CMMI - ISO

"Can't we all just get along?"

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The Boeing Company

Introduction

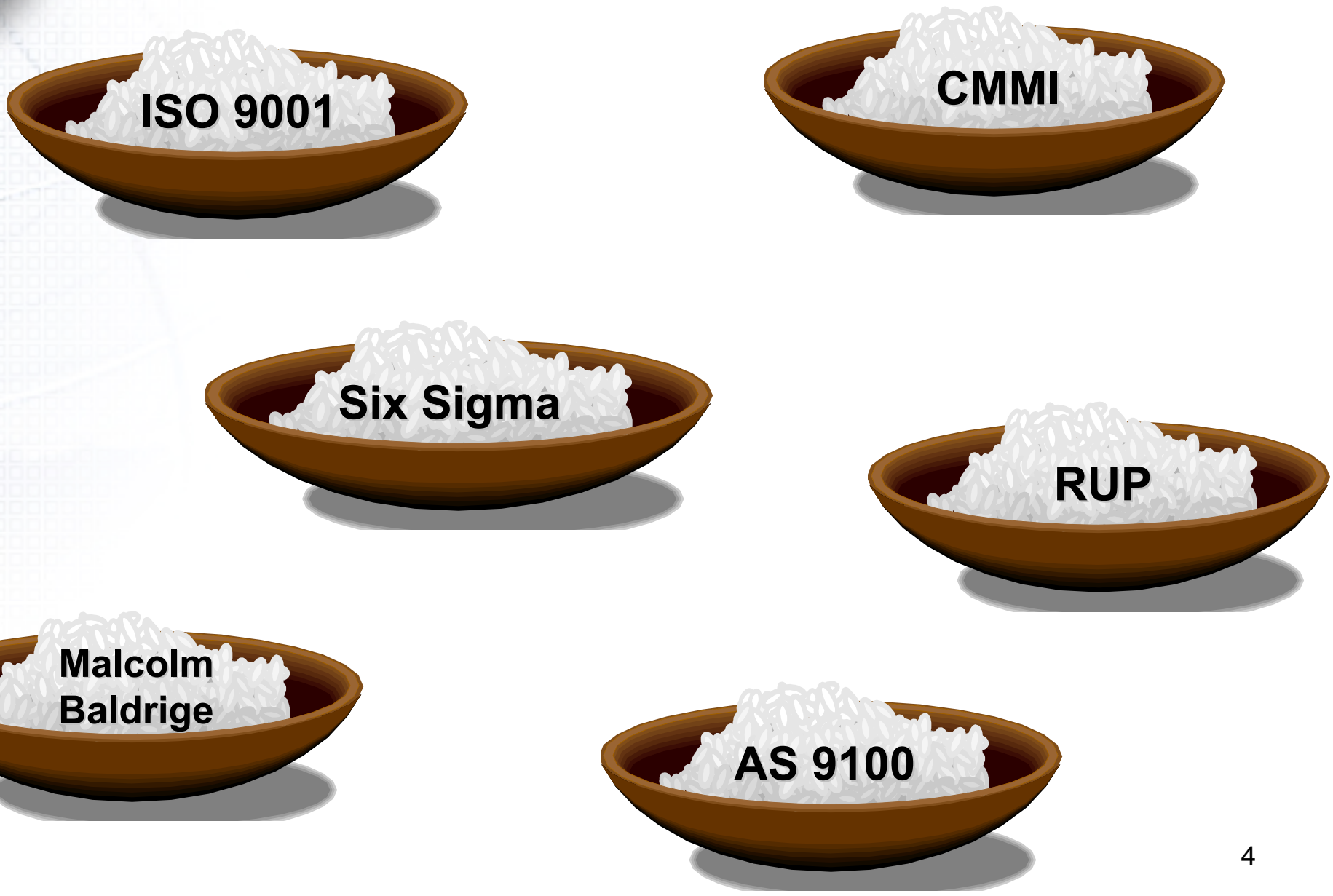
- There are many process improvement initiatives that draw the attention and resources of senior management and the Systems Engineering Process Group (SEPG)

- Organizations that have a process legacy or heritage in a particular model or standard have unintentionally created “Rice Bowls”

Purpose

- This presentation will describe the journey of a Boeing CMM (SW) Level 3 business unit that was merged with a Boeing ISO 9001:2000 registered site and how the resultant organization shattered these Rice Bowls on the road to CMMI (SE/SW) Level 3

The Initiatives - “Rice Bowls”



Setting the Stage @ Boeing

- Task: Integration of two Boeing business units:
  - Business Unit A: CMM (SW) Level 3
  - Business Unit B: ISO 9001:2000 Registered

- Goal: Unified process infrastructure compliant to CMMI (SE/SW) Level 3 and ISO 9001:2000

Initially - Rice Bowls Threatened

Initial Challenges

- ISO and CMMI have different architectures, different languages and different appraisal methods
- Need to set real business goals/objectives for process improvement and try to steer away from goals like:

  "Achieve CMMI Level X" or "Get ISO Registered"
- Reason: Organizations tend to revert back to their old bad habits after achieving CMMI or ISO resulting in the return of cost/schedule overruns and poor quality

Process Action Team (PAT)

- Step 1: “Get over it!”
- PAT Mission:
  - Select the “best practices” from the CMM (SW) and ISO process infrastructures and merge systems together
  - Ensure compliance with both CMMI and ISO 9001:2000
- Terminology Issues: “I’m a CMM guy and this ISO lingo is like a foreign language to me.”
- Key: Think “common process” not CMMI or ISO
- Results: Rice Bowls begin to shatter

Strengths of CMMI and ISO

- CMMI
  - Detailed Engineering practices
  - Comprehensive Program Management practices
  - Concept of increasing “Maturity Levels”

- ISO 9001:2000
  - Spotlight on Customer Satisfaction
  - Focus on Control of Records
  - Ensures process discipline across entire organization
  - Annual Surveillance Audit

PAT Focus - Our Customers

- What do our internal customers want?
  - Simple to use Process Asset Library (PAL)
  - One stop shopping for process, forms, work instructions, templates and samples
  - Not to deal with the ISO/CMMI requirements
  - An “Integrated Process”

Compliance Trace Matrix

ISO 9001:2000 Description		CMMI PA	CMMI Practices	CMMI Description	ISO Implementation	CMMI Implementation
4	**Quality Management System**				GAPS in green	GAPS in red
4.1	**General requirements**				⇩	⇩
	Establish and implement the quality management system				Quality Manual & BMS	Quality Assurance Plan
	Identify the processes that comprise the quality management system and determine their relationships				Quality Man. sect. 4.0	Organization Standard Process (OSP)
	Ensure that required resources are available				Quality Man. sect. 6.1	Policy
	Monitor and analyze process performance to ensure that the processes are effective				Quality Man. sect. 8.2	Quality Assurance Plan
	Improve process performance.				Quality Man. sect. 8.5	Quality Assurance Plan
		Generic Goals & Practices	GP 2.1	Establish an Organizational Policy	Quality Man. sect. 5.3	Policy
				Establish and maintain an organizational policy for planning and performing the process.	Quality Man. sect. 5.3	Policy
			GP 2.2	Plan the Process	Quality Man. sect. 4.0	Organization Standard Process (OSP)
				Establish and maintain the requirements and objectives, and plans for performing the process.	Quality Man. sect. 4.0	Organization Standard Process (OSP)
			GP 2.3	Provide Resources	Quality Man. sect. 6.1	Policy
				Provide adequate resources for performing the process, developing the work products and providing the services of the process.	Quality Man. sect. 6.1	Policy

Best Practice – Process Look & Feel

PI 202 QMP –INTEGRATION TEST

PURPOSE: The purpose of this process is for the testing of the "integrated" product (hardware, software and interfaces) received from the PI 201 Product Integration process. An Integration test plan/strategy is selected and defects are captured and corrected during the testing activity. When the Integration Test is complete, Configuration Management (CM) takes control of the product baseline in preparation for the System and Beta Test phases.

RESPONSIBILITY

Project Manager (PM): The PM is overall responsible for the planning, scheduling, and budgeting associated with integration testing.

Integration Lead: The Integration Lead will develop and execute the Integration Test Plan per the project's Systems Development Plan (SDP). The Integration Lead develops the integration strategy, acquires the necessary module stubs and drivers, oversees the integration test, records defect data and analyzes results.

Configuration Management (CM): The CM lead is responsible for the receiving the final product from the integration phase and performing the initial build and taking CM control of the baseline at the conclusion of the integration phase.

TOOLS

- CM Tool
- Defect Tracking DB
- MS Word
- MS Project

METRICS

- Test Progress
- Defect History

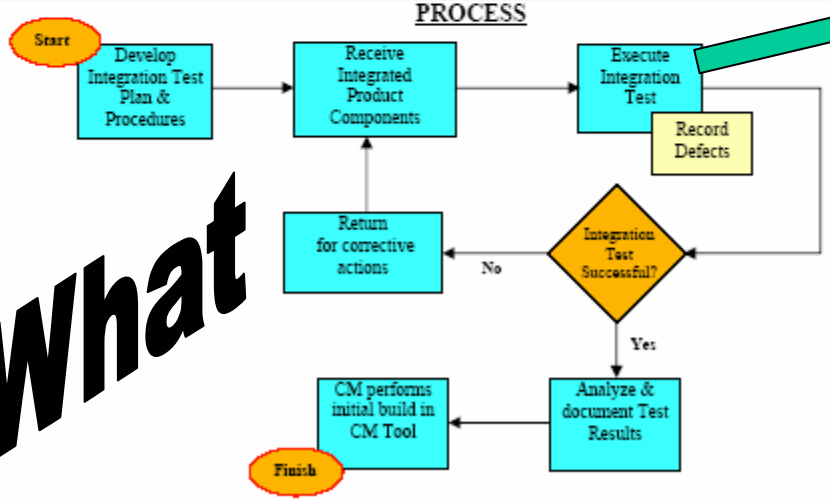
ENTRY CRITERIA

- PI 201 (Product Integration) process complete

EXIT CRITERIA

- Integration Test Report generated
- Product under CM Control

PROCESS



INPUTS

- Assembled Product (hardware, software, interfaces)

OUTPUTS

- CM Baseline
- Integration Test Plan
- Integration Test Report

SUPPORTING DOCUMENTATION

- System Specification
- Interface Control Document (ICD)
- Software Design Document (SDD)

What

WORK INSTRUCTION
PI 202 QMI – INTEGRATION TEST

1. **Develop Integration Test Plan and Procedures**
   a) Project manager appoints an Integration Lead to oversee the integration phase efforts.
   b) Integration Lead develops the Integration Test Plan and procedures. The formality of the Integration Test Plan and procedures is project dependent. Smaller projects may develop an informal (internal use only) Integration Test plan and procedures. In this case the Integration Test plan may be included in the overall project Test Plan that includes System and Beta testing. Larger projects develop a formal (separate) Integration Test Plan and procedures that may be a required contract deliverable item.
   c) For either approach described in b) above, the Test Plan Template located on the Process Asset Library (PAL) can be used.

2. **Receive Integrated Product Components**
   a) Integration Lead meets with Project Technical Lead to prepare to receive the integrated product components for the Integration Test.
      - Software: Generally binaries from the development platform will be copied over to the integration platform and the Integration Lead will then control the baseline throughout the Product Integration Phase.
      - Hardware: The hardware or environment necessary for the Integration Test will be established during the PI 201 Product Integration process.

3. **Execute Integration Test**
   a) Integration Lead assembles a test team and oversees integration testing of the product on the integration platform.
   b) Each defect or action item is entered into a defect tracking system and assigned one of the following severity codes by the Integration Lead: (NOTE: the locally developed Defect Tracking Database can be used for this process – see the SE… to get a copy of this database):
      Code 1: Must be fixed prior to System Test (i.e. Factory Acceptance Test)
      Code 2: Must be fixed prior to product release
      Code 3: Consider for future release
   c) The entire project team has access to the Integration Test database. The technical lead will assign developers to the correct defects in the database focusing efforts on problems assigned Code 1 or 2. Corrective actions are documented in the database and following unit testing, the binaries are again ported to the integration platform as discussed in step 2 above. Note: Caution should be taken that corrective actions are limited to defect fixes and NOT new added functionality at this point in the lifecycle. Requirements or functionality changes need to be addressed by management (e.g. Configuration Control Board (CCB)).
   d) The Integration Lead calls integration test status meetings as required to discuss opened/closed defects in the database. This iterative process continues until the integration test phase is successfully completed.

How To

Key Documentation Merge

- Three Key Top Level Legacy Documents:
  - CMM required Policy
  - CMM required Organization Standard Process (OSP)
  - ISO required Quality Manual

- Documentation Merge:
  - All 3 merged into a new Quality Manual
  - Quality Manual format was streamlined to reflect current organization policy/practice and NOT mirror the ISO or CMMI

Our Journey to CMMI Level 3

- Following PAT team's efforts, we:
  - Chartered and staffed a new SEPG
  - Deployed updated process infrastructure
  - Deployed Process Training (web or instructor-based)
  - Conducted CMMI Level 3 Class C
  - Conducted ISO Registration Audit @ legacy CMM site
  - Conducted CMMI Level 3 Class B
  - Three Progress Reviews with External Lead Assessor
  - Conducted CMMI Level 3 Class A SCAMPI Appraisal

Top Ten Lessons Learned

1. Early involvement and frequent visits (Progress Reviews) with external CMMI Lead Assessor
2. Open (constant) communications with ISO Registrar
3. Senior Management involvement and commitment
4. QA “Mentoring” before “Auditing”
5. Processes that reflect “Reality” not “Theory”
6. Proactive/Passionate SEPG Members
7. Regular All Hands Communications
8. Resources ($$ and Instructors) for Process Training
9. Viable Process Improvement Request (PIR) system
10. Frequently Asked Questions (FAQ) email to raise awareness

Sample FAQ

*The following bi-monthly Frequently Asked Question (FAQ) is being provided by the S&IS Mission Systems Quality Department regarding our Quality Management System (QMS) process infrastructure. To see historical FAQs, visit the **Quality Management Homepage** and select the FAQ tab.*

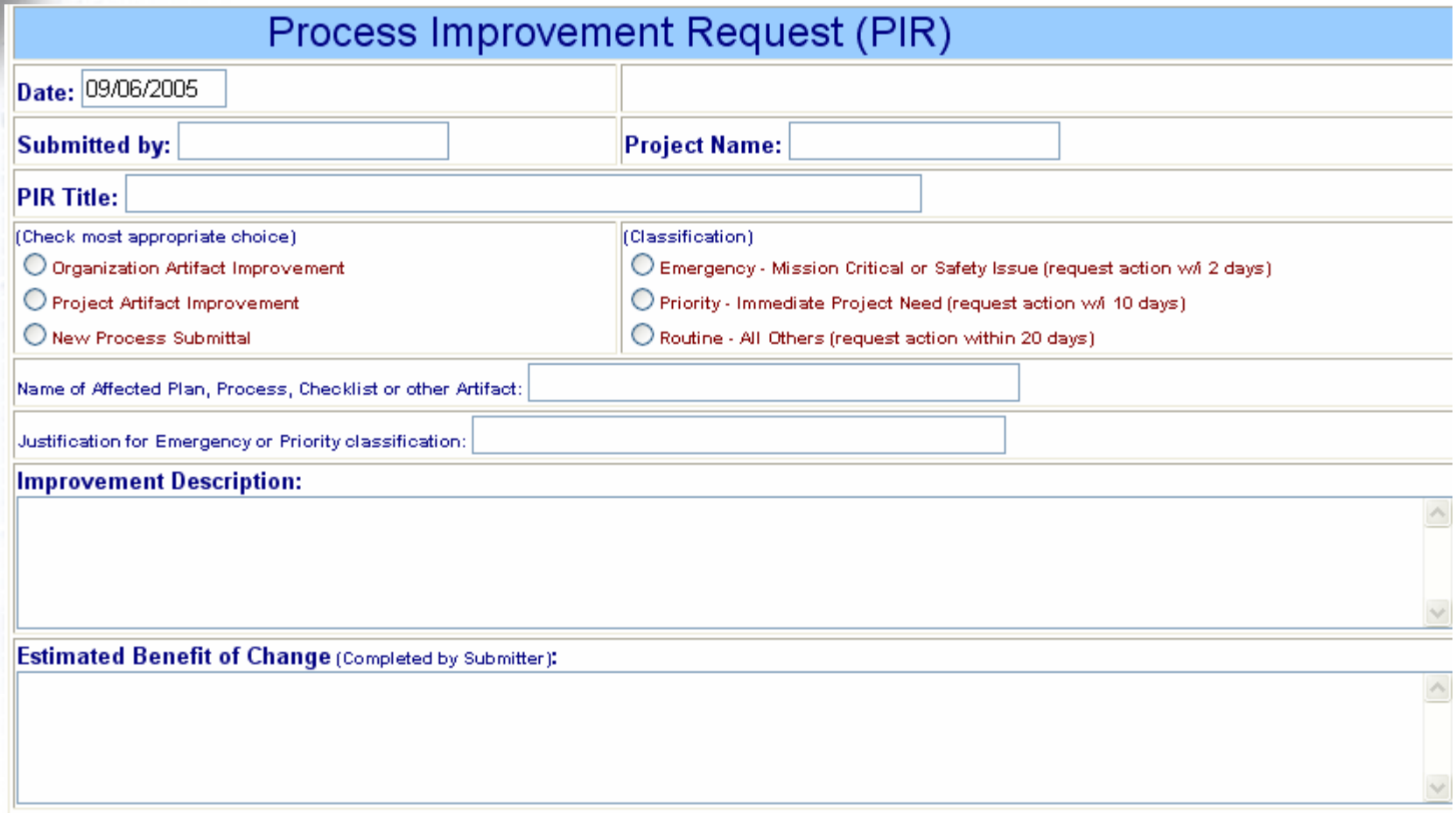
Q: I've just started on a brand new project. With regards to establishing my required Engineering and Project Management documentation, where do I begin?

A: The best place to begin is with the **PP 200 Project Start-up** process. This process starts with a review of our policy contained in the S&IS Mission Systems **Quality Manual** and then helps you develop the following key project documentation found on our **Templates Page**.

- Project Plan
- System Development Plan (SDP)
- Risk Management Plan
- Configuration Management Plan

Additionally, project startup assists with establishing schedules, budgets, tools and metrics on your new project.

Process Improvement Request (PIR)



Process Improvement Request (PIR)

Date: 09/06/2005

Submitted by: | Project Name:

PIR Title:

(Check most appropriate choice)
- Organization Artifact Improvement
- Project Artifact Improvement
- New Process Submittal

(Classification)
- Emergency - Mission Critical or Safety Issue (request action w/i 2 days)
- Priority - Immediate Project Need (request action w/i 10 days)
- Routine - All Others (request action within 20 days)

Name of Affected Plan, Process, Checklist or other Artifact:

Justification for Emergency or Priority classification:

Improvement Description:

Estimated Benefit of Change (Completed by Submitter):

Sample of Recent PIRs:

- Create Lessons Learned Database
- Online web-based Peer Review Forms
- Add “Operations” field for Defect data collection

What's Next?

- ISO is helping to pave the way for Integrated Product and Process Development (IPPD)
- Functional Organizations (Contracts, Finance, Security, Human Resources, etc) have documented processes under ISO Registration
- IPPD Effort: Create the "hooks" with the Project Management and System Engineering processes

CMMI – ISO: The Bottom Line

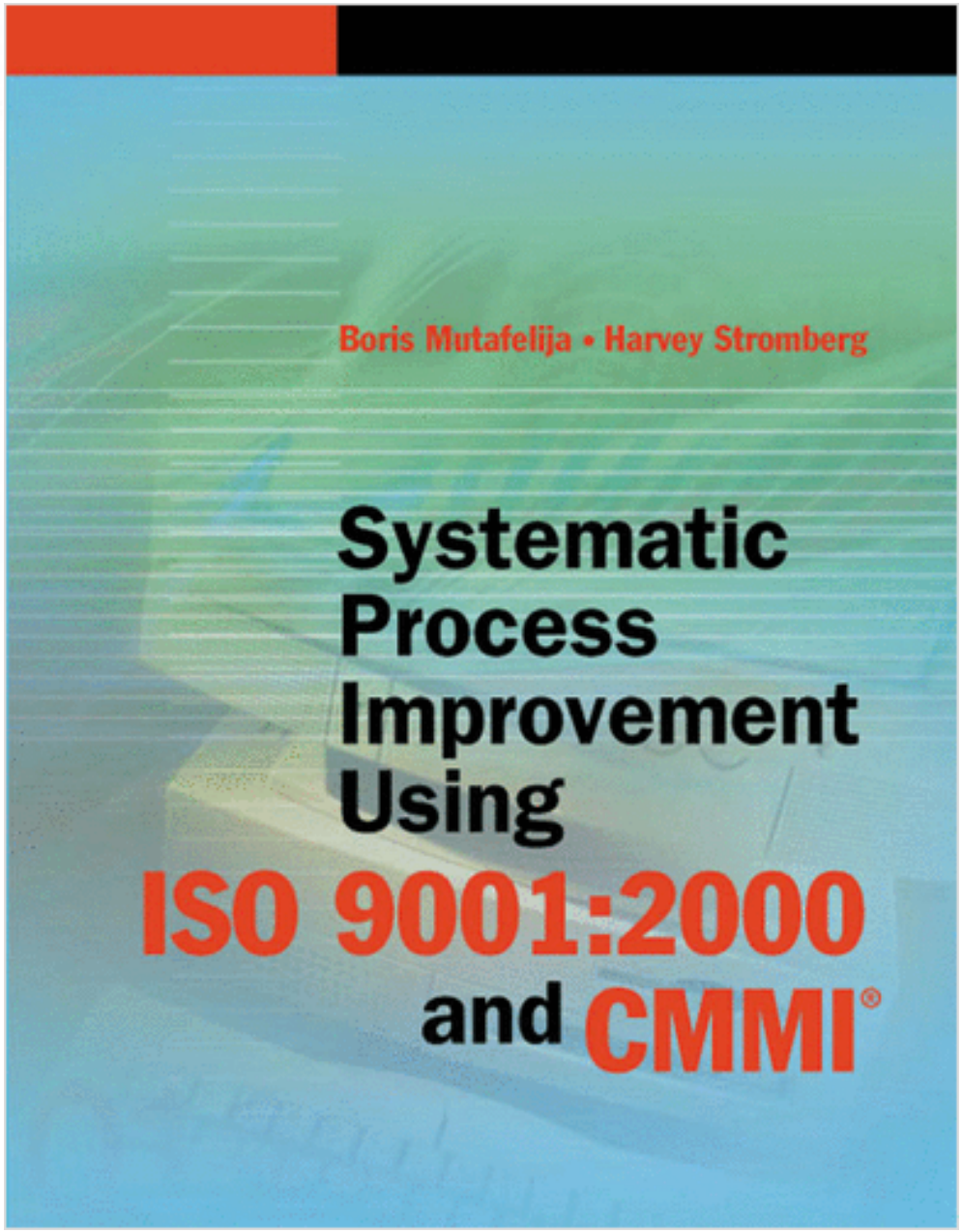
- ISO standard is broader in scope and ensures process discipline across the entire organization
- CMMI model provides greater detail and focus in Engineering and Program Management
- Together, ISO and CMMI models complement each other very well

Q: Can’t We All Just Get Along?

A: Yes, We Can and We Did!

QA “Mentoring” before “Auditing”

Recommended Reference



Publisher: Artech House
ISBN 1-58053-487-2
2003

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