Inspection Overview

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Inspection

- **Is used to verify intellectual products by manually examining the developed product, a piece at a time, by small groups of peers**
- **Exploits the synergy created by a small group of people working together**
- **Performs examination of work products at defined checkpoints**
- **Uses a defined seven step procedure**
- **Keeps record of errors detected for quality control and process management**
- ***Is not a forum for design decisions, nor it is a brainstorming session***

Why Inspection is Important?

- **Inspections serve as a filter to**
  - **Prevent defects creeping from earlier stages of the development to following stages, thereby reducing the software cost by reducing**
    - **» the defect detection cost**
    - **» defect correction cost**
    - **» warranty cost**
  - **Provides on going validation and verification of the product throughout the development life cycle**

Why Inspection is important?

- **Relative cost to fix a defect**

Phase in which found	Cost ratio (hrs)
– Requirement	1
– Design	3-6
– Coding	10
– Testing	15-70
– Operation	40-1000

We all know defects found during or after production is very expensive

Why Inspection is important?

- **Some Cost Examples (assume engineering salary and benefit of $150K/year)**
- **Cost of defect in**
  - **Requirement ($30-$250)**
  - **Integration Testing ($750-$3000) SEI data**
  - **Production ($10,000 HP, $ 140,000 IBM, $1,000,000 Commercial financial Services Inc., $1,000,000 Denver airport, multi Million NASA's Mars Probe)**

Why Inspection is important?

- **One third of software development cost is cost of rework**
- **Inspections save 60% of the rework**
- **This is 20% reduction in the total project cost**
- **Example: Motorola**
  - **$46,000,000 cost avoidance**
  - **productivity increased by 50%**
  - **41% increase in customer satisfaction**
  - **15% reduction in customer problem report**

Key Elements of Inspection

- **Objectives:**
  - **To obtain defects, and collect data**
  - **To communicate important work product information**
- **Elements:**
  - **A planned, structured meeting requiring individual preparation by all**
  - **A team of 3-6 people, led by impartial moderator**

Key Elements of Inspection (Cont.)

- **Participants**
  - **Moderator (coordinate inspection)**
  - **Author (developed artifact being inspected)**
  - **Reader (interprets the artifact being inspected)**
  - **Tester ** (member of the testing team)**
  - **Inspector (s) (everyone except the author)**
  - **Recorder (take notes during the inspection)**

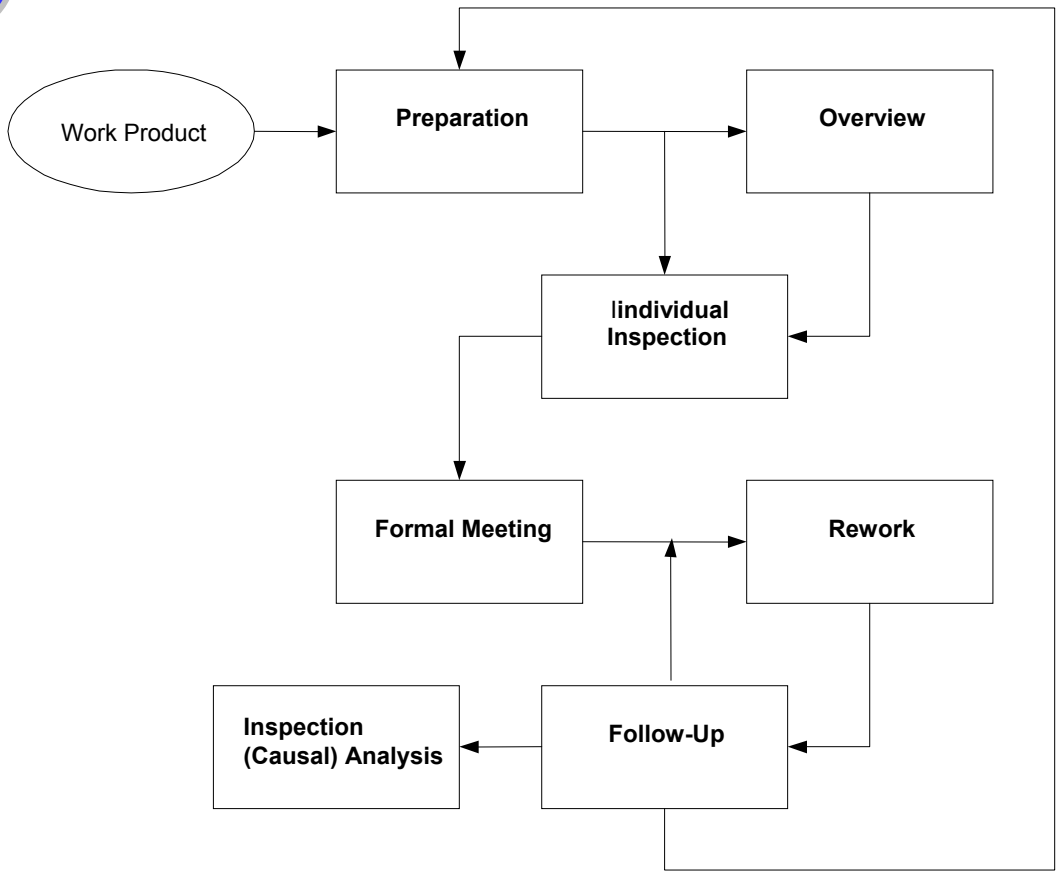
Key Elements of Inspection (Cont.)

- **Inputs:**
  - **Document to be inspected**
  - **Related source documents**
  - **General & tailored checklist**
- **Outputs:**
  - **Inspection report**
  - **Data on error types**

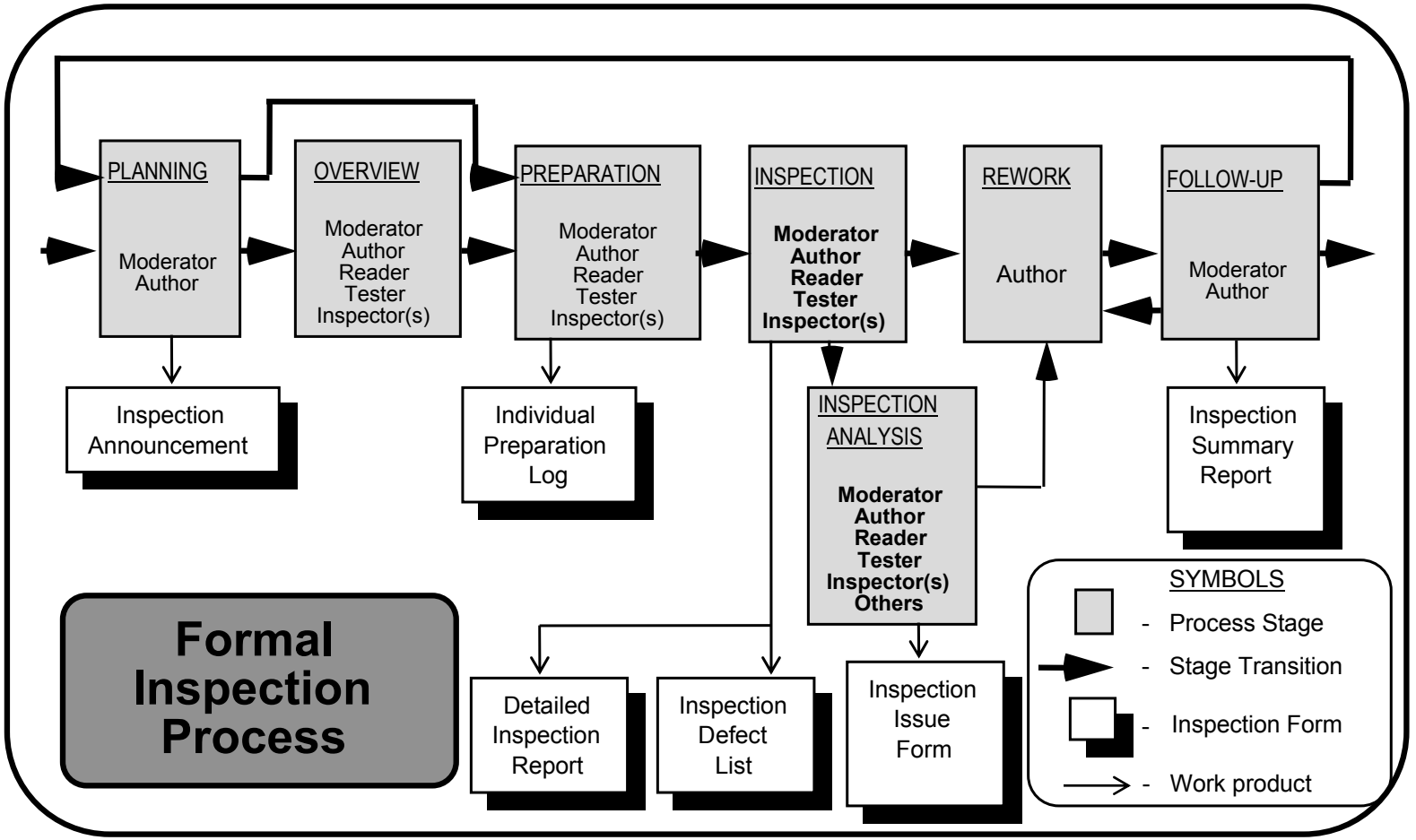
Inspection Process

- Key phases
  - Planning
  - Overview
  - Individual Preparation
  - Inspection Meeting
  - Rework
  - Follow-up
  - Inspection (causal) Analysis

Inspection Process Model (simple view)



Formal Inspection Process Stages and People (detail view)



Inspection Process (Cont.)

- **Planning**
  - **The participants are all identified, and their roles are defined**
    - » **Author: Person responsible for the development, or modification of product. He is responsible to address the readers questions**
    - » **Moderator: Makes sure the meeting proceeds according to schedule**
    - » **Reader: Not the author, leads the team through the work**

Inspection Process (Cont.)

- Recorder: Records and classifies all the defects, assist the moderator in preparation of meeting reports
- Inspector: All members of the team are inspector. Responsible for finding defects

- Author collects all the necessary document and make it available to participants
- Establish schedules

Inspection Process (Cont.)

- **Overview**
  - **Moderator distribute the material and identify roles and responsibilities**
  - **Author provide an educational background to the work to be inspected for such issues as:**
    - **Functionality**
    - **Design**
    - **Methodologies**
    - **Technologies**
  - **Participants ask question for clarification and understanding**

Inspection Process (Cont.)

- **Individual Preparation**
  - **Inspectors**
    - » **Review the products**
    - » **Create and execute test cases**
    - » **List**
      - **Potential bugs**
      - **Questions and issues for clarification**
  - **Moderator decides how to run the inspection meeting**
  - **Author put together additional supporting documents to refer to during the inspection meeting**
  - **Tester examines the artifact to insure testability**

Inspection Process (Cont.)

- **Inspection meeting**
  - **Only inspection team should attend**
  - **No Management participation**
  - **The moderator establish readiness for the inspection meeting**
    - » **Make sure all key participants are present**
    - » **Record the individual preparation time**
    - » **Record individual's number of defect found**
    - » **Establishes appropriate preparation is achieved**
    - » **If not, cancel the meeting and reschedule**
  - **The reader leads others through each phase (part) of the materials**

Inspection Process (Cont.)

- **Inspection meeting (Cont.)**
  - **Each inspector discuss the defects that they found in each phase (part) and make sure it**
    - **» Satisfy the appropriate standards**
    - **» Meet the exit criteria**
  - **Moderator make sure there is consensus about the defects identified (whether it is a defect, its type, and its severity)**
  - **Recorder records all the defects that are recognized and accepted by the moderator**
  - **Moderator generate action item list to accompany the defect list**

Inspection Process (Cont.)

- **Inspection meeting (Cont.)**
  - **Moderator and inspection team determine the state of the product**
    - » **No defect, release to the customer**
    - » **Some defect, minor changes and then release**
    - » **Some defect, mainly concentrated location, partial re-inspection**
    - » **Large number of defects, require re-inspection of the whole product**
  - **Moderator records the inspection time**
  - **Moderator request for process improvement (inspection, and software development) ******
  - **Moderator in collaboration with author estimate rework time**

Inspection Process (Cont.)

- **Rework**
  - **The final defect list will be distributed by the moderator to author**
  - **Author revise the product to eliminate ALL the reported defects**
  - **The author record the actual rework time**
- **Follow-up**
  - **The moderator verifies the rework, and elimination of the defects**
    - » **Moderator check the fixes, and accept or reject them (rejected fixes require additional rework)**
  - **The author in collaboration with the moderator determine whether a re-inspection is required**
  - **The moderator provide the complete inspection report to inspection coordinator**

Inspection Process (Cont.)

- Inspection Analysis
  - Moderator check to see if the inspection rates were within the recommended values
  - Moderator performs defect analysis
    - » Is there any systematic problems in development
    - » For each major defect
      - Cause is systemic or mis-execution?
      - Process change recommended?
      - Action required?
  - Moderator asks for process improvements (inspection and software development)***

Checklists

- **Inspection Checklists**
  - **Requirement Checklist**
  - **Design Checklist**
  - **Code Checklist**
  - **Test Plan Checklist**
  - **Test Case Checklist**

Inspection Rates

Development Stage	OVIEW Rate	PREP Rate	INSP Rate
Requirements	500	250	250
Preliminary design	500	200	200
Detailed design	500	150	150
Source code	300	150	150
Test plans	500	200	200
Test cases	300	150	150

The above rates are industry data.

Rates are in lines per hour. A page is roughly equivalent to 50 lines.

The above rates were found effective in system control applications.