



# Lecture 6: Formal Inspections

- 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, Walkthroughs, Inspections...

- "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)
    - > Often just 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
- These definitions are not widely agreed!

  - ↳ Other terms used:
    - > Formal Technical Reviews (FTRs)
    - > Formal Inspections
  - All types can vary in their formality:
    - ↳ informal:
      - > meetings over coffee, regular team meetings, etc.
    - ↳ formal:
      - > scheduled meetings,
      - > prepared participants,
      - > defined agenda,
      - > specific format,
      - > documented output



# Benefits of formal inspection

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

- Formal inspection works well for programming:
  - ↳ For applications programming:
    - > more effective than testing
    - > most reviewed programs run correctly first time
    - > compare: 10-50 attempts for test/debug approach
  - ↳ Data from large projects
    - > 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
- These benefits also apply to requirements inspections
  - ↳ Many empirical studies investigated variant inspection processes
  - ↳ Mixed results on the relative benefits of different processes



# Inspection 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
- Purpose
  - ↳ Remember the biggest gains come from fixing the process
    - > collect data to help you not to make the same errors next time



## 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



## Guidelines

Source: Adapted from Freedman and Weinberg, 1990.

### → 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

### → Walkthrough

- ↳ 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!



## Fagan Inspection Process

Source: Adapted from Blum, 1992, pp374-375

### 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

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. Wieggers, "Peer Reviews in Software: A Practical Guide", Addison-Wesley, 2001

*We'll be using the forms from this book for the practical inspection exercise.*

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.*