SE345

Atılım University
Dept of Software Engineering

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Tentative Course Schedule

Wk	Subjects	Chapter
1.	Introduction to Software Quality and Assurance	Chapter 1
2.	Introduction to Software Quality and Assurance	Chapter 1
3.	Software Quality Factors	Chapter 3
4.	Overview of Components of the SQA System	Chapter 4
5.	Overview of Components of the SQA System	Chapter 4
6.	Integrating Quality Activities in Project Life Cycle	Chapter 7
7.	Midterm	
8.	Reviews, Inspection and Audits	Chapter 8
9.	Software Quality Metrics	Chapter 21
10.	Presentations	
11.	Procedures and Work Instructions	Chapter 14
12.	Software Change Process	Chapter 18
13.	SOA Process Standards	Chapter 23

Review is?

A process for evaluating a documented software project product, in which a group of professionals and stakeholders raise comments regarding the contents of a document presented to them beforehand (IEEE).

The reviewers may have the authority to approve the document contents, and also to approve the project advancing to the next stage.

The role of SQA in Reviews

The role of the SQA is supportive and may include organising reviews and improving their efficiency and effectiveness.

SQA team members may participate in reviews, as part of the SQA activities of evaluating software products conformance.

Why does somebody else review my work?

- The ones who complete review(s) repeatedly prepare documents in order to detect any possible errors that might have been introduced: system analyst, designer, team leader etc.
- People involved in producing the document are unlikely to detect some of their own errors (we are ignorant to our errors :))
- Only others – such as peers, superiors, experts, and customer representatives – who have different experience and points of view and are not directly involved in creating the document, are capable of detecting errors unnoticed by the development team.

A review is probably the best method to detect existing errors that remained undetected in a software project document

Review objectives

Direct objectives

a. To detect analysis and design errors as well as subjects where corrections, changes and completions are required
b. To identify new risks likely to affect the project.
c. To locate deviations from templates, style procedures and conventions.
d. To approve the analysis or design product. Approval allows the team to continue on to the next development phase.

Indirect objectives

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

Idea behind reviews is to discover problems, <u>NOT to fix them</u> – fixed after review.

Reviews are NOT activities to be conducted haphazardly. Procedural order and teamwork lie at the heart of formal design reviews, inspections, and walkthroughs.

Several methodologies can be implemented when reviewing documents.

- Formal design reviews
- Peer reviews – inspections and walkthroughs
- Expert opinions

Stages of a Review Process

1. Planning

Identifies work product to be reviewed and sets the review schedule.

2. Overview

- Optional phase where team members who are unfamiliar with the work product to be reviewed receive orientation.

3. Preparation

- Team members review the work individually looking for defects in the work product.

4. Meeting

- Review team members met to discuss possible defects in the work product.

5. Rework

- The work product is revised to conform to requirements and specifications.

Formal Design Reviews

Formal Design Reviews (FDR)

"design reviews", "DRs," and "formal technical reviews" (FTR)

- FDR differ from all other review methods
  - It is a requisite for approving the development product.
  - Without approval, the development team cannot continue to the next phase of development.
- Formal design reviews may be conducted at any development milestone requiring completion of a document
  - whether the document is a requirement specification or an installation plan.

- Only Review in which approval of the design product is necessary
- Only review method with which the next phase can not be moved without approval
- Can be conducted at any development milestone requiring completion of an analysis or design document

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

- VDR – Version Description Review
- OMR – Operator Manual Review
- SMR – Support Manual Review
- TRR – Test Readiness Review
- PRR – Product Release Review
- IPR – Installation Plan Review

Participants of Formal Design Review

Review Leader

a person of higher seniority than the project leader

- **Knowledge and experience** in the development of projects of the type reviewed
- **Seniority** at a level similar to that of the project leader, if not higher.
- Existing **good relationships** with the project leader and his team.
- Preliminary acquaintance with the current project is **not necessary**.
- Of an **independent position**, external to the project team.
  - NOT Project Leader : Would impact objectivity!

Review Team

- Should be selected from **among the senior members of the project team**, together with appropriate senior professionals assigned to other projects and departments, customer/user representatives, and in some cases software development consultants.
- It is **desirable** that **out-of project staff** make up the **majority** of the review team.
- A review team of **3–5 members** is expected to be an efficient team
  - **large team** tends to create **coordination problems**, wastes review session time, and decreases the overall level of the review.

Preparations for FDR

Infrastructure

- Develop **checklists** for typical reviewed documents, or at least for the most common ones.
- **Train** senior professionals to serve as review leaders and DR team members.
- **Periodically analyse the effectiveness** of past DRs in regard to defect detection to improve the DR methodology

Schedule

- Schedule DRs **as part of the project activity plan**, and allocate the needed resources

Contents

- **DR Leader decides** the content of the review
  - entire document or part of document will be reviewed

Preparations for FDR

Review Leader

- To **appoint** team members
- To **schedule** review sessions
- To **distribute** the document to be reviewed among the team members (hard copy or electronic)

Review Team

- Team members are expected to **review the review document** and list their comments prior to the review session- you can use checklists

Development team

- The team's main responsibility is to **prepare a short presentation on the design document** just before the review session.

The Agenda of a DR session

Review Leader is key person

The review leader's experience in leading discussions and staying on track with the agenda is key to a successful 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*

FDR Session Decisions

Full approval

Continue on to the next phase (may have minor corrections)

Denial of approval

Requires repeating the DR. in cases of multiple major defects – particularly critical defects.

Partial approval

Continue to next phase for some parts of the project, major action items (corrections, changes, and additions) required for the remainder of the project.

Continuation to the next phase of these remaining parts will be permitted only after satisfactory completion of the action items.

Approval may be given by a member of the review team assigned to review the completed action items, by the whole review team in a special review session, or by any other forum the review leader considers appropriate.

DR post-review activities

a. Preparation of the DR report.

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

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

Post FDR Activities
Design Review Report

Review Leader’s primary responsibility (after meeting)

Contains: (Sometimes called an **ACTION LIST**)

- Summary of review discussions
- Decision about project continuation
- Full list of action items – corrections, changes, additions the project team must perform. For each item, anticipated completion date and responsible person is listed.
- Name of review team member assigned for follow up.

Important to perform corrections early and minimize delays to project schedule

Post FDR Activities Design Review Report Example

DESIGN REVIEW REPORT

DR date: ____________ The report was prepared by: ____________

Project name: ____________

The reviewed document: ____________ Version: ____________

The review team: ____________

1. Summary of the discussions

#	Discussion subject	Number of action items

2. The action items

#	Action items to be performed	Responsible employee	Completion date	Approval of completion	
				Date	Signature

3. Decision regarding the design product

Full approval ☐
Partial approval ☐
Approval granted for continuation to next phase of following parts: ☐
Denial of approval
Comments:

The report was approved by:

Name of participant	Date	Signature	Name of participant	Date	Signature

Approval of successful completion of all action items

Comments:

Name: Signature: Date:

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

Design Review Session

- Discuss professional issues in a constructive way refraining from personalising the issues.
- Keep to the review agenda.
- Focus on the 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

Inspections and Walkthroughs

FDR vs Peer Reviews

Difference in participants

FDRs: participants **hold superior positions** to the project leader

Peer reviews: **the project leader's equals**, members of the leader's department and other units

Degree of authority and objectives

FDR are authorised to approve the design document so that work on the next stage of the project may begin.

This authority is **not granted to peer reviewers, whose main objectives are to detect** errors and deviations from standards.

FDRs seek to ascertain that a tolerable level of quality is being attained. The focus is not on discovering technical flaws but on ensuring that the design and development fully and accurately address the application’s needs. For this reason, FDRs are effective early on during requirements verification and conceptual model verification.

Peer reviews concentrate more on assessing correctness.

Inspections vs Walkthroughs

The level of formality

Walkthrough participants are not requested to make any meaningful preparations

The members of an inspection team are required to prepare for the inspection session

Findings

Walkthroughs are limited to comments on the document reviewed

The findings of inspections are incorporated into the efforts invested to improve development methods through corrective action processes

Inspections

Software Inspections are a disciplined engineering practice for detecting and correcting defects in software artifacts, and preventing their leakage into field operations.

- Inspection **checklists** for each type of design document, coding language, and tools.
- Typical **defect frequency tables** based on past findings to direct inspectors to potential "defect concentration areas."
- **Training of competent professionals** in inspection process issues.
- **Periodic analysis of the effectiveness** of past inspections to improve the inspection methodology.

Participants of Peer Reviews

Inspection
- The Review leader
- The Author
- Specialized Professionals
  - Designer
  - Coder or implementer
  - Tester

Walkthrough
- The Review leader
- The Author
- Specialised Professionals
  - Standards enforcer
  - Maintenance expert
  - User representative

Recommended peer review team

★ review leader

★ the author

★ specialized professionals

3-5 participants - optimal
Should be peers of the software system designer author - for free discussion

Preparations of a Peer Review Session
Review Leader

- Determine, together with the author, which sections of the design document are to be reviewed.
  - The most difficult and complex sections
  - The most critical sections
  - The sections prone to defects
- Select team members.
- Schedule the peer review sessions (advisable to limit a review session to 2 hours)

important to schedule the sessions shortly after the pertinent design document sections are ready for inspection.

Inspection's review leader should schedule an overview meeting for his team and distribute the document to the team members prior to the review session.

Preparations of a Peer Review Session

Inspection Team

- expected to read the document sections to be reviewed, and list their comments before the inspection session begins.
- be asked to participate in an overview meeting. The author provides with the necessary relevant background for reviewing the selected document sections:
  - the project in general
  - the logic
  - processes
  - outputs
  - inputs
  - interfaces

An important tool for inspector's review : checklist

Walkthrough Team

- briefly read the material in order to obtain a general overview of the sections to be reviewed
- not required to prepare their comments in advance.

Peer Review Session Assignments

The presenter of the document

Inspections - chosen by the moderator: usually, not the document author

Walkthroughs - author, the professional most acquainted with the document

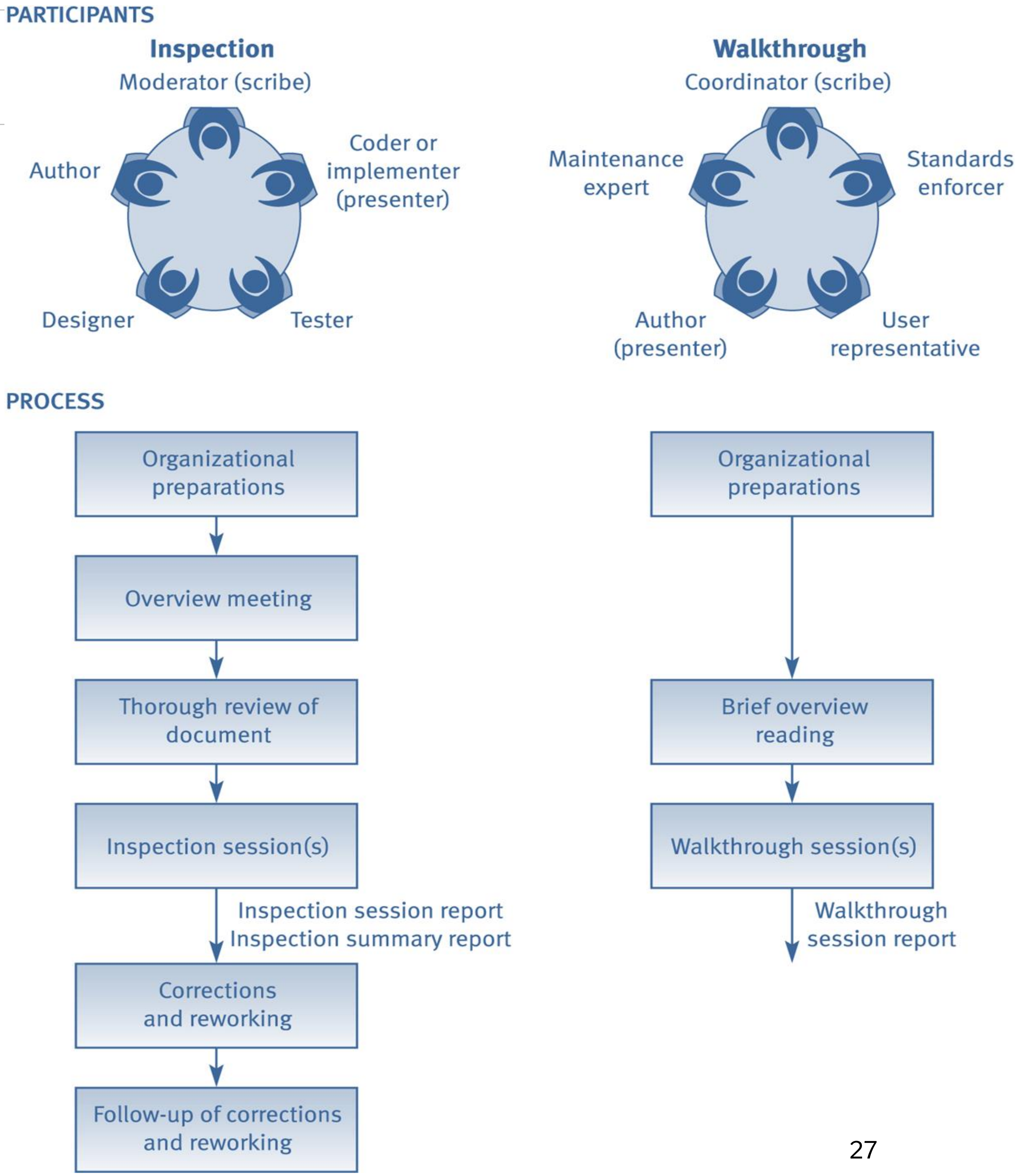
The scribe

The team leader often but not always

To record the noted defects to be corrected by the development team

Inspection vs. Walkthrough

- Presenter reads document section and may add explanation.
- Participants offer their comments to the document.
- Restrict discussion to identification of errors – no solution.
- Presenter in walkthrough provides an overview
- Scribes
  - Walkthrough scribe records each error (location, description, type – incorrect, missing, etc.)
  - Inspection scribe will also add estimated severity of each defect, a factor to be used in the statistical analysis of defects found and for the foundation of preventive / corrective actions.



Peer Review Session Documentation

Inspection

Documents produced following the session and subsequently distributed among the session participants:

1. **Inspection session findings report** by the scribe

2. **Inspection session summary report** by the inspection leader - summarizes the inspection findings and resources invested in the inspection. It serves mainly as input for analysis aimed at inspection process improvement, and corrective actions that go beyond the specific document or project

Walkthrough

copies of the defects documentation

walkthrough session findings report – should be handed to the development team and the session participants

Post Peer Review Activities Following Inspection Session

The inspection process, contrary to the walkthrough, does not end with a review session or the distribution of reports. The activities are conducted to attest to:

- The prompt, **effective correction and reworking of all errors** by the designer/author and his team, as approved by the inspection leader (or another team member) in the course of the assigned follow-up activities.
- **Transmission of the inspection reports** to the internal Corrective Action Board (CAB) for analysis. This action initiates the corrective and preventive actions that will reduce future defects and improve productivity

Post Peer Review Activities

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INSPECTION SESSION SUMMARY REPORT

Session date: 17/5

Project name: Oak Center

The inspected document: Detailed Design **Version:** 3

The inspected document sections: Ch. 5, Sec. 6.2 - 6.5 **Total:(A)** 31 pages **pages/k text lines**

The inspection team: Anita McMahon (inspection leader), John Woo, Ben Kinker

1. Resources invested (hours *worked*)

#	Team member	Overview meeting	Preparation	Inspection session	Total (hours)	Comments
1	Inspection leader Anita	1	3	2.5	6.5	including report preparation
2	John	1	4	2	7	
3	Ben	1	4	2	7	
4						
5						
	Total	3	11	6.5	(B) 20.5	

2. Error summary

* W=Wrong, M=Missing, E=Extra

Error severity	Error nature			Total Errors	Severity factor	Total errors (standardized)	Comments
	W	M	E*				
1 - critical	1			1	16	16	
2			2	2	8	16	
3	3			3	4	12	
4		2		2	2	4	
5 - minor	4	1	2	7	1	7	
Total	**8**	**3**	**4**	(C) 15		(D) 53	

3. Defect detection metrics

Average defects per page = C/A = $\frac{15}{31} = 0.48$

Average defects per page (standardized) = D/A = $\frac{53}{31} = 1.71$

Defect detection efficiency (hours per defect) = B/C = $\frac{20.5}{15} = 1.37$

Standardized defect detection efficiency (hours per standardized defect) = B/D = $\frac{20.5}{53} = 0.39$

W: Wrong

M: Missing

E: Extra

Comparison of Review Methodologies Process

Properties	Formal design reviews	Inspections	Walkthroughs
Main direct objectives	1. Detect errors 2. Identify deviations from standards 3. Identify new risks 4. Approve the design document	1. Detect errors 2. Identify deviations from standards	Detect errors
Main indirect objectives	Knowledge exchange	1. Knowledge exchange 2. Support corrective actions	Knowledge exchange
Review leader	Chief software engineer or senior staff member	Trained moderator (peer)	Coordinator (peer, the project leader on occasion)
Participants	Top-level staff and customer representatives	Peers	Peers
Project leader participation	Yes	Yes	Yes; usually as the review's initiator
Specialized professionals in the team	—	1. Designer 2. Coder or implementer 3. Tester	1. Standards enforcer 2. Maintenance expert 3. User representative
Process of review 1. Overview meeting 2. Participant preparations 3. Review session 4. Follow-up of corrections	No Yes – thorough Yes Yes	Yes Yes – thorough Yes Yes	No Yes – brief Yes No
Infrastructure 1. Formal training of participants 2. Use of checklists	No No	Yes Yes	No No
Error-related data collection	Not formally required	Formally required	Not formally required
Review documentation	Formal design review report	1. Inspection session findings report 2. Inspection session summary report	Walkthrough session findings report

Situations beneficial for expert's participation in reviews

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

Discussion - 1

David Martin just finished his inspection coordinator course. After obtaining his first appointment, he plans to add his personal secretary to the inspection team for the purpose of serving as session scribe and producing the required reports. He assumes that her participation will free him of the coordination tasks and enable him to conduct the session successfully.

Is it advisable to employ a secretary (a non-information technology professional) as a scribe in an inspection session? List the pros and cons of adding such a nonprofessional to the inspection session.

Discussion - 2

A proposal for changing an inspection procedure involves adding a new reporting requirement as follows:

“At the end of the session or series of sessions, the inspection leader will submit a copy of the inspection session finding's report and a copy of the inspection session summary report to management.”

Consider the proposal and list possible arguments for and against the change.

What would be your recommendation – to add the new reporting requirement or not? Explain your reasoning.

Discussion - 3

You are part of a software development team tasked with creating a new e-commerce application. The application will handle customer orders, inventory management, and payment processing. The project has reached different stages of development, and the team is now preparing for a review to find logical flows and coding errors in “Code Implementation for the Payment Gateway”. It is a critical component that ensures secure and accurate payment processing.

1. Which review type is appropriate? Explain your reasons briefly.
2. Why are the other types not appropriate? Justify your answer briefly.

Backup Slides

Deliverable vs Milestone

Aspect	Milestone	Deliverable
Definition	A significant event or checkpoint in the project timeline.	A tangible or measurable output or product resulting from project activities.
Nature	Indicates progress or completion of a specific phase or task.	Represents the outcome or result of the work completed during the project.
Purpose	Used to track project progress and ensure alignment with the schedule.	Provides a concrete output to stakeholders for approval or further use.
Examples	Requirements finalized, Design approved, Testing started.	Software Requirements Specification (SRS), Test Plan, Deployed Software.
Measurability	Represents a point in time; not directly measurable in terms of quantity.	Measurable as it is a physical or digital product, document, or artifact.
Dependency	Can depend on the completion of deliverables or other tasks.	Often required to meet milestones.
Tracking	Tracked on the project schedule as a zero-duration task.	Tracked in terms of progress, quality, and delivery status.
Example in Context	Milestone: "Completion of SRS phase."	Deliverable: The completed SRS document.

Participants of Peer Reviews Inspections

Designer

The system analyst responsible for analysis and design of the software system reviewed.

Coder or implementer

Thoroughly acquainted with coding tasks, preferably the leader of the designated coding team

to contribute his/her expertise to the detection of defects that could lead to coding errors and subsequent software implementation difficulties.

Tester

Preferably the leader of the assigned testing team, focuses on identification of design errors usually detected during the testing phase.

Participants of Peer Reviews Walkthroughs

Standards enforcer

specializes in development standards and procedures

assigned the task of locating deviations from the standards and procedures

Maintenance expert

focus on maintainability, flexibility, and testability issues, and another area requiring his/her expertise is documentation, whose completeness and correctness are vital for any maintenance activity.

User representative

Participation of an internal or external user representative in the walkthrough team contributes to the review's validity, as he/she examines the software system from the point of view of the user/consumer, rather than the designer/supplier.

Sections recommended to be included in or omitted from peer reviews

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 effect functionality
- Reused design and code
- Repeated parts of the design and code

Comparison of review methodologies - Process of review

Properties	Design review	Inspection	Walkthrough
Overview meeting	**No**	**Yes**	**No**
Participant's preparations	**Yes - thorough**	**Yes - thorough**	**Yes - brief**
Review session	**Yes**	**Yes**	**Yes**
Follow-up of corrections	**Yes**	**Yes**	**No**
Formal training of participants	**No**	**Yes**	**No**
Participant's use of checklists	**No**	**Yes**	**No**
Error-related data collection	Not formally required	Formally required	Not formally required
Review documentation	Formal design review report	**1**) Inspection session findings report **2**) Inspection session summary report	