Inspections

Lecture 9

Software Engineering
TDDC88/TDDC93
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Theory Lecture Plan

L1 - Course Introduction and Overview
L2 - Project Management
L3 - Requirements
L4 - Acceptance Testing and Quality Factors
L5 – UML
L6 - Design Patterns
L7 - System Design and Architecture
L8 - Testing Theory
L9 - Inspections
L10 - Testing in Practice
L11 - Software Life Cycles and Configuration Management
L12 - Software Quality Management
L13 - Course Summary, Exam examples, Questions
A Software Life-cycle Model
Which part will we talk about today?

- **Part I – Practical exercise**
- **Part II – The formal process**
- **Part III – Variants and alternatives**

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**Agenda - What will you learn today?**

- **Part I – Practical exercise**
- **Part II – The formal process**
- **Part III – Variants and alternatives**

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Part I
Practical exercise

Systematic inspections

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

- Experimentally proven in replicated studies

Goals:

- Find defects
- 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

Our inspection record

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<th>Id</th>
<th>Loc.</th>
<th>Description</th>
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Part II
The formal process

Roles

- Author
- Moderator
- Inspector
- Scribe
Part I
Practical exercise

Part II
The formal process

Part III
Variants and alternatives

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### 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

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### 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

Part III
Variants and alternatives
Part I
Practical exercise

Part II
The formal process

Part III
Variants and alternatives

Reading techniques - checklist

- Checklist
  - Industry standard
  - Shall be updated

Reading techniques - scenario

- Scenario
  - A checklist split to different responsibilities
  - 30% higher DFR?
Part I
Practical exercise

Part II
The formal process

Part III
Variants and alternatives

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Reading techniques – perspective-based

- Different inspectors represent different roles
- Real or played roles
- 30% higher DFR?

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Reading techniques – usage-based

- Inspect use-cases in order of priority
- 30% higher DFR?
- 75% higher DFR for most important faults?
Part I
Practical exercise

Part II
The formal process

Part III
Variants and alternatives

Capture-recapture

inspector 1

inspector 2

inspector 3

Many remaining defects

Fewer remaining defects

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

Practical investigation

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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*

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
Cost of quality

- Person-hours
- Calendar time
- Good reading techniques
- Good data recording

"Optimal" method

Inspectors

Repository

Two experts

Defect list

False positives
Part I
Practical exercise

Part II
The formal process

Part III
Variants and alternatives

Weaker methods

- Desk check
- Peer review
- Structured walk-through
- Review
- Audit

Inspections in quality assurance

- Appraisal – defect detection
- Assurance – prediction of defects
- Control – adjust the process
- Improvement: reduce variation, increase precision
Summary - What have we learned today?

- Inspections rule!
- Inspections are expensive