SE-3002
SOFTWARE QUALITY ENGINEERING

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Part III-Software Inspection

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TODAY'S OUTLINE

- Software Inspection
  - Fagan inspections
  - Software reviews
  - Inspection checks and metrics
- Presentations

SOFTWARE INSPECTION

- Most commonly performed software quality assurance (QA) activity besides testing.
- Inspection directly detects and corrects software problems without resorting to execution, therefore it can be applied to many types of software artifacts.
- Depending on various factors, such as the techniques used, software artifacts inspected, the formality of inspection, number of people involved, etc., inspection activities can be classified and examined individually, and then compared to one another.
- Software inspection deals with finding software defects through critical examination by human inspectors.
- As a result of this direct examination, the detected software defects are typically precisely located, and therefore can be fixed easily in the follow-up activities.

THE CASE FOR INSPECTION

- The main difference between the object types of inspection and testing, namely executable programs for testing and all kinds of software artifacts for inspection,
- The primary reason for the existence of inspection: One does not have to wait for the availability of executable programs before one can start performing inspection.
- Consequently, the urgent need for QA and defect removal in the early phases of software development can be supported by inspection, but not by testing.
- In addition, various software artifacts available late in the development can be inspected but not tested, including product release and support plans, user manuals, project schedule and other management decisions, and other project documents.
- Basically, anything tangible can be inspected.

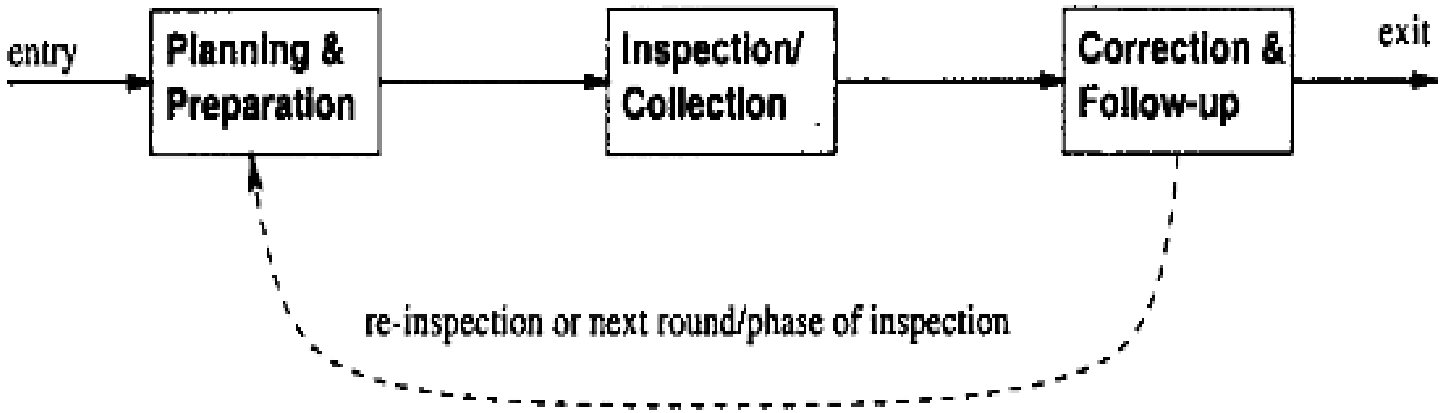
INSPECTION TECHNIQUES

- Wide variety of objects for inspection, so inspection techniques also vary considerably.
- For example, code inspection can use the program implementation details as well as product specifications and design documents to help with the inspection.
- Inspection of test plans may benefit from expected usage scenarios of the software product by its target customers.
- Inspection of product support plans must take into account the system configuration of the product in operation and its interaction with other products and the overall operational environment.
- Consequently, different inspection techniques need to be selected to perform effective inspection on specific objects.

DEGREE OF FORMALITY

- Similarly, there are different degrees of formality, ranging from informal reviews and checks to very formal inspection techniques associated with precisely defined individual activities and exact steps to follow.
- Even at the informal end, some general process or guidelines need to be followed so that some minimal level of consistency can be assured, and adequate coverage of important areas can be guaranteed.
- In addition, some organizational and tool support for inspection is also needed.

GENERIC INSPECTION PROCESS



Generic inspection process

PLANNING AND PREPARATION

- Inspection planning needs to answer the general questions about the inspection, including:
  - What are the objectives or goals of the inspection?
  - What are the software artifacts to be inspected or the objects of the inspection?
  - Who are performing the inspection?
  - Who else need to be involved, in what roles, and with what specific responsibilities?
  - What are the overall process, techniques, and follow-up activities of the inspection?

INSPECTION OR COLLECTION

- This step roughly corresponds to the execution of QA activities in generic quality engineering process.
- This step is also referred to as collection or collection meeting.
- The focus of this step is to detect faults in the software artifacts inspected, and record the inspection results so that these faults can be resolved in the next step.

CORRECTION AND FOLLOW-UP

- The discovered faults need to be corrected by people who are responsible for the specific software artifacts inspected. For example, in design or code inspection, the responsible designer or programmer, often labeled as design or code "owners" in industry, need to fix the design or code.
- There should be some follow-up activities to verify the fix.
- Sometimes, new inspection rounds can be planned and carried out,

FAGAN INSPECTION

- The earliest and most influential work in software inspection is Fagan inspection (Fagan, 1976), which is almost synonymous with the term "inspection" itself.
- Fagan inspection has been used widely across different industrial boundaries and on many different software artifacts, although most often on program code.
- Almost all the other inspection processes and techniques can be considered as derivatives of Fagan inspection, by enhancing, simplifying, or modifying it in various ways to fit specific application environment or to make it more effective or efficient with respect to certain criteria.

PROCESS AND PARTICIPANTS

- Planning: Deciding what to inspect, who should be involved, in what role, and if inspection is ready to start.
- Overview meeting: The author meets with and gives an overview of the inspection object to the inspectors. Assignment of individual pieces among the inspectors is also done.
- Preparation: Individual inspection is performed by each inspector, with attention focused on possible defects and question areas.

PROCESS AND PARTICIPANTS

- Inspection meeting to collect and consolidate individual inspection results. Fault identification in this meeting is carried out as a consensus building process.
- Rework: The author fixes the identified problems or provides other responses.
- Follow-up: Closing the inspection process by final validation.

GENERIC INSPECTION PROCESS AND FAGAN INSPECTION PROCESS

- We can adapt the generic inspection program (slide 7) to depict Fagan inspection in the following:
- The **"planning and preparation"** block can be expanded into three sequential steps, "planning", "overview", and "preparation" in Fagan inspection.
- The **"inspection/collection"** is directly mapped to the "inspection" step.
- The **"correction and follow-up"** block can be expanded into two sequential steps, "correction", and "follow-up".
- The dotted link for the next round of inspection is eliminated.

INSPECTION TEAM

- Fagan inspection typically involves about four people in the inspection team
- The potential inspectors are identified in the planning stage (Step 1) from those designers, developers, testers, or other software professionals or managers, who are reasonably familiar with the software artifacts to be inspected, but not necessarily those who directly work on it.
- An ideal mix would include people with different roles, background, experience, and different personal or professional characteristics, to bring diverse views and perspectives to the inspection.

INSPECTION WORK

- The assignment of individual pieces for inspection among the inspectors needs to take two issues into consideration: overall coverage and areas of focus.
- On the one hand, different inspectors will be assigned different pieces so as not to unnecessarily duplicate inspection effort.
- On the other hand, some important or critical pieces may need the focused attention of more than one inspector.
- The inspection meeting should be an organized event, with one inspector identified as the leader or moderator, who oversees the meeting and ensures that it fulfills its main purpose of defect identification and consolidation.
- The meeting typically lasts two hours or less.

INSPECTION WORK

- The focus is on defect detection and consolidation only, but not on defect resolution,
- A group of people working together would find and confirm problems that individuals may not.
- However, each individual must be fully prepared and bring forward candidate problems for the team to examine together.
- In this group process, false alarms will be eliminated, and consolidated defects will be confirmed, recorded, and handed over for authors to fix.

GENERAL OBSERVATIONS AND FINDINGS

- The importance of preparation
- Variations with team size, moderator role, and session coordination
- Defect detection techniques used in inspection
- Additional use of inspection feedback

OTHER INSPECTIONS AND RELATED ACTIVITIES

- Variations to Fagan inspection have been proposed and used to effectively conduct inspection under different environments.
- Some of them are direct responses to some of the general findings of Fagan inspection described above. We organize these inspection techniques and processes along two dimensions:
  - size and scope of the inspection,
  - formality of the inspection.

That is all