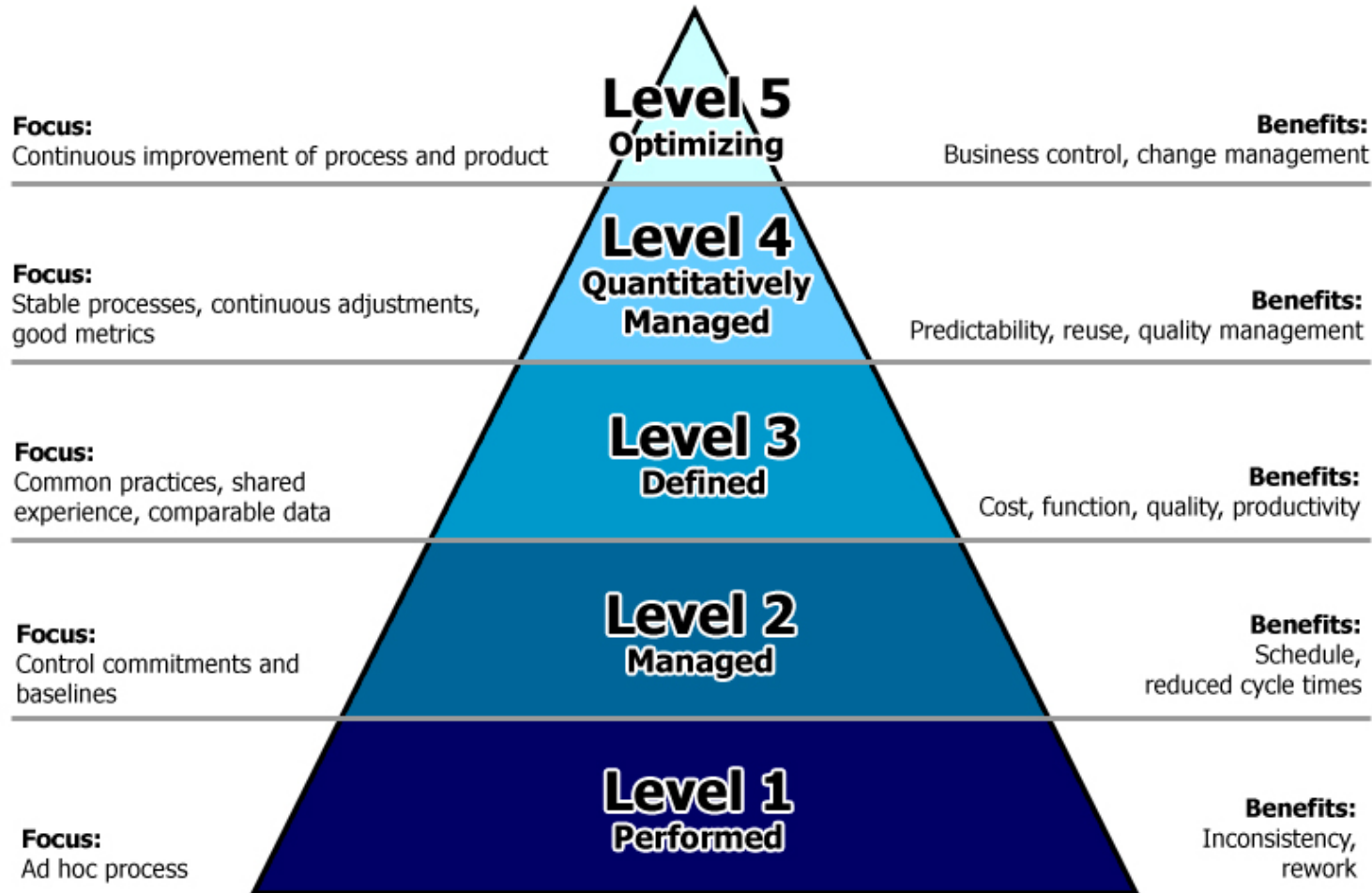
7. Process modeling and automation
  8. Rigorous testing including user cases
  9. Control over movement of applications by development personnel from test to production
    - Automated approval process ensuring management review and approval of IT solutions prior to implementation
  10. Post implementation review process for system modifications made in an emergency
  11. Enforcement of formal policies and procedures that define system security
  12. User account security parameters are in place and enforced
-

# Process Model Selection Framework



Source: Gartner Inc., Stamford, Conn.

# Benefits of CMMI & Process Maturity

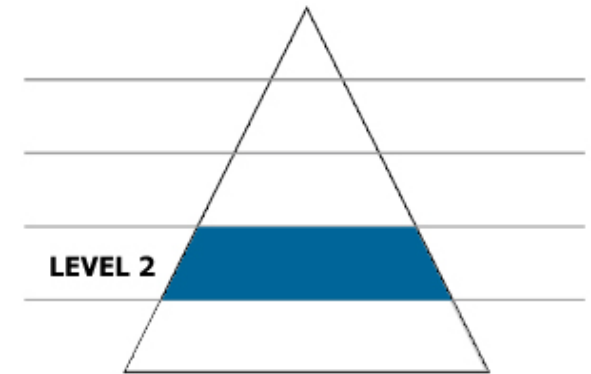


- Source: "IT Trends in Enterprise Software Development", Gartner Consulting

# CMMI Compliments IT Control Objectives

## ■ **Level 2 KPA's**

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



# CMMI Compliments IT Control Objectives

- **Level 3 KPA's**
  - Requirements Development
  - Technical Solution
  - Product Integration
  - Verification
  - Validation
  - Organizational Process Focus
  - Organizational Training
  - Integrated Project Management
  - Risk Management
  - Integrated Supplier Management
  - Decision Analysis and Resolution





## CMMI Compliments Control Objectives

- The following control objectives map most closely to level 2 & 3 KPAs:
    - ✓ Complete secure versioning & audit history of software, process, policy, and processes change
    - ✓ Developing a formal systems development methodology
    - ✓ Requirements management with user and IT approvals
    - ✓ Maintenance and versioning of project documentation
      - Systems requirement definition
    - ✓ Ensuring separation of development from production activities
    - ✓ Post implementation review process for system modifications made in an emergency
-

## **The Role of Enterprise SCM in Supporting CMMI & IT Control Objectives**

- Enterprise SCM not only supports the CMMI KPA's that map closely to CobiT but also supports these IT control objectives:
    - ✓ Process modeling and automation
    - ✓ Control over movement of applications by development personnel from test to production
      - Automated approval process ensuring management review and approval of IT solutions prior to implementation
-

## **The Role of Enterprise SCM in Supporting CMMI & IT Control Objectives**

- Requirements Management as an extension of core SCM functionality – continuous flow through lifecycle
  - Enforces and automates variety of processes – relaxed through to rigid
  - Automated audit trail for all change
  - Ensures releases and configurations are repeatable, secure and protected
  - Ensures only planned software change is deployed to production
  - Enables quick recovery of a system should errors be introduced
-

## Requirements Traceability & Visibility

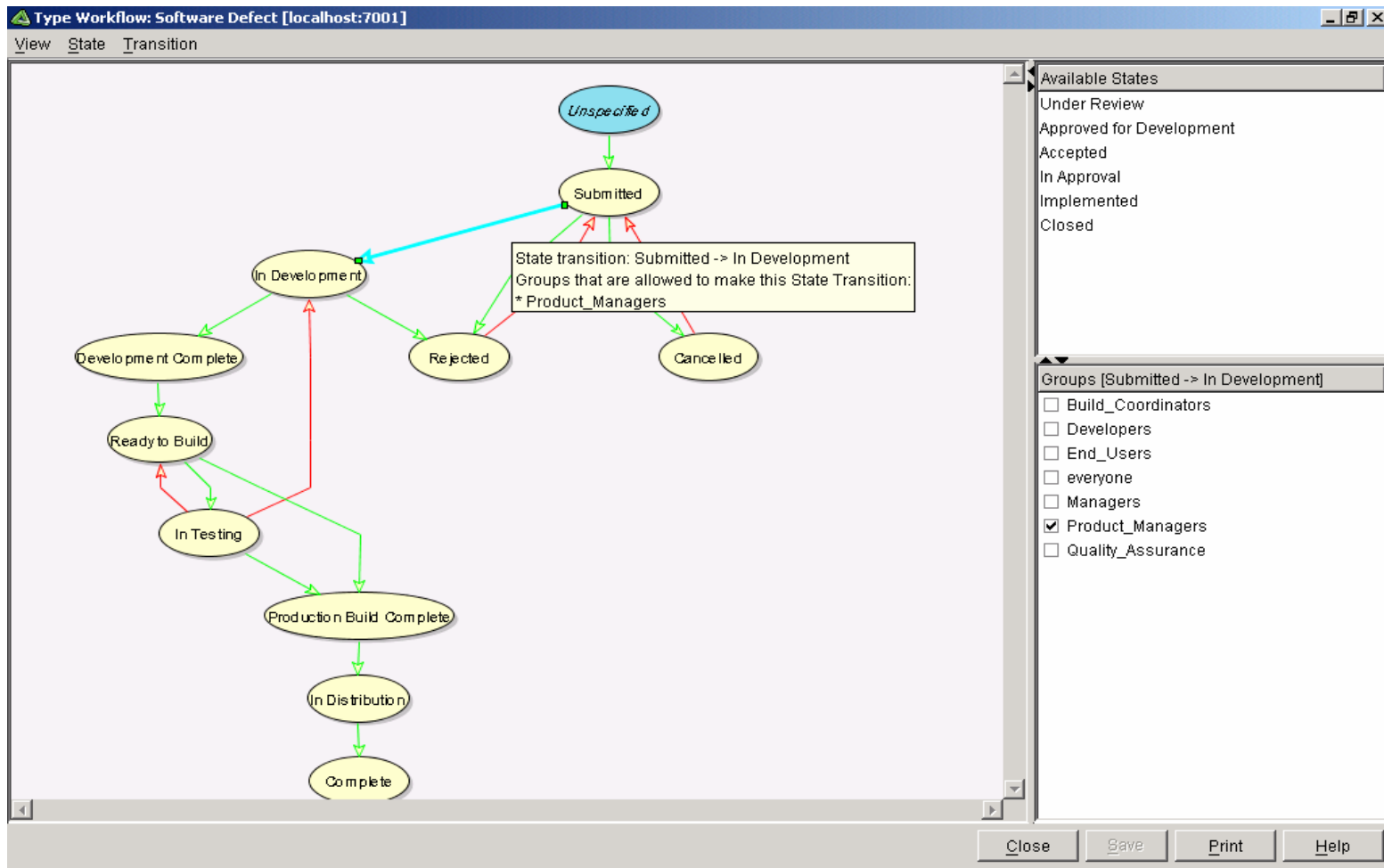
The screenshot displays the MKS Requirements 2005 ViewSet interface, which is part of the MKS Integrity Suite 2005. The interface is divided into several panes:

- Issues [Query: All Projects]:** A table listing project issues. The visible data is as follows:
 

| ID | Type    | Summary           | Iteratic |
|----|---------|-------------------|----------|
| 67 | Project | Amortization 2005 | Iteratic |
| 16 | Project | Forms 2005        | Iteratic |
| 9  | Project | Savings 2005      | Iteratic |
- Relationships View - Filtered Fields [Forward Relationships, Backward Relationships]:** A tree view showing the relationships between requirements. The selected requirement (ID 58) is expanded to show its relationships:
  - Consists of:
    - 10 User Requirement: Increase sale of add-on product
    - 12 Feature: Add Future Values Section
    - 25 User Requirement: All materials seen by customers
    - 27 Feature: Graphics must follow corporate s
    - 45 User Requirement: Savings calculator needs to be e
    - 46 Feature: Make future value a separate se
    - 57 User Requirement: Savings tool needs documentati
    - 58 User Requirement: Data should be collected in multi**
    - 59 Feature: Convert savings calculator into r
    - 62 Feature: Add usage instruction to panels
  - Impacts:
    - 16 Project: Forms 2005
  - Impacted by:
    - 17 User Requirement: Protect intellectual property from
    - 19 Feature: Display copyright on all forms
    - 37 User Requirement: Document control information m
    - 39 Feature: Display issue date and version n
    - 51 User Requirement: Implement government privacy I
    - 53 Feature: Accept signature on privacy agr
    - 74 User Requirement: Forms must support new langua
- Issue View - User Requirement: 58:** A detailed view of the selected requirement. It includes:
  - User Requirement: 58**
  - Created by [Analyst \(analyst\)](#) on
  - Modified by [Administrator \(administrator\)](#) on
  - User Requirement** (ABC Financial logo)
  - Fields | History | Relationships | Attachments
  - Overview:**
    - Summary:** Data should be collected in multiple guided steps
    - Level:** Top
    - Category:** Standard
  - Status:**
    - Project:** /ABC Tools/Savings
    - Assigned User:** [Manager \(manager\)](#)
    - State:** Revise
    - Priority:** High
    - Risk:** Medium
    - Version:** 1.1
  - Details:** (Collapsible section)

The Windows taskbar at the bottom shows the Start button, system tray icons, and the time 3:53 PM.

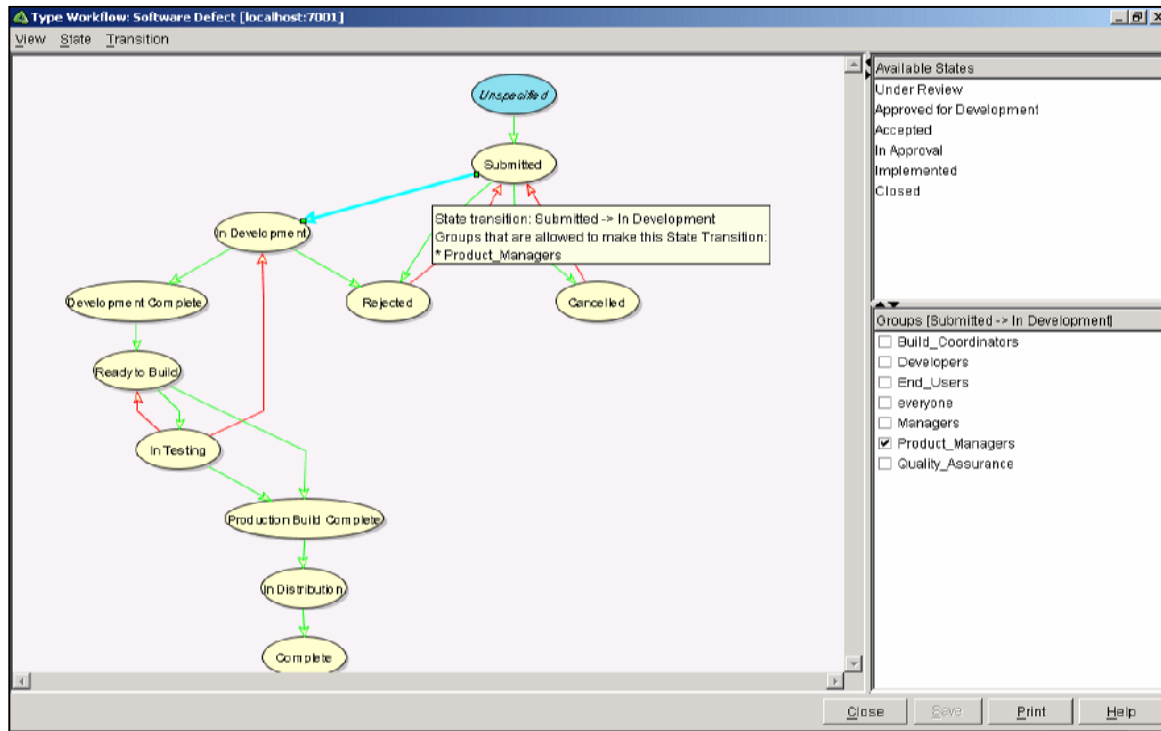
## Enforce Development Lifecycle Methodology - Model & Automate A Variety of Processes



## **The Role of Enterprise SCM in Supporting CMMI & IT Control Objectives**

- Management visibility across the global IT organization – concise reports & metrics
  - Provides for analytical quality measures – measures progress and activities over time
  - Granular security model – permissions defined at the user, role and project levels
  - Ensures outsourcers work on only the critical project at hand & that access to source code and intellectual property is secured at the individual, file, project levels
-

## Process and Change Management



- Define and enforce unique processes
- Requirements management
- Issue tracking
- Approvals, notifications, to-dos, escalation
- Metadata collection
- Reporting

- Flexible processes
- Understands about artifacts
- Delivers visibility

- Automates workflow
- Enforces review cycles
- Automated audit trail

## Procedures Under Version Control

Check List: Project Plan - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address C:\temp\Checklist\_Project\_Plan.htm

|   |   |   |   |     |                            |     |
|---|---|---|---|-----|----------------------------|-----|
| 4 | Master project schedule exists, identifying Development, QA, and Documentation activities for all committed features and milestone dates. | Provide all schedules to Project Manager.                           | Development, QA, Documentation                          | YES |                            | YES |
|   |   | Create integrated project schedule and post it on the project page. | Project Manager   | NO  | See <a href="#">Note C</a> |     |
| 5 | Risks have been identified and mitigation strategies developed.   | Identify risks and mitigations.                                     | Development, QA, Docs                                   | YES |                            | YES |
|   |   | Produce risk mitigation plan.                                       | Project Manager   | YES |                            |     |
|   |   | Approve risk mitigation plan.                                       | Development, QA, Documentation, VP R&D, Project Manager | YES |                            |     |
| 6 | A tracking mechanism using issue trends exists to monitor project status.   | Issue trend charts accessible via project page.                     | Project Manager   | Yes |                            | YES |
|   |   | QA defect analysis in place and accessible                          | Project Manager, QA                                     | Yes |                            |     |

| Evaluation Team      | We Hereby Agree to Proceed |                             |               |
|----------------------|----------------------------|-----------------------------|---------------|
|                      | Name                       | Title                       | Date          |
| Product Management   | Colin Doyle                | Product Manager, SI         | July 25, 2003 |
| Development          | Jeff Smith                 | V.P. R&D                    | July 24, 2003 |
| Project Management   | Blair Ernest               | Project Manager             | July 24, 2003 |
| QA                   | Phil Ruby                  | Director- Quality Assurance | July 25/03    |
| Documentation        | Russ E. Brown              | Mgr Documentation           | July 24, 2003 |
| Global Customer Care | Not Applicable             |                             |               |

**Page Revision Information**

\$Author: cdoyle \$  
 \$Date: 2003/07/29 14:02:59 EDT \$  
 \$Source: mks44/Checklist\_Project\_Plan.htm \$  
 \$Revision: 1.12 \$

Done My Computer



# Provide for Independent Audit – Complete Audit Trail for Change

**Feature: 100003**  
 Created by Rob Butter (devrb) on Apr 13, 2004 6:10:19 PM  
 Modified by Rob Butter (devrb) on Apr 13, 2004 6:24:51 PM

Fields History Relationships Attachments  Change Packages

**Modified by Rob Butter (devrb) on Apr 13, 2004 6:10:19 PM**

| Modified Fields | New Value                    |
|-----------------|------------------------------|
| Summary         | Add impact analysis to model |
| State           | Submit                       |
| Project         | /ABC Tools                   |
| Description     | Iseries add impact analysys  |

**Modified by Rob Butter (devrb) on Apr 13, 2004 6:10:47 PM**

| Modified Fields | New Value          |
|-----------------|--------------------|
| Assigned User   | Rob Butter (devrb) |

**Modified by Rob Butter (devrb) on Apr 13, 2004 6:12:19 PM**

| Modified Fields       | New Value                     |
|-----------------------|-------------------------------|
| State                 | In Development                |
| Priority              | Medium                        |
| Planned Release       | PDM 1.0                       |
| Development Type      | Strategic                     |
| Release Type          | Full                          |
| Classification        | New Capability                |
| Release Planning      | R1                            |
| Feature Specification | <a href="http://">http://</a> |

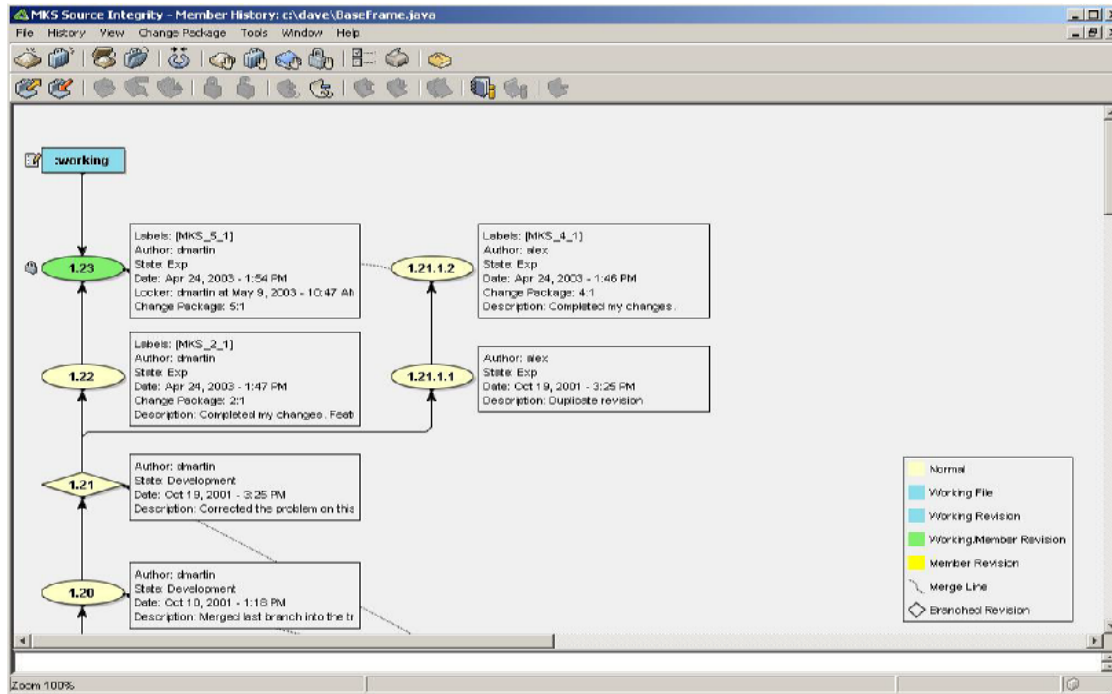
**Modified by Rob Butter (devrb) on Apr 13, 2004 6:17:09 PM**

| Modified Fields | New Value |
|-----------------|-----------|
| State           | QA        |

**Modified by Rob Butter (devrb) on Apr 13, 2004 6:18:28 PM**

| Modified Fields | New Value |
|-----------------|-----------|
|-----------------|-----------|

# Software Configuration Management



- Visual diff/merge
- Parallel development
- Geographically distributed development

- Tightly integrated to process management
- Configurations
- Versioning
- Release management
- Deployment tracking
- Change Packages
- History tracking
- Audit logs

- Manages all artifacts
- Controls versions
- Controls configurations

## Enforceable Review Process

**MKS Source Integrity**

Sandbox: c:\MKS\Sandboxes\WebServer\project.pj

Change Package: 3:1 (CommitFailed)

Accepted on Feb 6, 2004 2:20 AM (Submitted on Feb 6, 2004 2:16 AM)

User Reviewer: cdoyle

Vote: Accepted by cdoyle on Feb 6, 2004 2:20 AM

Comments:  
A very good start to the WebServer project

Changes:

| Type        | Member     | Revision | Sandbox                                |
|-------------|------------|----------|--|
| Pending Add | Purge.java | 1.1      | c:\MKS\Playground\WebServer\project.pj |
| Pending Add | main.java  | 1.1      | c:\MKS\Playground\WebServer\project.pj |

**Change Package: 4:1 (Open)**

| Type        | Member                       | Revision | Project                                | Variant | Date Changed        | Server    |
|-------------|------------------------------|----------|--|---------|---------------------|-----------|
| Pending Add | WebEngine/SocketFactory.java | 1.1      | c:\MKS\Playground\WebServer\project.pj |         | Feb 6, 2004 2:14 AM | COLINDOYI |
| Pending Add | WebEngine/sample.html        | 1.1      | c:\MKS\Playground\WebServer\project.pj |         | Feb 6, 2004 2:14 AM | COLINDOYI |
| Pending Add | WebEngine/HTTP.java          | 1.1      | c:\MKS\Playground\WebServer\project.pj |         | Feb 6, 2004 2:14 AM | COLINDOYI |
| Pending Add | WebEngine/Listener.java      | 1.1      | c:\MKS\Playground\WebServer\project.pj |         | Feb 6, 2004 2:14 AM | COLINDOYI |

**Issue View - Dev: 4 on colindoye:8001**

Issue Relationship Attachment Change Package

Dev: 4

Created by cdoyle on Feb 6, 2004 1:59:16 AM  
Modified by cdoyle on Feb 6, 2004 2:01:41 AM

Summary: Implement basic HTTP handling in WebServer

State: In Progress

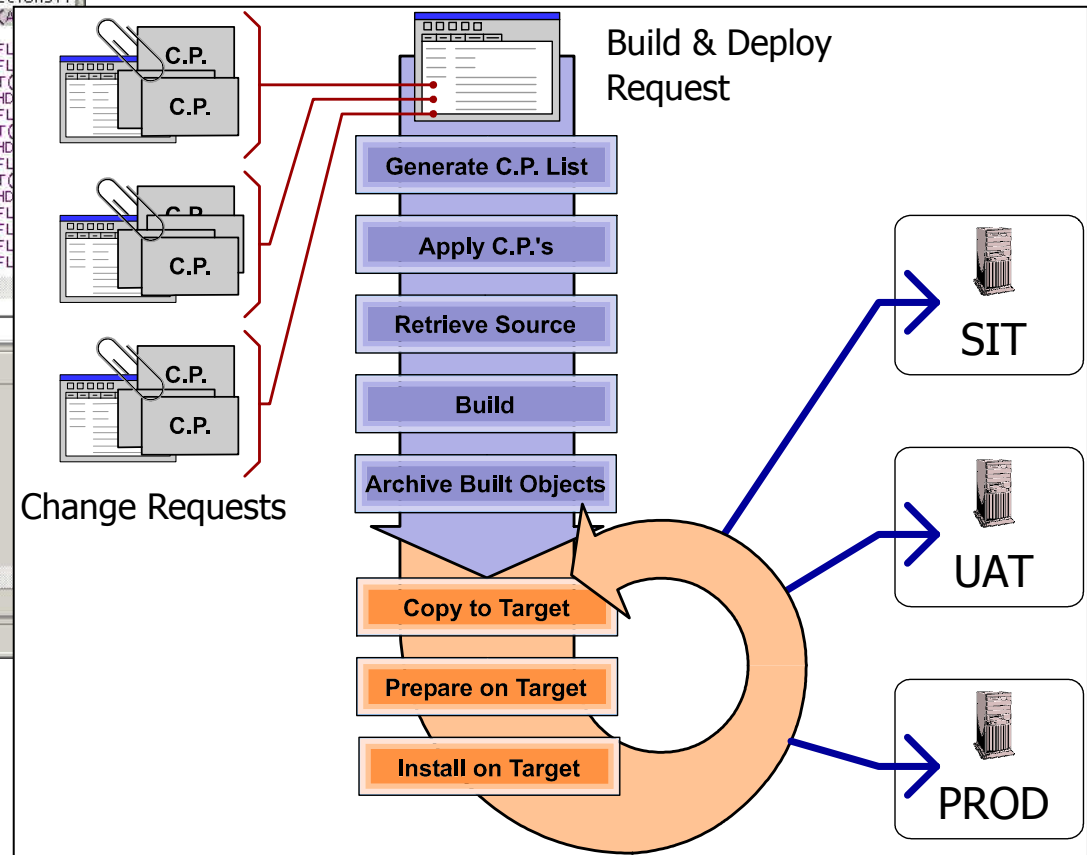
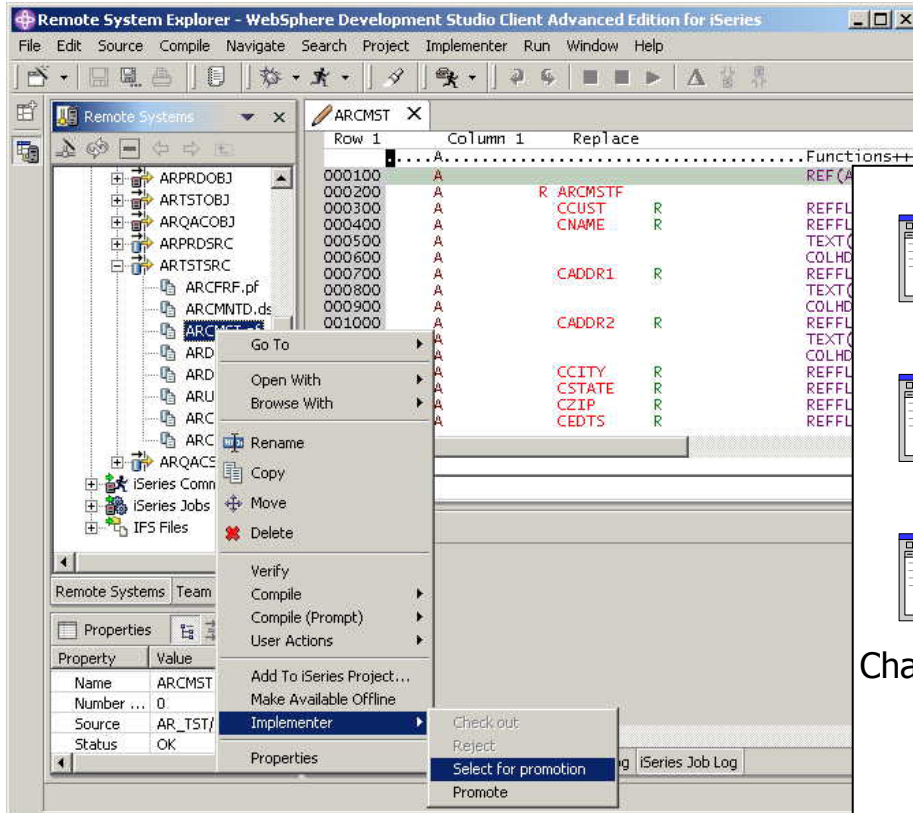
Assigned User: gbrown

Project: /Bentley

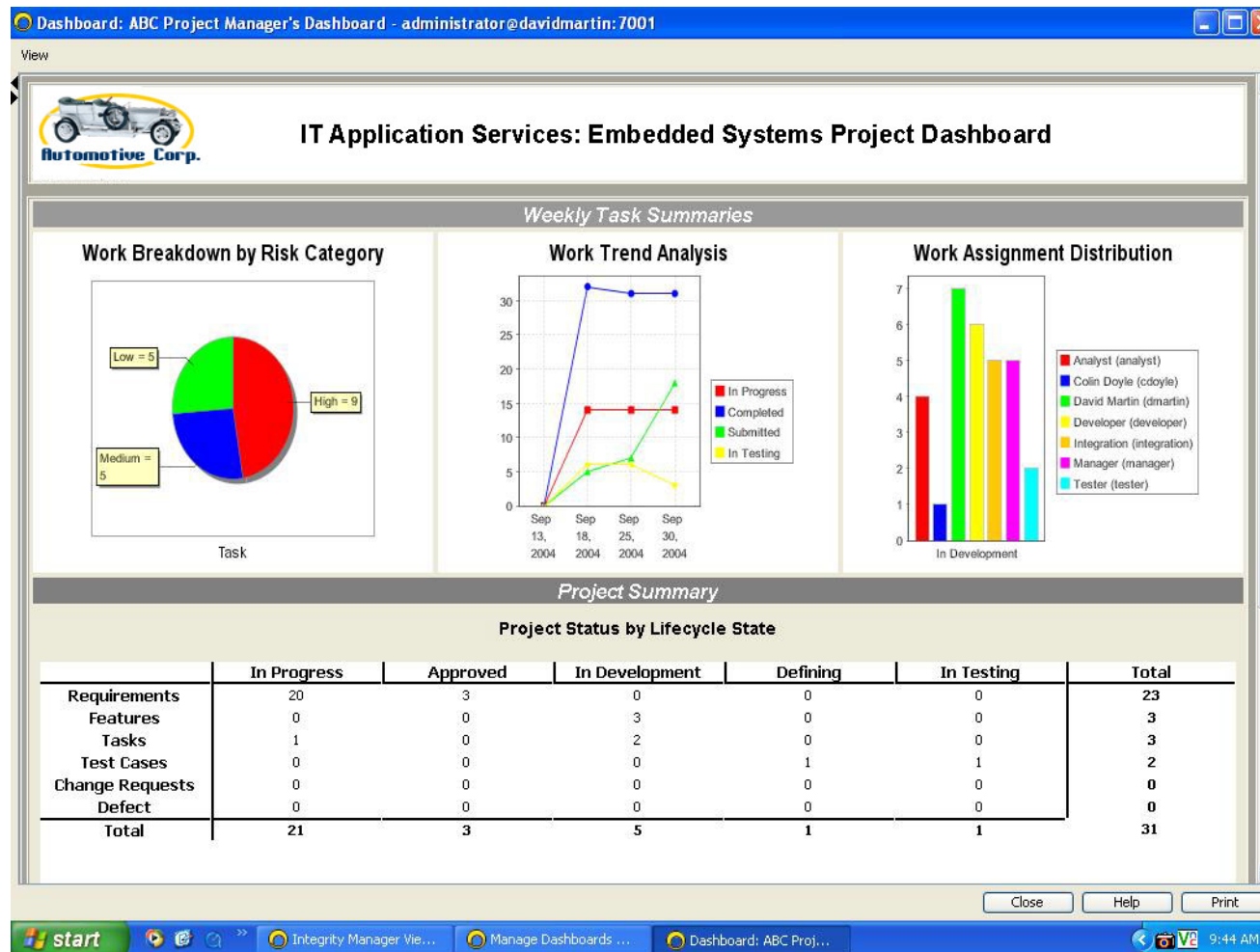
Description: Augment the skeleton version of WebServer to serve up a single test page using the HTTP protocol.

Priority: Medium

## Securely Deploy Change into Production



## Management Dashboard – Provides Concise Reports & Metrics



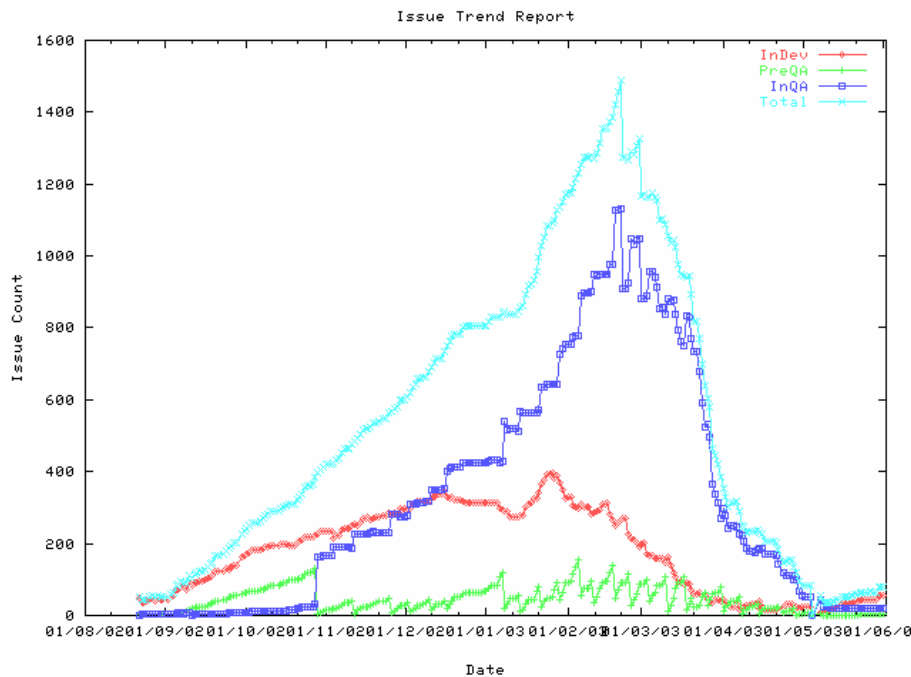
## Analytical Quality Measures

### Critical Items Report - Submitted in Last 7 Days

29/03/21

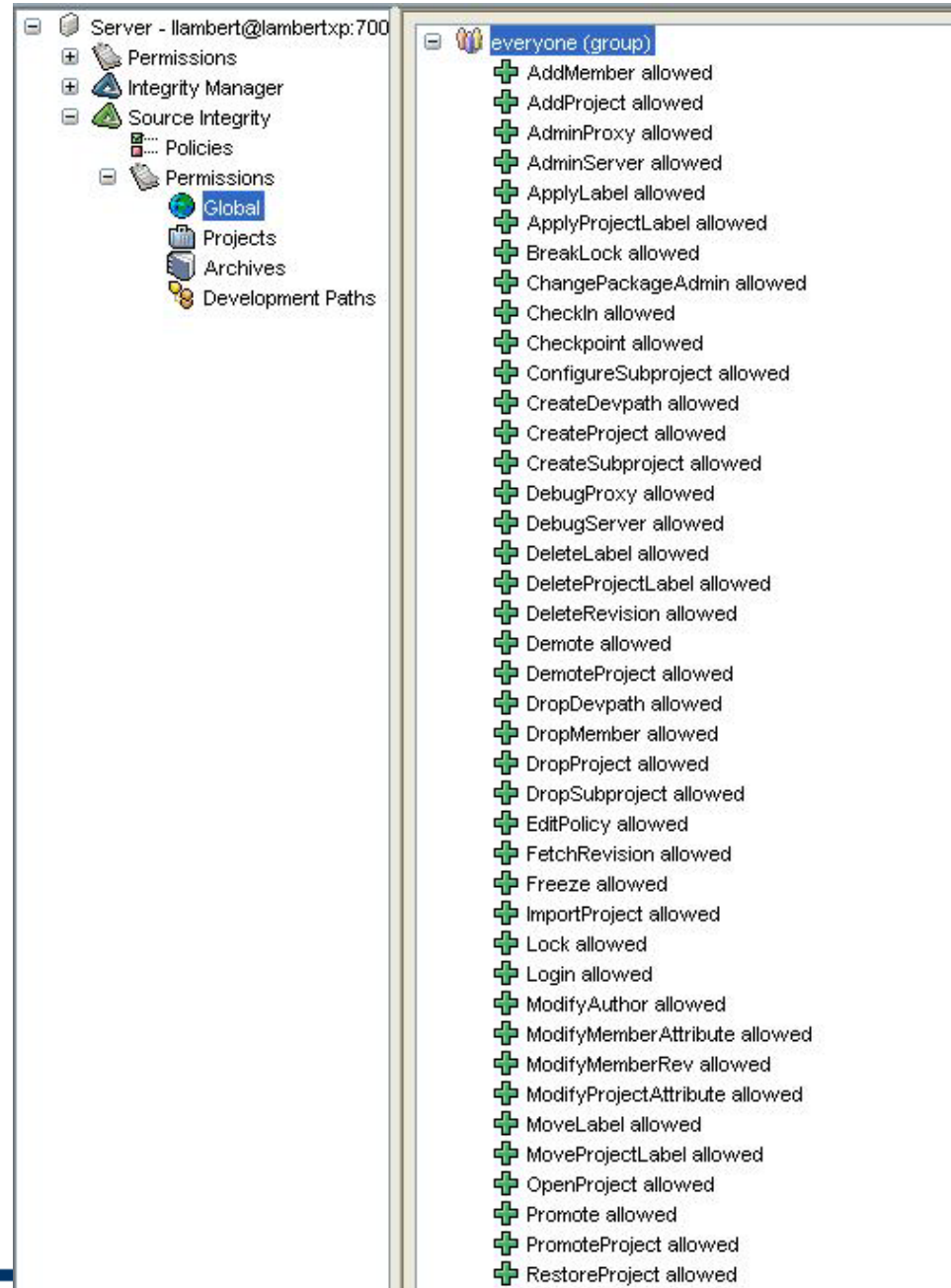
| ID   | Modified Date | Summary  | State            | Assigned User                     | Prior    |
|--|---------------|--|------------------|-----------------------------------|----------|
| <b>Project = Stock</b>                                     |               |  |                  |                                   |          |
| 54   | 18/02/2004    | Grammar error in the amortization calculator.                                | In Development   | David Martin (dmartin)            | Critical |
| <b>Group Total: Project = Stock</b>                        |               |  |                  |                                   |          |
| <b>Project = Product Delivery Model (PDM)</b>              |               |  |                  |                                   |          |
| 32   | 23/04/2003    | Need to formalize the software project planning process.                     | In Progress      | project_manager (project_manager) | Critical |
| 30   | 07/04/2003    | Develop QA audit policies/procedures for requirements management activities. | In Progress      | qa_manager (qa_manager)           | High     |
| <b>Group Total: Project = Product Delivery Model (PDM)</b> |               |  |                  |                                   |          |
|  |               | the amortization calculator.   | Investigate      | developer (developer)             | Critical |
|  |               | ie full amortization chart on a single page.                                 | Short Term Defer |                                   | High     |
|  |               | calculator should show multiple interest rates for comparison.               | Submit           |                                   | High     |
| <b>Group Total: Project = Amortization</b>                 |               |  |                  |                                   |          |

## Defect Trend Rate

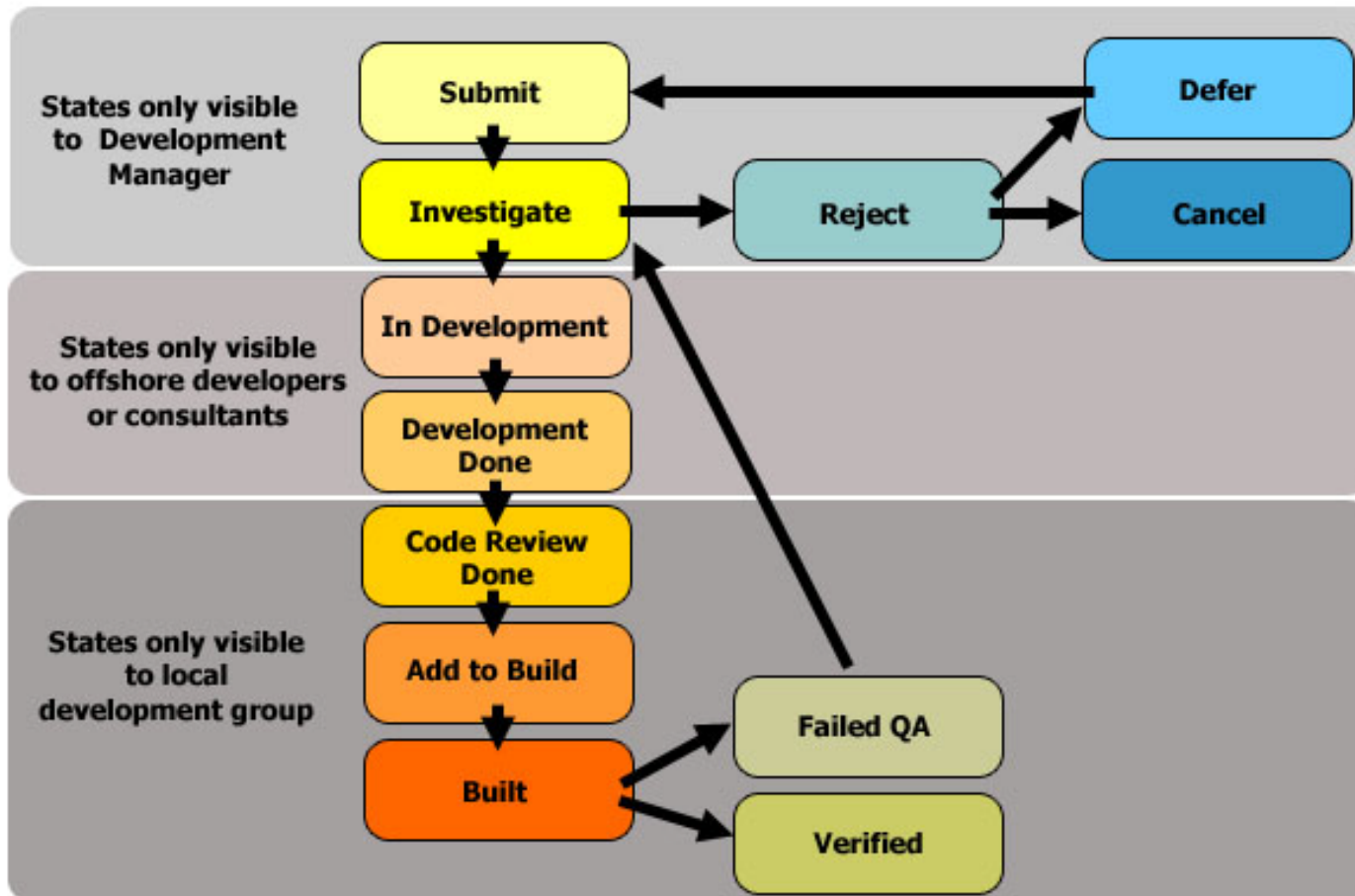


# Ensure Systems Security With Enterprise-Level Security Model

- Provides granular security
  - Define permissions at the user, role, or project levels
- Dynamic Groups (role-based permissions)
  - Provides administrators a high degree of flexibility by defining user permissions (i.e. Project Manager) according to the project they are working on

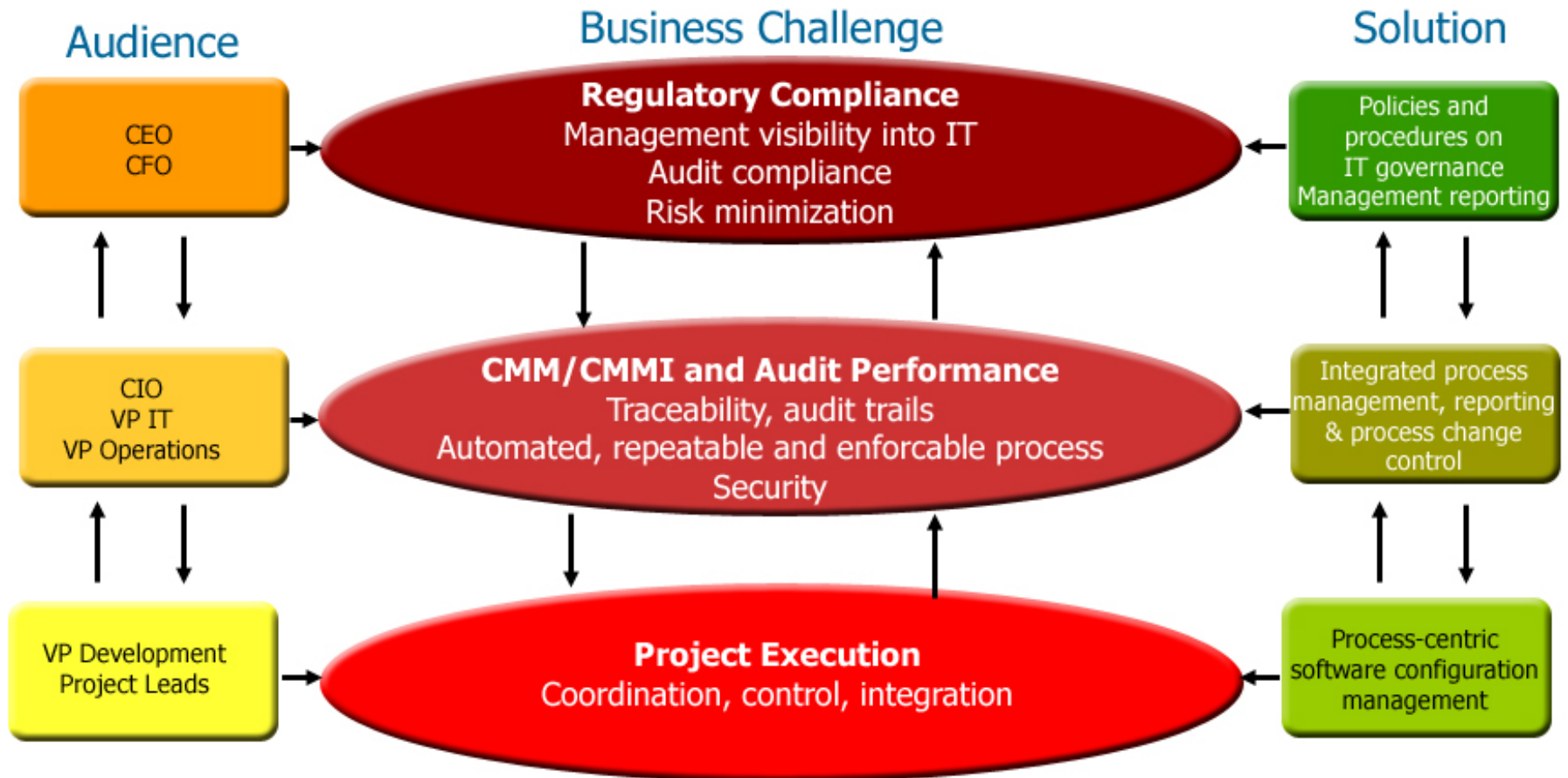


# Manage Supplier & Third Party Services - Outsourced Development Control





# Sarbanes-Oxley, CMMI & Enterprise SCM



# Analyst Recommendations

“Process-centric software configuration management (SCM) can be leveraged to help with Sarbanes-Oxley compliance. **By using the issue management and workflow support provided by SCM systems directly, any existing business process (not necessarily a software development process) can be automated, with direct tracking of all work completed, workflow integration with human beings, and full audit trails...**

**...Companies with a strategic governance initiative, or those companies that have to meet regulatory and auditory compliance that goes beyond financial reporting into their very development processes, should investigate process-centric SCM for the reasons given above.”**

*- Uttam Narsu, Principal Analyst, Forrester Research*

## **Enterprise SCM Can Help...**

- Define, model, enforce and automate processes from requirements capture through to deployment
- Provide full audit trails
- Allow global development teams to collaborate in real-time
- Providing tight security for offshore and outsourced work
- Give management visibility into global development activity with a Management Dashboard that provides clear and concise reporting

**... to more quickly achieve higher levels of CMMI and satisfy IT control objectives thus improving IT and Corporate Governance**

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**MKS**

## **Q & A**

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