Software Engineering Reviews

TDDC90
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Agenda - Theory

Part I
Inspections

Part II
Other reviews

Part II
Variants and research
Part 1 Inspections
Systematic inspections

The best way of finding many defects in code and other documents

- Experimentally grounded in replicated studies

Goals:

- Find defects (anomalies)
- Training
- Communications
- Hostage taking
Development over the years

• Fagan publishes results from code and design inspections 1976 in IBM systems journal
• Basili and Selby show the advantage of inspections compared to testing in a tech-report 1985.
• Graham and Gilb publish the book Software inspections 1993. This describes the standard process of today.
• Presentation of the Porter-Votta experiment in Sorrento 1994 starts a boom for replications.
• Sauer et al compare experimental data with behavioural research in a tech-report 1996
• IEEE std 1028 updated 2008
Roles

- Author
- Moderator (aka Inspection leader)
- Reader (if not handled by the Moderator)
- Inspector
- Scribe (aka Recorder)
Process

• Initial:
  • Check criteria
  • Plan
  • Overview

• Individual:
  • Preparation, or
  • Detection

• Group:
  • Detection, or
  • Collection
  • Inspection record
  • Data collection

• Exit:
  • Change
  • Follow-up
  • Document & data handling
Inspection record

- Identification
- Location
- Description

Decision for entire document:
  - Pass with changes
  - Reinspect
Data collection

• Number of defects
• Classes of defects
• Severity
• Number of inspectors
• Number of hours individually and in meeting
• Defects per inspector
• Defect detection ratio:
  • Time
  • Total defects
## Our inspection record

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Practical investigation

- 214 code inspections from 4 projects at Ericsson
- Median number of defects = 8
- 90 percentile = 30
- Majority values:
  - up to 3.5 h preparation per document
  - up to 3 h inspection time
  - up to 4000 lines of code
  - 2 to 6 people involved

**Inspection rate (IEEE Std 1028-2008)**

- Requirements or Architecture (2-3 pages per hour)
- Source code (100-200 lines per hour)
Regression wrt defect detection ratio

• Preparation time per code line typically 0.005 hours per line (12 minutes per page)
• Size of document have negative effect on DFR, max recommendation 5000 lines
• A certain project is better than two of the others
• 4 inspectors seems best (not significant)
• Analysis performed by Henrik Berg, LiTH-MAT-Ex-1999-08
Part II
Other reviews
Other reviews

- Management review – check progress
- Walk-through – improve product, training
- Technical review – evaluate conformance
- Audit – 3rd party, independent evaluation
- (Peer) Review
- Buddy-check
- Desk check
Technical reviews

• Determine the technical status of the product
• Evaluate conformance to specifications and standards
• Evaluate if the software is complete and suitable for intended use
• Performed by technical leadership and peers for a decision maker
• Higher volume of material than inspections
• Output: corrective actions (date and responsible), status, recommendations
Audits

- **External 3rd party (independent) evaluation of conformance to specification and standards**
- **An initiator (manager, customer, user representative) decides on the need for an audit**
- **Evidence collection, investigative actions**
- **The audit team gets information form liaison within the audited organization**
- **Output: Findings (major, minor)**
Root-cause analysis

- Performed regularly for severe defects, frequent defects, or random defects
- Popular mind map: The Ishikawa diagram
- Parameters:
  - Defect category
  - Visible consequences
  - Did-detect
  - Introduced
  - Should-detect
  - Reason
Sometimes the term “inspection” is used for this review.

Source: https://review.openstack.org/Documentation/intro-quick.html
Part II
Variants and research
Reading techniques - checklist

- Checklist
- Industry standard
- Shall be updated
Reading techniques - scenario

- Scenario, e.g.
  - Algorithm
  - Data types
  - Missing functions
  - Vulnerability
- A checklist splitted to different responsibilities
- 30% higher DFR?
Reading techniques – perspective-based

• Different inspectors represent different roles, e.g.
  • Programmer
  • Tester
  • Architect
• Real or played roles
• 30% higher DFR?
Cost of quality

- Person-hours
- Calender time
- Good reading techniques
- Good data recording
"Optimal" method

Inspectors

Repository

Two experts

Defect list

False positives
Summary - What have we learned today?

- Inspections rule!
- Inspections are expensive
That’s all, folks!