

Software Testing

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Chapter 6

Static Testing

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Objectives

- Static testing also improves the software quality.
- There are bugs which are detectable only through static testing.
- There are 3 types of static testing: Inspection, Walkthroughs and Reviews
- Inspections are the most widely used technique for static testing which is a formal process to detect the bugs at early stage.
- Benefits and effectiveness of inspection process
- Variants of Inspection process
- Walkthrough is a less formal and less rigorous method as compared to inspection.
- Review is higher level technique as compared to inspection or walkthrough, as it also includes management.

- Static testing techniques do not demonstrate that the software is operational or one function of software is working;
- They check the software product at each SDLC stage for conformance with the required specifications or standards. Requirements, design specifications, test plans, source code, user's manuals, maintenance procedures are some of the items that can be statically tested.
- Static testing has proved to be a cost-effective technique of error detection.
- Another advantage in static testing is that a bug is found at its exact location whereas a bug found in dynamic testing provides no indication to the exact source code location.

Types of Static Testing

- **Software Inspections**
- **Walkthroughs**
- **Technical Reviews**

Inspections

- Inspection process is an in-process manual examination of an item to detect bugs.
- Inspection process is carried out by a group of peers. The group of peers first inspects the product at individual level. After this, they discuss potential defects of the product observed in a formal meeting.
- It is a very formal process to verify a software product. The documents which can be inspected are SRS, SDD, code and test plan.

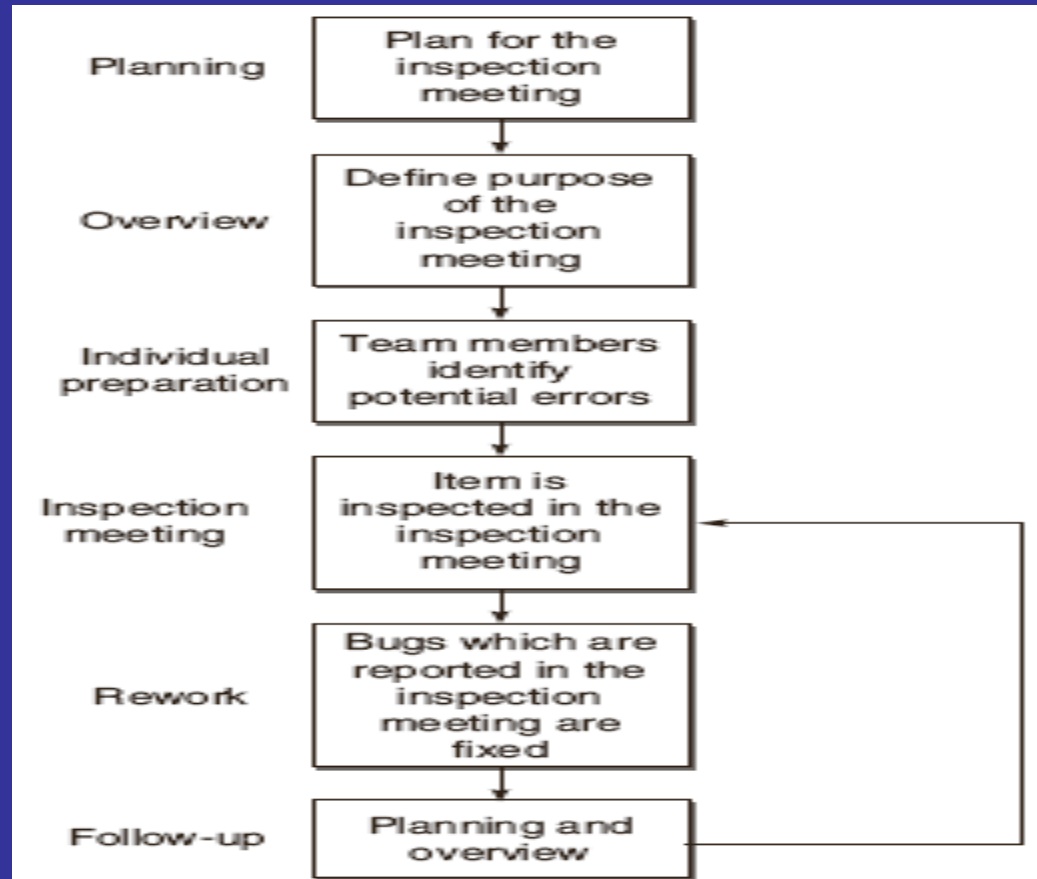
Inspections

- Inspection process involves the interaction of the following elements:
- Inspection steps
- Roles for participants
- Item being inspected

Inspection Team

- **Author / Owner / Producer(developer)**
- **Inspector(finds errors omisions and inconsistencies)**
- **Moderator(manages the whole inspection process)**
- **Recorder(results of inspection meeting)**

Inspection Process



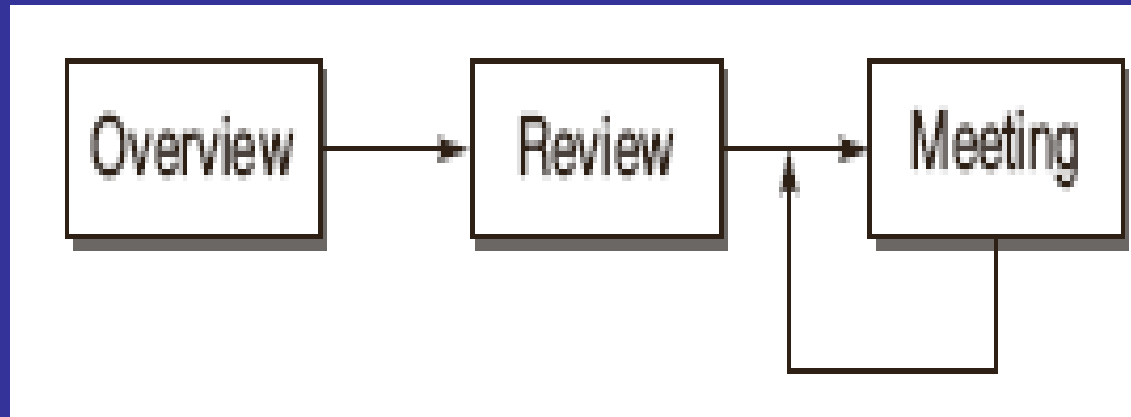
Benefits of Inspection Process

- Bug Reduction
- Bug Prevention
- Productivity
- Real-time Feedback to Software Engineers
- Reduction in Development Resource
- Quality Improvement
- Project Management
- Checking Coupling and Cohesion
- Learning through Inspection
- Process Improvement

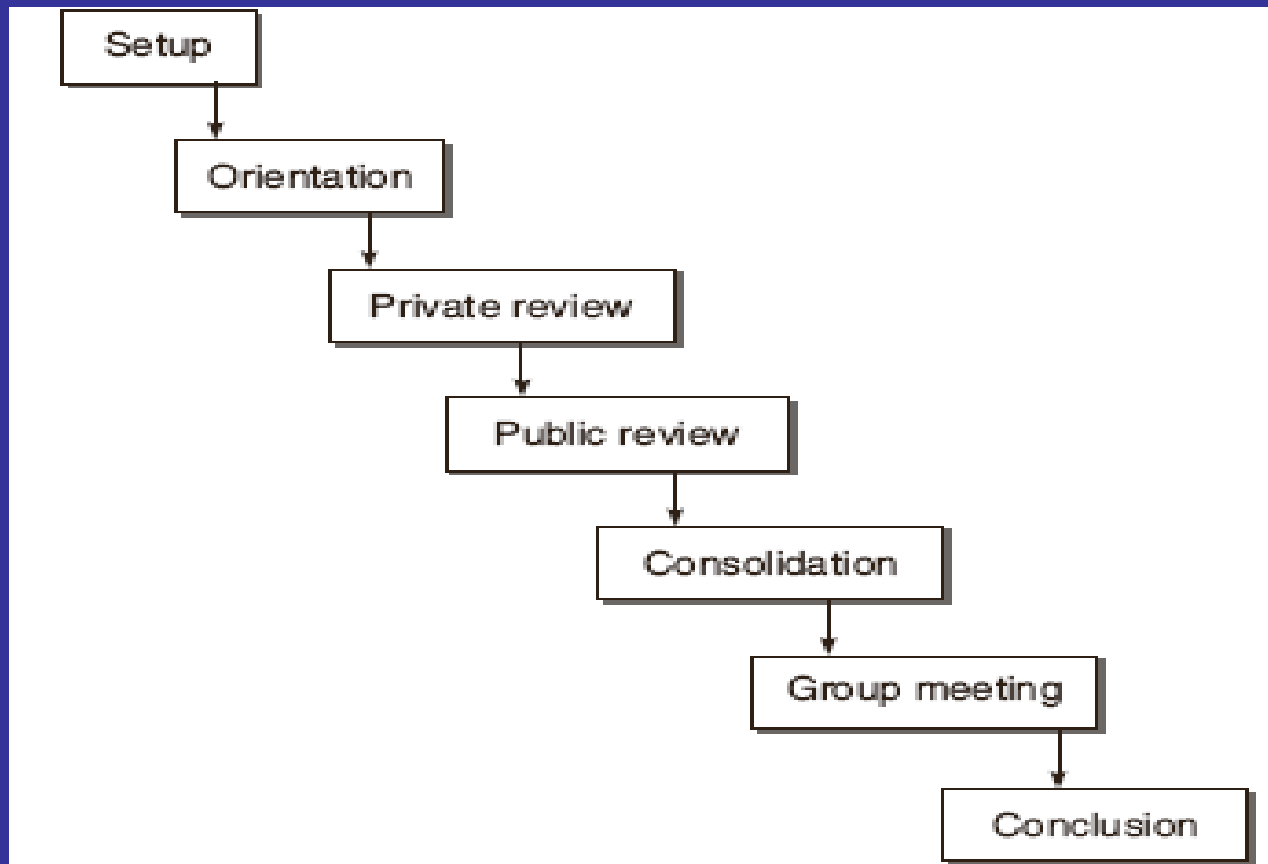
Variants of Inspection process

Active Design Reviews (ADRs)	Several reviews are conducted targeting a particular type of bugs and conducted by the reviewers who are experts in that area.
Formal Technical Asynchronous review method (FTArm)	Inspection process is carried out without really having a meeting of the members. This is a type of asynchronous inspection in which the inspectors never have to simultaneously meet.
Gilb Inspection	Defect detection is carried out by individual inspector at his level rather than in a group.
Humphrey's Inspection Process	Preparation phase emphasizes the finding and logging of bugs, unlike Fagan inspections. It also includes an analysis phase wherein individual logs are analysed and combined into a single list.
N-Fold inspections	Inspection process's effectiveness can be increased by replicating it by having multiple inspection teams.
Phased Inspection	Phased inspections are designed to verify the product in a particular domain by experts in that domain only.
Structured Walkthrough	Described by Yourdon. Less formal and rigorous than formal inspections. Roles are coordinator, scribe, presenter, reviewers, maintenance oracle, standards bearer, user representative. Process steps are Organization, Preparation, Walkthrough, and Rework. Lacks data collection requirements of formal inspections.

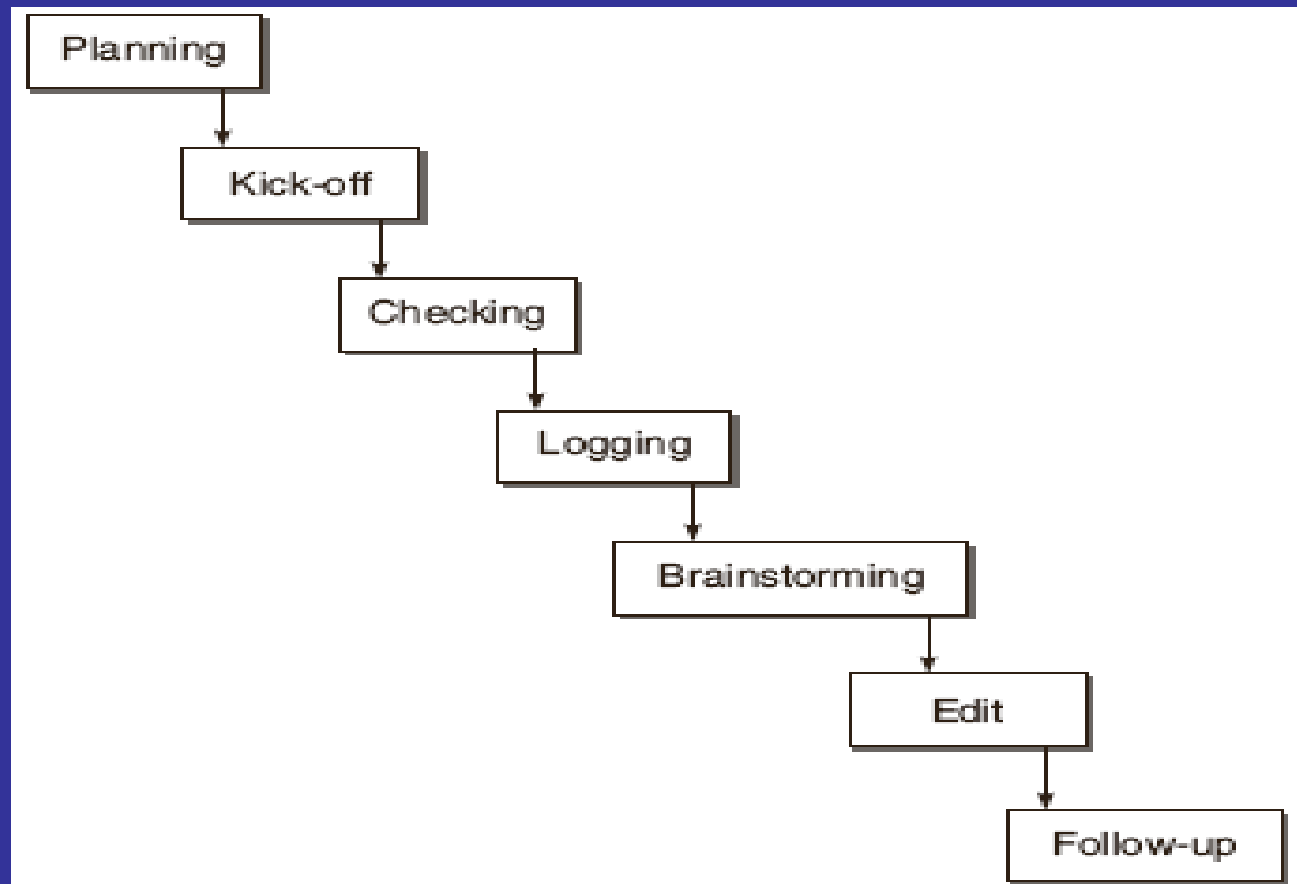
Active Design Reviews



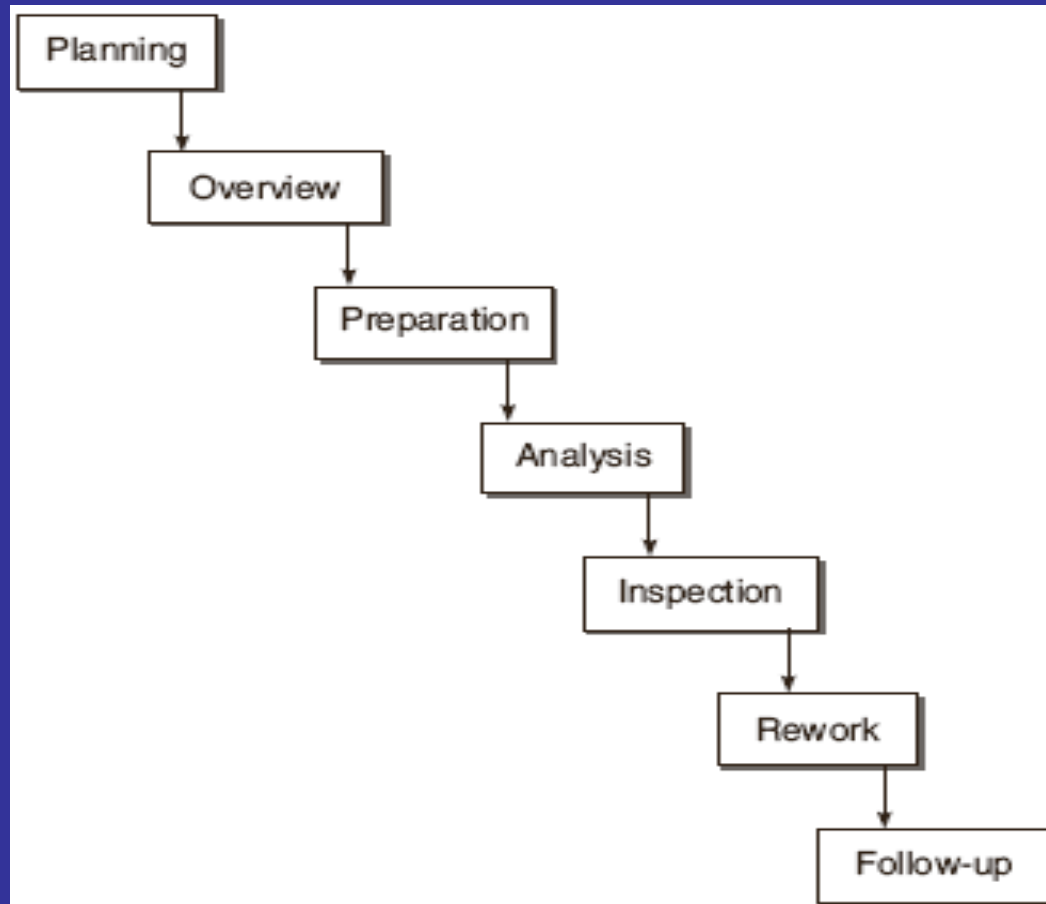
Formal Technical Asynchronous review method (FTArm)



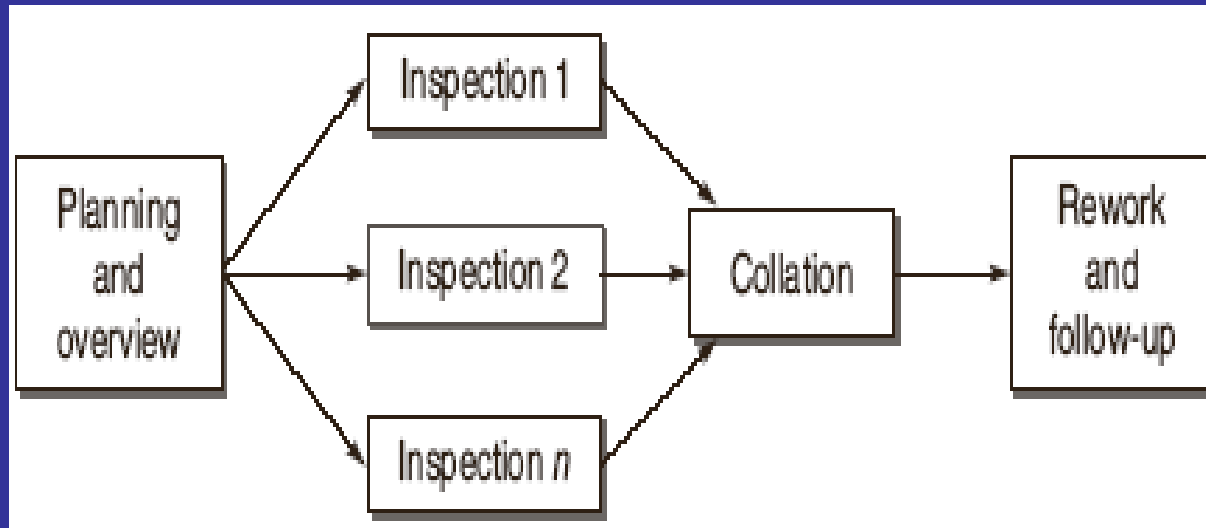
Gilb Inspection



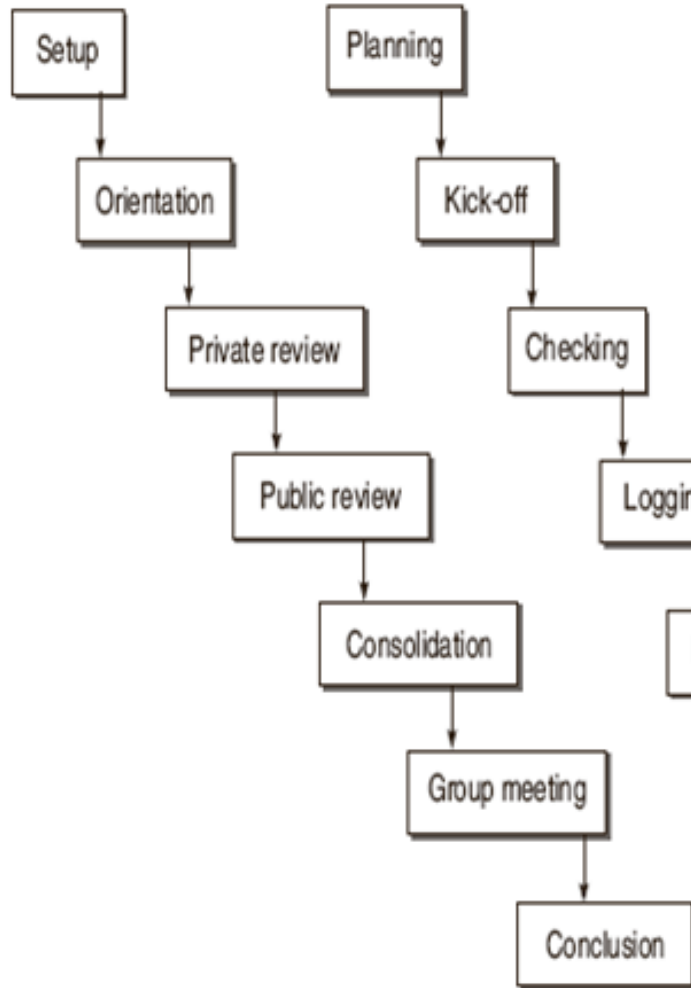
Humphrey's Inspection Process



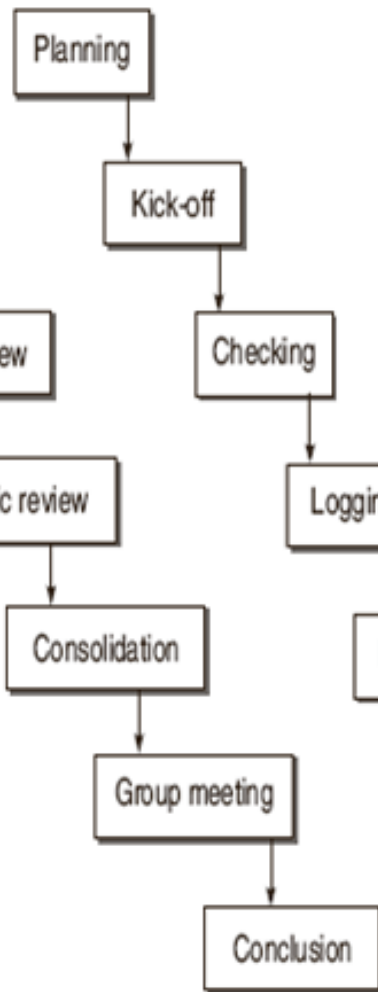
N-Fold Inspection



FTArm



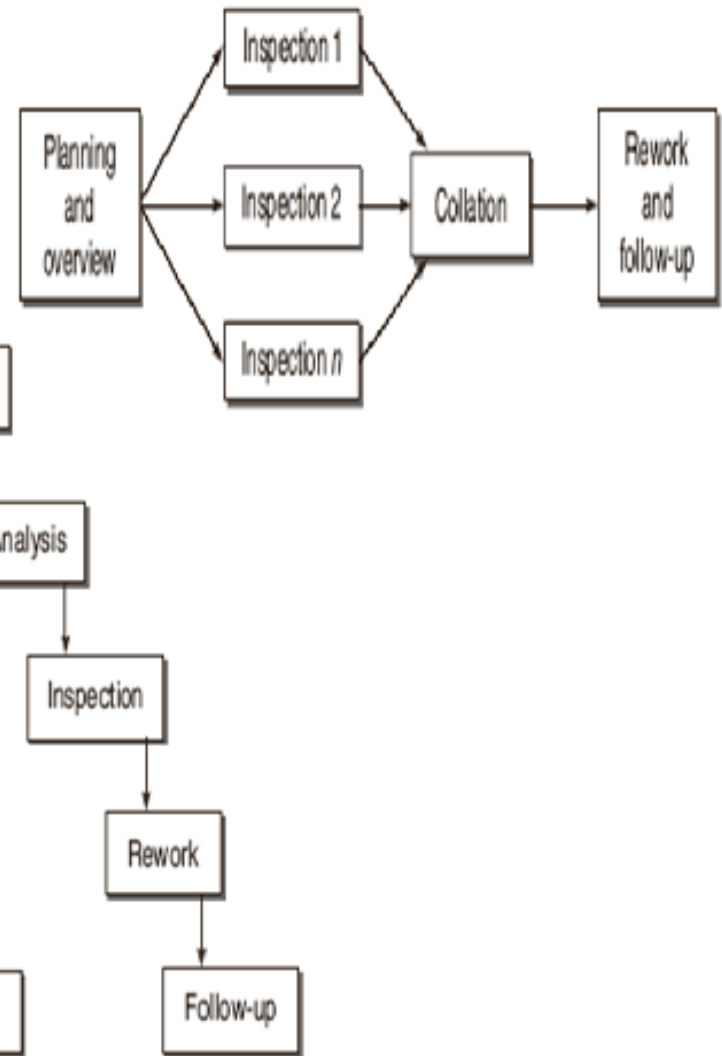
Gilb



Humphrey's



N-Fold



Reading Techniques

- A reading technique can be defined as a series of steps or procedures whose purpose is to guide an inspector in acquiring a deep understanding of the inspected software product.
- **Ad-hoc Method**
- **Checklists**
- **Scenario based Reading**

Perspective based Reading

- software item should be inspected from the perspective of different stakeholders. Inspectors of an inspection team have to check software quality as well as the software quality factors of a software artifact from different perspectives.

Usage based Reading

- This method given is applied in design inspections. Design documentation is inspected based on use cases, which are documented in requirements specification.

Abstraction driven Reading

- This method is designed for code inspections. In this method, an inspector reads a sequence of statements in the code and abstracts the functions these statements compute.

Task driven Reading

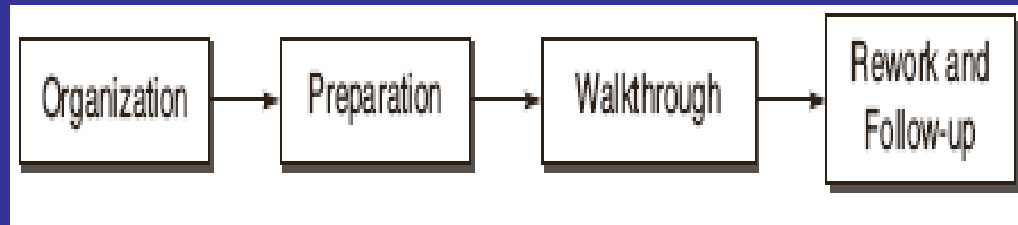
- This method is also for code inspections . In this method, the inspector has to create a data dictionary, a complete description of the logic and a cross-reference between the code and the specifications.

Function-point based Scenarios

- This is based on scenarios for defect detection in requirements documents [103]. The scenarios, designed around function-points are known as the Function Point Scenarios. A Function Point Scenario consists of questions and directs the focus of an inspector to a specific function-point item within the inspected requirements document.

Structured Walkthroughs

It is a less formal and less rigorous technique as compared to inspection. The very common term used in the literature for static testing is Inspection but it is for very formal process. If you want to go for a less formal having no bars of organized meeting, then walkthroughs are a good option.



A review is similar to an inspection or walkthrough, except that the review team also includes management. Therefore, it is considered a higher-level technique than inspection or walkthrough.

A technical review team is generally comprised of management-level representatives of the User and Project Management. Review agendas should focus less on technical issues and more on oversight than an inspection.