2 Reviews

A review is a type of static testing during which a work product or process is evaluated by one or more individuals to detect issues and to provide improvements.

When done properly, reviews are the single **biggest**, and **most cost-effective**, contributor to overall delivered quality

INFORMAL REVIEWS

characterized by not following a defined process and not having formal documented output

FORMAL REVIEWS

characterized by team participation, documented results of the review and documented procedures for conducting the review

Possible reviews

Contractual review
initiated at project inception and at major project
milestones

Requirements reviews
initiated when the requirements are available for review,
which covers functional and non-functional

Top level design reviews
initiated when the overall architectural design is available
for review

Detailed design reviews
initiated when the detailed design
is available for review

Code reviews
carried out as individual modules of software are created,
which may include the unit tests and their results as well
as the code

Test work product reviews
which may cover the test plan(s), test conditions, quality
risk analysis results, tests, test data, test environments,
and test results

Test entry reviews and **test exit reviews**
§for each test level, which respectively check the test
entry criteria prior to starting test execution and the test
exit criteria prior to concluding testing

Acceptance reviews

used to obtain customer or stakeholder approval for a system

Audits and management reviews

which focus more on the software process rather than the software work products

The review leader (sometimes same as the **Test Manager**) should:

- implement efficient reviews in their projects
- demonstrate the benefits of these reviews
- ensure that an environment exists which is conducive to the implementation of the success factors
- devise a measurement plan to ensure that the reviews provide value
- remember that while reviews should be augmented with other forms of static testing and dynamic testing of the code in order to improve test coverage and locate defects

Different techniques have different focuses:

- a review can eliminate an issue at the requirements level before the problem is implemented in the code
- static analysis can help enforce coding standards and check for problems
- Inspections can lead to the discovery and removal of defects, and also train authors in how to avoid creating defects

The focus of a review depends on the agreed objective and the software development lifecycle model should dictate the formality of a review based on the:

- maturity of the development process
- complexity of the work product being reviewed
- legal or regulatory requirements
- need of an audit trail

review success factors

- **Clear objectives** defined in planning and measured
- **Suitable review types** applied per the products and test levels and executed with proper participants
- **Review techniques used**
- **Up to date checklists**
- **Small chunks** used for large documents so that quality control is exercised by providing authors early and frequent feedback
- **Adequate time to prepare** for the participants
- Reviews are **scheduled with proper notice**
- **Defects found are acknowledged** and handled
- **Management support of the review process**
- The review is **conducted in an atmosphere of trust**

people success factors

- **right people are involved** to meet the objectives
- **Testers are seen as valued reviewers** who contribute to the review and learn about the work product
- Dedicate **adequate time** and **attention to detail**
- The **meeting is well-managed**
- **Adequate training is provided** (for ex: inspection)
- A **culture of learning** and improvement is promoted

Please keep in mind that

- A single work product may be the subject of **more than one type of review**
- one of the **main objectives is to uncover defects** even though reviews can be used for various purposes
- The types of defects found in a review vary, depending especially on the work product being reviewed
- All review types can aid in defect detection
- the selected review type should be based on
  - the needs of the project
  - available resources
  - product type and risks
  - business domain
  - company culture, etc.

INFORMAL REVIEW

is a review **without a formal or documented procedure**.
Same as: **buddy check**, **pairing**, **pair review.**

Main purpose: detecting potential defects
Can also generate ideas, solutions or quickly solve minor problems.

During an informal review we **may** have the below:
- review meeting
- documented results
- use checklists
- be performed by a colleague or a group of people

These kind of reviews are common within Agile develement

WALKTHROUGH

is a review in which **an author leads members of the review through a work product** and the members ask questions and make comments about possible issues.

Main purpose: find defects, improve the product, consider alternative implementations, evaluate conformance to a standard or specification.
Can also: facilitate the exchange of ideas, training the participants, achieving consensus

A walkthrough can vary from very formal to informal, but during a walkthrough we **must** have:
- review meeting
- scribe for the review meeting

and we **may**:
- have individual preparation before the meeting
- use checklists
- use potential defect logs and reports
- present it as scenarios, dry runs or simulations

TECHNICAL REVIEW

is a **formal review type executed by a team** of technically-qualified personnel that **examines the suitability of a work product** for its intended use and identifies discrepancies from specifications and standards

Main purpose: gaining consensus, detecting potential defects

Can also: evaluate quality and build confidence in the product, generate new ideas, motivate and enable authors to improve, consider alternative options

During a technical review we **must** have:
- individual preparation before the meeting
- scribe which is not the author

should have:
- reviewers as technical peers of the author

- reviewers as technical experts in the same or other discipline
- product potential defect logs and review reports

and **may**:

- hold a review meeting
- use checklists

INSPECTION

is a **formal review type** used to **identify issues in a work product**, which provides measurement to improve the review process and the software development process.

Main purpose: detecting potential defects, evaluating quality and building confidence in the product, preventing future similar defects through author learning and root cause analysis

Can also: motivate and enable authors to improve future work products and the software development process, achieving consensus.

There is a defined process with formal documented outputs, based on rules and checklists. We must:

- have clearly defined mandatory roles
- have individual preparation
- reviewers as peers of the author or experts in disciplines relevant for the work product
- specified entry and exit criteria

And the **must** continues
- have a scribe
- have a trained facilitator lead the review meeting (not the author)
- never have the author as leader, reader or scribe
- product potential defect logs and review reports
- collect metrics and use them to improve the entire software development process

the next reviews are of more interest for the Test Manager

MANAGEMENT REVIEW

is a **systematic evaluation** of:
- software acquisition
- supply
- development
- operation
- maintenance process

performed by or on behalf of management that:
- monitors progress
- determines the status of plans and schedules
- confirms requirements and their system allocation
- evaluates effectiveness of management approaches

To **achieve fitness for purpose** Management reviews are used to:
- **monitor progress**
- **assess status**
- **make decisions**
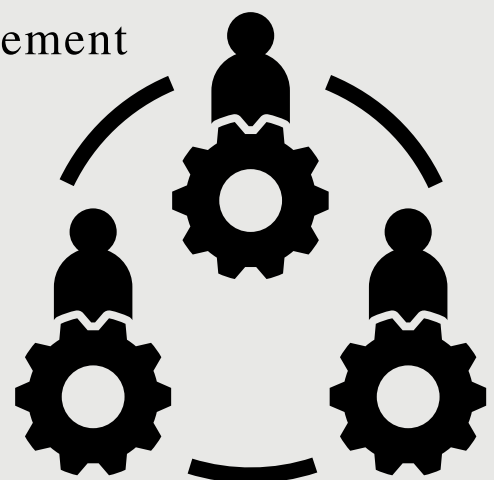
This approach is also used as decision support for:

- **adapting** the level of resources
- **implementing** corrective actions
- **changing** the scope of the project

Management reviews have the following **key traits:**

- Conducted by or for managers having direct responsibility for the project or system
- Check consistency with and deviations from plans
- Check if management procedures are adequate
- Assess project risks
- Evaluate impact of actions and ways to measure them

An output of this review consists of **lists of action items, issues to be resolved and decisions made**.

Test Manager **should** participate in and may initiate management reviews of testing processed and **should** consider such reviews as an integral part of process improvement (ex: management review of processed, project retrospectives, lessons learned, etc.).

AUDITS

is an **independent examination** of a work product, process, or set of processes that is **performed by a third party to assess compliance** with specifications, standards, contractual agreements, or other criteria

Audits are usually:
- performed to demonstrate conformance to a defined set of criteria
- Conducted and moderated by a lead auditor
- provide evidence of compliance collected through interviews, witnessing and examining documents
- have documented results

Managing reviews

The review strategy must be coordinated with the test policy and the overall test strategy.

Reviews should be planned to take place at natural break points or milestones:
- typically after requirement and design specification
- start with business objectives and work down to low level design
- often as part of a verification activity before, during, and after test execution

Before establishing an overall review plan at the project level, the **review leader** (may be a **Test Manager**) **should** take into account:
- What should be reviewed (product and processes)
- Who should be involved in specific reviews
- Which relevant risk factors to cover

The **review leader** **should** also:

- identify the items to be reviewed
- select the appropriate review type and level of formality
- identify a budget (time & resource) for the review
- create a business case and include a risk evaluation and return on investment calculation

The return on investment (ROI) for reviews is the difference between the cost of onducting the review and the cost of dealing with the same defects at a later stage (or missing them altogether).
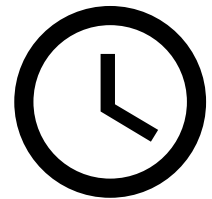
The **optimal time** to perform reviews depends on:

- availability of the items to review in a sufficiently final format
- availability of the right personnel for the review
- time when the final version of the item should be available
- time required for the review process of that specific item

The **objective** of the review must be defined during test planning and should also include:

- conducting effective and efficient reviews
- reaching consensus decisions regarding review feedback

Adequate metrics also need to be established.

A good **tip** in case of audit or inspections on big projects is to use brief inspections/audits conducted at the author's request as document fragments are completed. This will help have initial and iterative checks rather than a big bang approach when all is taken in at once. There are also options to have an advance audit prior the main certification audit.

We should not forget about the project reviews which are frequently held for the overall system and may also be necessary for subsystems and even individual software elements

Based on **project complexity** or **product risks** we should adjust:

- the number of reviews
- the types of reviews
- the organization of reviews
- the prople involved in reviews
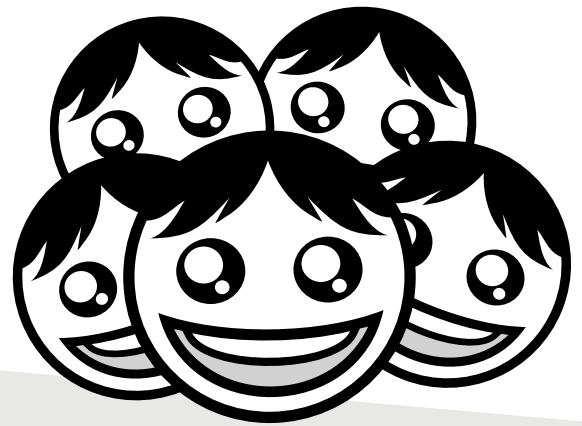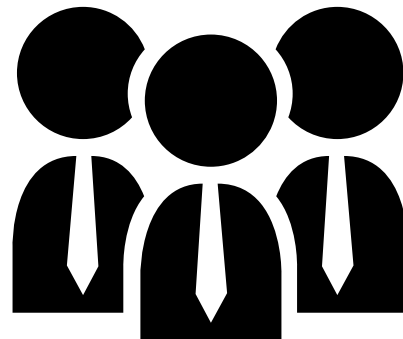
Participants in reviews **must**:

- Have the appropriate level of knowledge, both technical and procedural
- Be thorough and pay attention to details
- Have clarity and the use of a correct prioritization
- Understand their roles and responsibilities in the review process
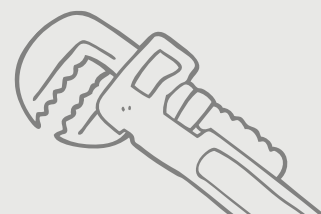
Review planning should address:

- The risks associated with technical factors, organizational factors and people issues
- The availability of reviewers with sufficient technical knowledge
- Ensure that each team is committed to the success of the review process
- Ensure that each organization is allocating sufficient time for required reviewers to prepare for and participate in the reviews
- Time allocation for required technical or process training for the reviewers
- Backup reviewers should be identified in case key reviewers become unavailable due to changes in personal or business plans

During execution, a **review Leader must** ensure:

- Adequate measurements are provided by the participants in the reviews to allow evaluation of review efficiency
- Checklists are created, and maintained to improve future reviews
- Defect severity and priority evaluation are defined for use in defect management of issues found during reviews

After each review, the **review Leader should**:

- Collect the review metrics and ensure that the issues identified are sufficiently resolved to meet the specific test objectives for the review
- Use the review metrics as input when determining the return on investment (ROI) for reviews
- Provide feedback information to the relevant stakeholders
- Provide feedback to review participants

A **reviews effectiveness** is evaluated by comparing results from the review with the actual results found in subsequent testing.
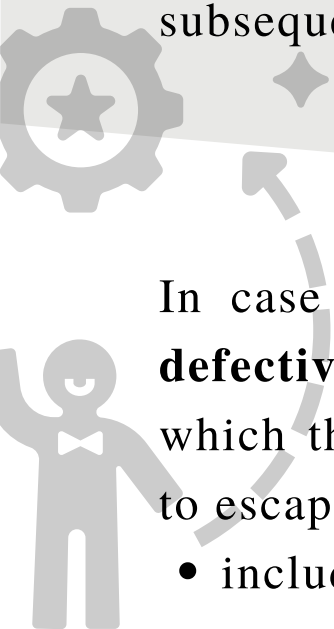
In case a **work product is reviewed, but later found defective**, then the review leader should consider ways in which the review process might have allowed the defects to escape. Some **likely causes:**

- include problems with the review process (like poor entry or exit criteria
- improper composition of the review team
- inadequate review tools (checklists)
- insufficient reviewer training and experience
- too little preparation and review meeting time

It is possible that reviews lose their effectiveness over time and this can be noticed in project retrospectives. In such cases, the review leader should investigate the cause.

If a pattern of escaped defects is consistent across projects this is another indicator that there are significant problems with the review process which have to be assessed and addressed.

By using metrics we **must focs on the review process** and never use them to punish or reward individuals.

Managing formal reviews

The **review leaders** need to ensure that all steps in the review process are followed.

Planning
- Define the:
  - scope of the review
  - what documents or parts to review
  - the quality characteristics to be evaluated
- Estimate effort and time frame
- Identify review characteristics such as the:
  - review type with roles
  - activities
  - checklists

- Select the people to participate in the review and allocating roles
- Define the entry and exit criteria
- Check that entry criteria are met

Initiate review
- Distribute the work product and other material, such as issue log forms, checklists, and related work products
- Explain the scope, objectives, process, roles, and work products to the participants
- Answer any questions that participants may have about the review

Individual review/preparation
- Review all or part of the work product
- Note potential defects, recommendations, and questions

Issue communication and analysis
- Communicate identified potential defects
- Analyze potential defects, assigning ownership and status to them
- Evaluate and document quality characteristics
- Evaluate the review findings against the exit criteria to make a review decision like:
  - reject
  - major changes needed
  - accept
  - possibly with minor changes

Fixing and reporting
- Create defect reports for those findings that require changes
- Fix defects found in the work product reviewed
- Communicate defects to the appropriate person or team
- Record updated status of defects, potentially including the agreement of the comment originator
- Gather metrics
- Checking that exit criteria are met
- Accepting the work product when the exit criteria are reached

Formal reviews have a number of characteristics:
- Defined entry and exit criteria
- Checklists to be used by the reviewers
- Deliverables such as reports, evaluation sheets or other review summary sheets
- Metrics for reporting on the review effectiveness, efficiency, and progress

Prior to initiating a formal review, fulfillment of the review prerequisites should be confirmed by the review leader.

If the prerequisite conditions for the formal review are not fulfilled, the **review leader** **may** propose:
- Redefinition of the review with revised objectives
- Corrective actions necessary for the review to proceed
- Postponement of the review

As part of controlling a formal review, these reviews are monitored in the context of the overall (higher level) program, and are associated with project quality assurance activities.

Control of formal reviews includes feedback information using product and process metrics.
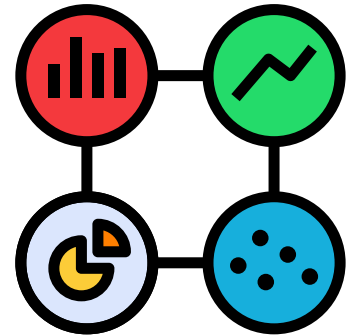
Metrics for reviews

Review leaders (may be **Test Managers**) must ensure that metrics are available to evaluate the:

- quality of the reviewed item
- cost of conducting the review
- downstream benefit of having conducted the review

For each **work product** reviewed the following can be measured:

- Work-product size (pages, lines of code,etc.)
- Preparation time (prior to the review)
- Time to conduct the review
- Rework time to fix defects
- Duration of the review process
- Number of defects found and their severity
- Identification of defect clusters within the work product (areas that have a higher defect density)

- Type of review (informal review, walkthrough, technical review or inspection)
- Average defect density (defects per page or per thousand lines of code)
- Estimated residual defects (or residual defect density)

Besides the previous metrics, the following ones can be measured and reported for **process evaluation**:

- Defect detection effectiveness (taking into account defects found later in the lifecycle)
- Improvement of review process effort and timing
- Percent coverage of planned work products
- Types of defects found and their severity
- Participant surveys about effectiveness and efficiency of the review process
- Cost of quality metrics for review defects versus dynamic test defects and production defects
- Correlation of review effectiveness (review type versus defect detection effectiveness)
- Number of reviewers
- Defects found per work-hour expended
- Estimated project time saved
- Average defect effort (i.e., the total detection and fix time divided by the number of defects)

Glossary

Each of the terms specified below are defined as per the ISTQB® Glossary which is displayed online at:

https://glossary.istqb.org/en/search/

review

A type of static testing during which a work product or process is evaluated by one or more individuals to detect issues and to provide improvements.

reviewer

A participant in a review, who identifies issues in the work product.

informal review

A type of review without a formal (documented) procedure.

moderator

A neutral person who conducts a usability test session.

walkthrough

A type of review in which an author leads members of the review through a work product and the members ask questions and make comments about possible issues.

audit

An independent examination of a work product, process, or set of processes that is performed by a third party to assess compliance with specifications, standards, contractual agreements, or other criteria.

inspection

A type of formal review to identify issues in a work product, which provides measurement to improve the review process and the software development process.

management review

A systematic evaluation of software acquisition, supply, development, operation, or maintenance process, performed by or on behalf of management that monitors progress, determines the status of plans and schedules, confirms requirements and their system allocation, or evaluates the effectiveness of management approaches to achieve fitness for purpose.

technical review

A formal review type by a team of technically-qualified personnel that examines the suitability of a work product for its intended use and identifies discrepancies from specifications and standards.

formal reviews

A type of review that follows a defined process with a formally documented output.

Exercises

ASTQB   ISTQB

ISTQB® Foundation 2011: 14, 15
ISTQB® Foundation 2018 Exam A: 14, 15, 16, 17, 18
ISTQB® Foundation 2018 Exam B: 14, 15, 16, 17, 18
ISTQB® Foundation 2018 Exam C: 14, 15, 16, 17

ASTQB® Foundation Exam 1: 14, 15, 16, 17, 18
ASTQB® Foundation Exam 2: 14, 15, 16, 17, 18

ISTQB® Advanced Test Manager: 31, 32, 33, 34, 35

ASTQB® Advanced Test Manager: 40, 41, 42, 43, 44, 45