Software Peer Reviews: An Executive Overview

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Agenda

- Define “peer review”
- Some benefits from peer reviews and inspections
- Different types of peer reviews
- The inspection process and participants
- Peer reviews and managers
- Making peer reviews work for you
What is a Software Peer Review?

An examination of a software work product by people other than its author in order to identify defects (departures from specifications or from standards) and improvement opportunities.
Objectives of Peer Reviews

- To reveal errors in function, logic, or implementation
- To ensure that a work product satisfies its specification
- To check for conformance to standards
- To give managers insight into product quality
- To communicate technical information in a project
- To enable someone besides the author to support or modify a work product
- To identify process improvement opportunities
Peer Reviews and Process Improvement

- The highest-leverage benefit is process improvement.
- It’s cheaper to prevent defects than to find and remove them.
- If you don’t correct the causes of defects, they’ll be back.

Review Observations → Defect Causal Analysis → Process Improvements → Fewer Defects Injected

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What Can Be Reviewed?

◆ Short answer:
  – any important project artifact that potentially contains defects

◆ Long answer:
  – project plans
  – project charter, vision & scope, or marketing requirements doc
  – requirements specifications
  – architecture designs
  – detailed designs
  – source code
  – verification and validation plans, test cases
  – documentation, on-line help, tutorials
Who Benefits from Peer Reviews

**Developer**
- Less time spent performing rework
- Increased programming productivity
- Confidence that the requirements are right
- Better techniques learned from other developers
- Reduced unit testing and debugging time
- Less debugging during integration & system testing
- Exchanging information with other team members

**Maintainer**
- Fewer production support demands
- More robust designs that tolerate change
- Conformance of work products to team standards
- More maintainable work products
- Better understanding of the product from having participated in design and code reviews
Who Benefits from Peer Reviews (Cont.)

**Test Engineer**
- can focus testing on finding subtle defects
- fewer defects that block continued testing
- improved test design and test cases

**Requirements Analyst**
- earlier correction of missing or erroneous requirements
- fewer infeasible and untestable requirements
- customer validation of requirements

**Project Manager**
- increased chance of shipping on schedule
- earlier awareness of risks and quality issues
- reduced risk from staff turnover through cross training
Who Benefits from Peer Reviews (Cont.)

**Development Manager**
- ✔ shortened product development cycle time
- ✔ reduced field service and customer support costs
- ✔ reduced lifetime maintenance costs
- ✔ improved teamwork and collaboration

**QA Manager**
- ✔ can judge the testability of product features
- ✔ shortened system-testing cycles, less retesting
- ✔ can use review data when making release decisions
- ✔ quality engineers who understand the product
- ✔ ability to anticipate QA effort needed
Some Benefits from Software Inspections

**Cost Reduction**
- **Hewlett-Packard**: saved $21.4M/year, ROI = 10X
- **Xerox**: 1 hour of requirements inspection saved 10 rework hours
- **Litton**: saved 63.4 staff hours per inspection

**Productivity Improvement**
- **Aetna Insurance**: 25% increase in coding productivity
- **Hewlett-Packard**: reduced time to market by 1.8 months
- **IBM**: 1 hour of inspection saved 20 testing hours and 82 defect-correction hours

**Quality Improvement**
- inspections can find 70-90% of all defects
- **Bell Northern Research**: avoided 33 hours of maintenance per defect found by inspection
Relative Cost to Fix a Defect

Development Phase
- Requirements
- Design
- Code
- Test
- Operation

Relative Cost to Correct a Defect
- Code
- Operation

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Cultural Barriers to Peer Reviews

- Fear of public ridicule or criticism
- Previous negative review experiences
- Fear that management will hold defects against the author
- Attitude that “my work doesn’t need reviewing”
- Concern that reviews will slow the project down
- Review outcomes that managers overrule
- Belief that testing is faster
- National or team cultures that avoid personal criticism

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Informal and Formal Reviews

**Informal Reviews**
- No defined process or participant roles
- Usually ad hoc, rather than planned
- Examples: walkthrough, peer deskcheck, passaround

**Formal Reviews**
- Defined review objectives
- Follow a documented review process
- Defined participant roles and trained team
- Checklists, rules, or analysis methods used to find defects
- Management report produced on product status
- Data collected for quality control and process management
Peer Review Formality Spectrum

More Formal

Inspection

Team review

Walkthrough

Pair programming

Peer deskcheck, passaroud

Ad hoc review

Less Formal
The Inspection Process

- **Initial Work Product**
  - **PLANNING**
  - **PREPARATION**
  - **INSPECTION MEETING**
  - **REWORK**
  - **FOLLOW-UP**
  - **Baselined Work Product**

- **OVERVIEW MEETING (optional)**

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**Inspection Participant Roles**

**Author:**
- Created or maintains work product being inspected
- Answers questions about the product
- Cannot serve as moderator, recorder, or reader

**Moderator:**
- With author, plans the inspection
- Leads and controls inspection meetings
- Reports inspection results to Peer Review Coordinator

**Reader:**
- Presents work product to other inspectors

**Recorder:**
- Classifies and records issues raised during the meeting

**Inspector:**
- Anyone else present to find defects in the product
- All participants are inspectors
**Other Peer Review Methods**

**Team Review**
- Skip overview meeting and causal analysis
- Author is responsible for follow-up
- Records are kept
- No reader role: moderator leads team through page by page

**Walkthrough**
- Author leads the discussion; no other roles are defined
- Preparation is not required, no records kept
- Good for education and brainstorming

**Pair Programming**
- A component of eXtreme Programming
- Real-time review by second person in the pair
Other Peer Review Methods (cont.)

*Peer Deskcheck*
- Only one reviewer; no team meeting
- May or may not keep records

*Passarounds*
- Multiple, concurrent peer deskchecks
- Need to reconcile conflicting comments without a meeting
- Good for asynchronous or remote review, or large review teams
- Many people probably won’t participate
- Don’t let comments replace human dialogue!
Using Risk to Select Items to Review

- Most mistakes are small; context determines severity
- Risk = (Probability of a defect) x (Impact if there’s a defect)
- Focus limited review effort on high-risk areas
  - new technology or techniques
  - complex logic or algorithms
  - mission- or safety-critical components
  - many or dangerous failure modes
  - components intended for reuse
  - created by less experienced people
  - key architectural components
  - components that affect multiple parts of product

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Keeping Inspection Records

- **Use standard forms.**
  - Typo List
  - Issue Log
  - Inspection Summary Report

- **Perform defect analysis.**
  - Classify defects by type, origin, and severity.
  - Rank the frequency of occurrence of types.
  - Identify which types to spend most time looking for.

- **Track the inspection process.**
  - Summarize results from multiple inspections.
  - Analyze inspection results and modify processes.

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Critical Success Factors for Reviews

- prefer to have peers, rather than customers, find defects
- review early and often, formally and informally
- train reviewers and review leaders
- allocate time in the project plan for reviews
- set goals for the review program
- identify a review champion
- review your early reviews
- obtain management commitment

prefer to have peers, rather than customers, find defects
10 Signs of Management Commitment

1. Providing resources to establish and sustain the review program.
2. Setting policies, expectations, and goals.
3. Ensuring that project schedules include time for reviews.
4. Making training available.
5. Never using review results to evaluate individuals.
6. Holding people accountable for participating in reviews.
7. Staying the course even in the face of schedule pressure.
8. Running interference with other managers and customers.
9. Respecting the review team’s document appraisal.
10. Asking for status reports on the program.
Common Peer Review Traps

- Reviews are skipped under time pressure.
- People think their projects are too small to benefit from reviews.
- Reviewers aren’t adequately prepared.
- Meetings drift into finding solutions, not problems.
- Reviewers criticize the author, not the product.
- Reviewers turn into lecturers.
- Authors become defensive.
- Review teams are too large.
Peer Review Tools

- Peer review tools save time and make it easier to collaborate on requirements, design documents, and code

- **Code Review - CodeCollaborator**
  - Automate tedious review aspects (file packaging and code review management)
  - Associate comments with lines of code
  - Point out defects, discuss code, and follow conversation threads
  - Collect and manage comments automatically
  - Facilitate review with team members in remote locations
  - Capture metrics, generate reports, provide audit trail to document code changes
  - Integrate with 16 SCM tools

- **Document and Code Review – PeerReview Complete**
  - One tool for document and code review
  - Allow the extended development team to review critical documents affordably
  - Faster, easier, and more efficient Microsoft Word and PDF document review
    - eliminate comment reconciliation step
    - see comments from all reviewers in one place
  - Use electronic signatures to meet regulatory and internal mandates
Software Peer Reviews

You cannot *review* quality in.
You must *build* quality in.
Further Reading


Types of Project Reviews

- **Educational Review**
  - bring other stakeholders up to speed

- **Management, Readiness, or Gate Review**
  - inform managers about project so they can decide to proceed or make changes

- **Peer Review**
  - *look for defects in a work product*

- **Post-Project Review** (aka “Retrospective”)
  - reflect on a completed project to learn lessons for the future

- **Status Review**
  - update project manager and team on project progress, risks, etc.
The Peer Review Process Owner

- Usually a mid-level manager
- Leads development of peer review process and process assets
- Provides continuity for ongoing improvement of review process
- Establishes and enforces review policies
- Monitors conduct and results of reviews
The Peer Review Coordinator

- Experienced inspector and moderator
- Coaches teams and moderators to perform reviews effectively
- Schedules training sessions
- Collects, analyzes, and reports on inspection data
- Works with Process Owner to improve the review process

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Peer Reviews and Managers

- The conventional wisdom is “no managers.”
  - can inhibit discussion
  - author’s fear of retribution

- I think it depends.
  - first-line manager can participate at author’s invitation
  - managers can often contribute technically
  - key issue is mutual respect and trust

- Managers need their work reviewed too.
  - project charters, plans, schedules
  - soliciting review is a culture builder
Peer Review Do’s

- Regard finding a defect as a “good catch.”
- Avoid being distracted by style issues.
- Emphasize finding — not fixing — defects during the review.
- Make everyone’s work subject to review.
- Check the significant portions of the material first.
- Train the reviewers.
- Emphasize defect prevention.
- Use reliable tools that ease the review process and promote collaboration.

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Peer Review Don’ts

- Use data collected from reviews to punish or reward individuals.
- Attribute defect data to individual authors.
- Track who finds the most defects.
- Use reviews to find scapegoats for project problems.
- Use untrained or reluctant review moderators.
- Include participants who are not there to find defects.
Thanks! Get Your Free 30-day Trials

**CodeCollaborator**

Work together seamlessly anytime, anywhere with a full-featured code review tool that enables and encourages communication, collaboration and quality.

Start your free trial now!

**PeerReviewComplete**

Use one tool to ensure that document and code reviews get done, comments aren’t lost, and the right people sign off! PeerReview Complete combines a revolutionary peer review process with electronic signatures. Start your free trial now!