Lecture 9: Inspections & Reviews

Types of Inspection

Benefits of Inspection

- Inspection is more cost effective than testing

How to conduct an inspection

- who to invite
- how to structure it

Some tips

Reviews, Inspections, Walkthroughs…

Note: these terms are not widely agreed

formality
- informal: *from* meetings over coffee, *to* regular team meetings
- formal: scheduled meetings, prepared participants, defined agenda, specific format, documented output

"Management reviews"
- E.g. preliminary design review (PDR), critical design review (CDR), …
- Used to provide confidence that the design is sound
- Attended by management and sponsors (customers)
- Usually a "dog-and-pony show"

"Walkthroughs"
- developer technique (usually informal)
- used by development teams to improve quality of product
- focus is on finding defects

"(Fagan) Inspections"
- a process management tool (always formal)
- used to improve quality of the development process
- collect defect data to analyze the quality of the process
- written output is important
- major role in training junior staff and transferring expertise

Source: Adapted from Blum, 1992, Freedman and Weinberg, 1990, & notes from Philip Johnson.

Benefits of formal inspection

For applications programming:

most reviewed programs run correctly first time

compare: 10-50 attempts for test/debug approach

Data from large projects

Data from Bell-Northern Research:

Inspection cost: 1 hour per defect.

Testing cost: 2-4 hours per defect.

Post-release cost: 33 hours per defect.

error reduction by a factor of 5; (10 in some reported cases)

improvement in productivity: 14% to 25%

percentage of errors found by inspection: 58% to 82%

cost reduction of 50%-80% for V&V (even including cost of inspection)

Effects on staff competence:

increased morale, reduced turnover

better estimation and scheduling (more knowledge about defect profiles)

better management recognition of staff ability

Constraints

Source: *Adapted from Blum, 1992, pp369-373 & Freedman and Weinberg, 1990.*

Size

"enough people so that all the relevant expertise is available"

min: 3 (4 if author is present)

max: 7 (less if leader is inexperienced)

Duration

never more than 2 hours

concentration will flag if longer

Outputs

all reviewers must agree on the result

accept or re-work or re-inspect

all findings should be documented

summary report (for management)

detailed list of issues

Scope

focus on small part of a design, not the whole thing

Fagan recommends rates:

130-150 SLOC per hour

Timing

Examines a product once its author has finished it

not too soon

product not ready - find problems the author is already aware of

not too late

product in use - errors are now very costly to fix

Choosing Reviewers

Source: *Adapted from Freedman and Weinberg, 1990.*

Possibilities

specialists in reviewing (e.g. QA people)

people from the same team as the author

people invited for specialist expertise

people with an interest in the product

visitors who have something to contribute

people from other parts of the organization

Exclude

anyone responsible for reviewing the author

i.e. line manager, appraiser, etc.

anyone with known personality clashes with other reviewers

anyone who is not qualified to contribute

all management

anyone whose presence creates a conflict of interest

Roles

Source: Adapted from Blum, 1992, pp369-373

Formal Walkthrough

Review Leader

- chairs the meeting
- ensures preparation is done
- keeps review focussed
- reports the results

Recorder

- keeps track of issues raised

Reader

- summarizes the product piece by piece during the review

Author

- should actively participate (may be the reader)

Other Reviewers

- task is to find and report issues

Fagan Inspection

Moderator

- must be a competent programmer
- should be specially trained
- could be from another project

Designer

- programmer who produced the design being inspected

Coder/Implementor

- programmer responsible for translating the design to code

Tester

- person responsible for writing/executing test cases

Source: Adapted from Freedman and Weinberg, 1990.

Guidelines

Prior to the review

- schedule Formal Reviews into the project planning
- train all reviewers
- ensure all attendees prepare in advance

During the review

- review the product, not its author
  - keep comments constructive, professional and task-focussed
- stick to the agenda
  - leader must prevent drift
- limit debate and rebuttal
  - record issues for later discussion/resolution
- identify problems but don't try to solve them
- take written notes

After the review

- review the review process

Opening Moments

Source: Adapted from Wiegers 2001.

1) Don't start until everyone is present

2) Leader announces:
   "We are here to review product X for purpose Y"

3) Leader introduces the reviewers, and explains the recording technique

4) Leader briefly reviews the materials
   check that everyone received them
   check that everyone prepared

5) Leader explains the type of review

Note: The review should not go ahead if:
   some reviewers are missing
   some reviewers didn't receive the materials
   some reviewers didn't prepare

Structuring the inspection

Checklist

uses a checklist of questions/issues

review structured by issue on the list

Walkthough

one person presents the product step-by-step

review is structured by the product

Round Robin

each reviewer in turn gets to raise an issue

review is structured by the review team

Speed Review

each reviewer gets 3 minutes to review a chunk, then passes to the next person

good for assessing comprehensibility!

Source: Adapted from Blum, 1992, pp374-375

Fagan Inspection Process

1 Overview

communicate and educate about product

circulate materials

Rate: 500 SLOC per hour

2 Preparation

All participants perform individually

review materials to detect defects

Rate: 100-125 SLOC per hour

3 Inspection

a reader paraphrases the design

identify and note problems (don't solve them)

Rate: 130-150 SLOC per hour

4 Rework

All errors/problems addressed by author

Rate: 16-20 hours per 1000 SLOC

5 Follow-up

Moderator ensures all errors have been corrected

if more than 5% reworked, product is re-inspected by original inspection team

Tactics for problematic review meetings

Devil's advocate

deliberate attempt to adopt a contrary position

Bebugging

put some deliberate errors in before the review

with prizes for finding them!

Money bowl

if a reviewer speaks out of turn, he/she puts 25c into the drinks kitty

Alarm

use a timer to limit 'speechifying'

Issues blackboard

appoint someone to keep an issues list, to be written up after the review

Stand-up review

no tables or chairs!

References

van Vliet, H. "Software Engineering: Principles and Practice (2nd Edition)" Wiley, 1999.

Section 13.4 gives a very brief overview of inspections and walkthroughs.

Freedman, D. P. and Weinberg, G. M. "Handbook of Walkthroughs, Inspections and Technical Reviews". Dorset House, 1990.

Good practical guidebook, full of sensible advice about conducting reviews. Not so strong on the data collection and process improvement aspects of Fagan inspections, though.

Ackerman, A. F. "Software Inspections and the Cost Effective Production of Reliable Software". From "Software Engineering", Dorfman & Thayer, eds., IEEE Computer Society Press, 1997.

This paper summarizes some of the practical aspects of introducing inspections, including how inspectors are trained.

Karl E. Wiegers, "Peer Reviews in Software: A Practical Guide", Addison-Wesley, 2001

Not actually published yet, but some chapters are on the web. We'll be using the forms from this book for our practical inspection exercise in the tutorials.

Blum, B. "Software Engineering: A Holistic View". Oxford University Press, 1992

Section 5.2 provides one of the best overview of walkthroughs and inspections anywhere. Blum manages to cut through a lot of the confusion about 'walkthroughs', 'inspections' and 'reviews' managing to get to the key issues.