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Course Outline

Chapter 1: Fundamentals of Testing

Chapter 2: Testing Throughout the Software Development Lifecycle

Chapter 3: Static Testing

Chapter 4: Test Techniques

Chapter 5: Test Management

Chapter 6: **Tool Support for Testing**

Course Outline

Chapter 6: <mark>Tool Support for Testing</mark>

No. of Session: 01
Session 14: 6 - 6.2.3

Chapter 6: Tool Support for Testing

Chapter 6: Tool Support for Testing

Chapter 6: Tool Support for Testing

There are a number of ways in which tools can be used to support testing activities:

❖ To start with the most visible use, we can use tools directly in testing. This includes test execution tools and test data preparation tools.

❖ We can use tools to help us manage the testing process. This includes tools that manage requirements, test cases, test procedures, automate test scripts, test results, test data and defects, as well as tools that assist with reporting and monitoring test execution progress.

Chapter 6: Tool Support for Testing

❖ We can use tools as part of exploration, investigation and evaluation. For example, we can use tools to monitor file activity for an application.

❖ We can use tools in a number of other ways, in the form of any tool that aids in testing. This would include spreadsheets when used to manage test assets or progress, or as a way to document manual or automated tests.

Chapter 6: Tool Support for Testing

<mark>Test Tool Classification /1</mark>

Main categories - based on the functionality

➢ Tool support for
management of testing and testware
➢ Tool support for static testing
➢ Tool support for
test design and specification
➢ Tool support for test execution and logging
➢ Tool support for performance
measurement and dynamic analysis
➢ Tool support for specialized testing needs
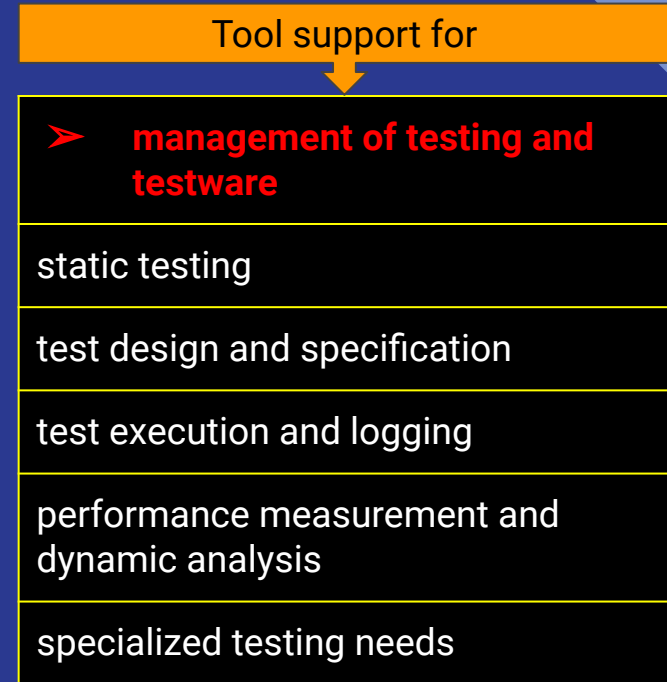
Tool support for
management of testing and testware
static testing
test design and specification
test execution and logging
performance measurement and dynamic analysis
specialized testing needs

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❏ Tool support for management of testing and testware
  ➢ Test management tools
  ➢ Requirements management tools
  ➢ Defect management tools
  ➢ Configuration management tools
  ➢ Continuous integration tools (D)

Tool support for
➢ **management of testing and testware**
static testing
test design and specification
test execution and logging
performance measurement and dynamic analysis
specialized testing needs

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❏ Tool support for static testing
  ➢ Tools that support reviews
  ➢ Static analysis tools (D)
❏ Tool support for test design and specification
  ➢ Test design tools
  ➢ Model-based testing tools
  ➢ Test data preparation tools
  ➢ Test-driven development (TDD) tools (D)
  ➢ Acceptance test-driven development (ATDD) and behaviour-driven development (BDD) tools

Tool support for
management of testing and testware
➢ **static testing**
➢ **test design and specification**
test execution and logging
performance measurement and dynamic analysis
specialized testing needs

Chapter 6: Tool Support for Testing
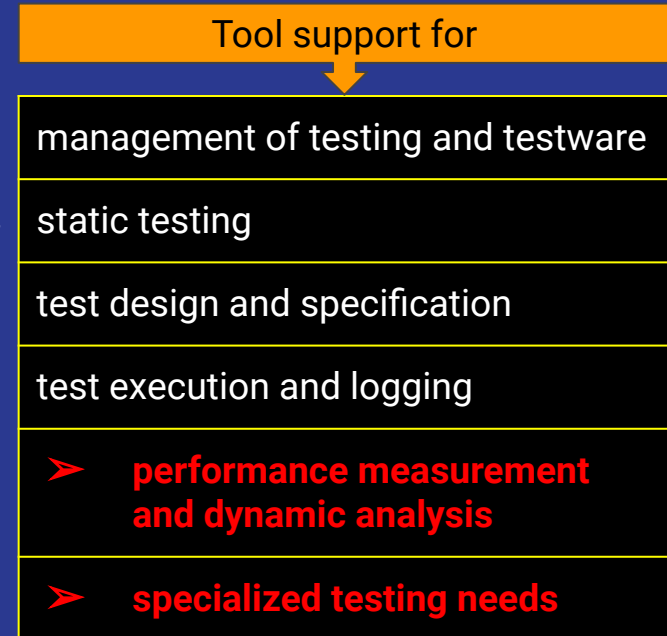
Test Tool Classification /4

❑ Tool support for test execution and logging
  ➢ Test execution tools
  ➢ Coverage tools
      ➔ Requirements coverage
      ➔ Code coverage (D)
  ➢ Test harnesses (D)
  ➢ Unit test framework tools (D)

Tool support for
management of testing and testware
static testing
test design and specification
➢ **test execution and logging**
performance measurement and dynamic analysis
specialized testing needs

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- ❏ Tool support for performance measurement and dynamic analysis
    - ➢ Performance testing tools
    - ➢ Monitoring tools
    - ➢ Dynamic analysis tools (D)
- ❏ Tool support for specialized testing needs
    - ➢ Data quality assessment
    - ➢ Data conversion and migration
    - ➢ Usability testing
    - ➢ Accessibility testing

Tool support for
management of testing and testware
static testing
test design and specification
test execution and logging
➢ performance measurement and dynamic analysis
➢ specialized testing needs

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❏ Tool support for specialized testing needs (continued)

➢ Localization testing
➢ Security testing
➢ Portability testing

Tool support for
management of testing and testware
static testing
test design and specification
test execution and logging
performance measurement and dynamic analysis
➢ **specialized testing needs**

Chapter 6: Tool Support for Testing

<mark>Benefits and Risks of Test Automation /1</mark>

Benefits:
There are many benefits that can be gained by using tools to support testing, whatever the specific type of tool. Benefits include:

- ❏ Reduction in repetitive manual work.
- ❏ Greater consistency and repeatability.
- ❏ More objective assessment.
- ❏ Easier access to information about tests or testing.

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Risks:
There are many risks that are present when tool support for testing is introduced and used, whatever the specific type of tool. Risks include:

- ❏ Unrealistic expectations for the tool.
- ❏ Underestimating the time, cost and effort for the initial introduction of a tool.

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Risks (continued):

- ❏ Underestimating the time and effort needed to achieve significant and continuing benefits from the tool.
- ❏ Underestimating the effort required to maintain the test assets generated by the tool.
- ❏ Over-reliance on the tool.

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==Special Considerations for== Test Execution ==and== Test Management

Test execution tools /1

There are different levels of scripting. Five are described in [Fewster and Graham, 1999]:

➔ Linear scripts, which could be created manually or captured by recording a manual test.
➔ Structured scripts, using selection and iteration programming structures.

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Special Considerations for Test Execution and Test Management

Test execution tools /2

➜ Shared scripts, where a script can be called by other scripts so can be reused: shared scripts also require a formal script library under configuration management.

➜ Data-driven scripts, where test data is in a file or spreadsheet to be read by a control script.

➜ Keyword-driven scripts, where all of the information about the test is stored in a file or spreadsheet, with a single control script that implements the tests described in the file using shared and keyword scripts.

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Special Considerations for Test Execution and Test Management

Test management tools
Test management tools need to interface with other tools (including spreadsheets for example) for various reasons, including:
➔ To produce useful information in a format that fits the needs of the organization.
➔ To maintain consistent traceability to requirements in a requirements management tool.
➔ To link with test object version information in the configuration management tool.

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❏ **Effective Use of Tools**
   ⇛ Main principles for tool selection
   ⇛ Pilot project
   ⇛ Success factors for tools

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==Effective Use of Tools==: Main Principles for Tool Selection /1
The following factors are important in selecting a tool:

- Assessment of the organization's maturity (e.g. readiness for change).
- Identification of the areas within the organization where tool support will help to improve testing processes.
- Understanding the technologies used by the test object(s), so that a tool will be selected that is compatible with those technologies.
- Knowledge of any build and continuous integration tools already being used within the organization, to make sure that the new tool(s) will integrate with them and be compatible.

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Effective Use of Tools: Main Principles for Tool Selection /2

- Evaluation of tools against clear requirements and objective criteria.
- Consideration of any free trial period for the tool (for commercial tools) to ensure that this gives adequate time to evaluate the tool.
- Evaluation of the vendor (including training, support and other commercial aspects) or support for non-commercial tools (open source).
- Identification of internal requirements for coaching and mentoring in the use of the tool.

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Effective Use of Tools: Main Principles for Tool Selection /3

- Evaluation of training needs for those who will use the tools directly and indirectly (for example without technical detail), taking into account testing skills and test automation skills (for those working directly with the tools).
- Consideration of pros and cons of different licencing models (for example commercial or open source).
- Estimation of a cost-benefit ratio based on a concrete and realistic business case (if required).

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==Effective Use of Tools==: Pilot Projects for Introducing a Tool into an Organization /1

The objectives for a pilot project for a new tool are:

- To learn more about the tool
  - ➔ more detail
  - ➔ more depth
- To see how the tool would fit with existing processes or documentation, how those would need to change to work well with the tool and how to use the tool to streamline existing processes.
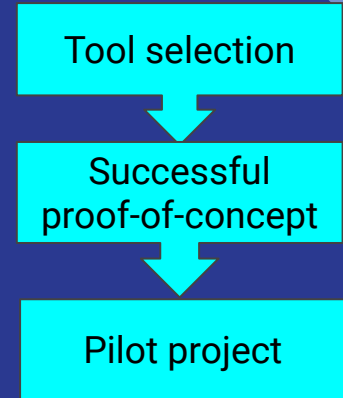
Tool selection

⬇

Successful proof-of-concept

⬇

Pilot project

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==Effective Use of Tools==: Pilot Projects for Introducing a Tool into an Organization /2

- To decide on standard ways of using the tool that will work for all potential users (e.g. naming conventions, creation of libraries, defining modularity, where different elements will be stored, how they and the tool itself will be maintained).
- To evaluate the pilot project against its objectives (have the benefits been achieved at reasonable cost?)

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<mark>Effective Use of Tools</mark>: Pilot Projects for Introducing a Tool into an Organization /3

- To understand (and experiment with) metrics that you want the tool(s) to collect and to report, and configuring the tool(s) to ensure that your goals for these metrics can be achieved.

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Effective Use of Tools: Success Factors for Tools /1

Here are some of the factors that have contributed to success:
➢ incremental roll-out (after the pilot) to the rest of the organization.
➢ adapting and improving processes, testware and tool artefacts to get the best fit and balance between them and the use of the tool.
➢ providing adequate training, coaching and mentoring of new users.

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Effective Use of Tools: Success Factors for Tools /2

- ➢ defining and communicating guidelines for the use of the tool, based on what was learned in the pilot.
- ➢ implementing a continuous improvement mechanism as tool use spreads through more of the organization.
- ➢ monitoring the use of the tool and the benefits achieved and adapting the use of the tool to take account of what is learned.