

**Ottawa Software Quality Association &**

**ASQ 0407 Software Focus Group**

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## ***Process Improvement Experience: CMM Level 3 Best Practices***

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## ***The Challenge***

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- How do we select and tailor process improvement activities that suit specific situations the best?*
  - *There is a significant number of books and articles devoted to process improvement:*
    - Reference books - useful as checklists for assessments*
    - Others have a whole spectrum of very detailed advice*

## Scope

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- ❑ *The Capability Maturity Model (CMM) was used as a framework for process improvement*
- ❑ *This mainly determined the selection of the activities we used to improve software development process*
- ❑ *The goal was to improve existing processes and to achieve CMM Level 3*
- ❑ *We harmonized activities required to be in compliance with ISO 9001*

## Presentation Overview

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- ❑ **Software Quality Assurance Group** – *You need it, but do you want it?*
- ❑ **IV&V Reviews** - *Independent Verification & Validation Reviews*
- ❑ **Documentation** – *How much do you need it and how do you track it?*
- ❑ **Peer Reviews** – *We want them but ...*
- ❑ **Software Process Database** – *Important!*
- ❑ **ISO 9001 and CMM** – *Is the gap between the two too big?*

## **Software Development Process – Initial State**

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### *Problems*

- *"Fire fighting" was a way of life*
- *Cost and schedule estimations were unreliable*
- *Independent, consistent and regular information about project activities and issues was not available*
- *Some project related data was available but not collected or analyzed according to a documented procedure*
- *A few procedures and software processes were available but not established, controlled and fully documented*

## **Software Quality Assurance (SQA) Group**

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### *Solution (an important part)*

- *You need an independent SQA group (independent from the development team)*
- *Focus:*
  - *Process improvement*
  - *Independent Verification and Validation reviews*
- *Driving force for the implementation of new/modified processes*
- *In the past – SQA Analysts were assigned to the project as a resource for specific SQA related tasks*
- *Now – SQA Specialists are consultants, reviewers/auditors*

## Independent Verification & Validation Reviews

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- ❑ SQA Reviews and (ISO) Internal Audits
- ❑ Six month summaries and trend analysis for executive management
- ❑ Rules for minimum number of IV&V reviews per project
- ❑ On-going monitoring of the projects and processes
- ❑ Training

## IV&V Review Report - Sample

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Project Name	Project/Development Manager/ Test Lead	Report Date	Ref. #
Project Phase:		Reviewed By:	
Project Size/Risk/Complexity Rating:		Review Date:	
Project Risk Category:			

## ***IV&V Review Report - Sample***

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### **Findings**

ISO 9001 – Project Management Process

<i>Number</i>	<i>Category*</i>	<i>Description</i>	<i>Comments</i> (Project Manager/Development Manager/ Head of Project Management)

SEI CMM

<i>KPA</i>	<i>Status*</i>	<i>Issue Description</i>	<i>Comments</i> (Project Manager/Development Manager)

## ***Documentation***

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### ***Problems***

- *Hard to find documents*
- *Different forms (layouts) of documents*
- *Incomplete documents*
- *Different content for the same type of documents*
- *"Oh, I didn't know that we needed to create that document!"*

## Documentation

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### Solution

- **General Document Template** – unified document layout across all of projects
- **Document Tracking Form** – Great tool for specifying the type of documentation that the project team needs to create
- **Project Directory Structure** – simple but helpful

## Documentation

### General Document Template

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- *Everybody does it his/her own way in the absence of standards*
- *General Document Template sections:*
  - *Title page*
  - *Version Control Page*
  - *Table of contents*
  - *Main body*
  - *Appendices*

#### *Important :*

- *Header/Footer with the project name, Page number and number of pages, Date*

# General Document Template

## General Document Template Project Name

Document Version:

Publication Date:

Owner: Name of Owner

Author(s): Name of Author

Contributor/Reviewer(s):

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# General Document Template

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Version	Date	Author	Description of Change

## Documentation Document Tracking Form

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- ❑ It is created at the beginning of the project
- ❑ The form lists the:
  - Documents to be produced
  - Mandatory documents
  - Order of documents by project phase
- ❑ Helps Project and Development Managers to plan the project activities
- ❑ Foundation for SQA reviews

## Document Tracking Form - Sample

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### 1 **Project Name** Project Document Tracking Form

*(Replace <Project Name> field with real name of the project.)*

		Mandatory (M), Sign-off (Q) by QAD or N/A, TBD, ORMG Signature (O)		
			Create Document ↓	Comments
<b>00_Project Status</b>				
Group Meeting Minutes				
Project Status Report (Monthly)		M		
Issue Log				
Project Change Log				
Risk Log				
Document Tracking Form		M/Q		



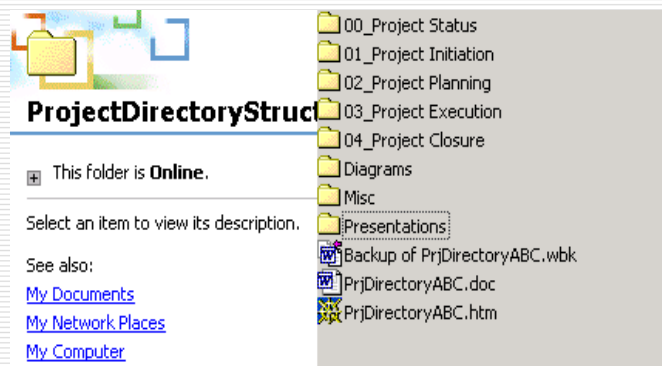
## Documentation Project Directory Structure

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- ❑ Same structure as in the Document Tracking Form
- ❑ Same for every project
- ❑ Easy to find any document – saved a lot of time for a project team and SQA reviewers

## Project Directory Structure - Sample

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## Project Directory Structure - Sample

The screenshot shows a web interface for a project directory. The main heading is "01\_Project Initiation". Below it, there is a message: "This folder is Online." and a prompt: "Select an item to view its description." There are three links: "My Documents", "My Network Places", and "My Computer". To the right, a list of folders is displayed, including: Business Requirements, Communication Management, Cost Management Plan, Human Resources Management Plan, Integration \_Change Management Plan, Letter of Engagement, Procurement & Vendor Management Plans, Project Charter, Project Initiation Phase Completion Checklist, Project Management Process Checklist, Project Schedule, Quality Management Plan, Resource Plan, Rfa\_Sra, Risk Assessment, Scope Management\_Requirements Managem, Seed RFA\_Pre-RFA Funding, SeedRFA\_PreRFA, Stakeholder Participation Form, Time Management Plan, and Work Breakdown Structure.

## Peer Reviews

### Problems

- Convince people to use reviews*
- Overcome fear of individual performance rating*
- Scepticism – "not applicable here" – people believe that reviews are good for other organizations, but not here*
- We do not have time (our project timeline is too short)*
- We do not have resources*

## Peer Reviews

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### Solution

- ❑ Key – Educate
- ❑ Make them mandatory but pick minimum number of deliverables – don't overdo
- ❑ Plan them!
- ❑ Reviewers become respected for their expertise

## Peer Reviews

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### What gets reviewed:

- ❑ **Business Requirement** document is mandatory for all projects
- ❑ Based on risk analysis and size/risk/complexity factor **System Specification** and **Code** may be mandatory

## Peer Reviews – Measurement Sample

### Peer Review Measurement & Summary Report

Work Product Under Review		
Project		
System Name		
Overview Date		
Peer Review Date		
Peer Review Time		
Location		
Moderator		
Author		
Recorder		
Reviewers		
Peer Review Type (select one)	Walkthrough	
	Technical Review	
	Formal Inspection	
Is this a resubmitted product for review? (if Yes indicate if this is review # 2 or 3, etc.)	Yes or No	No
Category of Work Product:		
Planning Doc.	System Specs	
Business Req.	Design	
Testing Docs.	UAT	
Support Manual	Code and Unit Test	
Process Doc.	User/Operator Manuals	

## Peer Reviews - Sample

Measurements	
Total Numbers of Reviewers	Peer Review Duration (hrs)
Reviewers Prep Time (hrs)	Planning Prep Time (hrs) (Author & Moderator)
Overview session	Product size (Pages or SLOC)
Programming Language	
Report Generation(defect & issue report/summary report)	
Number of Defects / Issues Recorded Major: _____ Moderate: _____ Minor: _____	
Disposition Accept: _____ Conditional: _____ Not Accepted: _____	
Comment if Not Accepted or Conditional: _____	
Estimate Rework Effort: _____ (hrs) Actual Rework Effort: _____ (hrs)	
Number of open items remaining (two weeks following the meeting) _____	
Person/Group assigned responsibility for any open issues:	
Additional Comments (if any):	

## **Software Process Database**

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### *Problems*

- It is hard to find data from the past – even if it exists, is it useful?*
- Fear of measuring (performance of individuals)*
- Numbers do not tell the whole story*

## **Software Process Database**

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### *Solution*

- Start simple*
- Make it available (on organization's Intranet)*
- What gets measured will improve (Hawthorne Effect)*

## Software Process Database

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□ Software Process Database tables:

- Project Management Data
- Product Management Data
- Client Satisfaction Surveys Data
- Peer Reviews Data
- Exemptions
- Lessons Learned

## Database – Project Data - Sample

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Project Name	Project ID	Project/System Manager	Project Description	Project Size	Team Size	Risk Assessment Rating	Size/Complexity Rating	RFA Approved Amount

Baseline Number	Baseline Date	Estimation				Committed Delivery Date	Actual Amount (at Completion)	Actual work-months	Actual Duration (months)	Implementation Date
		Estimated		Total Estimated						
		Work-months	Duration (months)	Work-months	Duration (months)					

## **Database – Peer Review Data - Sample**

Project Name	Date of Review	Review Type	Work Product	Programming Language	# of Reviewers	Total Lines /Pages Inspected
Project Alfa	29-Jan-02	Inspection	Code	Java	2	4,000
Project Beta	18-Feb-02	Inspection	Business Requirements	N/A	2	78
Project Gama	27-Jun-02	Inspection	System Spec	N/A	3	225

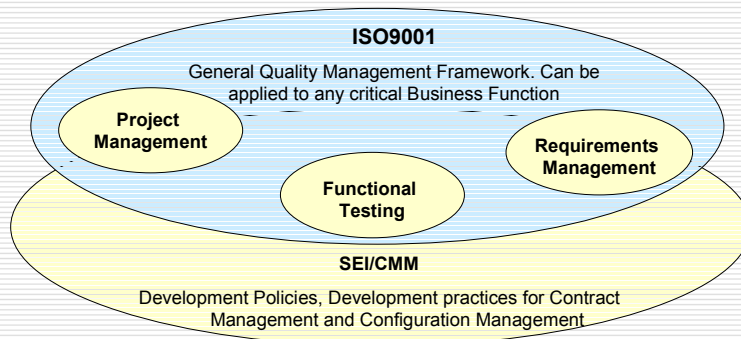
Inspection Duration	Prep Time in hours	Disposition	Major Issues	Moderate Issues	Minor Issues	Rework Effort
1.00	10.00	Conditionally Accepted	0	1	12	6.00
2.25	11.00	Conditionally Accepted	4	16	7	7.50
2.00	14.00	Conditionally Accepted	7	18	9	40.00

## **ISO 9001 and CMM**

- How big is the gap between processes we already established and ISO processes we have to follow?*
- Did experience with implementing the CMM related processes help?*

## ***Relationships between CMM/ISO9001***

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## ***ISO certified processes***

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- Project Management Process (2001)*
- Functional Testing Process (2002)*
- Requirements Management Process (2003)*



## **Lessons Learned**

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- ❑ Have a **vision** – believe (in changes)  
believe in process improvement
- ❑ Keep **people** in mind
- ❑ Apply changes in **small steps**
- ❑ Go for the **minimum** in the first steps
- ❑ Make it relevant to the **business needs**

## **Lessons Learned**

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- ❑ Base the changes on the **existing** procedures as much as possible
- ❑ **Listen!**
- ❑ Be ready to **change** and modify your changes
- ❑ **Explain** (training)

## **Success Factors**

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- ❑ *Senior Management Support*
- ❑ *Independent SQA group*
- ❑ *Implementation of new processes was based on existing (usually not documented or well defined) procedures - whenever possible*

## **Benefits of using CMM**

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- ❑ *Improved quality of deliverables (scheduling, budgeting and applications)*
- ❑ *Greater visibility into the development process*
- ❑ *Improved customer relationships*
- ❑ *Improved employee morale & retention*

Source: *The Capability Maturity Model: Guidelines for Improving the Software Process*, Addison-Wesley, 1999

## **Next steps**

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**CMM level 4**

**CMMI Level 4**

## **References and Additional Reading**

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## **Questions and Answers**

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