Bug Hunt

“Software inspections and their cousins, reviews and walkthroughs, are proven techniques for reducing the number of defects in a program before it goes out the door.”

“The greatest leverage from the time spent on software inspections comes from examining requirements documents.”

Wie95

Reviews and Walkthroughs

• 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

Formal Inspections

• 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

Benefits of Formal Inspection

• For programming:
  – For applications programming:
    • more effective than testing
    • most reviewed programs run correctly first time
    • compare: 10-50 attempts for test/debug approach
  – 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 various inspection processes
  – Mixed results on the relative benefits of different processes

Statistics on Benefits

<table>
<thead>
<tr>
<th>Metric</th>
<th>Benefit</th>
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<tbody>
<tr>
<td>Error reduction</td>
<td>Factor of 5 (10 in some cases)</td>
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<tr>
<td>Improvement in productivity</td>
<td>14% to 25%</td>
</tr>
<tr>
<td>Percentage of errors found by inspection</td>
<td>58% to 82%</td>
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<tr>
<td>Cost reduction of V&amp;V (includes inspection costs)</td>
<td>50% to 80%</td>
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</table>
Inspection Process

1. Planning
   - Select reviewers and assign roles.
   - Schedule the overview and inspection meetings.
   - Distribute the inspection materials.

2. Overview
   - Educate the inspection team about the important features of the work product.
   - Determine/state the inspection objectives.

3. Preparation
   - All participants complete the following tasks individually:
     - perform inspections based on the decided-upon criteria.
     - review materials to detect defects.

4. Inspection Meeting
   - a reader paraphrases portions of the work product
   - identify and record problems (don’t solve them)
   - Make product appraisal

5. Rework
   - All errors/problems addressed by author

6. Follow-up
   - Moderator ensures all errors have been corrected
   - if more than 5% reworked, product is re-inspected by original inspection team

1. Planning: Choosing Reviewers

- 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

2. Overview: Determine Inspection Objectives

- Determine the scope
  - It may not be possible to review the entire document in a single inspection.

- Agree upon inspection criteria
  - Requirements should be: correct, feasible, necessary, prioritized, unambiguous, verifiable, complete, consistent, modifiable, traceable.
  - Example categories (Weiger’s defect types): Missing, Wrong, Extra, Usability, Performance, Style, Clarity.
  - Decide on the issues log and/or checklist.

3. Preparation: Individual Inspections

- Review the document.
- Focus on the agreed upon criteria and using the log/checklist find and record defects.
- Describe the defect, its severity and its location.
- Log typos and style errors as well.
- Individual inspections are completed before the inspection meeting.

4. Inspection Meeting: Opening Moments

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
4. Inspection Meeting: 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 document
- **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!

Note: the meeting structure is independent of the log/checklist used for individual inspections.

4. Inspection Meeting: Make Document Appraisal

- Possible document appraisals:
  - **Accepted As Is**
    - Few or no modifications required, no need to verify modified version.
  - **Accept Conditionally**
    - Defects must be fixed and changes need to be verified by a member of the inspection team.
  - **Re-inspect Following Rework**
    - Many changes to be made. A second inspection is required after the author has made the changes.
  - **Inspection not completed**
    - A large portion of the document was not inspected.
- If inspectors disagree on the product appraisal, then the most conservative appraisal is used.

5. Rework & 6. Follow-up

- Author corrects the defects and typos.
- The rework effort is recorded.
- A member of the inspection team verifies that the changes were made.
- The final inspection report is delivered.

Review: Inspection Process

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Inspection Constraints

- **Size**
  - “enough people so that all the relevant expertise is available”
    - min: 3 (4 if author is present)
    - max: 7 (fewer if leader is inexperienced)
- **Duration**
  - Inspection meeting never more than 2 hours
- **Outputs**
  - all reviewers must agree on the product appraisal
  - all findings should be documented
    - summary report (for management)
    - detailed list of issues

Inspection Constraints [2]

- **Scope**
  - May need to focus only on part of the requirements document.
    - Explain the reason for selection one part over another.
- **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

[Blu92], [FW90]
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-focused
  – 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

Tactics for Problematic Reviews

• 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


