Software Inspections and Testing

Software inspections play a key role in building quality into a software product, and testing plays a key role in verifying that the software is correct and corresponds to the requirements. The objective of inspections is to build quality into the software product as there is clear evidence that the cost of correction of a defect increases the later in the development cycle in which the defect is detected. Consequently, there is an economic argument to employing software inspections as there are cost savings in investing in quality up front rather than adding quality later in the cycle. The purpose of testing is to verify that quality has been built into the product, and in a mature software company the majority of defects (e.g., 80%) will be detected by software inspections with the remainder detected by the various forms of testing conducted in the organization.

There are several approaches to software inspections, and the degree of formality employed in an inspection varies with the particular method adopted. The simplest and most informal approach consists of a walkthrough of the document or code by an individual other than the author. The informal walkthrough generally consists of a meeting of two people, namely, the author and a reviewer. The meeting is informal and usually takes place at the author’s desk or in a meeting room, and the reviewer and author discuss the document or code, and the deliverable is reviewed informally.

There are very formal software inspection methodologies and these include the well-known Fagan inspection methodology [Fag:76] and the Gilb methodology [Gilb:94], and these typically include pre-inspection activity, an inspection meeting, and post-inspection activity. Several inspection roles are typically employed, including an author role, an inspector role, a tester role, and a moderator role. The Fagan inspection methodology was developed by Michael Fagan of IBM, and the Gilb methodology was developed by Tom Gilb. The formality of the inspection methodology used by an organization is dependent on the type of organization and its particular business. For example, telecommunications companies tend to employ a very formal inspection process, as it is possible for a one-line software change to create a major telecommunications outage. Consequently, a telecommunications company needs to assure the quality of its software, and a key part of building the quality in is the use of software inspections. The organization needs to devise an inspection process which is suitable for its particular needs.
The quality of the delivered software product is only as good as the quality at the end each particular phase. Consequently, it is desirable to exit the phase only when quality has been assured in the particular phase. Software inspections assist in assuring that quality has been built into each phase, and thus assuring that the quality of the delivered product is good. Software testing verifies the correctness of the software. Customer satisfaction is influenced by the quality of the software and its timely delivery.

2.1 Overview Fagan Inspections

The Fagan methodology is a well known software inspection methodology. It is a seven-step process, including planning, overview, preparation, inspection, process improvement, re-work, and follow-up activity. Its objectives are to identify and remove errors in the work products, and also to identify any systemic defects in the processes used to create the work products. A defective process may lead to downstream defects in the work products.

There is a strong economic case for identifying defects as early as possible, as the cost of correction increases the later a defect is discovered in the lifecycle. The Fagan inspection process stipulates that requirement documents, design documents, source code and test plans all be formally inspected by experts independent of the author, and the experts typically inspect the deliverable with different viewpoints, for example, requirements, design, test, customer support, etc.

There are various roles defined in the inspection process, including the moderator, who chairs the inspection, the reader, who paraphrasing the particular deliverable and gives an independent viewpoint, the author, who is the creator of the deliverable; and the tester, who is concerned with the testing viewpoint. The inspection process will consider whether a design is correct with respect to the requirements, and whether the source code is correct with respect to the design. There are seven stages in the Fagan inspection process: