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SECTION 7
STATIC TECHNIQUES

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AGENDA

1. REVIEWS AND THE TEST PROCESS (K2)
2. REVIEW PROCESS (K2)
   - ACTIVITIES OF A FORMAL REVIEW (K1)
   - ROLES AND RESPONSIBILITIES (K1)
   - TYPE OF REVIEWS (K2)
   - SUCCESS FACTORS FOR REVIEWS (K2)
3. STATIC ANALYSIS BY TOOLS (K2)

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A TEDIOUS EXERCIZE

- **First:**
  - Count all “e” character in document without any guide.
  - Note the results of numbers counted
  - Note the reasons of different results

- **Next:** Count all “e” character in document with some guide and rules
  - **Rule 1:** Count all “e” include both header and footer
  - **Rule 2:** Count from Right to Left
  - **Rule 3:** Take the couples, count each row and write the number of “e” in the left of each row; compare with partner to have the same result

- ***Note the Results and compare with First time of doing this exercise***

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A TEDIOUS EXERCIZE

- **Compare and Reasons for Different Results:**
  - Process
  - Cross-Checking
  - Requirement Clarity
  - Guidance
  - Break into small pieces
  - **Review**

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1. REVIEWS AND THE TEST PROCESS

- **Definition (What):**
  - Static Techniques rely on the Manual Examination (Reviews) and Automated Analysis (Static Analysis) of the code or other project document without the execution of the code.
  - Dynamic Techniques: Testing that involves the execution of the software of a component or system.

1. REVIEWS AND THE TEST PROCESS

- **Values (Why):**
  - Early defect Detection and correction
  - Development productivity improvement
  - Reduce development timescales, reduce testing cost and time, lifetime cost, fewer defect and improved communication
  - Detect early omissions (for example: in requirement)

- **Applicable for which phase (When):** all phase (requirement, design, code, test).

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1. REVIEWS AND THE TEST PROCESS

- **Which?**
  - **Objects:**
    - SRS, Design Specification, Code, Test Plan, Test Specification, Test Case, Test Script, User Guide or Web Page, …
  - **Type of defects:**
    - deviations from standards,
    - missing requirements,
    - design defects,
    - non-maintainable code
    - and inconsistent interface specifications.

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1. REVIEWS AND THE TEST PROCESS

- **Who should use these techniques**:
  - All people, all role (Peer Review or Cross-Checking, Upper Review, ...)

- **How to review:**
  - Manual Activity (Review manually)
  - Static Analysis (Automated Analysis by Tool)

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1. REVIEWS AND THE TEST PROCESS

- Static versus Dynamic Testing:

	Static Testing	Dynamic Testing
Same Objective	DETECT DEFECT	
Differences	Prevention	Cure
	Detect defect earlier without code compile	Only find bug when code is compiled
	Correction cost is low	Correction cost is high
	Can find omissions	Can't detect the omission
	N/A	Give confidence of quality

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2. REVIEW PROCESS (K2)

- Activities of a Formal Review (K1)
- Roles and Responsibilities (K1)
- Types of Review (K2)
- Success Factors for Reviews (K2)

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2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- Planning
- Kick-off
- Individual Preparation
- Examination/Evaluation/Recording of Result (Review Meeting)
- Rework
- Follow-up

2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- **Planning:**
  - Defining the Review Criteria
  - Selecting the personnel
  - Allocating Roles
  - Defining the Entry and Exit Criteria for more formal review type
  - Selecting which parts of document to review
  - Checking Entry Criteria (for more formal review types)

2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- **Kick-off:**
  - Distributing Documents
  - Explaining the Objectives, Process and Documents to the participants

2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- **Individual Preparation:**
  - Preparing for the review meeting by reviewing the document(s)
  - Noting potential defects, questions and comments

2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- **Examination/Evaluation/Recording of Result (Review Meeting)**
  - Discussing or Logging, with documented results or minutes (for more formal review types)
  - Noting defects, making recommendations regarding handling the defects, making decisions about defects
  - Examining/Evaluating and Recording Issues during any physical meetings or tracking any group electronic communications

2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- **Rework**
  - Fixing defects found (typically done by author)
  - Recording updated status of defect (in formal reviews)

2.1. ACTIVITIES OF A FORMAL REVIEW (K1)

- **Follow-up**
  - Checking that defects have been addressed
  - Gathering metrics
  - Checking on Exit Criteria (for more formal review types)

2.2. ROLE AND RESPONSIBILITIES (K1)

- Manager
- Moderator
- Author
- Reviewers
- Scribe/Recorder

2.2. ROLE AND RESPONSIBILITIES (K1)

- Manager:
  - To decide on the execution of review,
  - Allocate time and Determine if the review objectives have been met or not

- Moderator:
  - Lead the review (Planning, Running Meeting, Follow-Up after meeting),
  - Mediate between the various points of view to make the success of review

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2.2. ROLE AND RESPONSIBILITIES (K1)

- Author:
  - Chief responsibility for document to be reviewed
  - Work as a reviewer
- Reviewers (a.k.a Checkers or Inspectors):
  - Identify and describe defects, comments
- Scribe/Recorder:
  - Document or record issues, problems, open points in meeting

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2.3. TYPE OF REVIEWS (K2)

CP	Informal Review	Walkthrough	Technical Review	Inspection
Process	Informal	Formal Process	Formal Process	Formal Process
Purpose	- Inexpensive way to get some benefit **- Finding defects**	- Learning - Gaining Understanding - **Finding defects**	- Discussing - Making decisions - Evaluating alternatives - **Finding defects** - Solving technical problem - Checking conformance to Specification, Plan, Regulation and Standard	**- Finding defects**

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2.3. TYPE OF REVIEWS (K2)

CP	Informal Review	Walkthrough	Technical Review	Inspection
Lead	Dependent	Author	- Trained Moderator or Peer Reviewer - Technical Expert	- Trained Moderator (Author)
Other	Result may be documented	-**Optional** pre-meeting preparation - **Optional** preparation of a review report - **Optional** scribe	- Preparation of review report - **Optional** use of checklist - Preparation Meeting by Reviewer - Peer or Technical Expert (outside of project)	- Peer Examination - Defined Roles - Formal Process based on Rules and Checklists - Specified Entry and Exit Criteria - Preparation Meeting - Inspection report - Formal Follow-up Process - **Optional** Reader

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2.4. SUCCESS FACTORS OF REVIEWS (K2)

i. Clear predefined objectives
ii. Right people involved
iii. Testers are valued reviewers
iv. Defects found are welcomed and expressed objectively
v. People issues and psychological aspects are dealt with

2.4. SUCCESS FACTORS OF REVIEWS (K2)

vi. Review in an atmosphere of trust; outcome is not used for the evaluation of the participants

vii. Suitable review techniques

viii. Checklist or roles can be used

ix. Training is given in review techniques

x. Management supports a good review process

xi. There is an emphasis on learning and process improvement

3. STATIC ANALYSIS BY TOOLS (K2)

- **What?**
  - SA by Tools is the activity to find defect in software source code and software models without actually executing product.
  - Input: Program Code (e.g., control flow & data flow)
  - Output: Analyzing report (ex: in HTML and XML format).

3. STATIC ANALYSIS BY TOOLS (K2)

- **Why?**
  - Early detection of defects prior to text execution
  - Early warning about suspicious aspects of code or design
  - Identify defects which not easily found by dynamic testing
  - Detecting dependencies and inconsistence in software models
  - Improved maintainability of code and design
  - Prevention of defects, improve quality with lesson learned

3. STATIC ANALYSIS BY TOOLS (K2)

- **When and Who?**
  - Before and during Component and Integration Testing (by developer)
  - When checking-in code to configuration management tools (by developer)
  - During software modeling (by designer)

3. STATIC ANALYSIS BY TOOLS (K2)

- **Typical Defects found by Static Tools (How).**
  - Referencing a variable with an undefined value
  - Inconsistent interfaces between modules and components
  - Variables that are not used or are improperly declared
  - Unreachable (dead) code
  - Missing and erroneous logic (potentially infinite loops)
  - Overly complicated constructs
  - Programming standards violations
  - Security vulnerabilities
  - Syntax violations of code and software models

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SUMMARY

- Have knowledge about: static testing, dynamic testing, reviews, statics analysis
- Know how to organize a formal review meeting (6 steps)
- Type of reviews: informal review, walkthrough, technical review, inspection
- Some kind of defects in reviews, static analysis process

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Q&A