

# Static Testing: Inspections

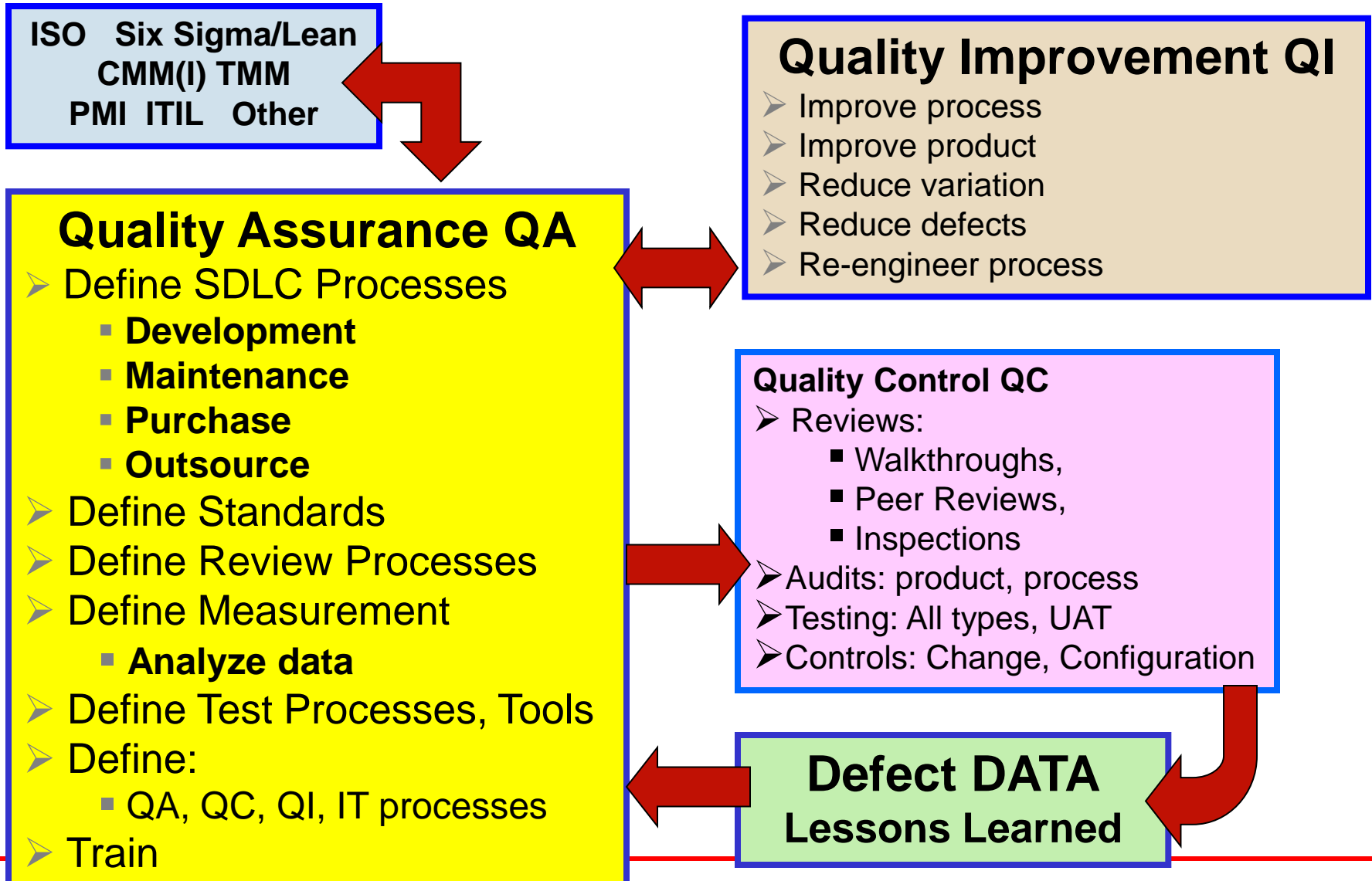


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# Common Vocabulary

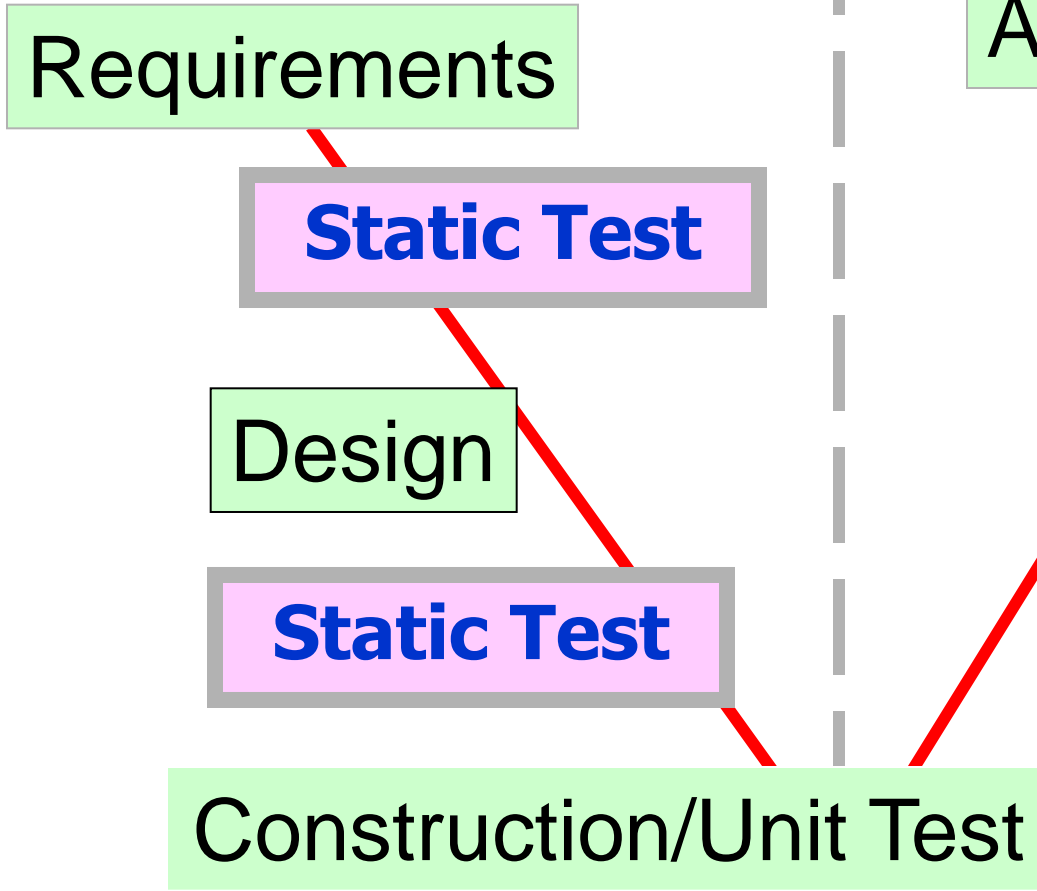
- **Process** – actions that convert input into output, using process components to add value
- **Product** – result or output of a process, may be tangible item, information or service
- **Quality** – “process output is fit for use” – J.M. Juran; “continuous improvement of all processes” – W.E. Deming
- **Defect** – any failure in the process, unexpected result, non-conformance to requirements or standards
- **Quality Control** – processes to find defects
- **Quality Assurance** – processes to prevent defects
- **Quality Improvement** – processes to reduce variation and defects in any process or product
- **Static Testing** – reviews, inspections, audits
- **Dynamic Testing** – regular testing [e.g., unit, system, regression, UAT]

# Relationship Among All Quality Elements

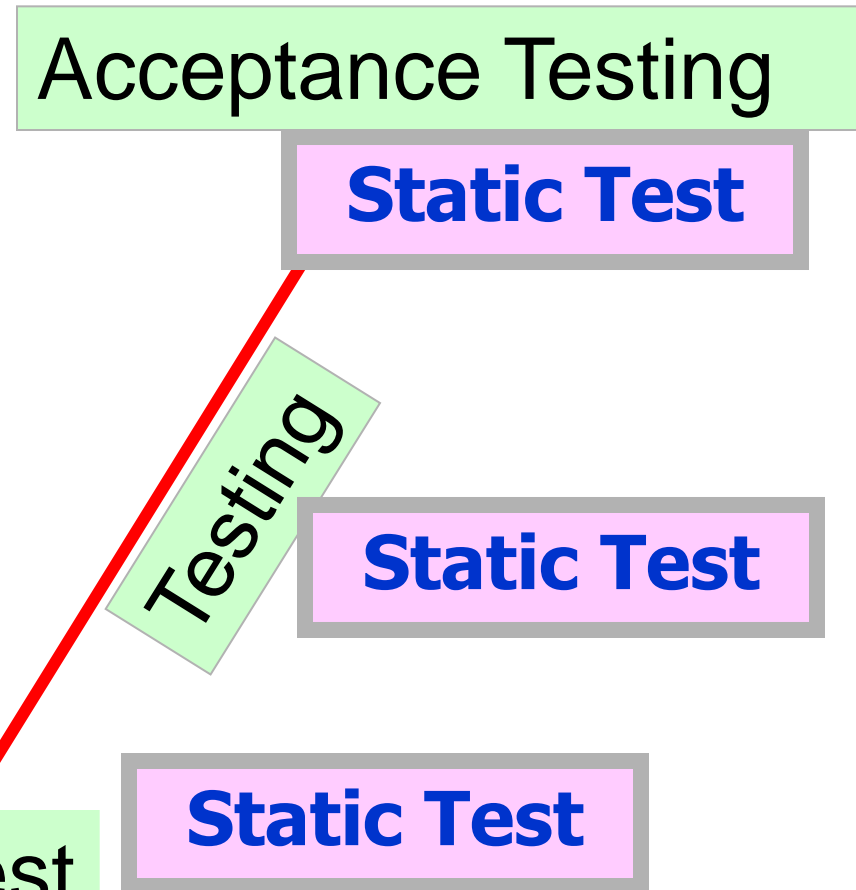


# The "V" Model

## Static Testing



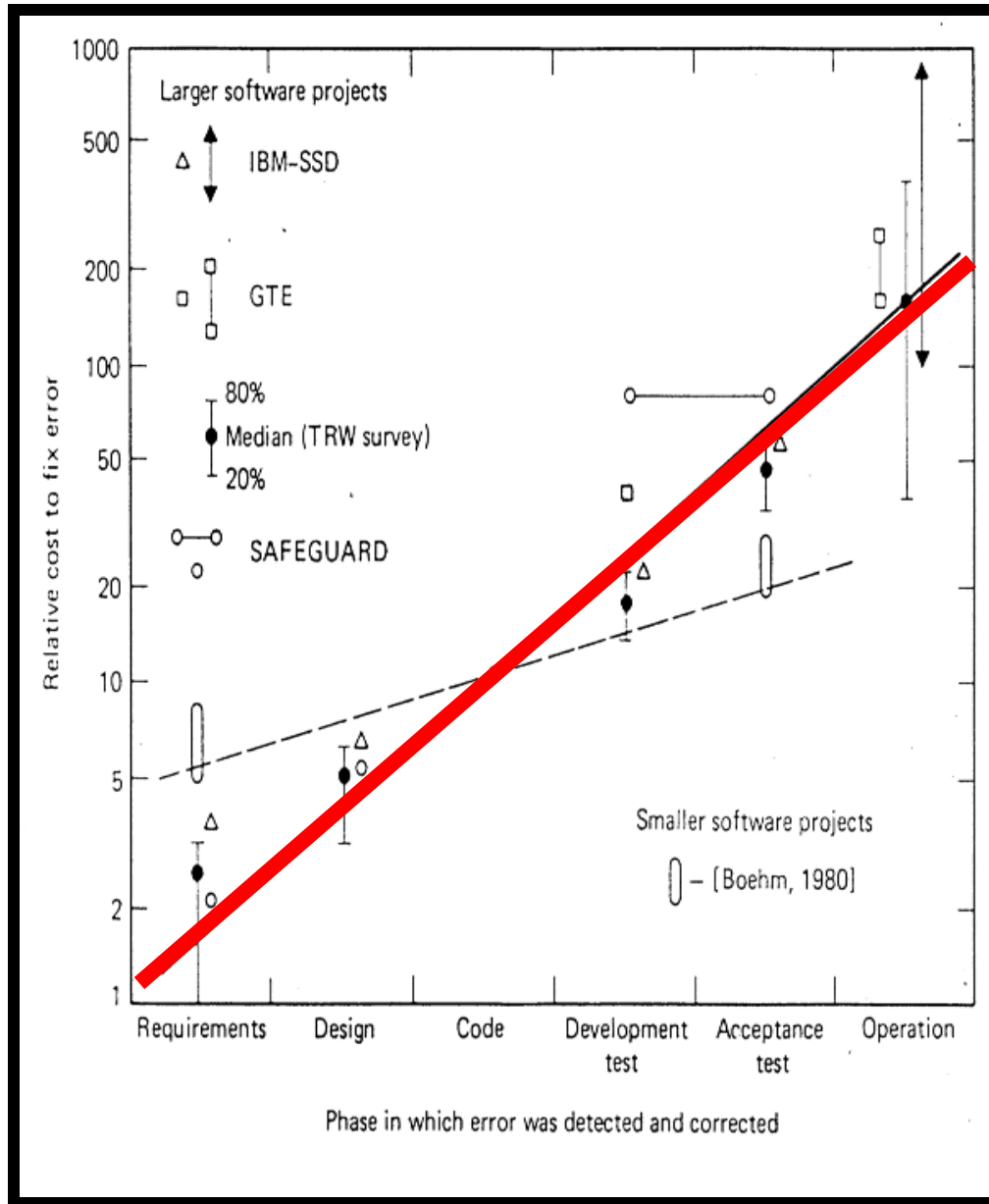
## Dynamic Testing



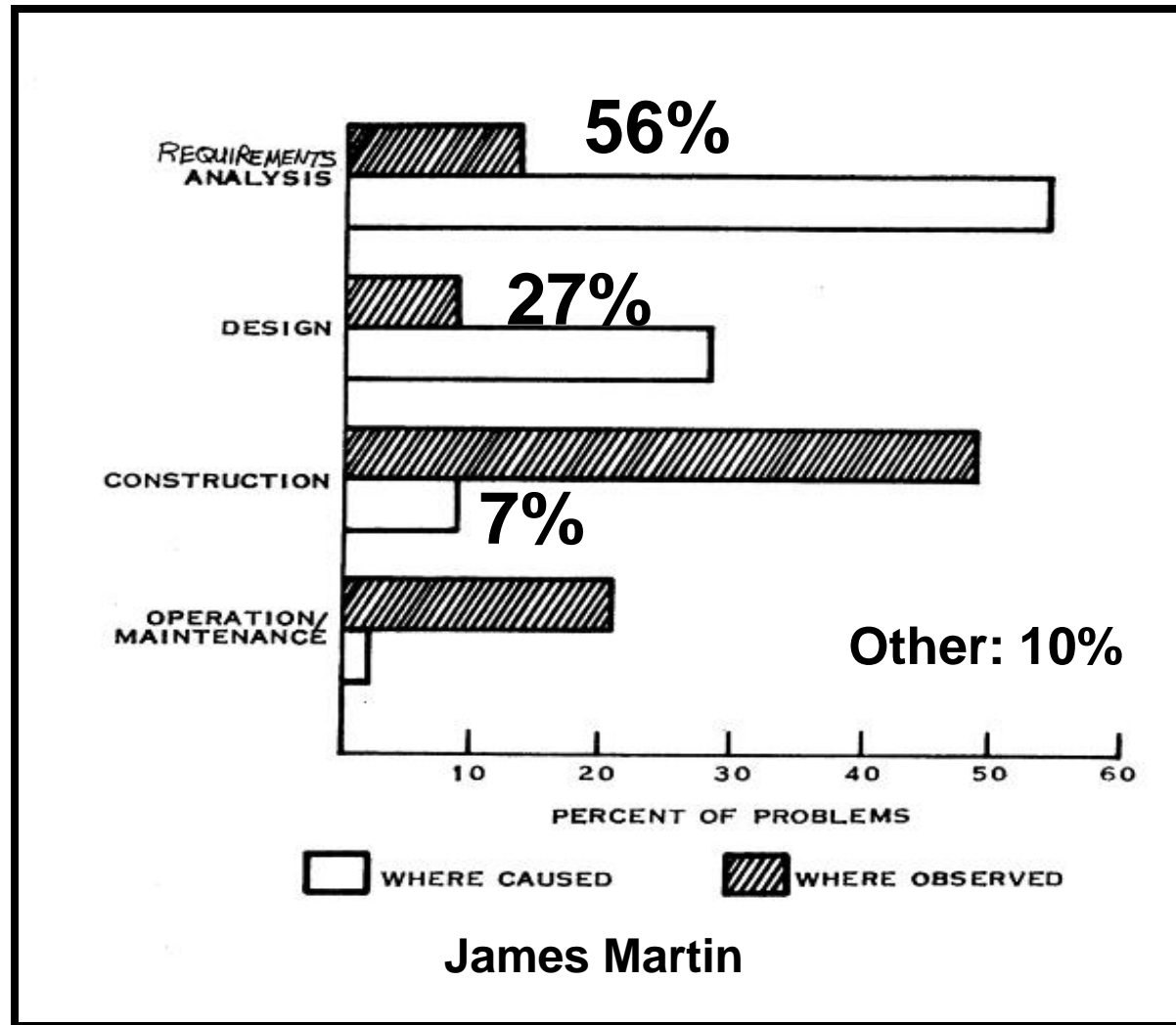
# Software Engineering Economics

Barry Boehm

Prentice Hall, 1981



# Where Defects Caused/Found



# Calculating Defect Cost

Life Cycle Stage	Relative Cost/Defect (Boehm)	Company X Actual Cost/Defect
Requirements	\$2	\$100
Design	\$5	\$250
Code	\$10	\$500
Testing	\$20	\$1000
Configuration Mgt	\$50	\$2500
Warranty	\$100	\$5000
Production	\$200	\$10,000

**Cost to Repair = (Defects) X (Relative Cost) X (Hourly Rate) X (Time)**  
**Company hourly rate = \$50**

# Formal (Fagan) Inspections

- Developed by Michael Fagan at IBM in the 1970s
- Widely used throughout the world
- Continue to produce excellent results where they are applied systematically
- Because most defects are produced during Requirements, their greatest impact can be found when they are used early in the Life Cycle.
- Improved by Tom Gilb, who worked with Fagan at IBM
- Karl Wiegers also contributed templates and checklists to structure the finding of defects

# Formal Inspections

- *A structured process review of a stable product in the software development or maintenance process designed to find defects*
- Capture synergy of trained inspectors' group effort
- Ensure product quality at a reduced price and schedule
- Provide feedback for self-appraisal
- Provide data for process improvement
- **DO NOT**
  - discuss style or alternative solutions
  - review the producer or assign BLAME
- **CANNOT** be
  - used for individual performance evaluations
  - modified or 'tailored'

# Inspection Process

## Process Components

**People:** Trained Moderator, Reader, Recorder, Author, Tester, Inspectors

**Machines:** Computer, screen

**Methods:** Excel [software for recording defects]; Inspection Procedures; Defect Definitions; Entry & Exit Criteria

**Materials:** Standards hardcopy, document hardcopy, flipcharts, markers

**Environment:** Conference room, Electricity

## Value Added Transformation:

1. Planning
2. Overview
3. Preparation
4. Inspection
5. Process improvement
6. Rework
7. Follow up

### Input:

Item to Inspect

### Output:

Inspected Item

# Rules for Inspections

- Team:
  - Minimum 4 – Moderator/Recorder, Reader, Author, Tester
  - Author is ALWAYS present
  - Moderators: formally trained; required skills include organization, team management, communication; inspection process owner; maintain inspection integrity
- Meeting:
  - *NO Management present*
  - Agenda; lasts 45 minutes – 2 hours
  - ALL participants are Inspectors
  - Inspect materials in advance & prepare
  - Inspect the product, not the Author
  - No discussion of other issues
  - Capture results for analysis
  - Monitor rework

# Inspection Requirements 1 of 2

## ○ Entry Criteria

- Minimum standards for product
- Author provides the documentation of the Entry Criteria
- Moderator certifies: [example]
- Standards for the Life Cycle phase and the deliverable to be inspected
- Inputs into the process that created the product or deliverable
- Project Guidelines or standards
- Tools to help in Inspections such as reports from automated systems

## ○ Exit Criteria

- Specifications or standards that must be met before next phase of Life Cycle
- May be checklists or standard descriptions; contribute defect definitions
- Criteria deviations are defects
- Project specific criteria are developed to support Critical Success Factors.
- Success or failure of Inspections depends on thorough Exit Criteria

# Inspection Requirements 2 of 2

## ○ Training

- Moderator: 4 or 5 days; basics of Inspections, process improvement, measurement and group dynamics and Inspection management
- Inspector are trained on the fundamentals of Inspections.
- Moderator may train the team

## ○ Management Support

- Funds to train Moderators and teams; a learning curve to become proficient; ongoing costs to execute the process
- Project Managers and IT managers need to understand benefits of the process and requirements for deployment
- At some point the additional time required to perform Inspections is more than justified by the improved processes, product quality, customer satisfaction and productivity and reduced testing time, rework and backlogs.

## ○ Defect Definitions and Classifications [next slide]

## Defect Definitions:

- Non-conformance to required methods / standards
- Any failure, error, or cause of a failure or error
- Bugs, glitches, undocumented features
- Any unexpected result
- A “problem” or “issue”

## Defect Classification:

### Major or Minor

#### Major

- Level 1: System Malfunction, Jeopardy; Fix now
- Level 2: Adverse Affect, No ‘Work-around’; Fix quickly

#### Minor

- Level 3: Adverse Affect, ‘Work-around’ known; Fix before implement
- Level 4: Customer inconvenience, fix in timeframe
- Level 5: Typos, fix as time available

### Class:

- Missing – element that should be present
- Wrong – incorrect, non-conformance
- Extra – additional material

# Roles and Responsibilities 1 of 2

**Moderator:** Conducts the Inspection

- leads and guides the Inspection
- makes effective use of team
- maintains objectivity and integrity of inspection
- responsible for the inspection process:
  - ensures preparation
  - seeks active participation
  - monitors follow up

**Reader:** Sets the pace

- cannot be the Author
- must understand material
- paraphrases material
  - covers each piece of logic or main element of document
  - follows each branch through logic
  - paces reading for clarity and comprehension
- Inspectors identify potential defects
  - Inspection team decides if defects exist

# Roles and Responsibilities 2 of 2

- **(Recorder):** Lists the defects
  - notes every defect as detected
  - records defect type, class, severity, a description, and where found
  - cannot be the author or reader; may be moderator
- **Author:** provides product for review; performs as Inspector
  - expert in material being inspected
  - can detect defects while explaining product
  - conducts the Overview
  - must not be defensive
- **Tester:** trained extensively in defect discovery; has an analytical, critical approach to reviewing documentation.
- **Inspector:** (with no other function): looks for defects
  - must be prepared for the inspection by reviewing product in advance
  - are objective toward product
  - are supportive of Author
  - maintain confidentiality of the results

# Inspection Steps 1 of 3

## ○ **Planning: Moderator**

- Plan the Inspection
- Choose the team, coordinate resources
- Insure materials meet Entry Criteria
- Assign roles [Reader, (Recorder), Author, Tester, Inspector (with no other function)]
- Schedule

## ○ **Overview: Author**

- Plan the Overview
- Author conducts the Overview
- Educates Inspection Team
- Manage follow up to the Overview

# Inspection Steps 2 of 3

## ○ Preparation:

- Provide participants with Inspection materials
- Coordinate with Project Team
- Each member prepares to fulfill role
- Review Exit Criteria and Inspection Material

## ○ Inspection: Find Defects

- Record Preparation data
- Conduct Inspection
- Record Defects
- Decide on follow up, include re-inspection
- Resolve conflicts
- Prepare Inspection Report

# Inspection Steps 3 of 3

## ○ Process Improvement

- Provide input for Process Improvement
- Improve defect detection

## ○ Rework

- Coordinate Rework activities
- Author fixes all defects
- Resolve items

## ○ Follow Up

- Verify all defect fixes
- Approve Rework or Reconvene Inspection Team
- Create Defect Summary Report

# Using Inspection Data

- Improvement of software (product)
- Improvement of processes
  - Examine testing processes; identify how defects are missed
  - Change process to catch these high-impact defects
- Defect Studies
  - Monitor defects in production
  - Look for trends; most frequent, costly
- Ongoing Measurement

# Implementation Considerations in the “real” world

- Trusting environment
- Management backing
- IT maturity
- Level of standards development
- Level of standards usage
- Time, budget, people, priority alignment

# Implementing Inspections Step By Step

- Assess maturity
- Assess usage
- Align strategy with IT plan
- Get management backing
- Train Moderator, team
- Pilot
- Plan Do Check Act
- Implement

# Questions?

*Thank You!*