Software Inspection

- Software inspection involves people examining the source representation with the aim of discovering anomalies and defects.
- They have been shown to be an effective technique for discovering program error.
- The software inception is conducted only when the author, i.e. developer, has made sure that the code is ready for inspection.
- After passing through these review methods, the code is then sent for group inception.

Process of Software Inspection

- Planning
  - Select the group review team (3-5) Members.
  - Identify the moderator.
  - Prepare the package for distribution – Work product for review plus supporting docs.
  - The package should be complete for review.
- Overview
  - Brief meeting – Deliver package, explain the purpose of the review, introduction, etc.
  - All team members then individually review the work product.
  - Ideally should be done in one sitting, and issues are recorded in the log.

Process of Software Inspection

- Individual Preparation
  - Each reviewer studies the project individually.
  - Notes down the issues that have come across while studying the project.
  - Decides how to put up these issues and makes a note of it.

Process of Software Inspection

- Inspection Meeting
  - Reviewer goes over the product line by line. At any line, all issues are raised.
  - Discussion follows to identify if a defect.
  - Decisions are recorded at the end of the inspection meeting.
  - Scribe present the list of defects. If few defects, the work product is accepted; else, it might be asked for another review.
  - Group does not propose solutions through some suggestions that may be recorded.
  - A summary of the inspection is prepared, which is useful for evaluating effectiveness.

Process of Software Inspection

- Rework and Follow-up
  - Defects bin the defect list are fixed later by the author. These modifications are made to repair the discovered errors. Once fixed, the author gets it OKed by the moderator or goes for another review.
  - A reinspection may or may not be required.
  - Once all defects are satisfactorily addressed, the review is completed, and collected data is submitted.

Process of Software Inspection

- Inspection Roles
  - Author or owner
  - Inspector
  - Moderator or Chairman
  - Scribe
  - Reader
  - Chief Moderator

Advantages of Inspection

- The goal of this method is to detect all faults, violation and other side effects.
- Authors and other reviewers do complete preparation before conducting an inspection.
- A group of people are involved in the inspection procedure; multiple diverse views are enlisted.
- Every person in the inspection team is assigned a specific role.
- The reader in the inspection reads out the document sequentially in a structured manner so that all the points and all the code is inspected thoroughly.

Disadvantages of Inspection

- scheduling can become an issue since multiple people are involved.
- Time-consuming as it needs preparation as well as formal meetings.
- It is not always possible to go through every line of code with several parameters and their combination to ensure the correctness of the logic, side effects and appropriate error handling.

Deskchecks

- The term "desk checking" refers to the manual approach of reviewing source code (sitting a desk), rather than running it through a debugger or another automated process.
- In some cases, a programmer may even use a pencil and paper to record the process and output of functions within a program.
- Developers may desk check their code before releasing a software program to make sure the algorithms are functioning efficiently and correctly.
- It is useful for uncovering logic errors and other issues within a program's source code, it is time-consuming and subject to human error.

A desk check is normally done as a table with columns for:

- Pseudo code **line number** column (Pseudo code doesn't normally have lines numbers, but these are necessary in a desk check to specify the line(s) being executed)
- **One column per variable** used. The columns should be in alphabetical order on variable name with the variable name at the top of the column.
  - As the algorithm is executed, the new values of the variables are put in the appropriate column. Show working for calculations. e.g. the variable column heading *discount Price* could be used rather than the actual variable name *discountPrice*.

A desk check is normally done as a table with columns for:

- A **condition** column. The result of the condition will be true (T) or false (F). As the algorithm is executed, conditions are evaluated and the details are recorded in the column. Show working when evaluating the conditions. This is used whenever a condition is evaluated.
- An **Input/Output** column is used to show what is input by the user and displayed by the program. Show inputs with: the variable name, a "?" and the value input e.g. price ? 200.

Walkthrough

- A *walkthrough* is an informal way of presenting a technical document in a meeting.
- Unlike other kinds of reviews, the author runs the walkthrough: calling the meeting, inviting the reviewers, soliciting comments, and ensuring that everyone present understands the work product.
- It typically does not follow a rigid procedure; rather, the author presents the work product to the audience in a manner that makes sense.

Walkthrough

- Walkthroughs are used when the author of a work product needs to take into account the perspective of someone who does not have the technical expertise to review the document.
- For example, a requirements analyst must make sure that the use cases she builds will provide the functionality that the users need, but the user representatives may not have seen use cases before and would be overwhelmed by them.
- The user sit in the meeting silently

Pair Programming

- Innovative practice, Introduced in XP is that programmers work in pairs to develop the software.
- A pair of programmers are sit together at the same workstation to develop the software.
- However, the same pairs do not always program together.
- Pairs are created dynamically so that all team members work with each other during the development process.

Advantages of Pair Programming

- It supports the idea of collective ownership and responsibility for the system. The team has common responsibility for resolving problems.
- Pair programming is a less formal process that probably doesn't find as many errors as code inspections, it is a much cheaper inspection process than formal program inspections.
- It helps support refactoring, which is a process of software improvement. Where pair programming and collective ownership are used.

Summarize Advantages of Pair Programming

- Fewer Coding Mistakes
- Knowledge is spread among the pairs.
- Reduced effort to Co-ordinate.
- Increase Resiliency

Challenges of Pair Programming

- Efficiency
- Equally Engaging pairs
- Social and Interactive Process
- Sustainability

Code Review

- Code Review, is the act of consciously and systematically convening with one's fellow programmers to check each other's code for mistakes and has been repeatedly shown to accelerate and streamline the process of software development like few other practices can.
- A perfect code should be easy to understand, flexible to modify, and readable. But since the work develops quickly, it may overlook these factors. That's why code reviews procedures are necessary to improve its quality.
- A code review accelerates and streamlines the software development process.

Benefits of Code Review

- Ensures consistency in design and implementation.
- Optimizing code for better performance.
- Collaborating and sharing new techniques
- Tracking project requirement and quality

Process of Code Review

- Know what you're looking for in a code review.
- Understand the different ways to conduct a code review.
- Hold regular group meetings where participants can receive feedback on their particular areas while also receiving notes about any issues.
- Make comments clear and specific.
- Be open to improvement.
- Be available for discussions.
- Start with small changes, then review more complex ones.
- Keep the status of a commit updated.

Where should code review be done

- Over the shoulder.
  - It happen at a developer's desk, where an experienced team member walks through the new code and makes suggestions.
- Email Passaround
  - The code is sent by e-mail once it is ready. Although e-mails offer a more passive approach to code review, content can become nested in multiple replies and difficult to manage and search.
- Pair Programming
- Tool assisted
  - It could be open source or paid, like GitHub, BitBucket, etc. Today, most people prefer it.

Use inspection to manage commitments

- A successful project needs more than just a blanket agreement between team members.
- It's very easy for someone to "agree" to a document, only to turn around later and decide that he didn't fully understand what he was agreeing to.
- The goal of an inspection is to build consensus on the document by gaining a real commitment from everyone who has read it.
- When a reviewer approves a document, he takes responsibility for its contents, and if the document has defects, he shares some of the blame for missing the mistake.

Use inspection to manage commitments

- The best way to reach consensus among the inspection team is for each person to feel like he or she made a real contribution to the document.
- The inspection meeting accomplishes that by allowing each person to find problems in the document and help the rest of the team find a solution to each problem.
- This is why it's important for the team to go beyond just pointing out the defects in the document and actually come up with replacement wordings that fix the defects.