8. Reviews

- Review objectives
- Formal design reviews (FDRs)
- Peer reviews
  - Inspections
  - walkthroughs
- Comparison of peer reviews methods
- Expert opinions

8.1 Reviews

- Review objectives
- Formal design reviews (FDRs)
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8.2 Reviews

- Direct objectives
  1. To detect analysis and design errors as well as subjects where corrections, changes and completions are required
  2. To locate deviations from templates, style procedures and conventions.
  3. To approve the analysis or design product. Approval allows the team to continue on to the next development phase.

- Indirect objectives
  1. To provide an informal meeting place for exchange of professional knowledge about methods, tools and techniques.
  2. To record analysis and design errors that will serve as a basis for future corrective actions.

8.3 Reviews

- Formal Design Reviews (DRs)
  1. Participants
     - Leader
     - Team
  2. Prior preparation
  3. DR session
  4. Post-DR activities

8.4 Reviews

- Some common formal design reviews (DRs)
  DPR – Development Plan Review
  SRSR – Software Requirement Specification Review
  PDR – Preliminary Design Review
  DDR – Detailed Design Review
  DBDR – Data Base Design Review
  TPR – Test Plan Review
  STPR – Software Test Procedure Review
  VDR – Version Description Review
  OMR – Operator Manual Review
  SMR – Support Manual Review
  TRR – Test Readiness Review
  PRR – Product Release Review
  IPR – Installation Plan Review

8.5 Reviews

- Reviewers should be senior personnel and/or outside experts
- Outcome:
  - approve
  - approve pending changes
  - reject
- Review Leader should not be Project Leader
- Usually done at the end of the phase.
  - very appropriate for Software Requirements Specification (SRS) and Design
  - sometimes appropriate for code
1. Characteristics of a DR leader

* Knowledge and experience in development of projects of the type reviewed. Preliminary acquaintance with the current project is not necessary.
* Seniority at a level similar if not higher than that of the project leader.
* A good relationship with the project leader and his team.
* A position external to the project team.

2. Review preparations

- **Team Leader**
  - Appoint team members
  - Schedule review session
  - Distribute design (or other) documents
    - Some to each member when complex
- **Team**
  - Review documents
  - List comments
  - Use checklist

3. The Agenda of a DR session

a. A short presentation of the design document.
b. Comments made by members of the review team.
c. Verification and validation of comments is discussed to determine the required action items (corrections, changes and additions).
d. Decisions about the design product (document), which determines the project's progress:
   - Full approval.
   - Partial approval.
   - Denial of approval.

4. DR post-review activities

a. Preparation of the DR report.
   The report's major sections:
   - A summary of the review discussions.
   - The decision about continuation of the project.
   - A full list of the required action items — corrections, changes and additions. For each action item, completion date and project team member responsible are listed.
   - The name(s) of the review team member(s) assigned to follow up.

b. Follow up performance of the corrections and to examine the corrected sections.

Sample Design Review Checklist

- Well-structured
- Simple
- Efficient
- Adequate
- Flexible
- Practical
- Implementable

**General**:
1. Does the architecture convey a clear vision of the system that can be used for further development?
2. Is the architecture structured to support likely changes?
3. Does the architecture describe the system at a high level of detail? (No interface or implementation details.)
4. Does the architecture cleanly decompose the system?
5. Is the architecture independent of the infrastructure used to develop the system?
6. Has maintainability been considered?
7. No duplicate functionality in the architecture?

**Complete**:
1. Are software requirements reflected in the software architecture?
2. Is effective modularity achieved? Are modules functionally independent?
3. Does each module/class have an understandable name?
4. Is each association well named?
5. Is each association’s and aggregation’s cardinality correct?

**Correct**:
1. Does each association reflect a relationship that exists over the lives of the related modules/classes?
2. Does the architecture have loose coupling and good cohesion?
Pressman’s 13 golden guidelines for successful DR - 1

Design Review Infrastructure
- Develop checklists for common types of design documents.
- Train senior professionals serve as a reservoir for DR teams.
- Periodically analyze past DR effectiveness.
- Schedule the DRs as part of the project plan.

The Design Review Team
- Review teams size should be limited, with 3–5 members being the optimum.

Pressman’s 13 golden guidelines for successful DR - 2

The Design Review Session
- Discuss professional issues in a constructive way refraining from personalizing the issues.
- Keep to the review agenda.
- Focus on detection of defects by verifying and validating the participants’ comments. Refrain from discussing possible solutions.
- In cases of disagreement about an error - end the debate by noting the issue and shifting its discussion to another forum.
- Properly document the discussed comments, and the results of their verification and validation.
- The duration of a review session should not exceed two hours.

Post-Review Activities
- Prepare the review report, including the action items.
- Establish follow-up to ensure the satisfactory performance of all the list of action items.

Peer reviews
- guided by:
  - checklists,
  - standards,
  - past problems
- attendees:
  Inspection
  - Review leader
  - The author
  - Specialized professionals:
    - Designer
    - Coder or implementer
    - Tester
  Walkthrough
  - Review leader
  - The author
  - Specialized professionals:
    - Standards enforcer
    - Maintenance expert
    - User representative

Sample Design Walkthrough
1. Does the algorithm accomplishes desired function?
2. Is the algorithm logically correct?
3. Is the interface consistent with architectural design?
4. Is the logical complexity reasonable?
5. Have error handling and "anti-bugging" been specified?
6. Are local data structures properly defined?
7. Are structured programming constructs used throughout?
8. Is design detail amenable to implementation language?
9. Which are used: operating system or language dependent features?
10. Is compound or inverse logic used?
11. Has maintainability been considered?

Inspection vs. Walkthrough

Inspection Process
- pre-meeting
  - read the document ahead of time
- meeting
  - author presents overview
  - review team asks questions and express opinions
- after meeting
  - scribe prepares summary
  - team approves summary
  - follow up
Inspection Guidelines

- Review the Product, not the person!
- Find errors, don’t try to solve them!
- Keep Records
  - Take written notes.
  - Review your earlier reviews.
- Allocate resources and schedule time for inspections
  - 3 to 5 people
  - Conduct training for reviewers
- Keep it short
  - Limit debate and rebuttal
  - Set an agenda and keep it.
  - No more than two hours preparation
  - Narrow focus increases likelihood of finding an error
  - Meeting duration less than two hours, twice per day

Sections recommended for inclusion

- Sections of complicated logic
- Critical sections, where defects severely damage essential system capability
- Sections dealing with new environments
- Sections designed by new or inexperienced team members

Sections recommended for omission

- “Straightforward” sections (no complications)
- Sections of a type already reviewed by the team in similar past projects
- Sections that, if faulty, are not expected to affect functionality
- Reused design and code
- Repeated parts of the design and code

Comparison of review methodologies - Process of review

<table>
<thead>
<tr>
<th>Properties</th>
<th>Design review</th>
<th>Inspection</th>
<th>Walkthrough</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview meeting</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Participant implications</td>
<td>Yes - thorough</td>
<td>Yes - thorough</td>
<td>Yes - brief</td>
</tr>
<tr>
<td>Review session</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Role of statisticist</td>
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<td>Yes</td>
<td>No</td>
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<tr>
<td>Formal training of participants</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Participation summary of users</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Error-related data collection</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Review documentation</td>
<td>Not formally required</td>
<td>Formally required</td>
<td>Not formally required</td>
</tr>
<tr>
<td>Formal design review report</td>
<td>Formal design review report</td>
<td>1) Inspection session summary report</td>
<td>2) Inspection session auxiliary report</td>
</tr>
</tbody>
</table>

- Insufficient in-house professional capabilities in a specialized area.
- Temporary lack of in-house professionals for review team.
- Indecisiveness caused by major disagreements among the organization’s senior professionals.
- In small organizations, where the number of suitable candidates for a review team is insufficient.

Year | Defect detection method | Defects per 1000 lines of maintained code
---|-------------------------|--------------------------------------
1977 | 85% Design review, 15% Code inspection | 0.19
1978 | 80% Design review, 15% Code inspection | 0.13
1979 | 70% Design review, 20% Code inspection | 0.06
1980 | 60% Design review, 15% Code inspection | 0.05
1981 | 40% Design review, 30% Code inspection | 0.04
1982 | 30% Design review, 40% Code inspection | 0.02

Situations beneficial for expert’s participation in reviews

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