Software Testing

Lesson 2
Basic Test Process
V1.0

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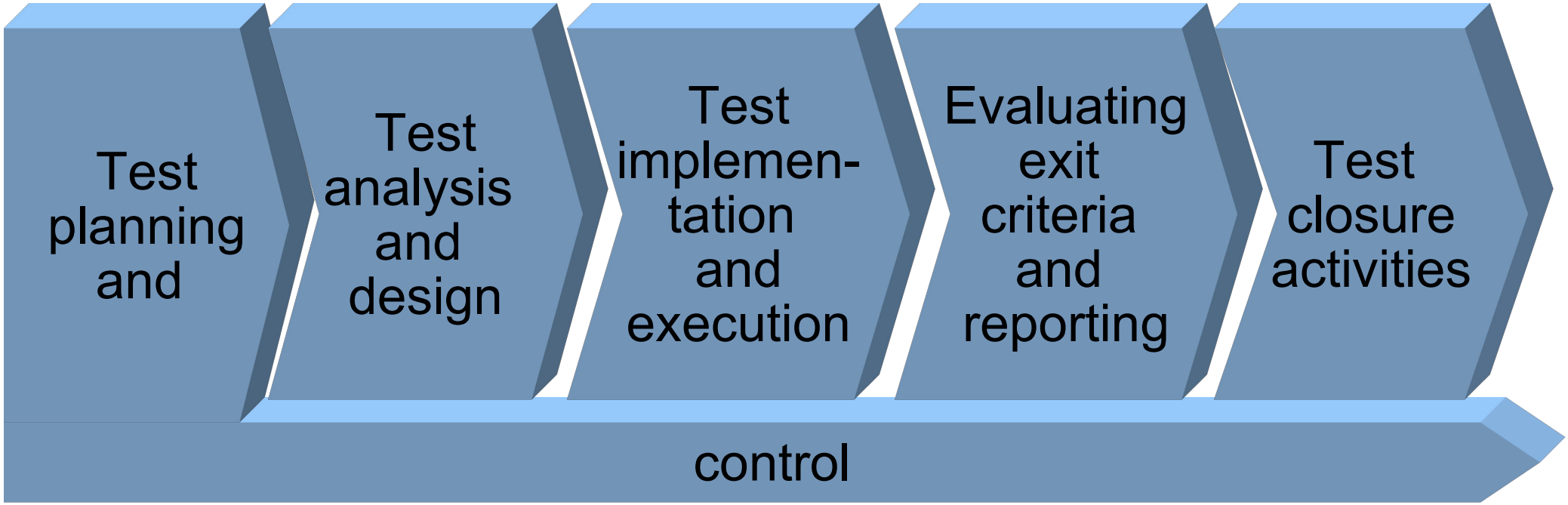
Fundamental Test Process

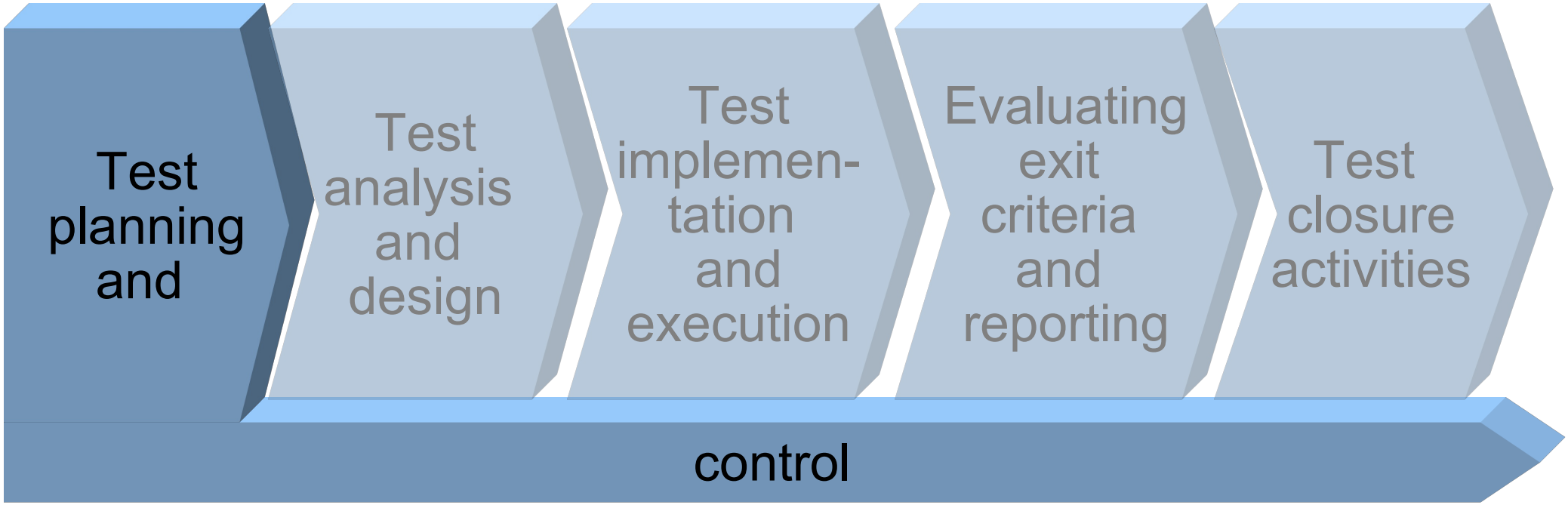
- Testing is more than test execution!
- To be considered
  - Testing has to be planned
  - Testing hat to be prepared, like
    - Preparation of test environment
    - Design of test cases
    - Design of test data
  - Test execution has to be prepared
  - Results have to be evaluated

Fundamental Test Process



- Process activities may overlap
- Tailoring required – depending on context

Fundamental Test Process
Test planning and control



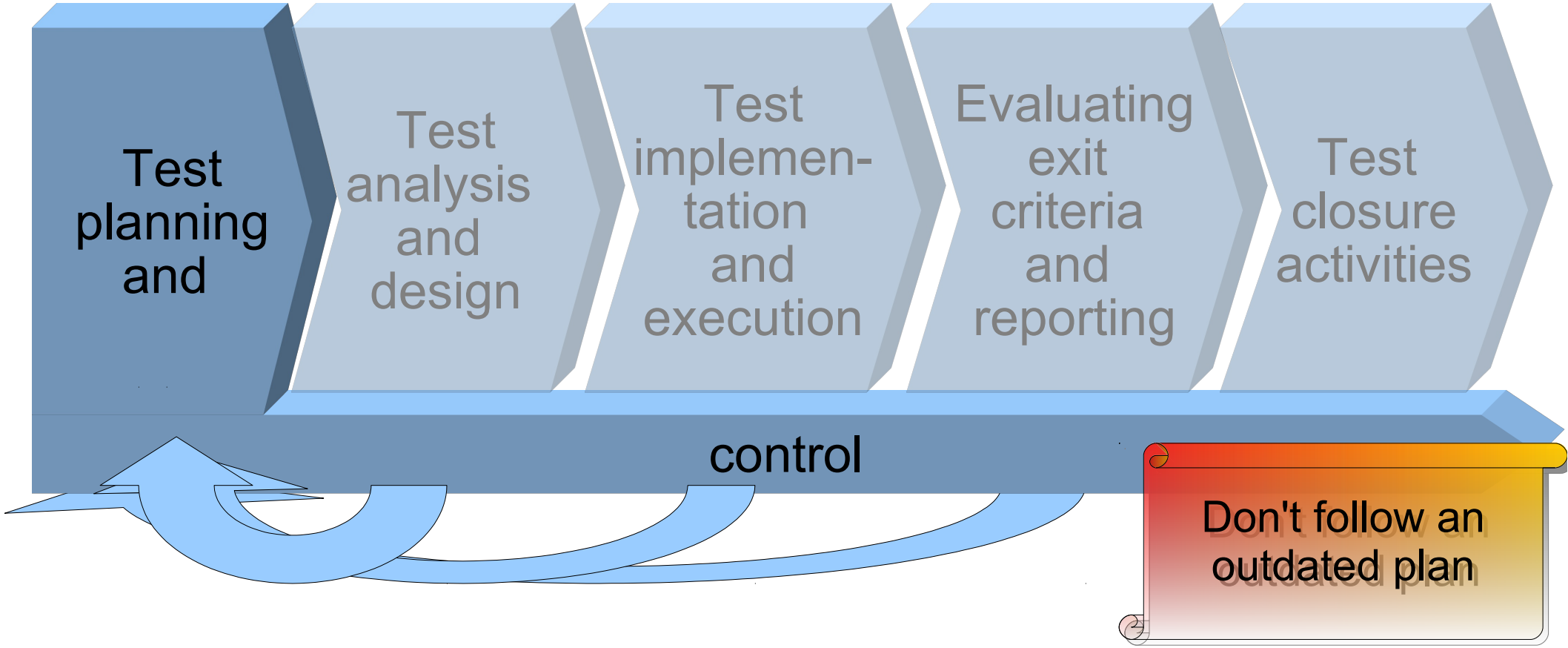
Fundamental Test Process
Test planning and control

- Test planning
  To meet the objectives and mission:
  - Defining the objectives of testing
  - Specification of test activities

Fundamental Test Process
Test planning and control

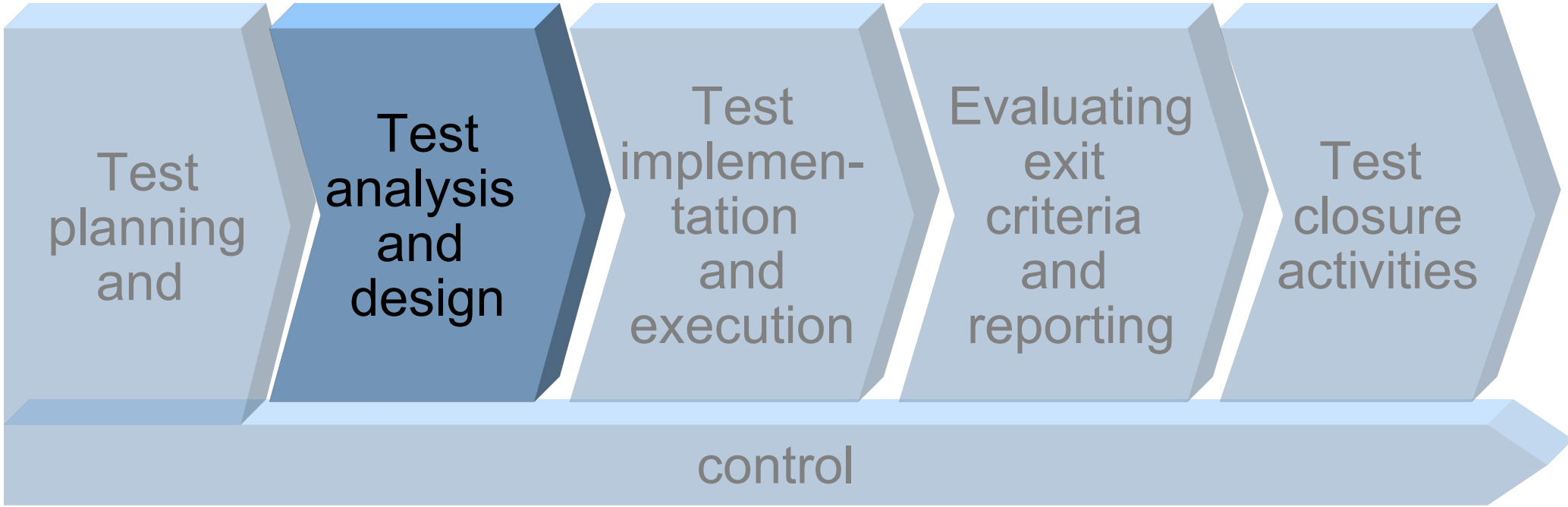
- Test control is the ongoing activity of
  - comparing actual progress against the plan,
  - reporting the status, including deviations from the plan.
- It involves taking actions necessary to meet the mission and objectives of the project.
- In order to control testing, the testing activities should be monitored throughout the project.

Fundamental Test Process
Test planning and control



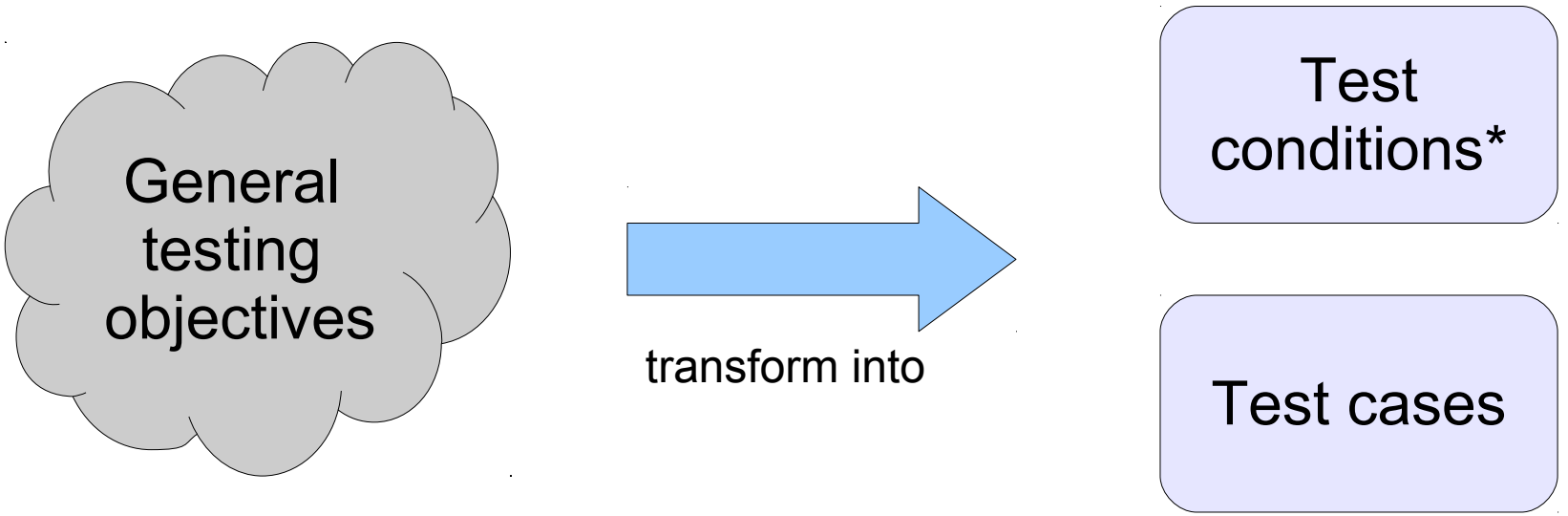
Test planning takes into account the feedback from monitoring and control activities.

Fundamental Test Process
Test analysis and design



Fundamental Test Process
Test analysis and design

- Test analysis and design
  Main activity:



* Test condition = An item or event of a component or system that could be verified by one or more test cases, e. g. a function, transaction, feature, quality attribute, or structural element [ISTQB-GWP12].

Fundamental Test Process
Test analysis and design

Major tasks (1/3):

- Reviewing the test basis, e. g.
  - requirements,
  - software integrity level (risk level)
    => Compliance of software characteristics defined by stakeholder
  - risk analysis reports,
  - architecture,
  - design,
  - interface specifications

Fundamental Test Process
Test analysis and design

Major tasks (2/3):

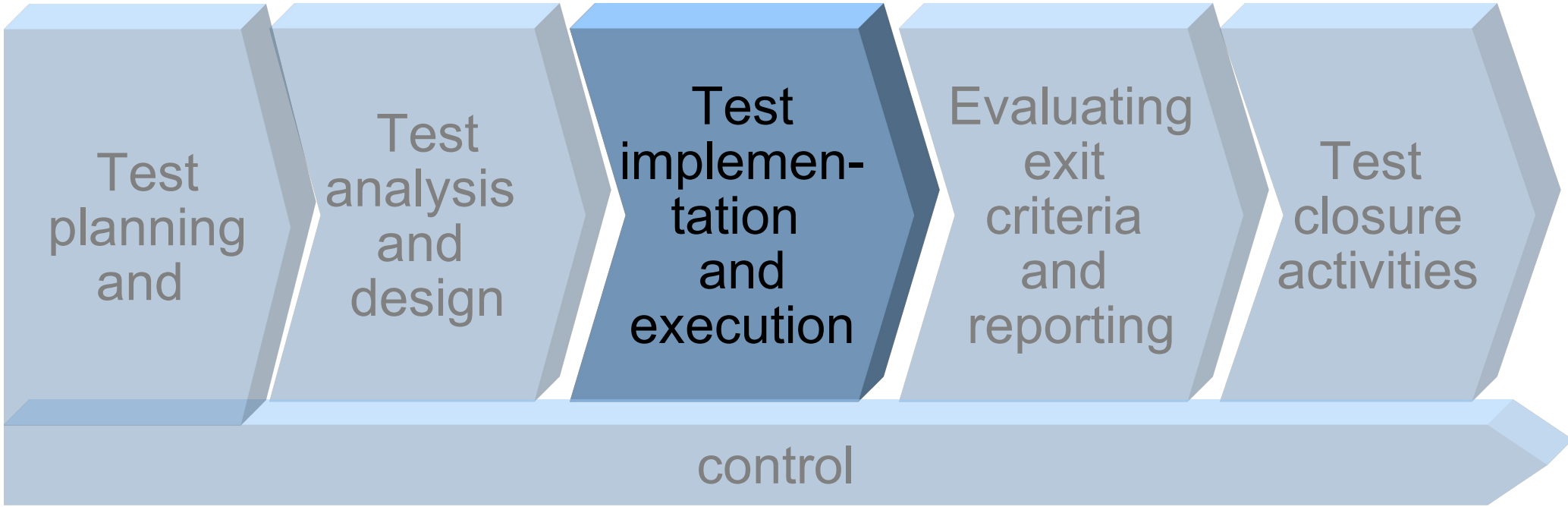
- Evaluating testability of the test basis and test objects
- Identifying and prioritizing test conditions based on analysis of
  - test items,
  - the specification,
  - behavior of the software,
  - structure of the software.

Fundamental Test Process
Test analysis and design

Major tasks (3/3):

- Designing and prioritizing high level test cases.
- Identifying necessary test data to support the test conditions and test cases.
- Designing the test environment setup and identifying any required infrastructure and tools.
- Creating bi-directional traceability between test basis and test cases.

Fundamental Test Process
Test implementation and execution



Fundamental Test Process
Test implementation and execution

- Test implementation and execution is the activity where
  - test procedures or scripts are specified
    - by combining the test cases in a particular order
    - including any other information needed for test execution
  - the environment is set up, and
  - the tests are run.

Fundamental Test Process
Test implementation and execution

Major tasks (1/5):

- Finalizing, implementing and prioritizing test cases (including the identification of test data).
- Developing and prioritizing test procedures,
- Creating test data
- *Optionally*
  - Preparing test harnesses*
  - Writing automated test scripts.

* Test harness: A test environment comprised of stubs (*stub = A skeletal or special-purpose implementation of a software component*) and drivers (*driver = A software component or test tool that replaces a component that takes care of the control and/or the calling of a component or system)* needed to execute a test. [ISTQB-GWP12].

Fundamental Test Process
Test implementation and execution

Major tasks (2/5):

- Creating test suites from the test procedures for efficient test execution.
- Verifying and updating bi-directional traceability between the test basis and test cases.

Fundamental Test Process
Test implementation and execution

Major tasks (3/5):

- Executing test procedures
  - manually or
  - by using test execution tools.
- Logging the outcome of test execution and recording the identities and versions of the software under test, test tools and testware*

* Artifacts produced during the test process required to plan, design, and execute tests, such as documentation, scripts, inputs, expected results, set-up and clear-up procedures, files, databases, environment, and any additional software or utilities used in testing. [After Fewster and Graham] [ISTQB-GWP12].

Fundamental Test Process
Test implementation and execution

Major tasks (4/5):

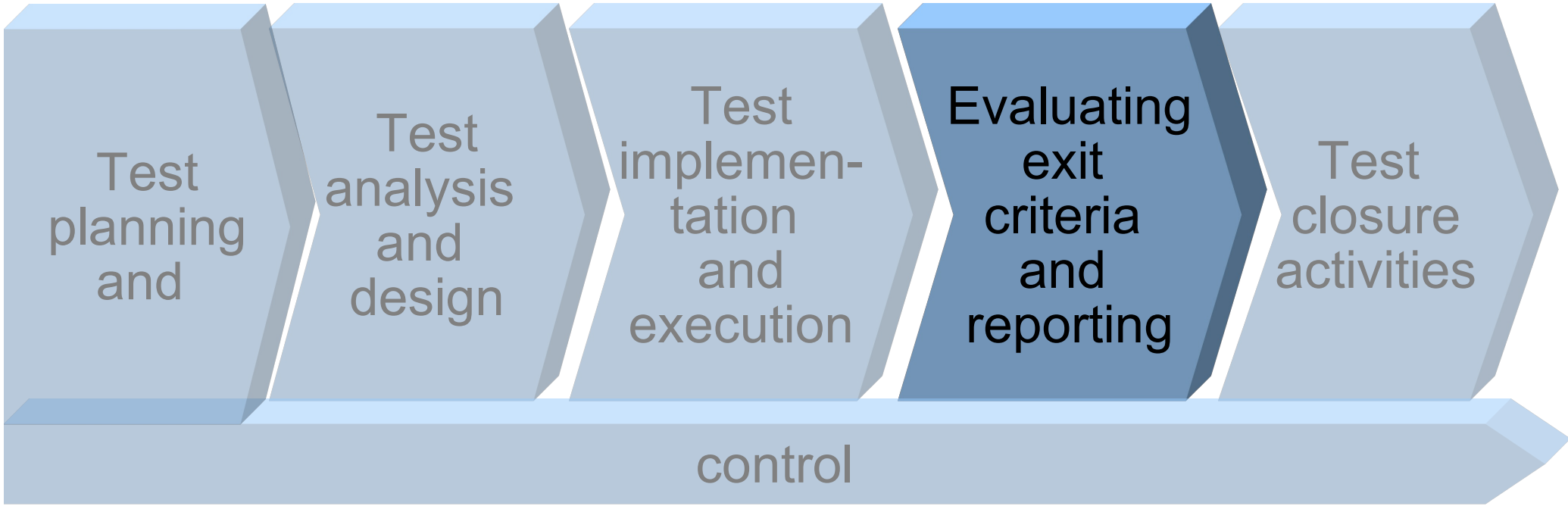
- Comparing actual results with expected results.
- Reporting discrepancies as incidents and analyzing them in order to establish their cause. Possible causes are e. g.
  - wrong requirements,
  - a defect in the code,
  - a defects in specified test data,
  - a defect in the test document, or
  - mistake in the way the test was executed

Fundamental Test Process
Test implementation and execution

Major tasks (5/5):

- Repeating test activities as a result of action taken for each discrepancy, for example,
  - re-execution of a test that previously failed in order to confirm a fix (confirmation testing),
  - execution of a corrected test,
  - execution of regression tests to ensure
    - there are no side effects (defects have not been introduced in unchanged areas of the software).
    - that defect fixing did not uncover other defects.

Fundamental Test Process
Evaluating exit criteria and reporting



Fundamental Test Process
Evaluating exit criteria and reporting

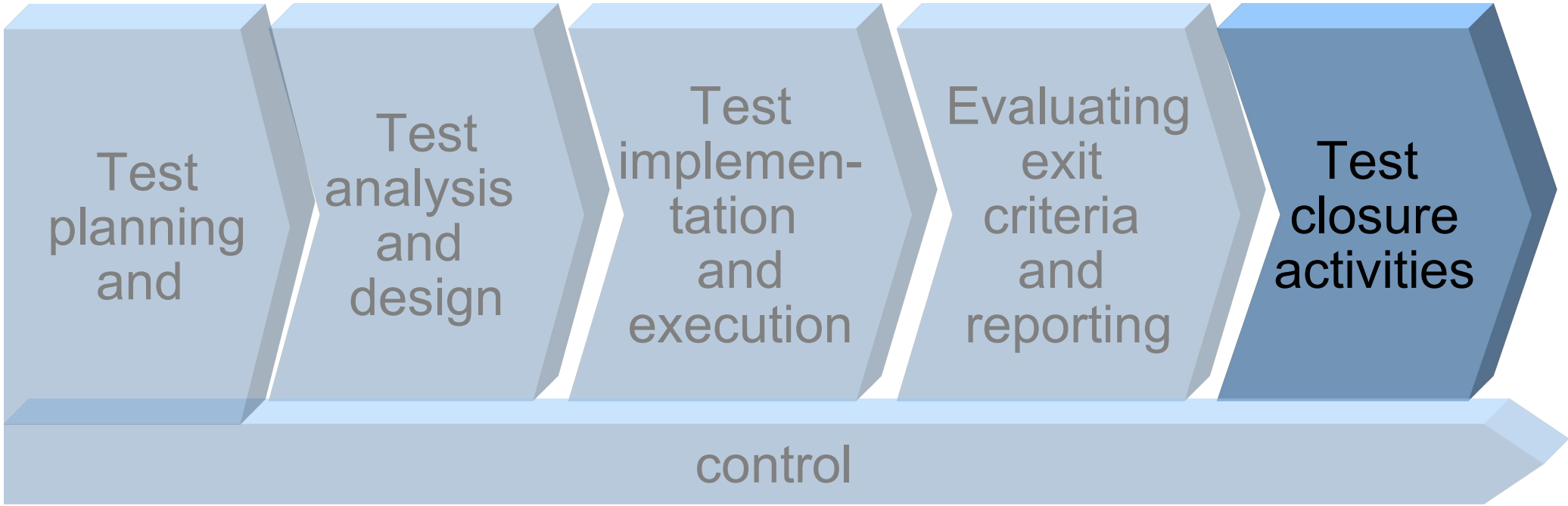
- Evaluating exit criteria:
  Assessing test execution against the defined objectives.
- This should be done for each test level.
  Examples of test levels are
  - component test,
  - integration test,
  - system test, and
  - acceptance test.

Fundamental Test Process
Evaluating exit criteria and reporting

Major tasks:

- Checking test logs against the exit criteria specified in test planning.
- Assessing if
  - more tests are needed or
  - the exit criteria specified should be changed.
- Writing a test summary report for stakeholders.

Fundamental Test Process
Test closure activities



Fundamental Test Process
Test closure activities

- Test closure activities collect data from completed test activities to consolidate experience, testware, facts and numbers.
- Test closure activities occur at project milestones such as when
  - a software system is released,
  - a test project is completed (or canceled),
  - a milestone has been achieved, or
  - a maintenance release has been completed.

Fundamental Test Process
Test closure activities

Major tasks (1/2):

- Checking which planned deliverables have been delivered
- Closing incident reports or raising change records for any that remain open
- Documenting the acceptance of the system
- Finalizing and archiving for later reuse
  - testware,
  - the test environment, and
  - the test infrastructure.

Fundamental Test Process
Test closure activities

Major tasks (2/2):

- Handing over the testware to the maintenance organization
- Analyzing lessons learned to determine changes needed for future releases and projects
- Using the information gathered to improve test maturity

The Psychology of Testing

Background (1/2)

- Errare humanum est
  … who admits?
- Development = constructive
  Testing = ?
- Is it good for a developer to test his own program?
  What do you think?

The Psychology of Testing

Background (2/2)

- The mindset to be used while developing software is different from that used while testing and reviewing.
- With the right mindset:
  Developers are able to test their own code.
- Separation of testing responsibility to a tester:
  Help to focus effort and provide an independent view.
- Independent testing may be carried out at any level of testing.

The Psychology of Testing Degree of independence

- A certain degree of independence (avoiding the author bias) often makes the tester more effective at finding defects and failures.
- Independence is not a replacement for familiarity.
- Developers can efficiently find many defects in their own code.

The Psychology of Testing Degree of independence

- Developer testing
  - Is familiar with test object
  - Blind against own errors
- Independent test team testing
  - Needs familiarization with topic
  - Impartial
  - Test know how

Idea: Balanced distribution of testing

The Psychology of Testing
Degree of independence

- Tests designed by the person who wrote the software under test
- Tests designed by another person (e. g., from the development team)
- Tests designed by people from a different organizational group or test specialists (e. g., an independent test team; performance test specialists)
- Tests designed by people from a different organization or company (i. e., outsourcing or certification by an external body)

The Psychology of Testing Communication

- Tester:

  "Hey Fred. Here's a fault report AR123. Look at this code. Who wrote this? Was it you? Why, you couldn't program your way out of a paper bag. We really want this fixed by 5 o'clock or else."

- Fred's reply ?

Source: [STG14]

The Psychology of Testing Communication

- Communication problems may occur, particularly if testers are seen only as messengers of unwanted news about defects.
- However, there are several ways to improve communication and relationships between testers and others ...

The Psychology of Testing Communication

- Start with collaboration rather than battles.
  Common goal of everyone: Better quality systems
- Communicate findings on the product in a neutral, fact-focused way, e. g. reproducible defect descriptions
- Write objective and factual incident reports and review findings.
- Do not criticize the person who created it.
- Try to understand how the other person feels and why they react as they do.
- Confirm that the other person has understood what you have said and vice versa.

Code of Ethics

- Involvement in software testing enables individuals to learn confidential and privileged information.
- A code of ethics is necessary, among other reasons to ensure that the information is not put to inappropriate use.
- ISTQB states code of ethics recognizing the ACM and IEEE code of ethics for engineers.

Code of Ethics

- Certified software testers shall
  - act consistently with the public interest.
  - act in a manner that is in the best interests of their client and employer, consistent with the public interest.
  - ensure that the deliverables they provide (on the products and systems they test) meet the highest professional standards possible.
  - maintain integrity and independence in their professional judgment.

Code of Ethics

- Certified software testers shall
  - advance the integrity and reputation of the profession consistent with the public interest.
  - be fair to and supportive of their colleagues, and promote cooperation with software developers.
  - participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.
- Certified software test managers and leaders shall subscribe to and promote an ethical approach to the management of software testing.

Sources

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